

OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: November 2022

DFI No. D01411

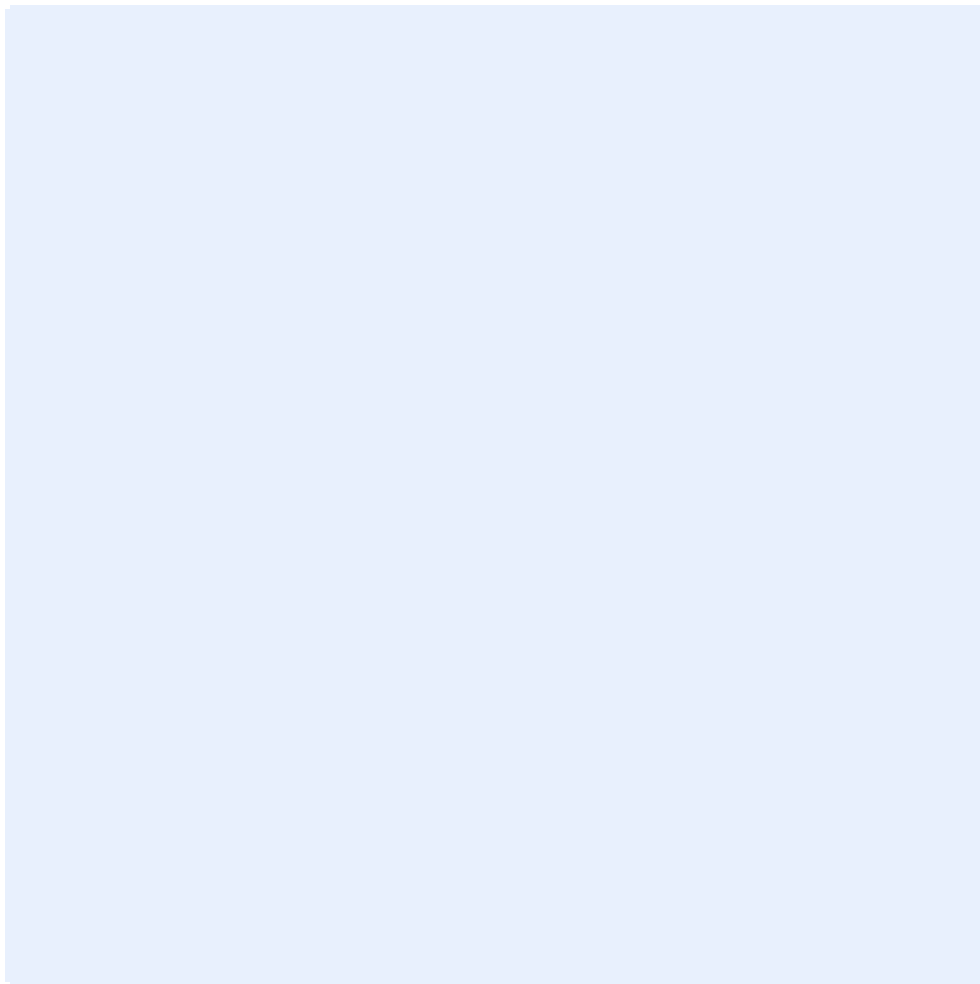


Figure 1: DFI No. D01411, looking [note cardinal direction]

Identification

Drainage Facility ID (DFI): D01411
Facility Type: Water Quality Biofiltration Swale
Construction Drawings: (V-File Numbers) 56V-030
Location: District: 04
Highway No.: 034
Mile Post: 0.23 to 25, 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 median

Flow direction: West

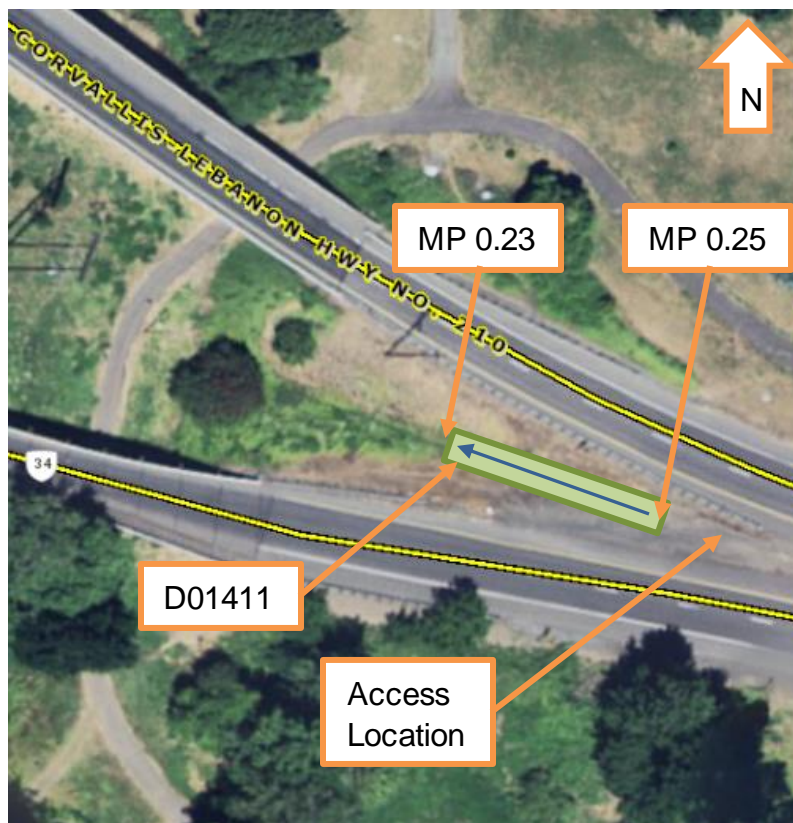


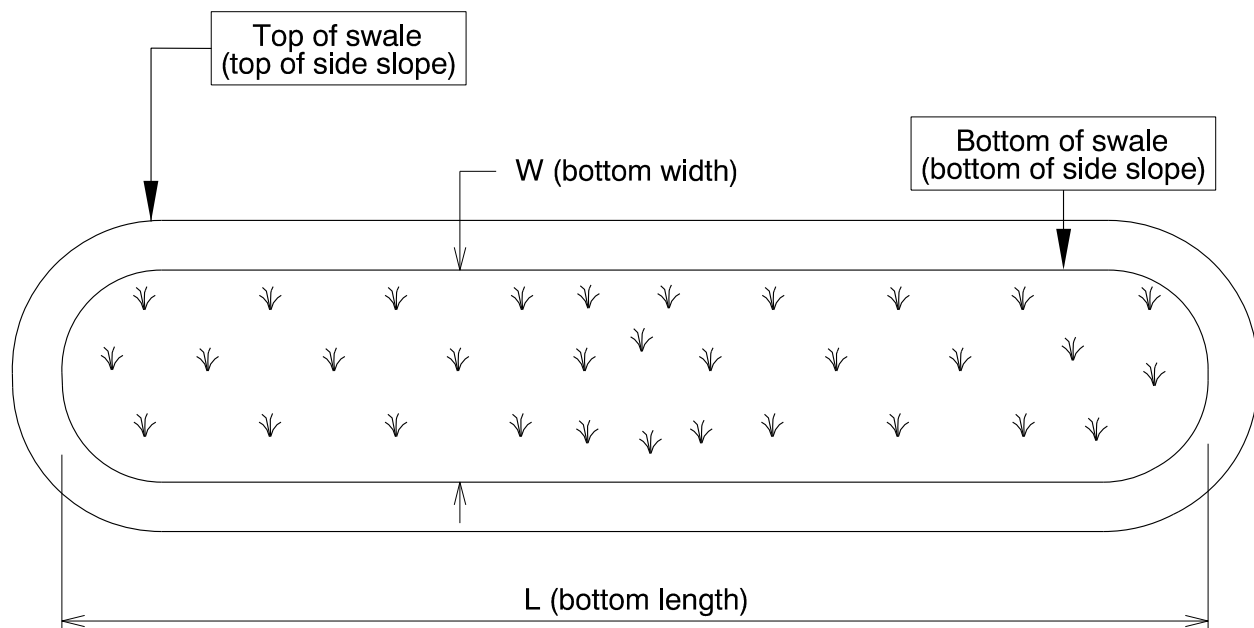
Figure 2: Facility location map

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:

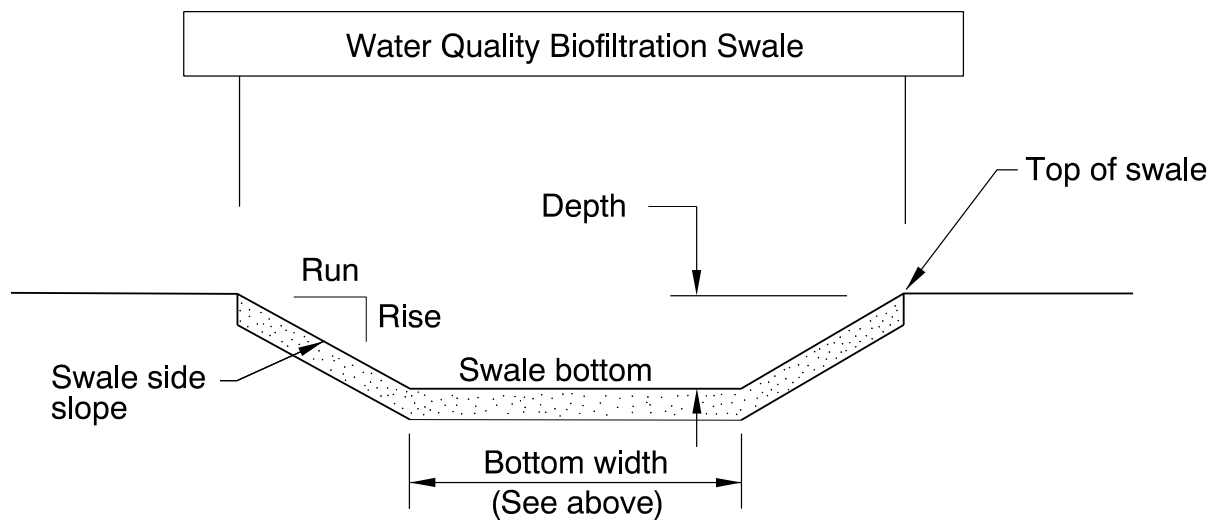
Bottom Length (feet)	Bottom Width (feet)
105	5



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)
0-2	1	4
2-7	1	2



Site Specific Information: Swale is constructed in Roadway Median. Access the swale from the east side in the roadway gore area. Medium duty porous pavers installed on swale bottom.

4. Facility Access

Maintenance access to the facility:

<input type="checkbox"/> Roadside pad	<input checked="" type="checkbox"/> Roadside shoulder
<input type="checkbox"/> Access road with Gate	<input type="checkbox"/> Access road without Gate

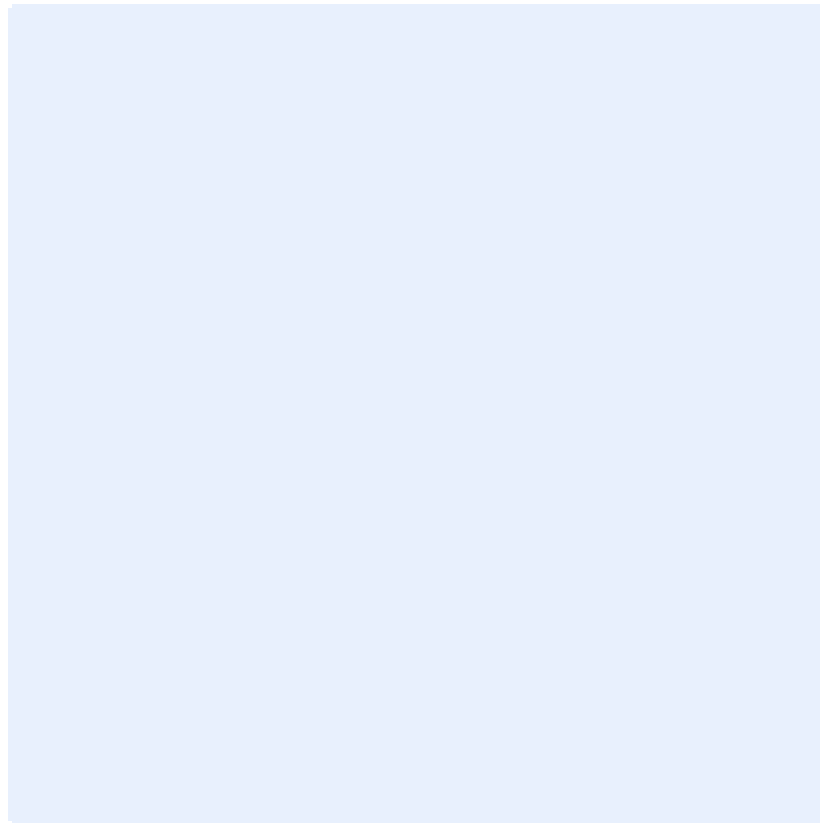


Figure 3: [insert post construction facility access photo and caption text]

5. Operational Components / Maintenance Items

Classification

This facility is classified as an:

<input checked="" type="checkbox"/> On-line Swale	<input type="checkbox"/> 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:

<input checked="" type="checkbox"/> No	<input type="checkbox"/> 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:

<input type="checkbox"/> Operational Plan A	<input checked="" type="checkbox"/> Operational Plan B	<input type="checkbox"/> 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	<input type="checkbox"/>	S1
Weir type flow splitter/flow splitter manhole	<input type="checkbox"/>	S2
Orifice type flow splitter/flow splitter manhole	<input type="checkbox"/>	S3
Standard manhole	<input type="checkbox"/>	S4
Swale Inlet		
Pavement sheet flow	<input type="checkbox"/>	S5
Inlet Pipe (s)	<input checked="" type="checkbox"/>	S6
Open channel inlet	<input type="checkbox"/>	S7
Riprap pad	<input checked="" type="checkbox"/>	S8
Ground Cover		
Grass bottom	<input checked="" type="checkbox"/>	S9
Grass side slopes	<input checked="" type="checkbox"/>	S10
Granular drain rock	<input type="checkbox"/>	S11
Plantings	<input type="checkbox"/>	S12
Underground Components		
Geotextile fabric	<input type="checkbox"/>	S13
Water quality mix	<input checked="" type="checkbox"/>	S14
Perforated pipe	<input type="checkbox"/>	S15
Porous pavers (access grid)	<input checked="" type="checkbox"/>	S16
Flow Spreader		
Rock basin (used at inlet)	<input type="checkbox"/>	S17
Anchored board (midpoint of swale or every 50 feet along swale bottom)	<input checked="" type="checkbox"/>	S18
Other:	<input type="checkbox"/>	S19
Swale Outlet		
Catch basin with grate	<input checked="" type="checkbox"/>	S20
Outlet Pipe (s)	<input checked="" type="checkbox"/>	S21
Open channel outlet	<input type="checkbox"/>	S22
Auxiliary Outlet:	<input type="checkbox"/>	S23
Outfall Type		
Waterbody (Creek/Lake/Ocean)	<input type="checkbox"/> C	S24
	<input type="checkbox"/> L	
	<input type="checkbox"/> O	
Ditch	<input type="checkbox"/>	S25
Storm drain system	<input checked="" type="checkbox"/>	S26
Outfall Components		
Riprap pad	<input type="checkbox"/>	S27
Riprap bank protection	<input type="checkbox"/>	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:

<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
There are medium 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

