OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: December 2021

DFI No. D01424

Figure 1: DFI No. D01424, looking [note cardinal direction]

Identification

Drainage Facility ID (DFI):	D01424
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 54V-102
Location:	District: 4
	Highway No.: 031
	Mile Post: 6.25 to 6.27, 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: Northeast

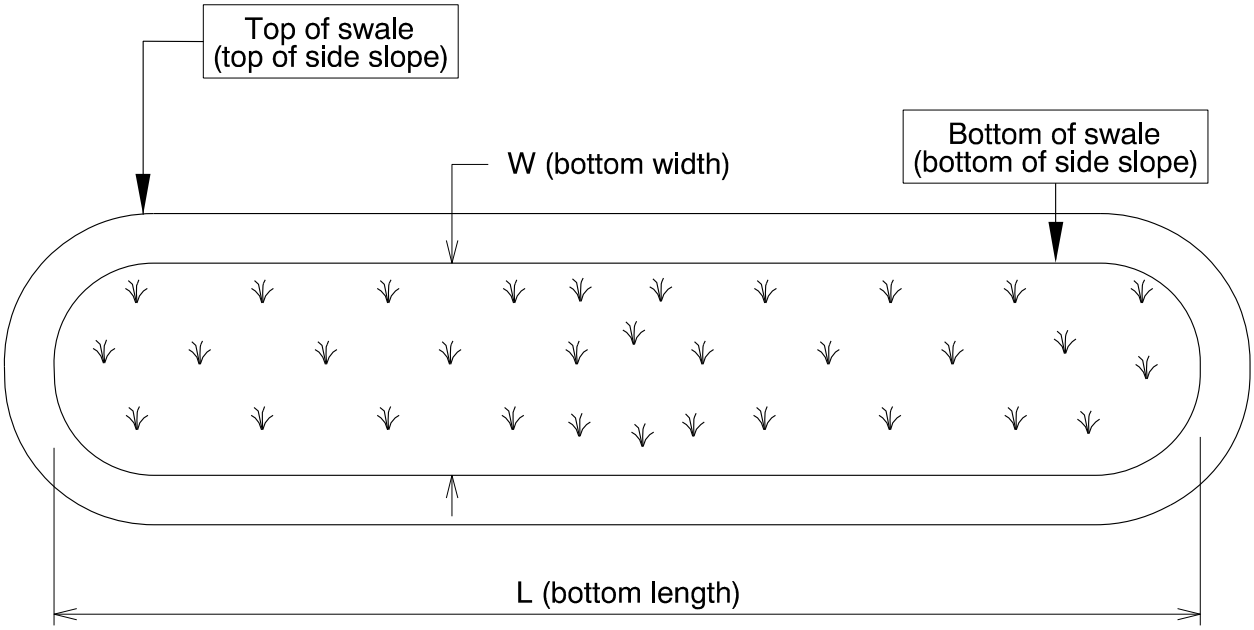
Figure 2: Facility location map

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:

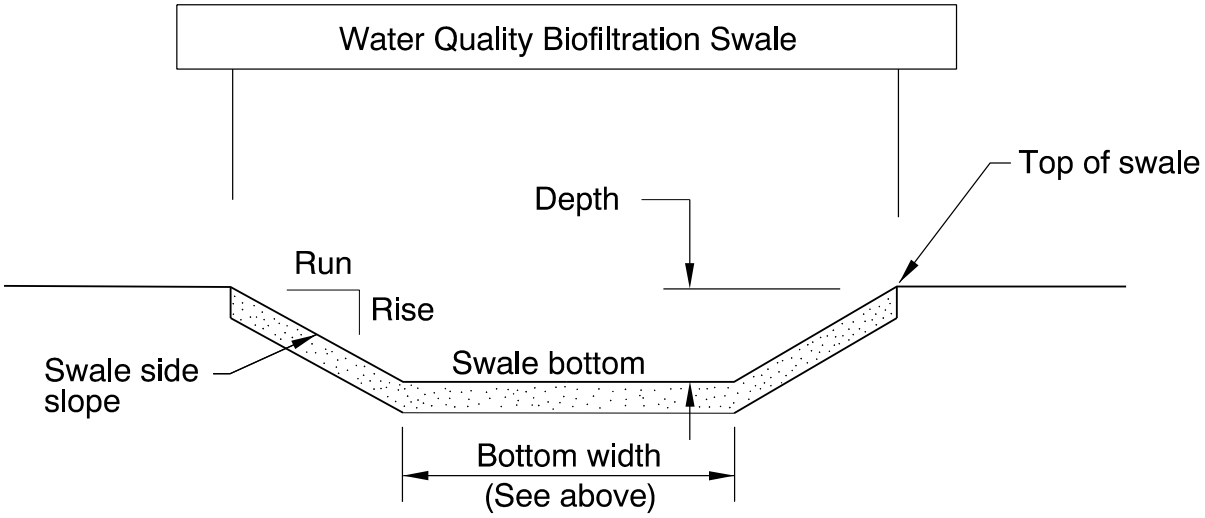
Bottom Length (feet)	Bottom Width (feet)
100	4



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:

Depth (feet)	Rise (feet)	Run (feet)
1.9 minimum	**1**	**4**



Site Specific Information: This facility is located on the south side of northbound US-20 just north of a private access road.

