OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: July/2019

DFI No. D01213

Figure 1: DFI No. D01213, looking North

Identification

Drainage Facility ID (DFI):	D01213
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 52V-097
Location:	District: 11
	Highway No.: 019
	Mile Post: 130.40 to 130.43, [Left]

1. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions.

2. Facility Location

The location map on the next page details the facility location. The highway, mile posts, side streets, access location, and stormwater flow directions are noted on the map.

Facility location type: Roadway shoulder

Flow direction: West

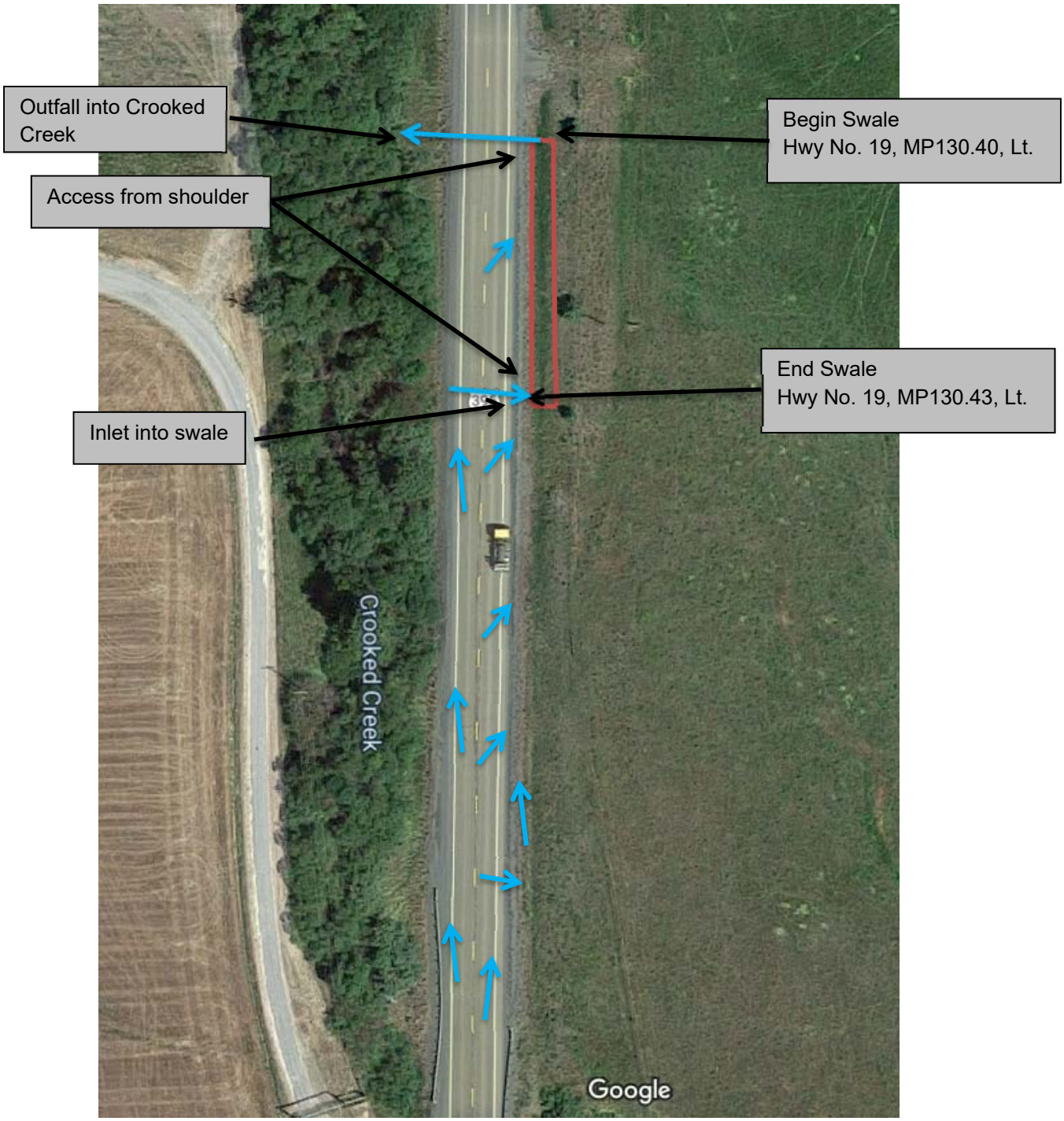


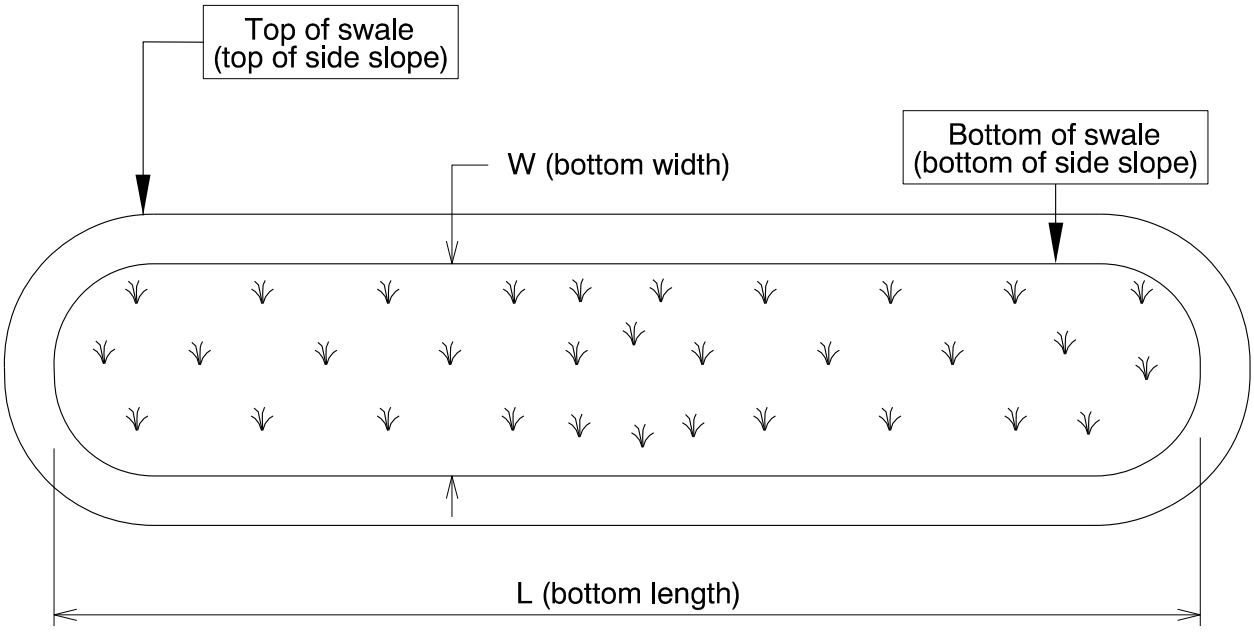
