OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: October, 2021

DFI No. D01404

Figure 1: DFI No. D01404, looking south

Identification

Drainage Facility ID (DFI):	D01404
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 55V-014
Location:	District: 01
	Highway No.: 009
	Mile Post: 26.68 to 26.70, 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: Roadway shoulder

Flow direction: South

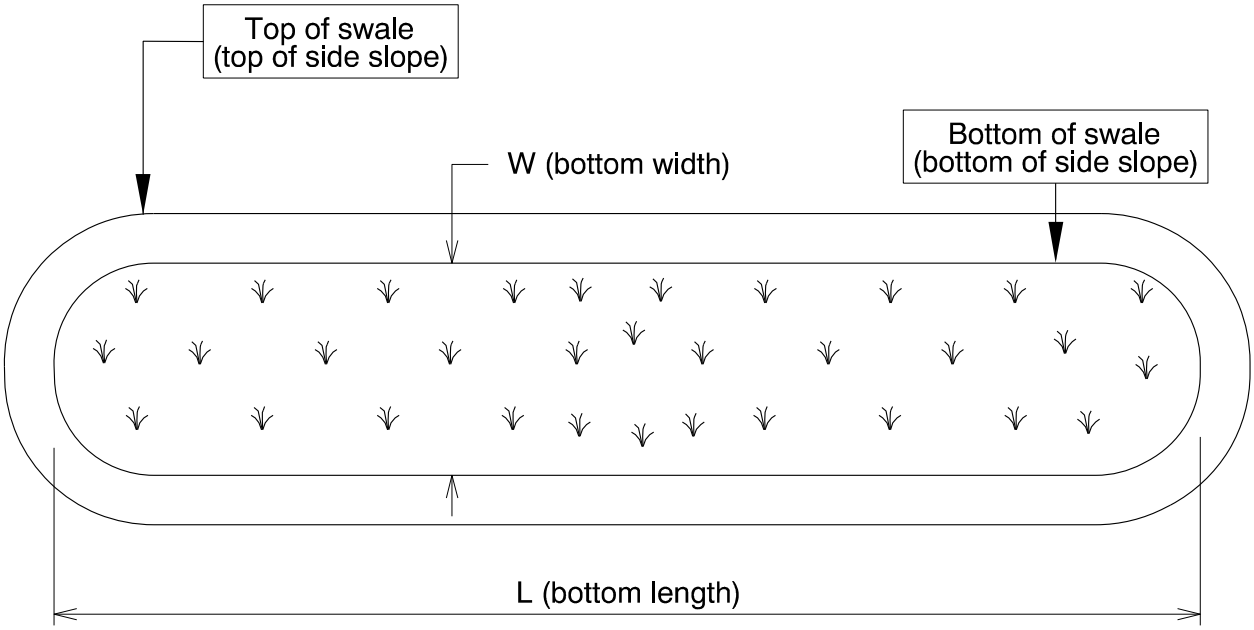
Figure 2: Facility location map

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:

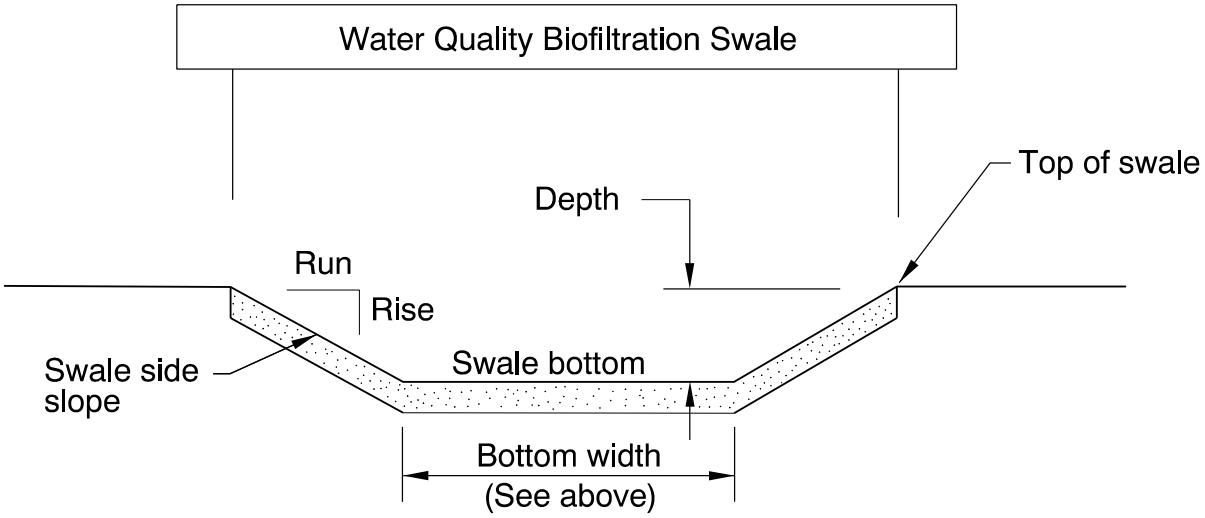
Bottom Length (feet)	Bottom Width (feet)
158	**4.75**