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: Class 50 Riprap Check Dam	☒	**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 medium 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

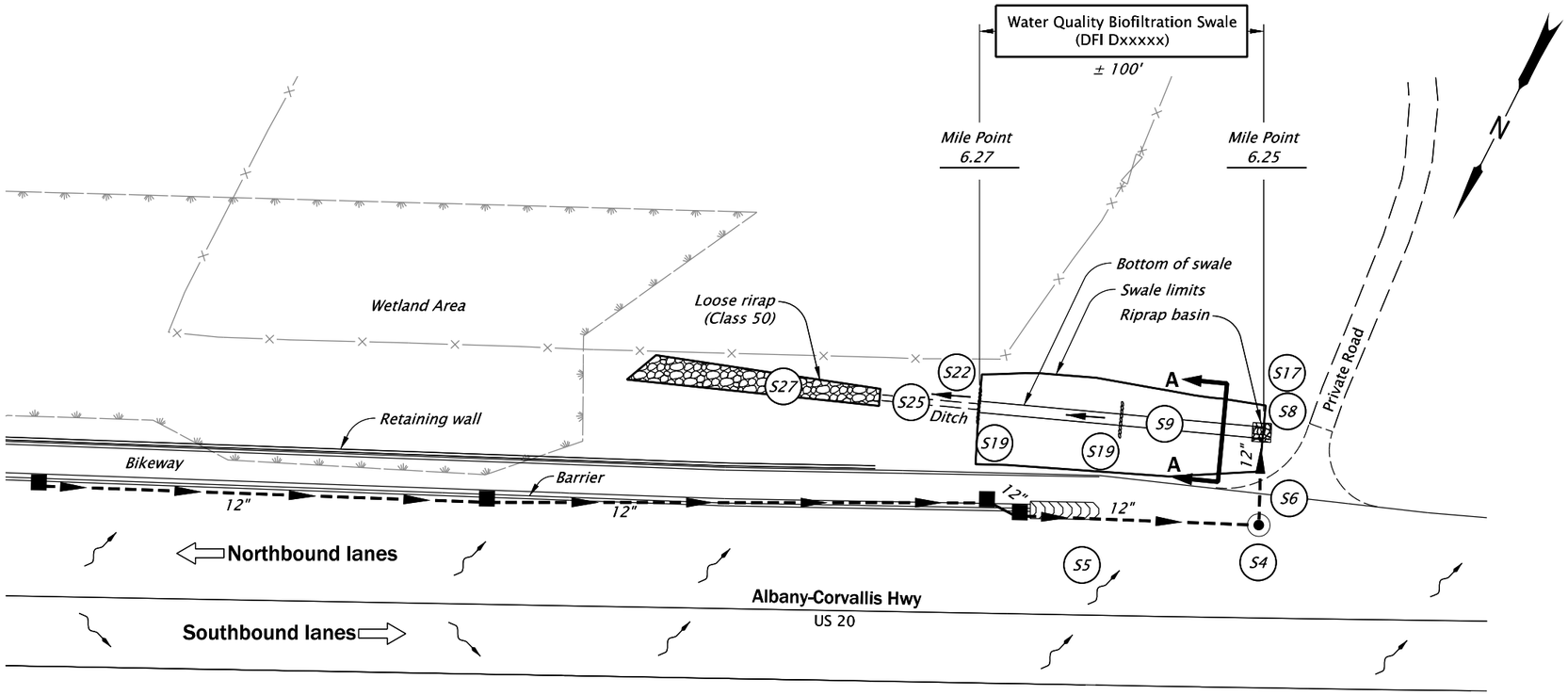
Contact any of the following for more detailed information about management of waste materials found on site:

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

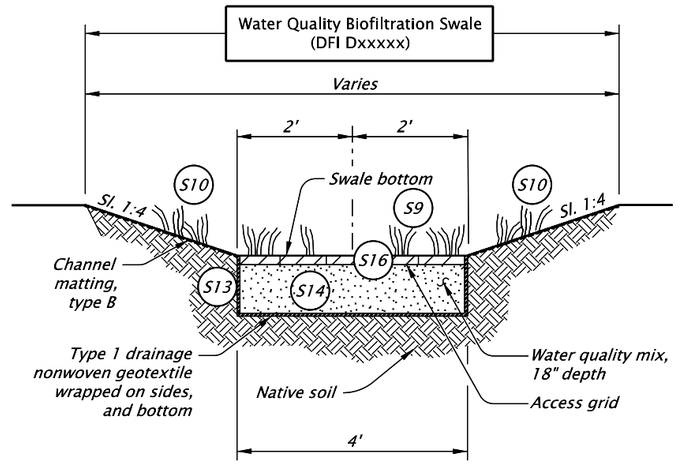
A Appendix A – Site Specific Operational Plan

Contents:

Operational Plan: DFI D01424



PLAN
Not to Scale



SECTION A-A
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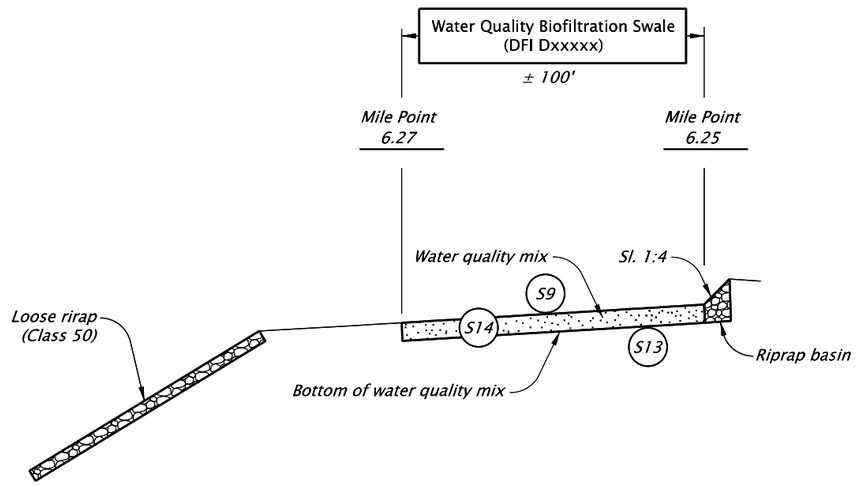


PROFILE
Not to Scale

LEGEND

- Photo location / direction
- X# — Facility component (see Table 1 in O&M Manual)
- Manhole (and or)
- Inlet (and or)
- Storm pipe (Facility)
- Storm pipe (or)
- Swale boundary
- Conveyance direction
- Pavement / facility flow path
- Traffic flow direction

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

Sht. 1 of 1

Prepared By: Mike Rice

Drafted By: Edita Boguslawski

DFI D#####
MAINTENANCE DISTRICT # HWY 20
BIOFILTRATION SWALE
ALBANY-CORVALLIS HIGHWAY MP 6.25 - 6.27
BENTON COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 54V-102

54V-102

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

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

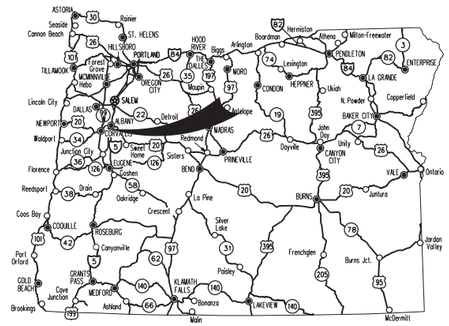
PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION & SIGNALS

US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.

ALBANY-CORVALLIS HIGHWAY

BENTON COUNTY
SEPTEMBER 2021



Overall Length Of Project – 2.2 Miles

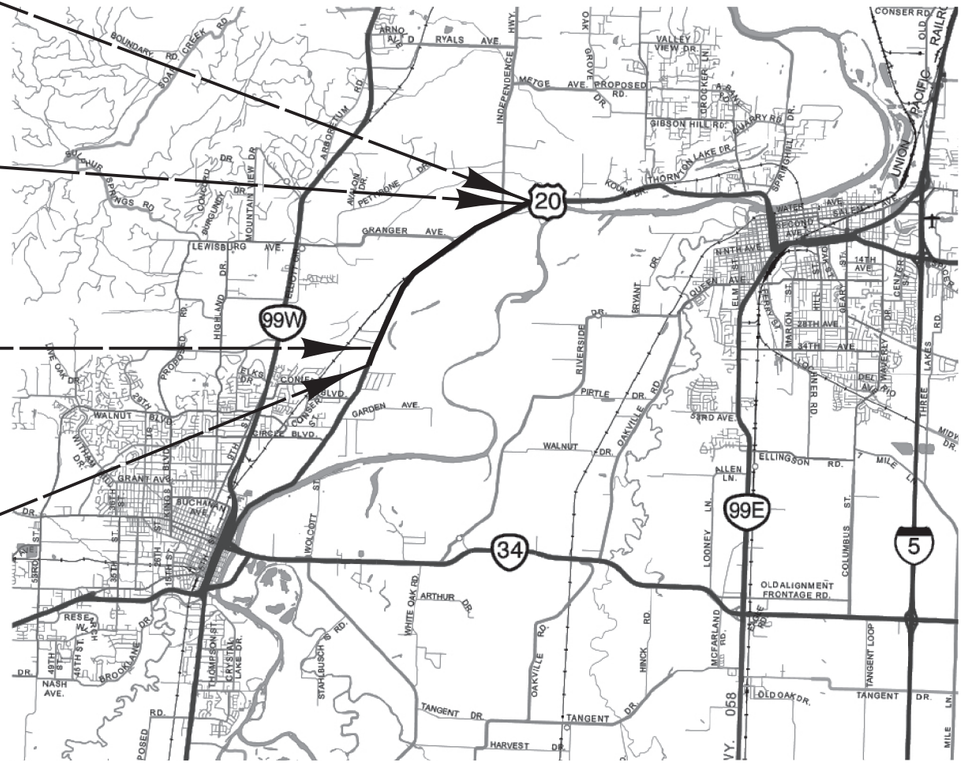
ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0001 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center (Note: The Telephone Number For The Oregon Utility Notification Center Is (503) 232-1987).