Figure 2: Facility location map

3. Facility Summary

The length and width of a swale is based on the bottom dimensions.

The bottom length and bottom width of the swale is:

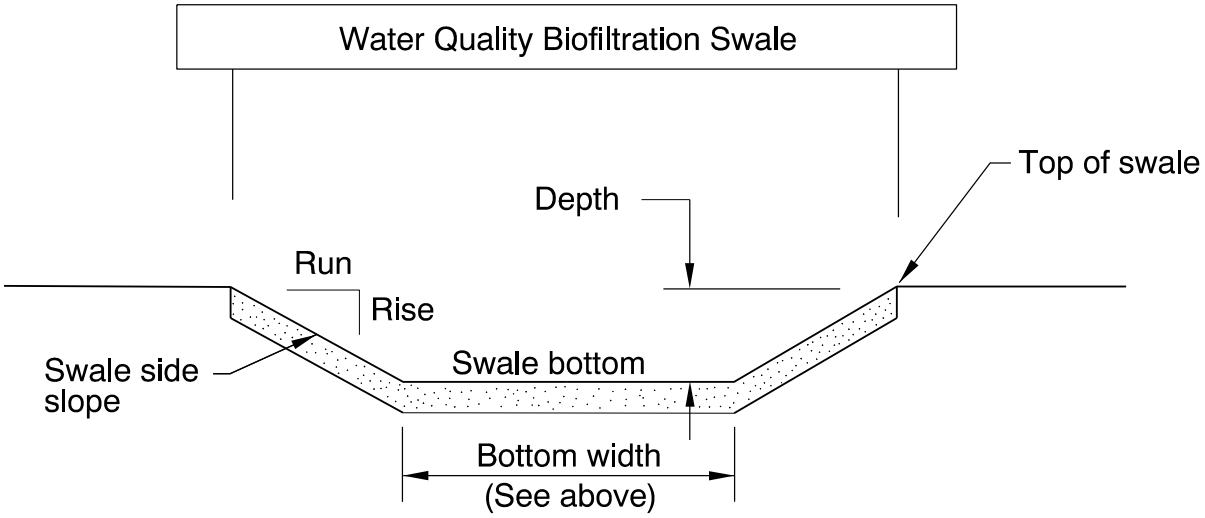
Bottom Length (feet)	Bottom Width (feet)
125	4



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)
2	1	4



Site Specific Information:

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 inlets	☒	**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: Riprap flow spreaders	☒	**S19**
Swale Outlet		
Catch basin with grate	☒	**S20**
Outlet Pipe (s)	☒	**S21**
Open channel outlet	☐	**S22**
Auxiliary Outlet:	☐	**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