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	2



Site Specific Information: The swale has a blended compost and topsoil mixture. The swale bottom is grassed and has five riprap flow spreaders spaced 25 feet apart.

4. Facility Access

Maintenance access to the facility:

☐Roadside pad	☐Roadside shoulder
☒Access by foot	☐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**
Grouted Riprap	☒	**S11**
Plantings	☐	**S12**
Underground Components		
Geotextile fabric	☒	**S13**
Water quality mix	☒	**S14**
Water Proof Membrane	☒	**S15**
Porous pavers (access grid)	☐	**S16**
Flow Spreader		
Rock basin (used at inlet)	☐	**S17**
Riprap flow spreader (every 25 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

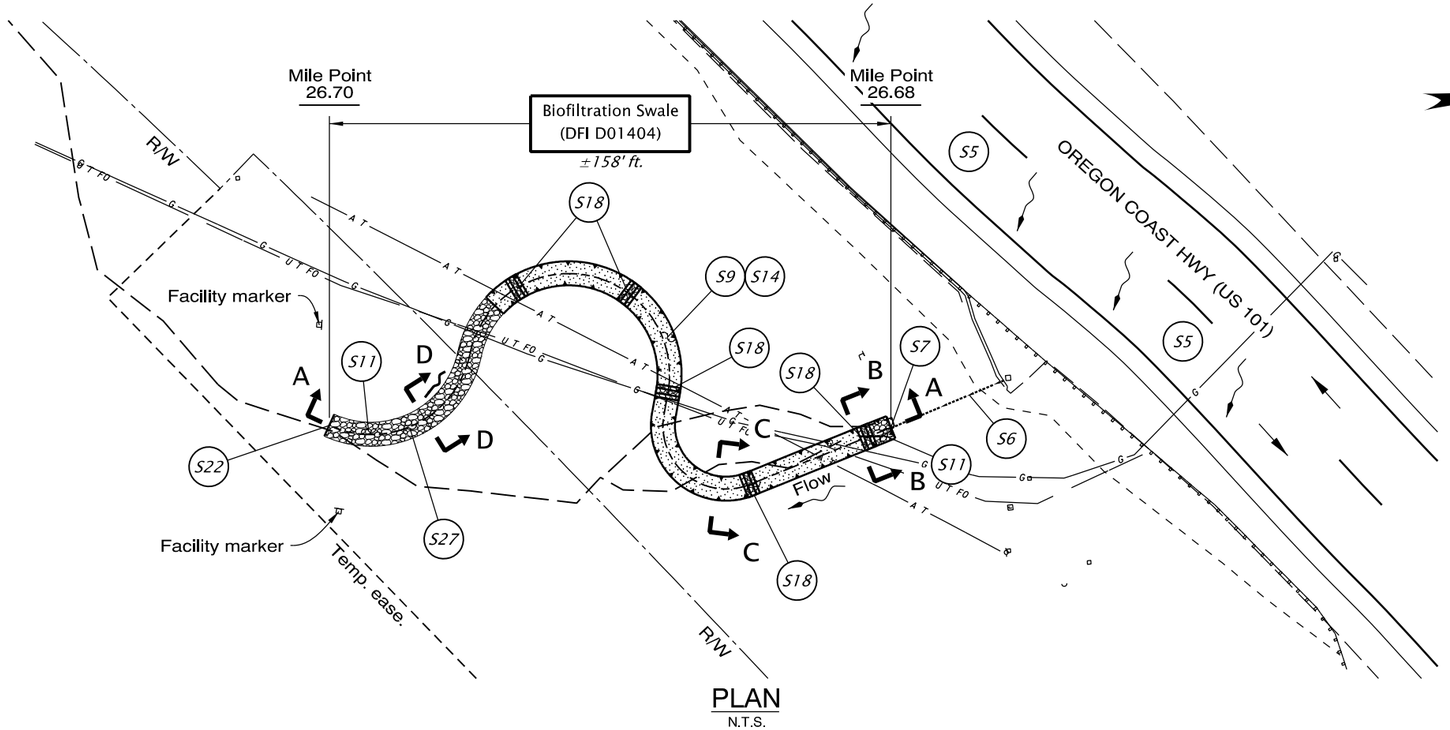
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT 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:

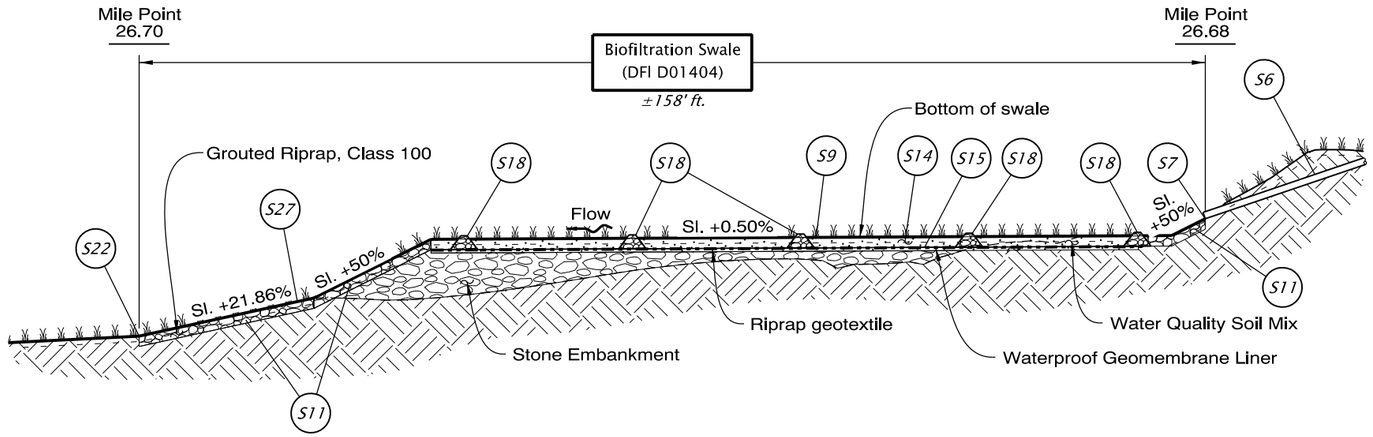
Operational Plan: DFI D01404



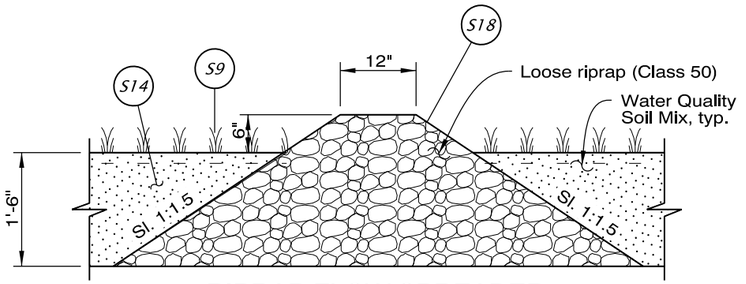
PLAN
N.T.S.

LEGEND:

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



SECTION A-A
N.T.S.



RIPRAP FLOW SPREADER
N.T.S.