BEGINNING OF CONTRACT
STA. "E2" 1187+04.6 (MP 7.04)

BEGINNING OF PROJECT
STA. "E2" 1188+49.5 (MP 7.01)

END OF PROJECT
STA. "E2" 1303+30.3 (MP 4.81)

END OF CONTRACT
STA. "E2" 1314+20.1 (MP 4.62)



N

T. 4 S., R. 11 W., W.M.

PLANS PREPARED FOR
OREGON DEPARTMENT OF TRANSPORTATION
By:

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

OREGON TRANSPORTATION COMMISSION

Robert Van Brocklin	CHAIR
Alando Simpson	COMMISSIONER
Julie Brown	COMMISSIONER
Sharon Smith	COMMISSIONER
Maurice Henderson	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: Edward J. Chamberland II 2021.07.16 15:22:43-07'00'
Signature & date

Edward J Chamberland II, Proj. Mgr.
Print name and title

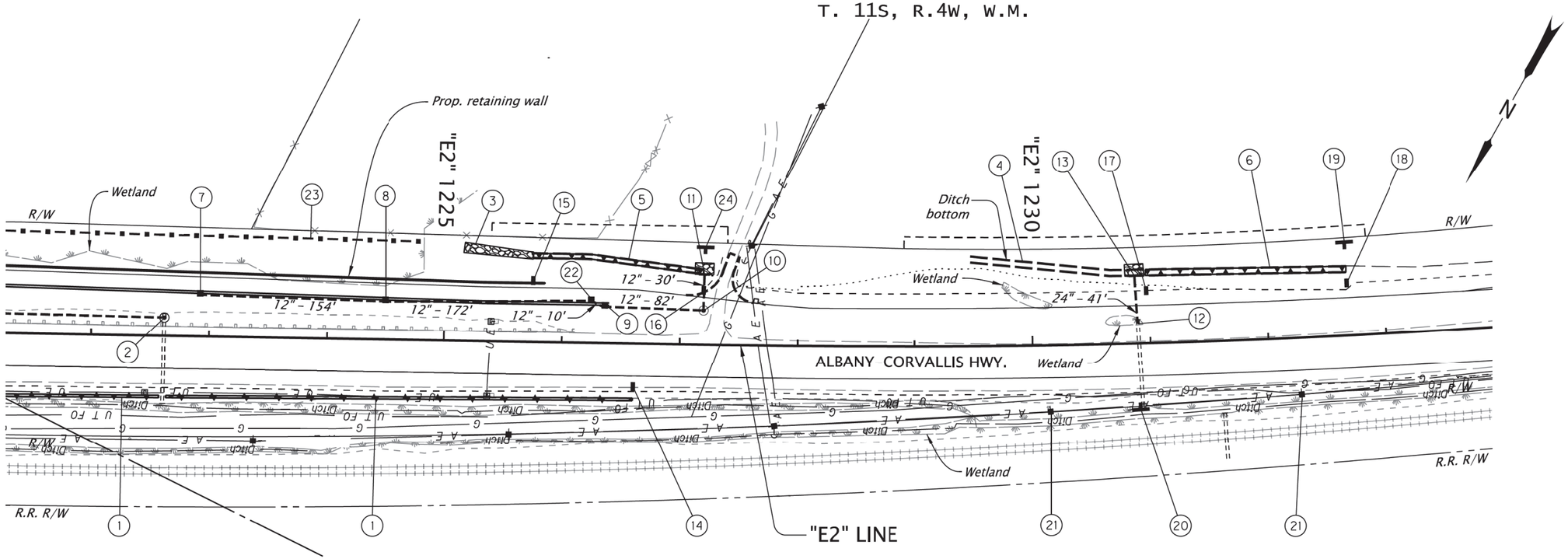
Steven B Cooley COOLEY Steven B Aug 10 2021 11:20 AM
Concurrence by ODOT Chief Engineer

US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.
ALBANY-CORVALLIS HIGHWAY
BENTON COUNTY

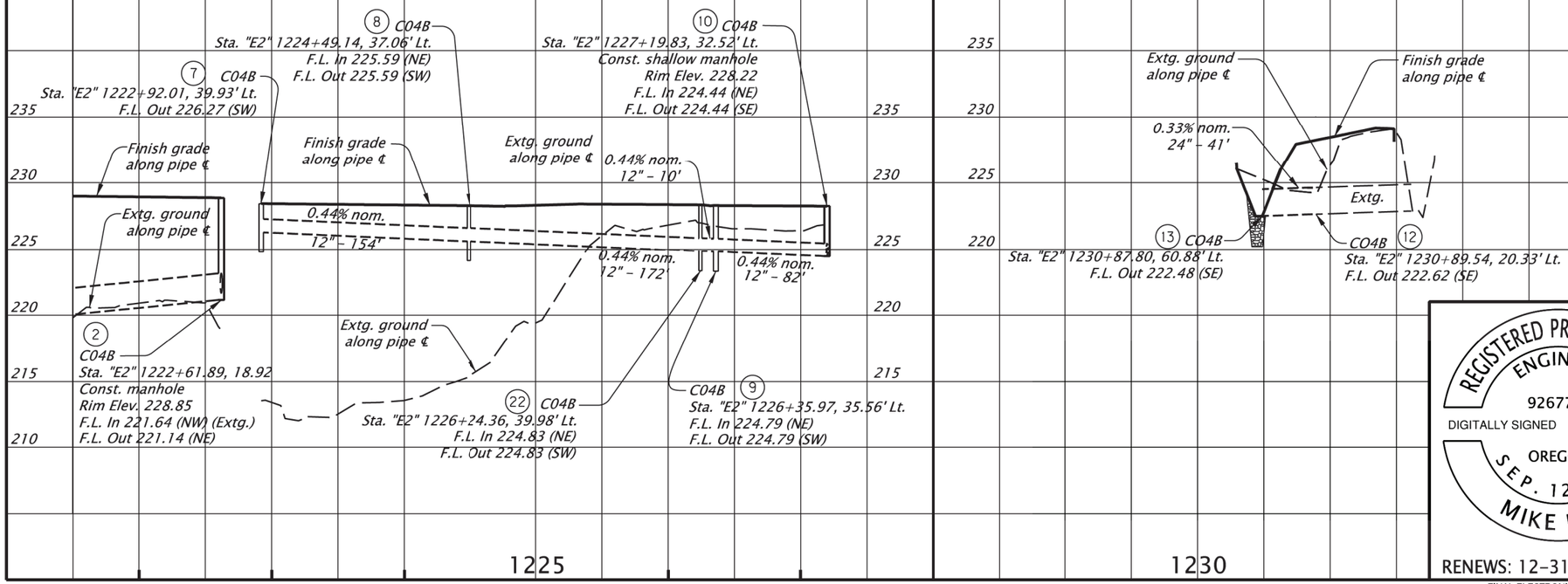
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	**S031(014)**	A01