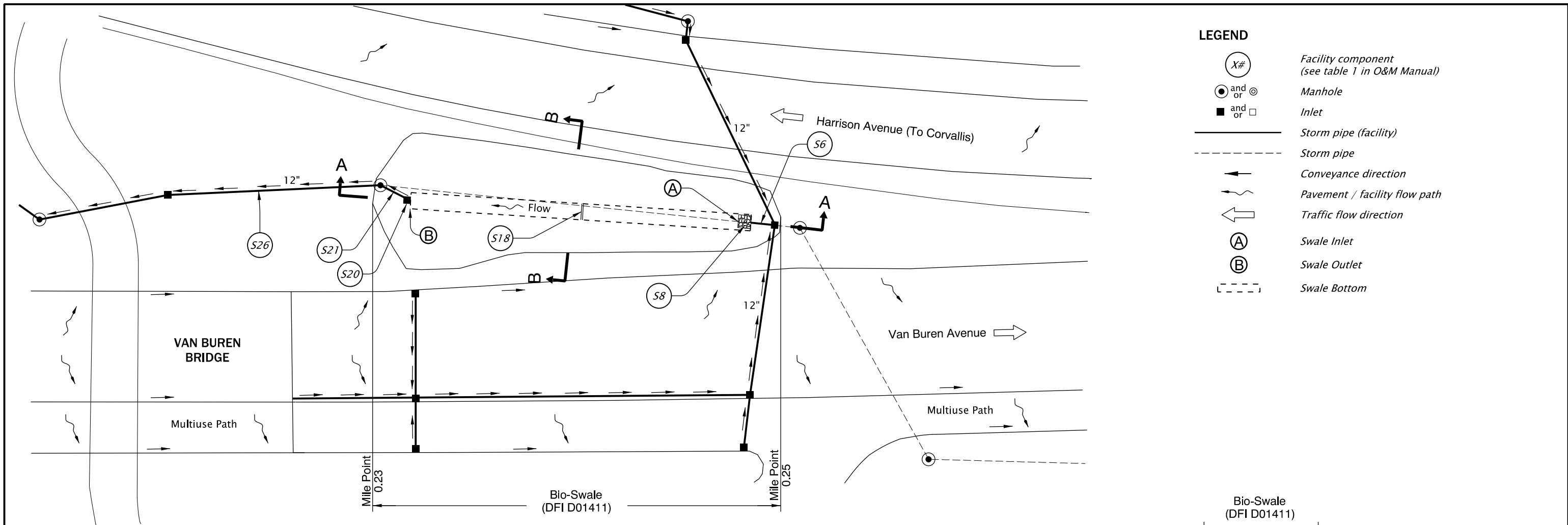
Contact any of the following for more detailed information about management of waste materials found on site:

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

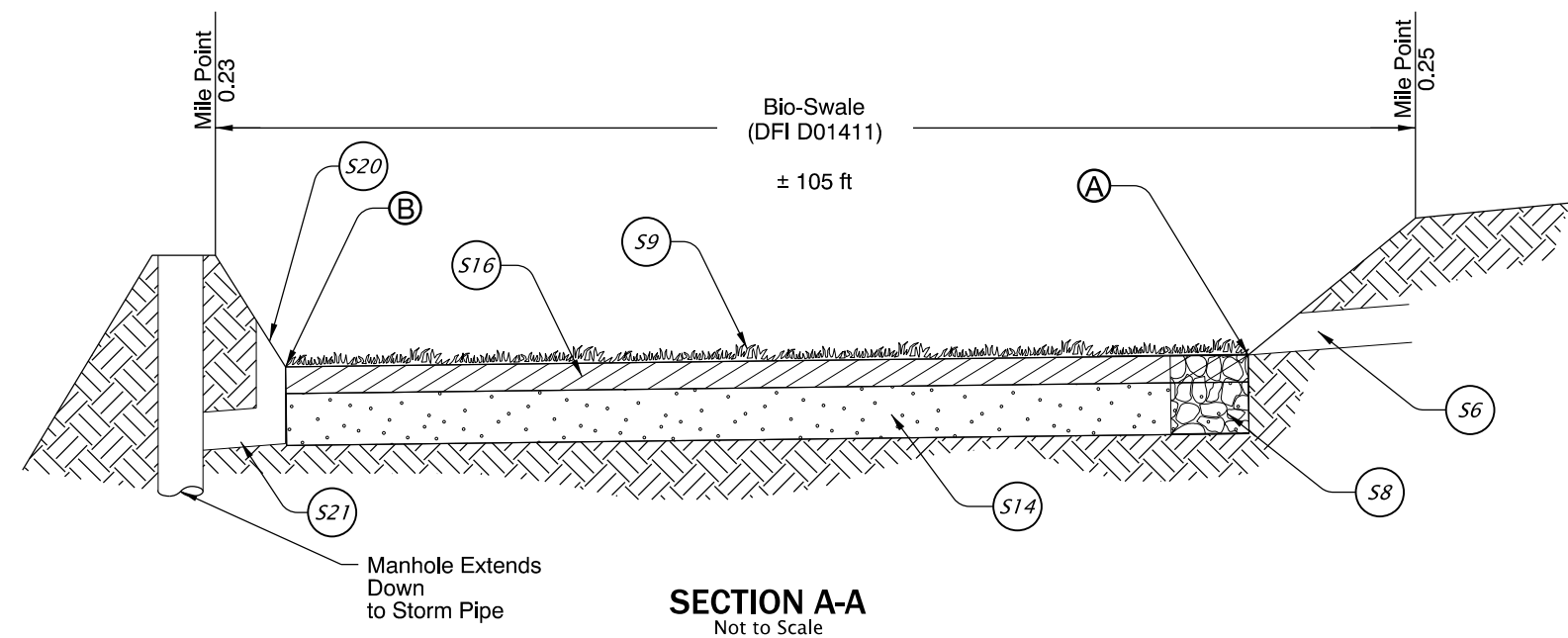
Contents:

Operational Plan: DFI D01411

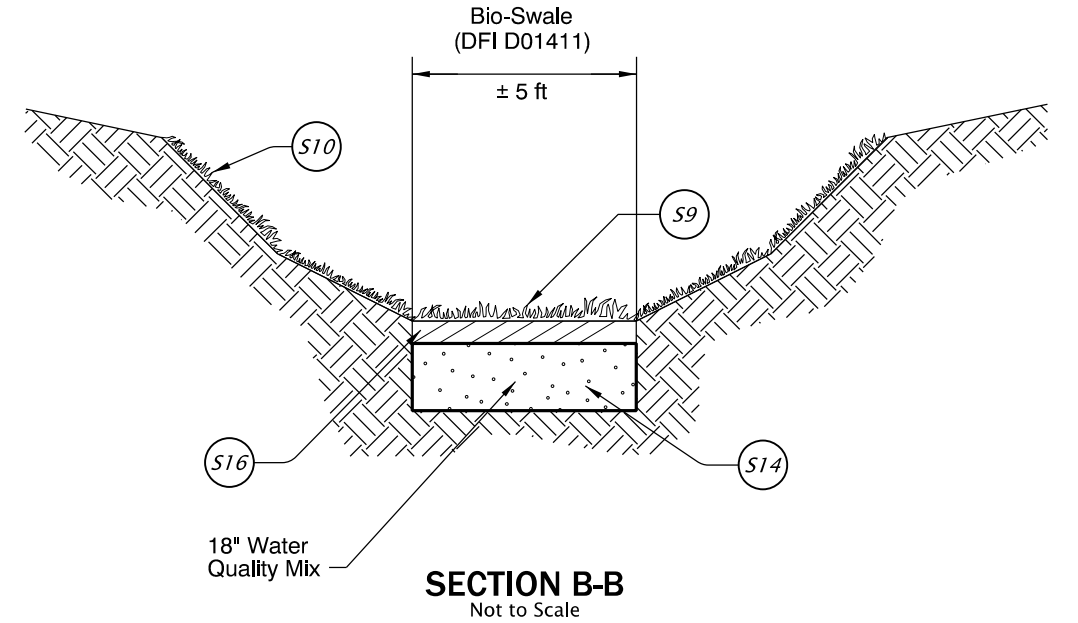


- LEGEND**
- (X#) Facility component (see table 1 in O&M Manual)
 - and ○ Manhole
 - and □ Inlet
 - Storm pipe (facility)
 - - - Storm pipe
 - Conveyance direction
 - ~ Pavement / facility flow path
 - ⇐ Traffic flow direction
 - (A) Swale Inlet
 - (B) Swale Outlet
 - - - Swale Bottom

PLAN
Not to Scale



SECTION A-A
Not to Scale



SECTION B-B
Not to Scale

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 1 of 1
Prepared By: Scott Taylor
Drafted By: Scott Taylor

DFI D01411
MAINTENANCE DISTRICT 4 HWY 34
FILTERRA
HIGHWAY MP 0.23 to 0.25
LINN COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 56V-030

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
A01	Title Sheet
A02, A03	Index Of Sheets Cont.
A04	Std. Dwg. Nos.
A05, A06	Survey Control Data

STATE OF OREGON
DEPARTMENT OF TRANSPORTATION

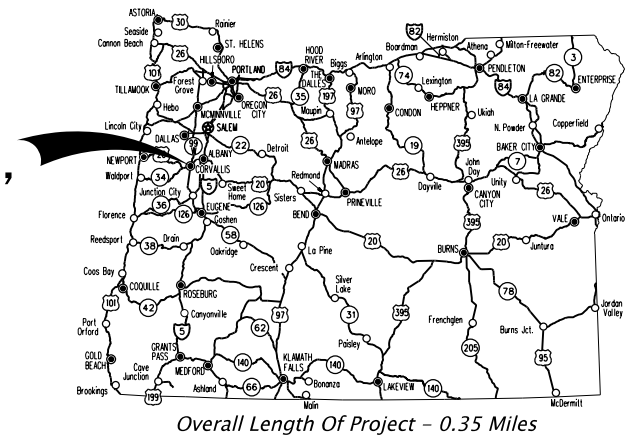
PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, STRUCTURES, PAVING, CURB RAMPS, SIGNING, ILLUMINATION,
 SIGNALS, INTELLIGENT TRANSPORTATION SYSTEM & ROADSIDE DEVELOPMENT

OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT

CORVALLIS-LEBANON HWY.