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 1 of 2

Prepared By: Jason Stroud

Drafted By: Michael Skelton

DFI D01404
MAINTENANCE DISTRICT 1 HWY US101
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 26.68 - 26.70
CLATSOP COUNTY

H_K18733_SwOMP_03 :: D01404-1 6/8/2022 8:19:42 AM hwye93l

Rotation: 84.4826° Scale: 1"=20'

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

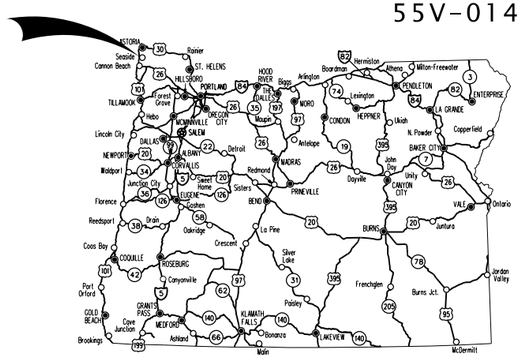
GRADING, DRAINAGE, PAVING, CURB RAMPS, SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

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

OREGON COAST HIGHWAY

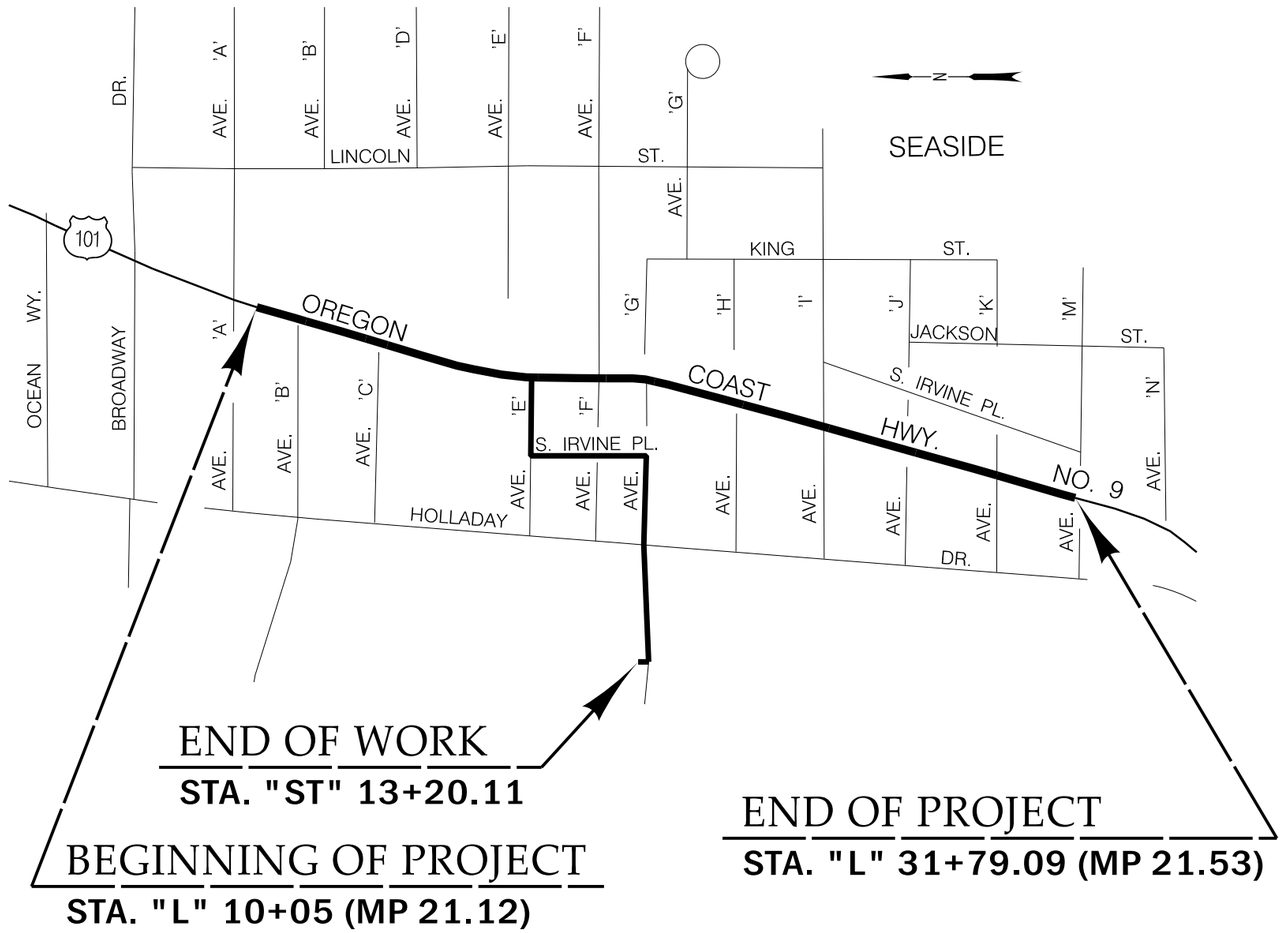
CLATSOP COUNTY

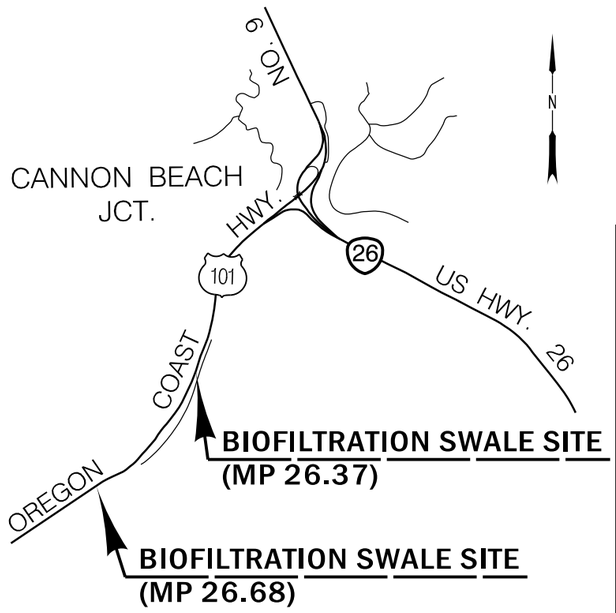
JULY 2022



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'

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ROADWAY DETAILS	
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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	
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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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FA01 Thru FA14 Incl.	Roadside Development Planting Plan
FA15	Roadside Development Schedules
EROSION CONTROL	
FB01	Erosion And Sediment Control Layout
FB02 Thru FB11 Incl.	Erosion & Sediment Control Plan
GEOTECHNICAL	
GB01	Tall Curb Plan And Elevation
GB02	Details
GB03 Thru GB05 Incl.	Tall Curb Plan And Elevation
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MA02	Existing utilities
MB01	Flashing Beacon Plan
MB02	Existing utilities
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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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- RD910 – Perpendicular Curb Ramp
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- 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