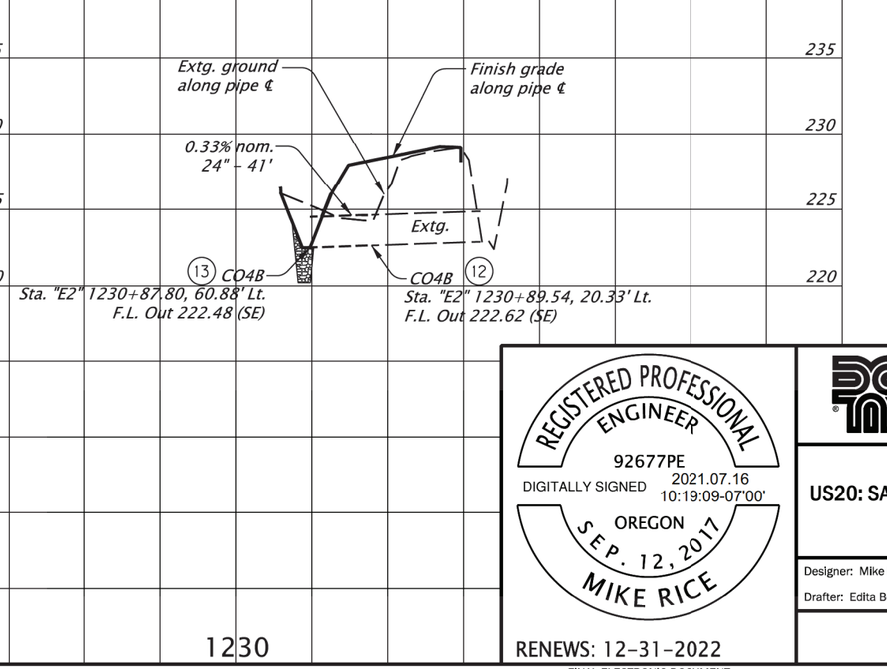
54V-102

T. 11S, R.4W, W.M.



PROFILE ALONG PIPE ℄
Sta. "E2" 1230+89.54





REGISTERED PROFESSIONAL ENGINEER
92677PE
DIGITALLY SIGNED 2021.07.16 10:19:09-07'00'
OREGON
SEP. 12, 2017
MIKE RICE
RENEWS: 12-31-2022

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

OREGON DEPARTMENT OF TRANSPORTATION

US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.

ALBANY - CORVALLIS HIGHWAY
BENTON COUNTY

Designer: Mike Rice
Reviewer: Mike Rice
Drafter: Edita Boguslawski
Checker: Julie McCaskill

DRAINAGE & UTILITIES

SHEET NO. C04B

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Rotation: 209.2458° Scale: 1"=100'

1. *See sht. C03B, note 7*
   Const. bio-slope - D01421

2. *Sta. "E2" 1222+61.89, 18.92' Lt.*
   Const. manhole
   Connect to extg. culv.

3. *Sta. "E2" 1224+15.80, Lt. to Sta. "E2" 1225+74.96, Lt.*
   Const. loose rirap (Class 50) - 25 cu. yd.
   Tr. exc. - 25 cu. yd.
   (For details, see sht. HA02)

4. *Sta. "E2" 1229+51.41, 75.21' Lt. to*
   Sta. "E2" 1230+97.25, 63.32' Lt.
   Const. ditch
   4' Flat bottom, 1:4 slopes
   (For details, see sht. HA03)

5. *Sta. "E2" 1225+75, Lt. to Sta. "E2" 1227+19, Lt.*
   Const. water quality swale - D01421
   (For details, see shts. HA02 & HA04)

6. *Sta. "E2" 1230+97, Lt. to Sta. "E2" 1232+69, Lt.*
   Const. water quality swale - D01425
   (For details, see shts. HA03 & HA04)

7. *Sta. "E2" 1222+92.01, 39.93' Lt.*
   Const. type "G-2" inlet w/ 1.5' sump

8. *Sta. "E2" 1224+49.14, 37.06' Lt.*
   Const. type "G-2" inlet w/ 1.5' sump
   Inst. 12" storm sew. pipe - 154'
   5' depth