**BENTON AND LINN COUNTIES
 FEBRUARY 2023**



BEGINNING OF WORK

STA. "L3w" 12+93.98

BEGINNING OF PROJECT

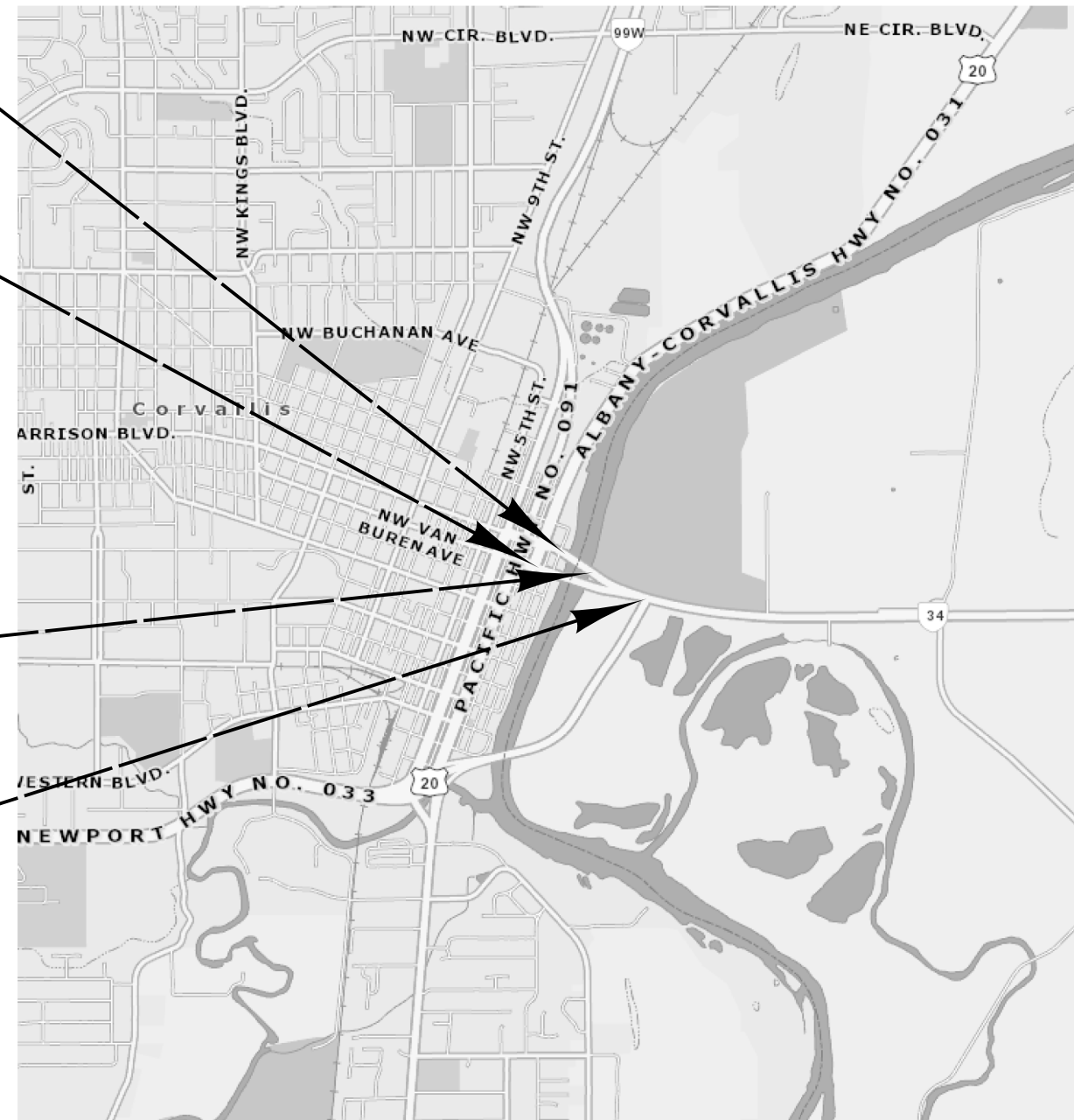
STA. "L" 9+76.48 (M.P. -0.01)

END OF WORK

STA. "L3w" 23+10.00

END OF PROJECT

STA. "L" 28+70.98 (M.P. 0.34)



SEC. 35, T. 11 S., R. 5 W., W.M.

LET'S ALL
 WORK TOGETHER
 TO MAKE THIS
 JOB SAFE

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).