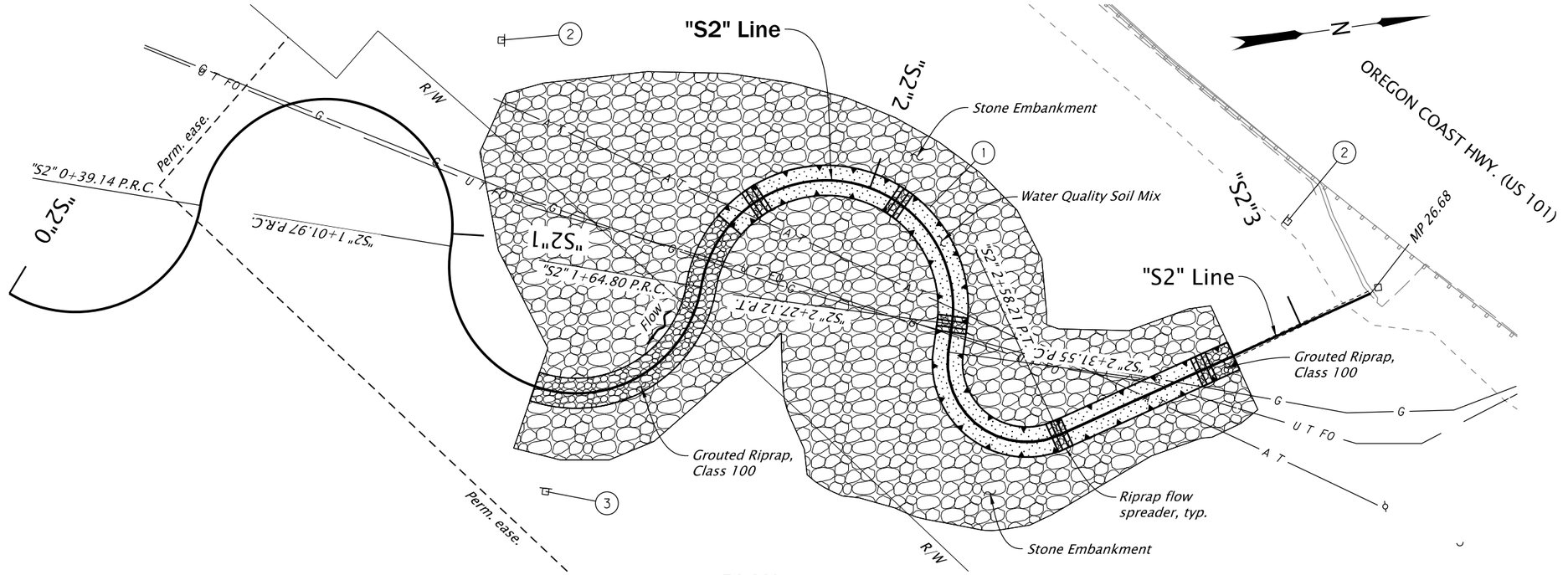
R/W Map RW9635M

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

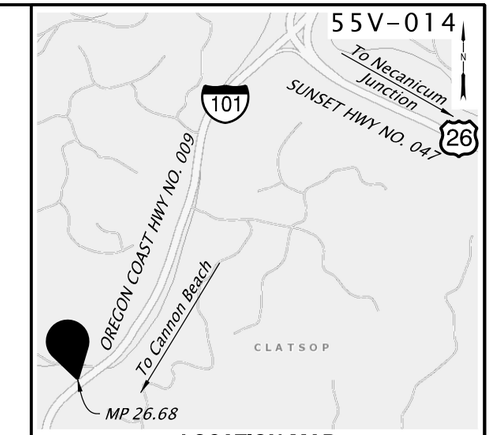
OREGON DEPARTMENT OF TRANSPORTATION

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'

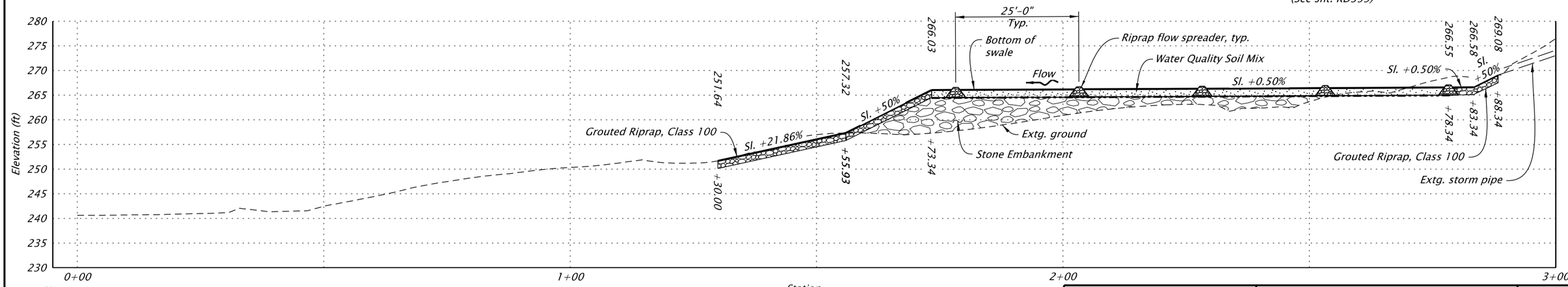


LOCATION MAP
SEC. 16, T5S, R10W, WM
LAT. 45.9211, LONG. -123.9358

(1) *Sta. "S2"1+30.00 to Sta. "S2"2+88.34*
Const. Water Quality Biofiltration Swale DFI No. D01404
General excavation – 40 cu. yd.
Water Quality Soil Mix – 91 cu. yd.
Stone Embankment – 575 cu. yd.
Grouted Riprap, Class 100 – 112 cu. yd.
Riprap Flow Spreader (Class 50) – 7 cu. yd.
¾" – 0" Aggregate – 40 cu. yds.

(2) *Inst. Type S1 marker – 1*
(See sht. RD399)

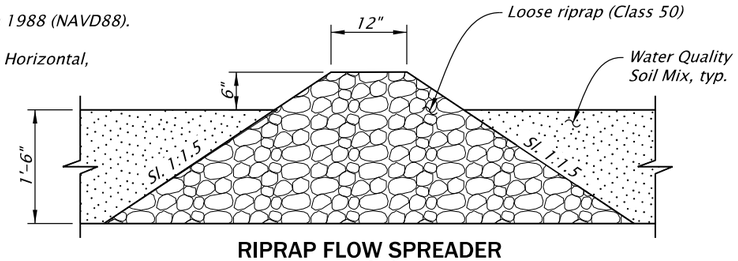
(3) *Inst. Type S2 marker – 1*
(See sht. RD399)