9. *Sta. "E2" 1226+35.97, 35.56' Lt.*
   Const. type "G-2" inlet w/ 1.5' sump
   Inst. 12" storm sew. pipe - 10'
   5' depth

10. *Sta. "E2" 1227+19.83, 32.52' Lt.*
    Const. shallow manhole
    Inst. 12" storm sew. pipe - 82'
    5' depth

11. *Sta. "E2" 1227+20.19, 62.93' Lt.*
    Inst. 12" storm sew. pipe - 30'
    5' depth
    Const. sloped end
    Const. paved end slope
    Const. riprap basin
    (For details, see shts. HA02 & HA05)
    (See drg. no. RD320)

12. *Sta. "E2" 1230+89.54, 20.33' Lt.*
    Connect to extg. pipe

13. *Sta. "E2" 1230+87.80, 60.88' Lt.*
    Inst. 24" culv. pipe - 41'
    5' depth
    Const. sloped end
    Const. paved end slope
    Const. riprap basin
    (For details, see sht. HA05)

14. *Sta. "E2" 1226+60.53, 38.00' Rt.*
    Inst. drainage facility ID marker, Type S1

15. *Sta. "E2" 1225+74.99, 55.50' Lt.*
    Inst. drainage facility ID marker, Type S1

16. *Sta. "E2" 1227+19.67, 49.58' Lt.*
    Inst. drainage facility ID marker, Type S1

17. *Sta. "E2" 1230+97.56, 48.00' Lt.*
    Inst. drainage facility ID marker, Type S1

18. *Sta. "E2" 1232+68.73, 48.00' Lt.*
    Inst. drainage facility ID marker, Type S1

19. *Sta. "E2" 1232+68.34, 82.71' Lt.*
    Inst. drainage faciliy ID marker, Type S2
    DFI no. D01425
    MP 6.14

20. *Sta. "E2" 1230+92.47, 52.94' Rt.*
    Inst. culv. ID marker, Type 2
    DFI no. D050157
    MP 6.17
    (See drg. no. RD398)

21. *Relocate utility pole (By others) - 2*

22. *Sta. "E2" 1226+24.36, 39.98' Lt.*
    Const. type "G-2" inlet w/ 1.5' sump
    Inst. 12" storm sew. pipe - 172'
    5' depth

23. *No work zone.*
    See sht. C04A, note 8

24. *Sta. "E2" 1227+20.90, 86.16' Lt.*
    Inst. drainage facility ID marker, Type S2
    DFI no. D01424
    MP 6.25

REGISTERED PROFESSIONAL ENGINEER
92677PE
DIGITALLY SIGNED 2021.07.23 16:37:50-07'00'
OREGON
SEP. 12, 2017
MIKE RICE
RENEWS: 12-31-2022

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.
ALBANY - CORVALLIS HIGHWAY
BENTON COUNTY

Designer: Mike Rice | Reviewer: Mike Rice
Drafter: Edita Boguslawski | Checker: Julie McCaskill

DRAINAGE & UTILITIES NOTES

SHEET NO. C04C

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

54V-102

4%

"E2" ℄

1226+31.99
e 0.0%

1228+96.99
e 2.0%

Rt. edge of travel way

4%

-4%

1224+99.49
e -2.0%

P.S.

P.S.C.

Lt. edge of travel way

-4%

SUPERELEVATION CHART

235

230

225

220

Profile grade @ "E2" ℄

-0.10%

22"

Subgrade

Ground line @ "E2" ℄

Extg. ground line along water quality swale ℄

1.50%

Finish grade along water quality swale ℄

Swale - D01424 (For detail, see sht. HA02)

Emb. 2839

Exc. 1838

Sta. "D01424" 1+45 = Sta. "E2" 1225+75, 76.48' Lt.

Sta. "D01424" 0+00 = Sta. "E2" 1227+19, 65.08' Lt.

228.51

180' V.C.

+87.99

Extg. ground line along water quality swale ℄

0.30%

1.50%

Finish grade along water quality swale ℄

Swale - D01425 (For detail, see sht. HA03)

22"

Subgrade

Sta. "D01425" 0+00 = Sta. "E2" 1232+69, 59.64' Lt.

Sta. "D01425" 1+70 = Sta. "E2" 1230+97, 63.32' Lt.

1225

1230

REGISTERED PROFESSIONAL ENGINEER
17810PE
DIGITALLY SIGNED 2021.07.24 08:42:24-07'00'
OREGON
JULY 25, 1995
EDWARD J. CHAMBERLAND II
RENEWS: 12-31-2021