PLANS PREPARED FOR
 OREGON DEPARTMENT OF TRANSPORTATION

WWW.DOWL.COM

OREGON TRANSPORTATION COMMISSION

Robert Van Brocklin CHAIR
 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

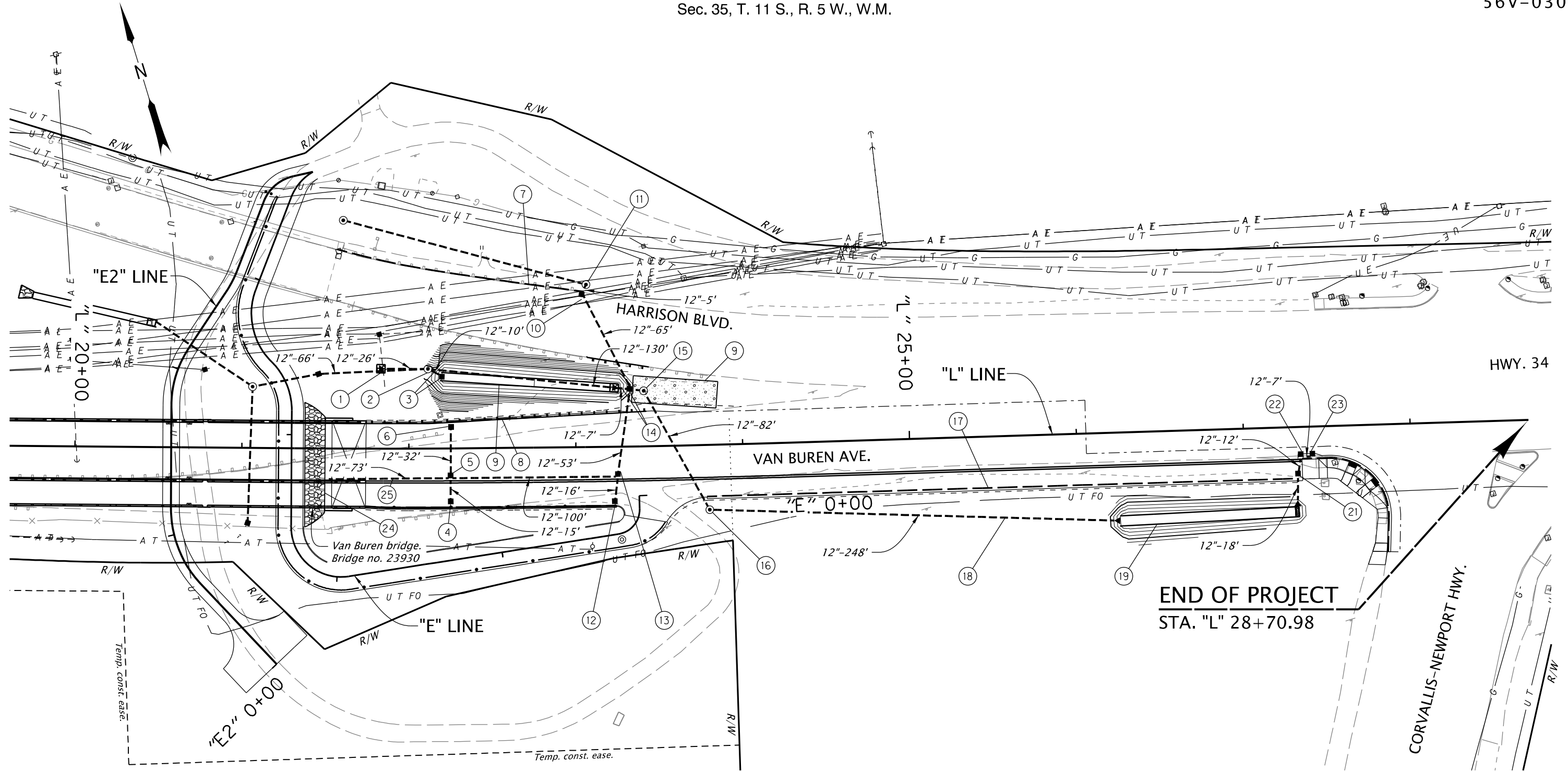
 Print name and title

 Concurrence by ODOT Chief Engineer

OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT
 CORVALLIS-LEBANON HWY.
 BENTON AND LINN COUNTIES

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	S210(022)	A01





REGISTERED PROFESSIONAL
ENGINEER
79131
Digitally Signed 2022.11.17 15:09:00-08'00'
OREGON
JUNE 14, 2007
BENJAMIN P. WEWERKA
EXPIRES: 06/30/24

DOWL
WWW.DOWL.COM

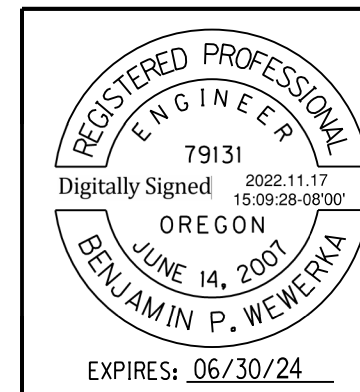




OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT
CORVALLIS-LEBANON HWY.
BENTON AND LINN COUNTIES

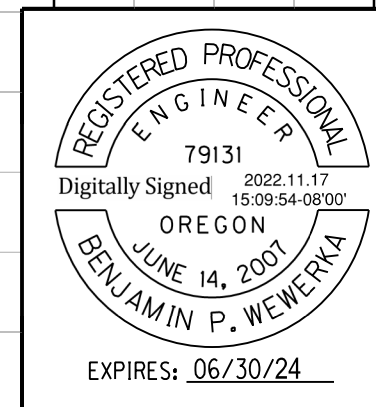
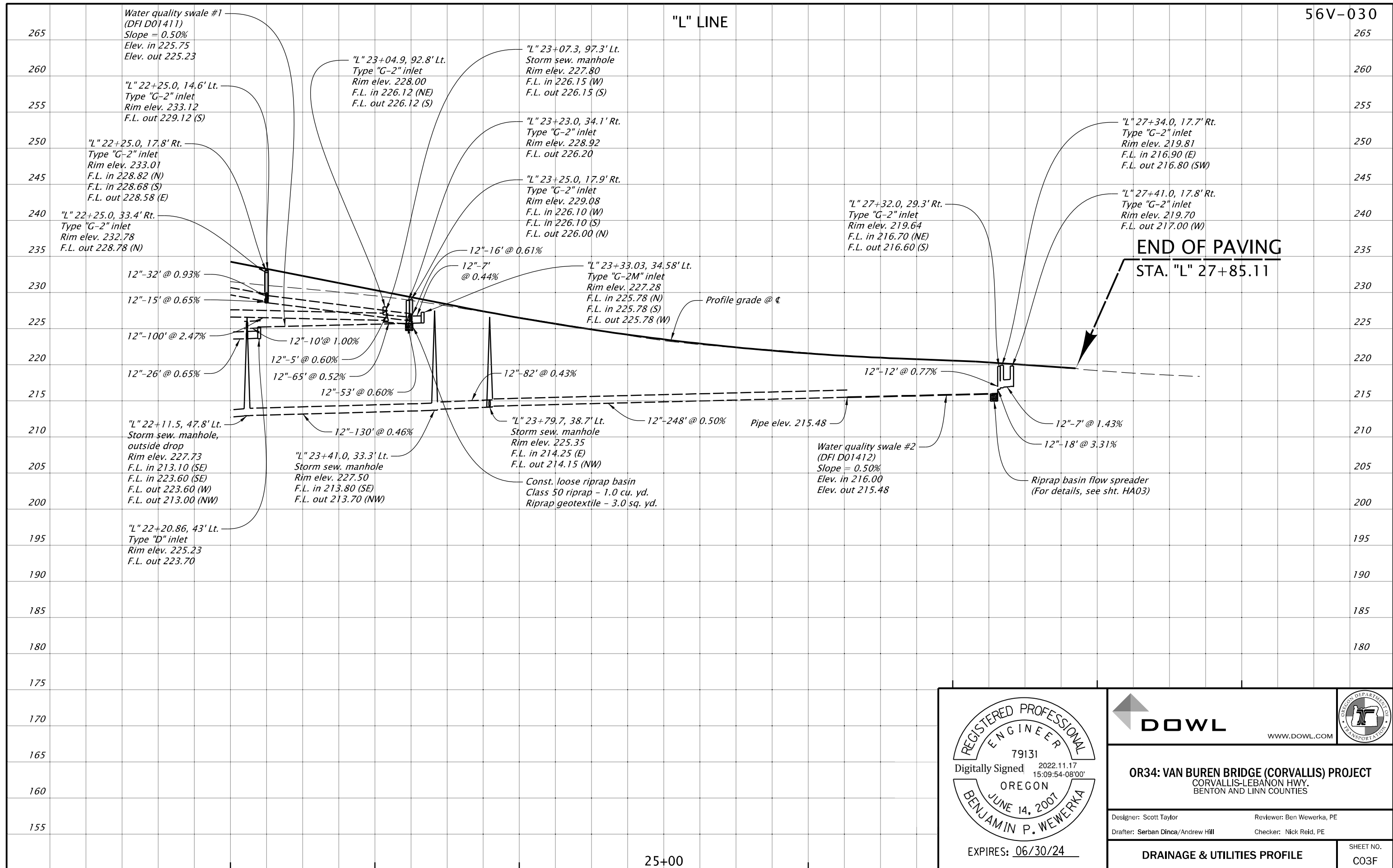
Designer: Scott Taylor Reviewer: Ben Wewerka, PE
Drafter: Serban Dinca/Andrew Hill Checker: Colton Fisher, PE