PROFILE "S2" LINE
HORIZ. SCALE: 1":20'
VERT. SCALE: 1":20'

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

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



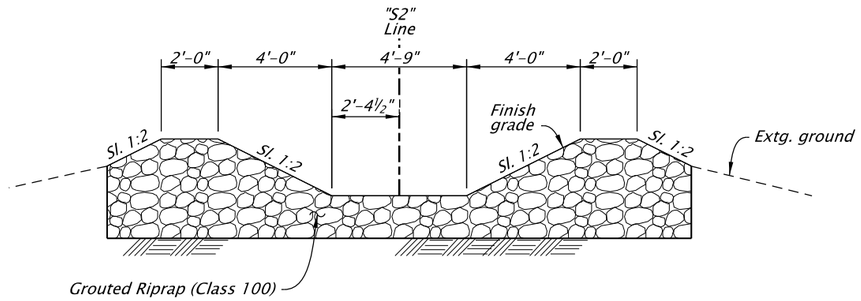
RIPRAP FLOW SPREADER
No Scale

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

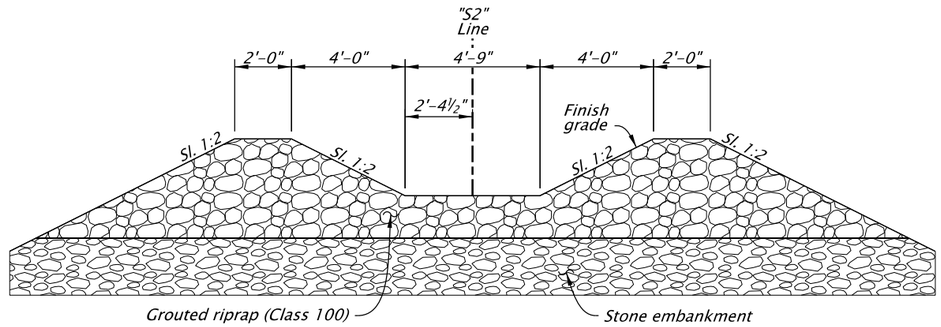
OREGON DEPARTMENT OF TRANSPORTATION

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

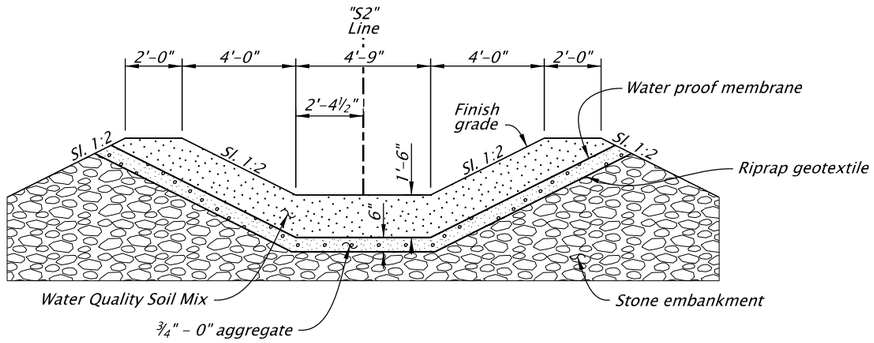
HWY: 009	
M.P.: 26.68	
UNIT FILE CODE	N/A
DFI/TSSU NO.	D01404
Designer: Aiman Mahmoud	Reviewer: Jason Stroud
Drafter: Michael Skelton	Checker: N/A
STORMWATER PLAN	SHEET NO. HA06



TYPICAL
STA. "S2"1+30.00 TO STA. "S2"1+55.93
STA. "S2"2+78.34 TO STA. "S2"2+88.34



TYPICAL
STA. "S2"1+55.93 TO STA. "S2"1+73.34



TYPICAL
STA. "S2"1+73.34 TO STA. "S2"2+78.34

Note:
Slopes are shown as Vertical to Horizontal.

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

HWY: 009	
M.P.: 26.68	
UNIT FILE CODE	N/A
DFI/TSSU NO.	D01404

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

STORMWATER PLAN — SHEET NO. HA07

Rotation: 0° Scale: 3/16"=1'-0"