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

OREGON DEPARTMENT OF TRANSPORTATION

US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.
ALBANY - CORVALLIS HIGHWAY
BENTON COUNTY

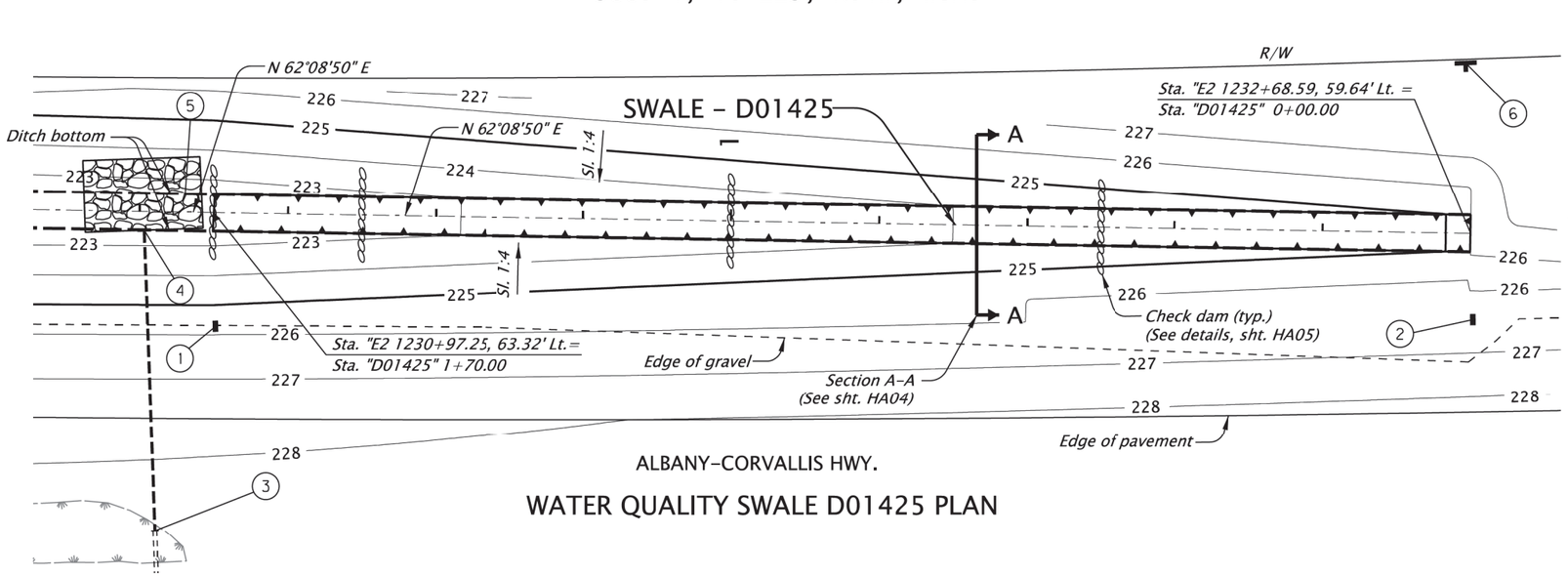
Designer: Brett Seely
Reviewer: Ed Chamberland
Drafter: Tammy Taggart
Checker: Terry Wheeler

PROFILE

SHEET NO. C04D

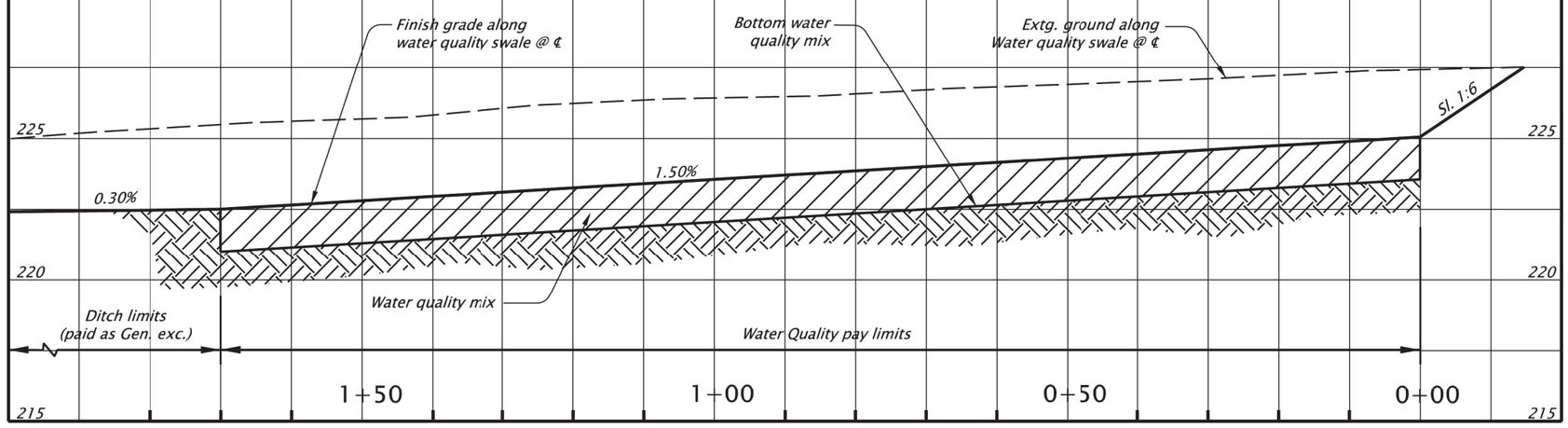
54V-102

Sec. 4, T. 11S, R.4W, W.M.