DRAINAGE & UTILITIES SHEET NO. C03C

- ① Sta. "L" 21+85.71, 47.91' Lt.
Inst. 12" storm sew. pipe - 26'
5' depth
Const. sloped end
Const. paved end slope, Lt.
Const. loose riprap (Class 50) - 1 cu. yd.
Riprap geotextile, type "1" - 3 sq. yd.
(For details, see sht. HA05)
(See dwg. no. RD320)
- ② Sta. "L" 22+11.5, 47.8' Lt.
Const. storm manhole 48" dia., outside drop
Inst. 12" storm sew. pipe - 66'
20' depth
(See dwg. no. RD352)
- ③ Sta. "L" 22+20.86, 43.20' Lt.
Const. type "D" inlet
Inst. 12" storm sew. pipe - 10'
5' depth
- ④ Sta. "L" 22+25.0, 33.4' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 15'
5' depth
- ⑤ Sta. "L" 22+25.0, 17.8' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 100'
5' depth
Class E backfill
- ⑥ Sta. "L" 22+25.0, 14.6' Lt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 32'
5' depth
- ⑦ Sta. "L" 21+56.56 to Sta. "L" 23+03.3
Const. drainage curb - 147'
- ⑧ Sta. "L" 21+83.92 to Sta. "L" 22+68.06
Const. drainage curb - 84'
- ⑨ Const. water quality swale #1 (DFI D01411)
Inst. facility field markers, type "S1" - 2
Inst. facility field markers, type "S2"
(See detail sht. HA01)
- ⑩ Sta. "L" 23+04.9, 92.8' Lt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 65'
5' depth
Class E backfill
- ⑪ Sta. "L" 23+07.3, 97.3' Lt.
Const. storm sew. manhole 48" dia., shallow
Inst. 12" storm sew. pipe - 5'
5' depth
- ⑫ Sta. "L" 23+23.0, 34.1' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 16'
5' depth
- ⑬ Sta. "L" 23+25.0, 17.9' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 53'
5' depth
Class E backfill
- ⑭ Sta. "L" 23+33.03, 34.58' Lt.
Const. type "G-2M" inlet
Inst. 12" storm sew. pipe - 7'
5' depth
Const. sloped end
Const. paved end slope, Lt.
- ⑮ Sta. "L" 23+41.0, 33.3' Lt.
Const. storm sew. manhole 48" dia.
Inst. 12" storm sew. pipe - 130'
20' depth
- ⑯ Sta. "L" 23+79.7, 38.7' Rt.
Const. storm sew. manhole 48" dia.
Inst. 12" storm sew. pipe - 82'
20' depth
- ⑰ Sta. "L" 23+78 to Sta. "L" 27+31
Const. drainage curb - 353'
- ⑱ Sta. "L" 26+27, 52.94' Rt.
Inst. 12" storm sew. pipe - 248'
5' depth
Const. sloped end
Const. paved end slope, Rt.
- ⑲ Const. water quality swale #2 (DFI D01412)
Inst. facility field markers, type "S1" - 2
Inst. facility field markers, type "S2"
(For details, see sht. HA02)
- ⑳ Note not used
- ㉑ Sta. "L" 27+32.0, 29.3' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 18'
5' depth
Const. sloped end
Const. paved end slope, Rt.
- ㉒ Sta. "L" 27+34.0, 17.7' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 12'
5' depth
- ㉓ Sta. "L" 27+41.0, 17.8' Rt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 7'
5' depth
Class E backfill
- ㉔ Sta. "E" 2+45 to Sta. "E" 3+18.90, Lt.
Const. grouted riprap (Class 50) - 29.9 cu. yd.
Filter blanket - 89.7 sq. yd.
(For details, see sht. HG03)
- ㉕ Sta. "L" 21+52.23, 18.42' Rt.
Inst. 12" storm sew. pipe - 73'
5' depth
Connect to 10" bridge deck drainage pipe



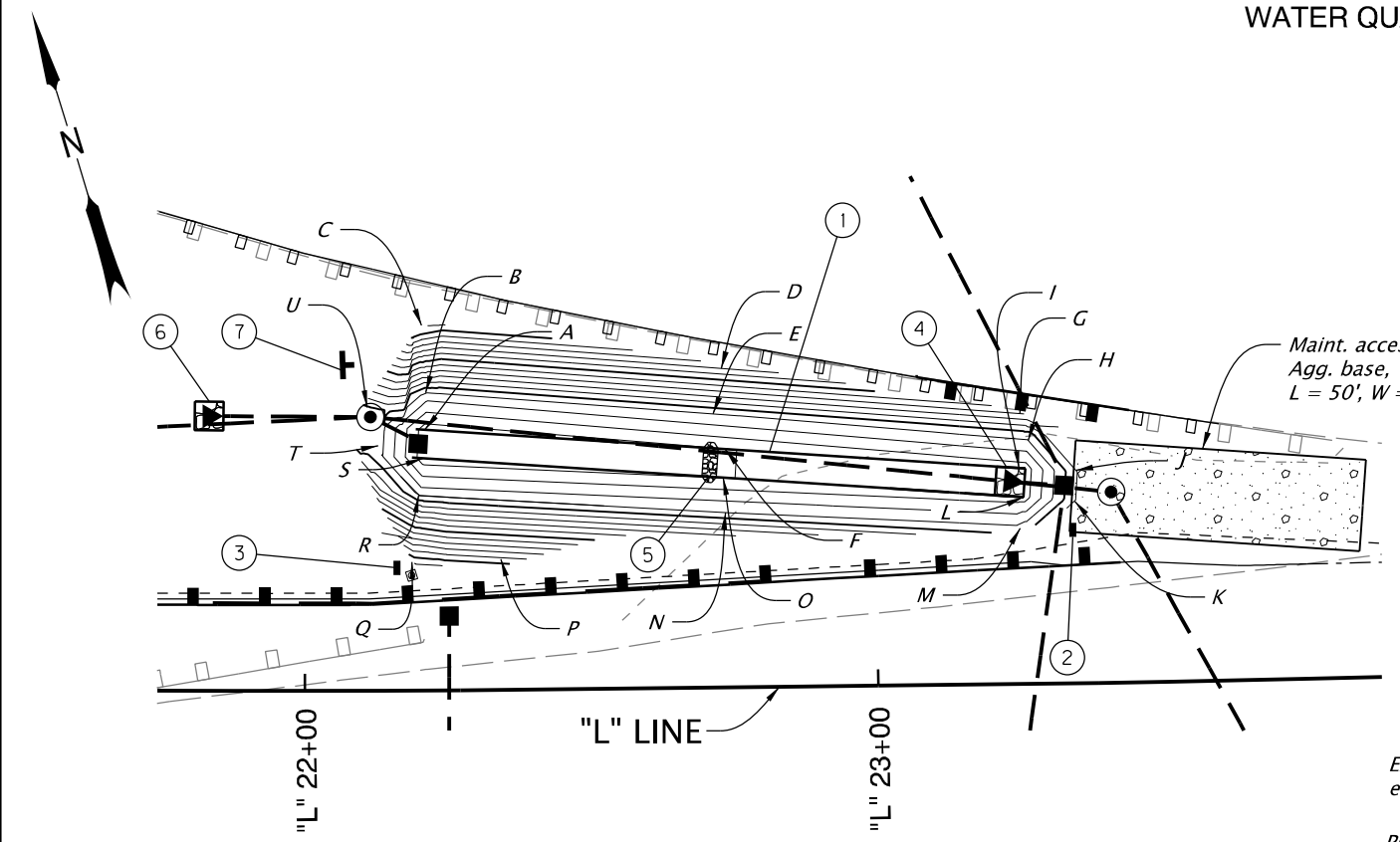
 WWW.DOWL.COM	
OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT CORVALLIS-LEBANON HWY. BENTON AND LINN COUNTIES	
Designer: Scott Taylor Drafter: Serban Dinca/Andrew Hill	Reviewer: Ben Wewerka, PE Checker: Colton Fisher, PE
DRAINAGE & UTILITIES NOTES	
SHEET NO. C03D	



 	
<p>OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT CORVALLIS-LEBANON HWY. BENTON AND LINN COUNTIES</p>	
<p>Designer: Scott Taylor Drafter: Serban Dinca/Andrew Hill</p>	<p>Reviewer: Ben Wewerka, PE Checker: Nick Reid, PE</p>
<p>DRAINAGE & UTILITIES PROFILE</p>	<p>SHEET NO. CO3F</p>

WATER QUALITY BIOFILTRATION SWALE

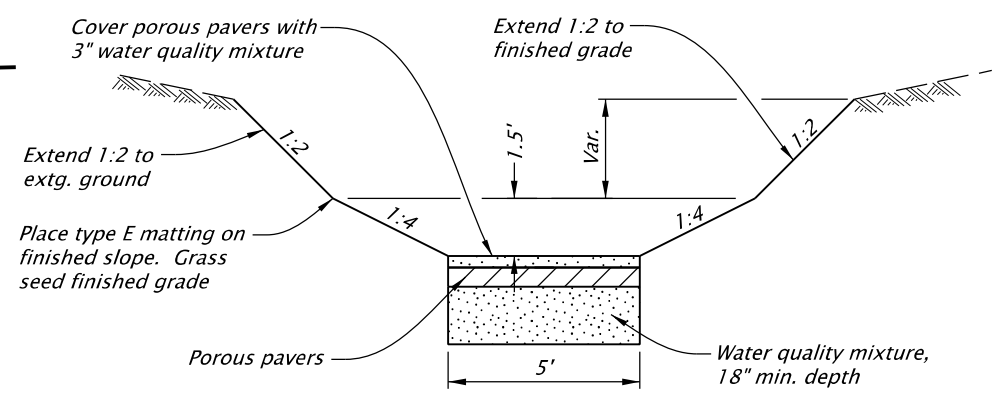
56V-030



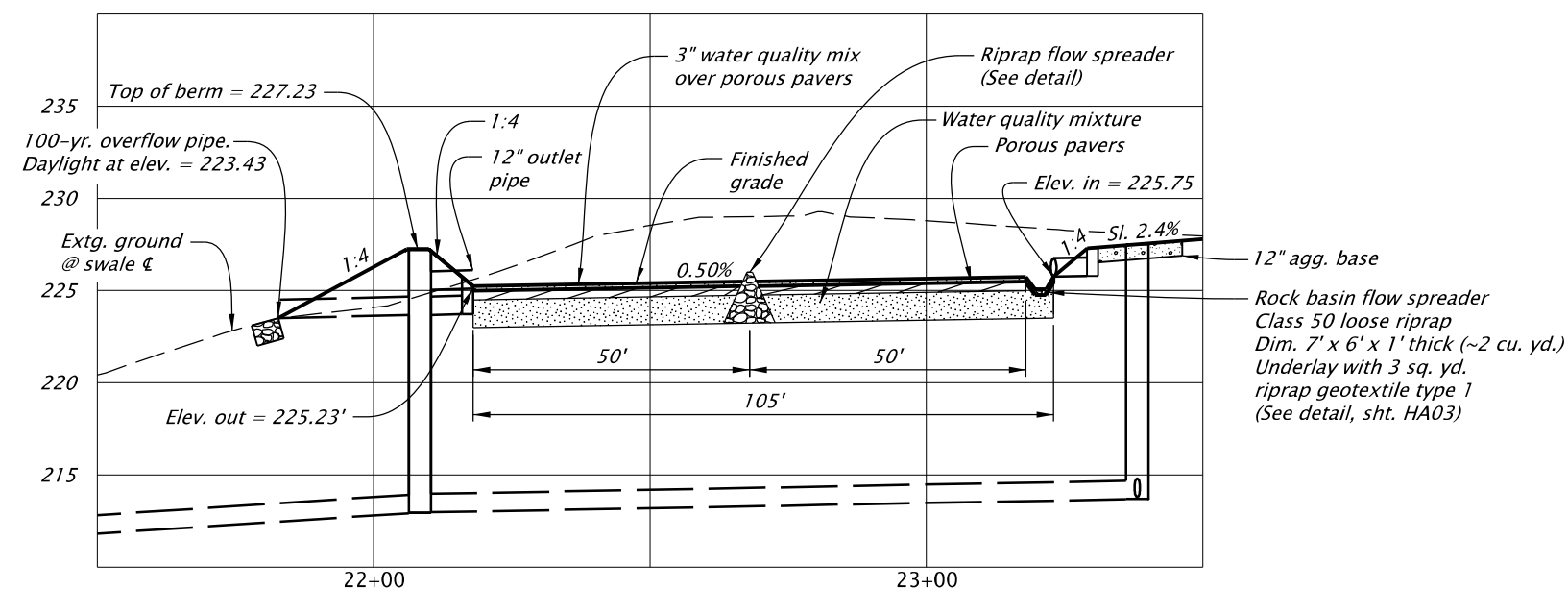
WATER QUALITY SWALE #1 (DFI D01411) PLAN
NTS

- ① Sta. "L" 22+20.8 to Sta. "L" 23+25.8
Const. water quality biofiltration swale
DFI no. 01411
- ② Sta. "L" 23+35.22, 25.66' Lt.
Inst. type "S1" marker - green
(For details, see sht. HA05)
- ③ Sta. "L" 22+13.67, 20.92' Lt.
Inst. type "S1" marker - red
(For details, see sht. HA05)
- ④ Rock basin flow spreader
- ⑤ Riprap flow spreader
- ⑥ Const. riprap pad
Loose riprap (Class 50) - 1 cu. yd.
Riprap geotextile, type "1" - 3 sq. yd.
(For details, see sht. HA05)
- ⑦ Sta. "L" 22+07.58, 59.02' Lt.
Inst. type "S2" marker
(For details, see sht. HA05)

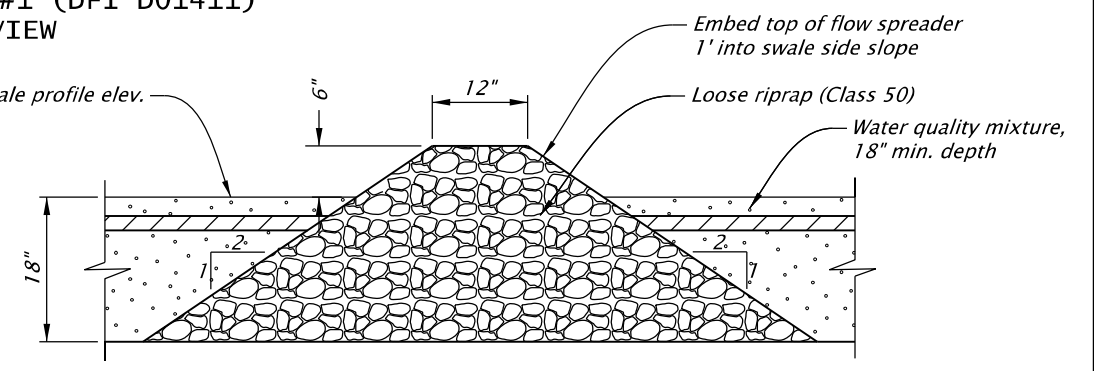
WATER QUALITY SWALE GRADING TABLE			
POINT	STATION	OFFSET	ELEVATION (FT)
A	"L" 22+21.04	45.49' Lt.	225.24
B	"L" 22+21.35	51.92' Lt.	226.80
C	"L" 22+20.54	63.51' Lt.	233.00
D	"L" 22+77.16	55.69' Lt.	231.10
E	"L" 22+76.68	47.75' Lt.	227.10
F	"L" 22+75.77	41.63' Lt.	225.50
G	"L" 23+26.22	47.16' Lt.	229.00
H	"L" 23+26.86	43.49' Lt.	227.20
I	"L" 23+26.35	37.62' Lt.	225.75
J	"L" 23+35.46	36.89' Lt.	228.00
K	"L" 23+35.43	31.89' Lt.	228.10
L	"L" 23+25.89	32.71' Lt.	225.75
M	"L" 23+26.13	27.15' Lt.	227.30
N	"L" 22+74.52	30.63' Lt.	227.00
O	"L" 22+75.38	36.62' Lt.	225.50
P	"L" 22+35.86	21.99' Lt.	232.50
Q	"L" 22+19.33	21.94' Lt.	223.10
R	"L" 22+20.28	34.34' Lt.	226.80
S	"L" 22+20.71	40.53' Lt.	225.23
T	"L" 22+12.53	42.56' Lt.	227.20
U	"L" 22+12.94	48.44' Lt.	227.20



WATER QUALITY SWALE #1 (DFI D01411)
SECTION VIEW
NTS



WATER QUALITY SWALE #1 (DFI D01411) PROFILE
NTS



RIPRAP FLOW SPREADER DETAIL
NTS

REGISTERED PROFESSIONAL ENGINEER
79131
Digitally Signed 2022.11.17 15:10:26-08'00"
OREGON
JUNE 14, 2007
BENJAMIN P. WEWERKA
EXPIRES: 06/30/24

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WWW.DOWL.COM

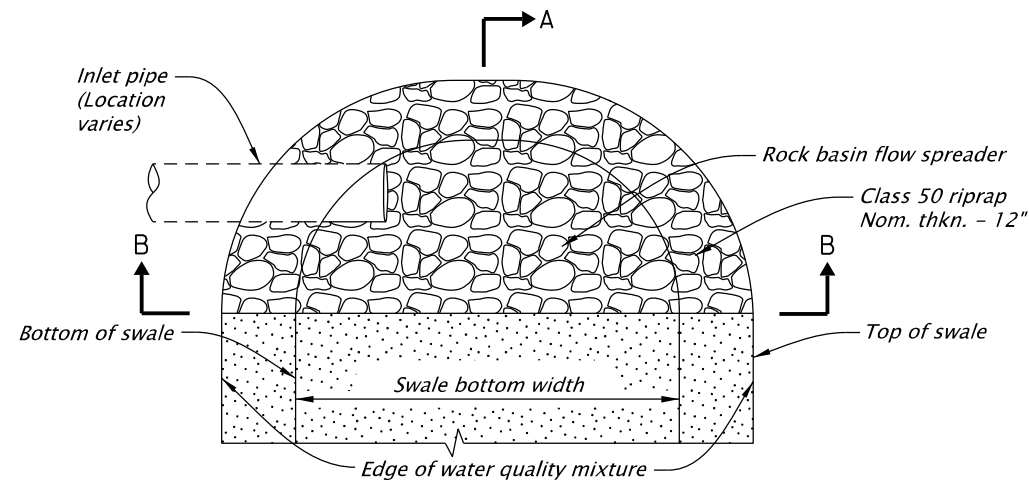
OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT
CORVALLIS-LEBANON HWY.
BENTON - LINN COUNTIES