WATER QUALITY SWALE D01425 PLAN

1. See sht. C04C, note 17
2. See sht. C04C, note 18
3. See sht. C04C, note 12
4. See sht. C04C, note 13
5. See sht. C04C, note 4
6. See sht. C04C, note 25



WATER QUALITY SWALE D01425 PROFILE

CHECK DAM LOCATION TABLE

WATER QUALITY SWALE	LOCATION
"D01425"	Sta. "D01425" 0+50
	Sta. "D01425" 1+00
	Sta. "D01425" 1+50
	Sta. "D01425" 1+70

REGISTERED PROFESSIONAL ENGINEER
92677PE
DIGITALLY SIGNED 2021.07.23 16:41:27-07'00'
OREGON
SEP. 12, 2017
MIKE RICE
RENEWS: 12-31-2022

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

OREGON DEPARTMENT OF TRANSPORTATION

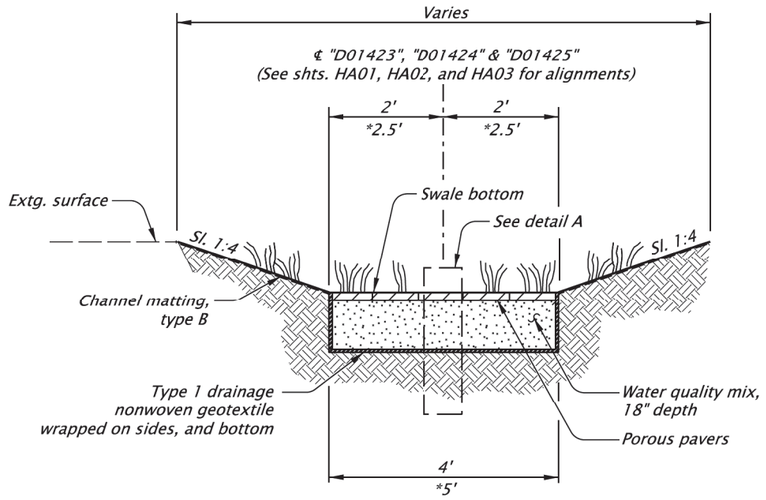
US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.
ALBANY - CORVALLIS HIGHWAY
BENTON COUNTY

Designer: Mike Rice
Reviewer: Mike Rice
Drafter: Edita Boguslawski
Checker: Julie McCaskill

DETAILS

SHEET NO. HA03

Rotation: 151.2036° Scale: 1"=20'

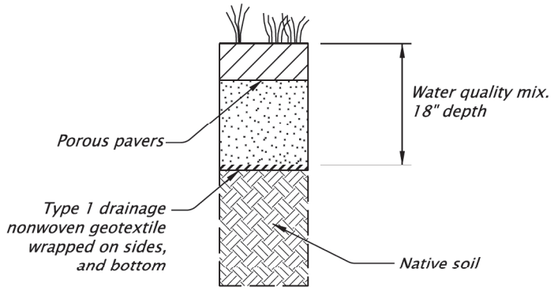


* "D01425" water quality swale width

WATER QUALITY SWALE "D01423" CROSS SECTION A-A
STA. "E2" 1199+41, LT. TO STA. "E2" 1200+86, LT.

WATER QUALITY SWALE "D01424" CROSS SECTION A-A
STA. "E2" 1225+75, LT. TO STA. "E2" 1227+19, LT.

WATER QUALITY SWALE "D01425" CROSS SECTION A-A
STA. "E2" 1230+97, LT. TO STA. "E2" 1232+69, LT.
N.T.S.



DETAIL A
N.T.S.

STORMWATER FIELD MARKER TABLE "D01423"
STA. "E2" 1199+41, LT. TO STA. "E2" 1200+86, LT.

FACILITY LOCATION		DFI #	TYPE S1 MARKER	
STATION	MP		RED	GREEN
Sta. "E2" 1200+86, LT.	6.74	D01423	✓	
Sta. "E2" 1199+41, LT.	6.77			✓

✓ Check where appropriate
Red = Beginning of facility
Green = End of facility

STORMWATER FIELD MARKER TABLE "D01424"
STA. "E2" 1225+75, LT. TO STA. "E2" 1227+19, LT.

FACILITY LOCATION		DFI #	TYPE S1 MARKER	
STATION	MP		RED	GREEN
Sta. "E2" 1227+19, LT.	6.25	D01424	✓	
Sta. "E2" 1225+75, LT.	6.28			✓

✓ Check where appropriate
Red = Beginning of facility
Green = End of facility

STORMWATER FIELD MARKER TABLE "D01425"
STA. "E2" 1230+97, LT. TO STA. "E2" 1232+69, LT.

FACILITY LOCATION		DFI #	TYPE S1 MARKER	
STATION	MP		RED	GREEN
Sta. "E2" 1232+69, LT.	6.14	D01425	✓	
Sta. "E2" 1230+97, LT.	6.17			✓

✓ Check where appropriate
Red = Beginning of facility
Green = End of facility

REGISTERED PROFESSIONAL ENGINEER
92677PE
DIGITALLY SIGNED 2021.07.16 10:28:51-07'00'
OREGON
SEP. 12, 2017
MIKE RICE
RENEWS: 12-31-2022

DAVID EVANS AND ASSOCIATES INC.
2100 S River Parkway
Portland Oregon 97201
Phone: 503.223.6663

OREGON DEPARTMENT OF TRANSPORTATION

US20: SAFETY UPGRADES (ALBANY TO CORVALLIS) SEC.
ALBANY - CORVALLIS HIGHWAY
BENTON COUNTY

Designer: Mike Rice | Reviewer: Mike Rice
Drafter: Edita Boguslawski | Checker: Julie McCaskill

DETAILS | SHEET NO. HA04