Designer: Scott Taylor
Reviewer: Ben Wewerka, PE
Drafter: Serban Dinca
Checker: Colton Fisher, PE

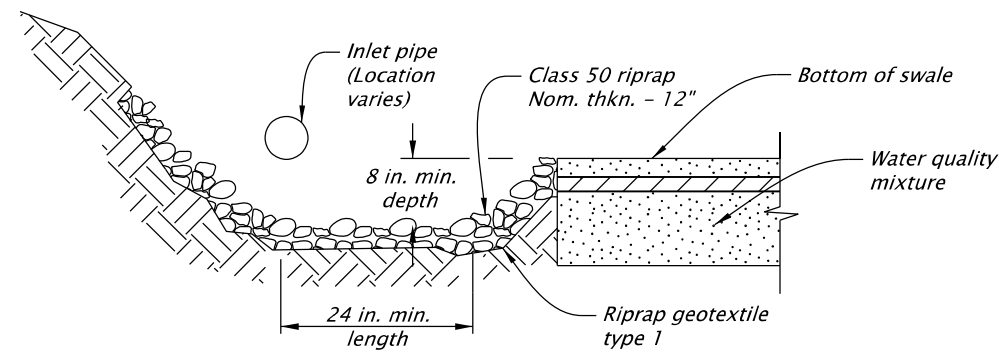
STORMWATER SWALE DETAILS

SHEET NO.
HA01

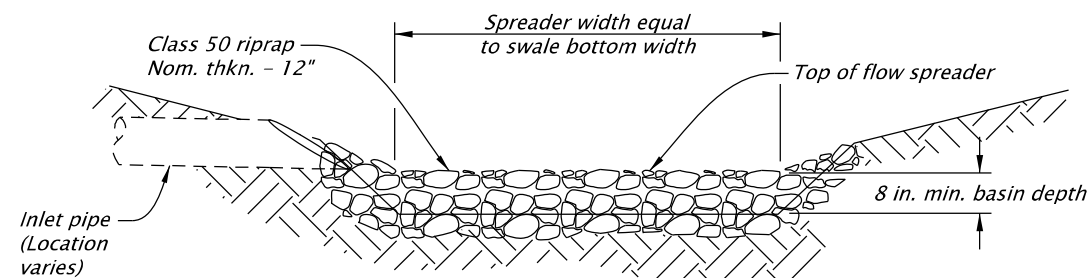
ROCK BASIN FLOW SPREADER



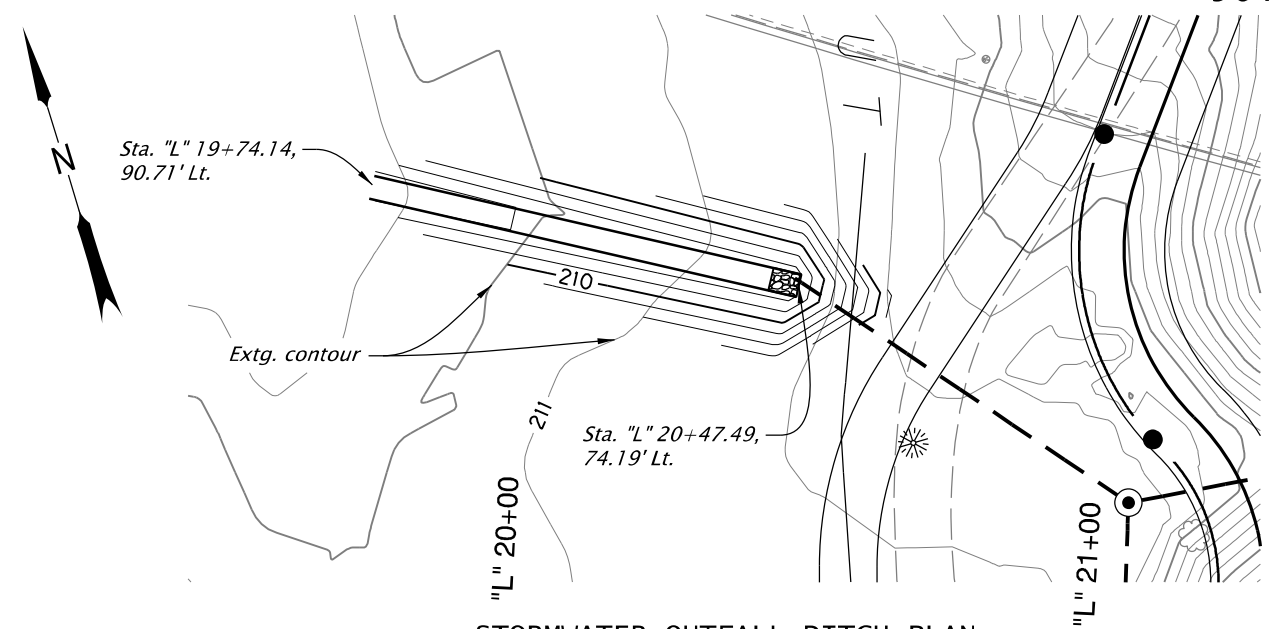
PLAN VIEW
NTS



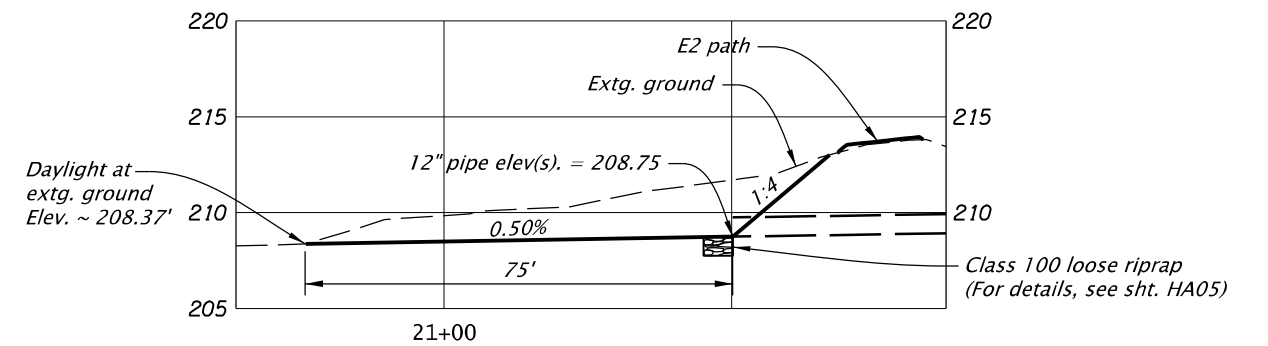
SECTION A-A
NTS



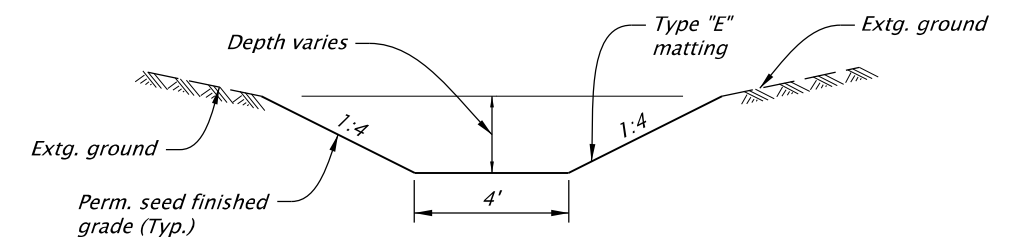
SECTION B-B
NTS



STORMWATER OUTFALL DITCH PLAN
NTS



STORMWATER OUTFALL DITCH PROFILE
NTS



STORMWATER OUTFALL DITCH SECTION
NTS

REGISTERED PROFESSIONAL
ENGINEER
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OREGON
JUNE 14, 2007
BENJAMIN P. WEWERKA
EXPIRES: 06/30/24

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OR34: VAN BUREN BRIDGE (CORVALLIS) PROJECT
CORVALLIS-LEBANON HWY.
BENTON - LINN COUNTIES

Designer: Scott Taylor Reviewer: Ben Wewerka, PE
Drafter: Serban Dinca Checker: Colton Fisher, PE

STORMWATER DITCH DETAILS SHEET NO. HA03