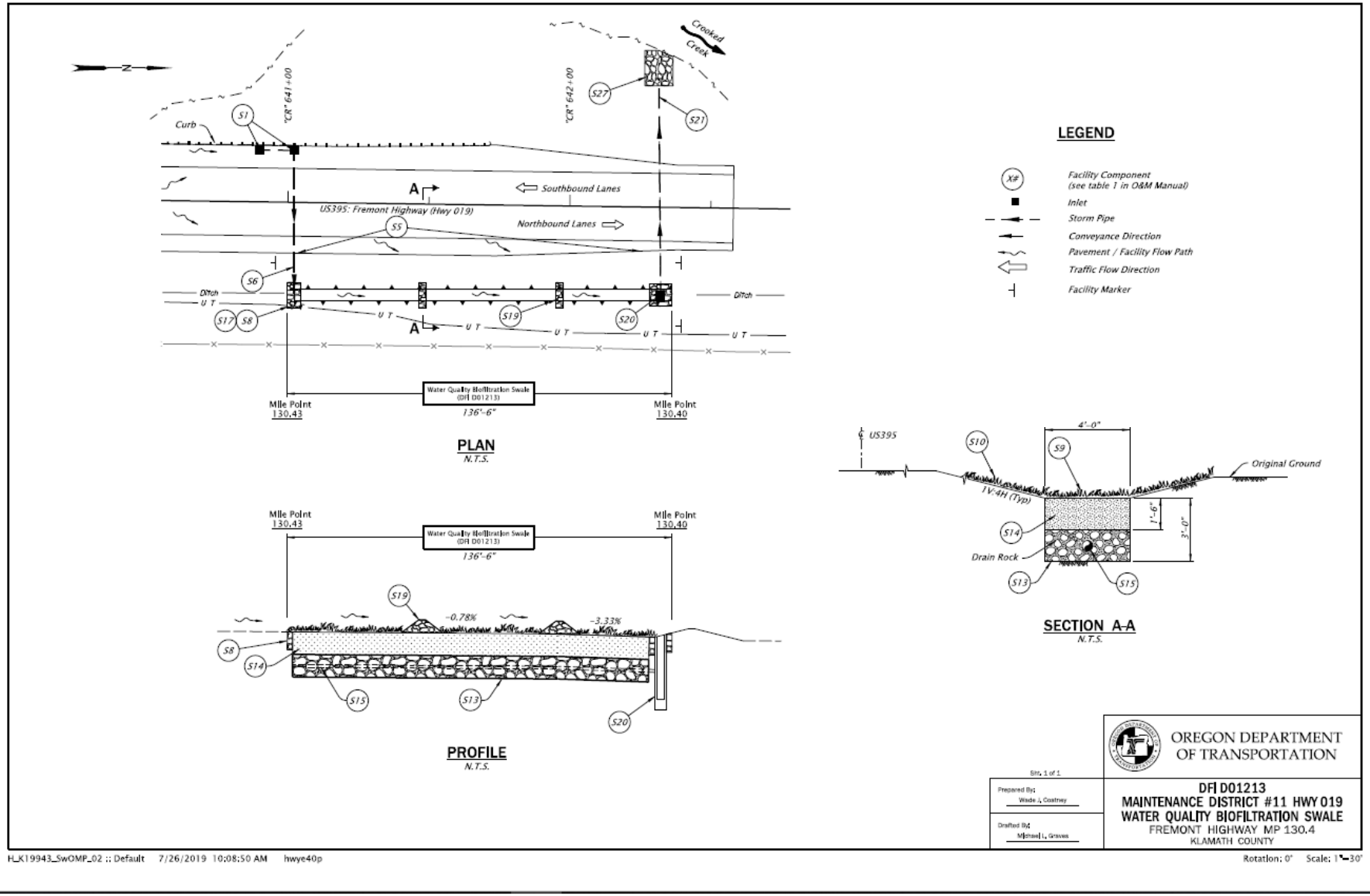
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT 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 D01213


N
"CR" 641+00
"CR" 642+00
Crooked Creek
Curb
S1
S27
S21
A
Southbound Lanes
US395: Fremont Highway (Hwy 019)
Northbound Lanes
S5
S6
Ditch
U T
S17
S8
S19
S20
Water Quality Biofiltration Swale
(DFI D01213)
136'-6"
Mile Point
130.43
Mile Point
130.40
PLAN
N.T.S.
-0.78%
-3.33%
PROFILE
N.T.S.
LEGEND
X#
Facility Component
(see table 1 in O&M Manual)
Inlet
Storm Pipe
Conveyance Direction
Pavement / Facility Flow Path
Traffic Flow Direction
Facility Marker
US395
S10
S9
4'-0"
Original Ground
1V:4H (Typ)
1'-6"
3'-0"
S14
Drain Rock
S13
S15
SECTION A-A
N.T.S.
OREGON DEPARTMENT
OF TRANSPORTATION
Sht. 1 of 1
Prepared By:
Wade A. Coatney
Drafted By:
Michael L. Graves
DFI D01213
MAINTENANCE DISTRICT #11 HWY 019
WATER QUALITY BIOFILTRATION SWALE
FREMONT HIGHWAY MP 130.4
KLAMATH COUNTY
H_K19943_SwOMP_02 :: Default 7/26/2019 10:08:50 AM hwye40p
Rotation: 0° Scale: 1"=30'

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 52V-097

52V-097

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

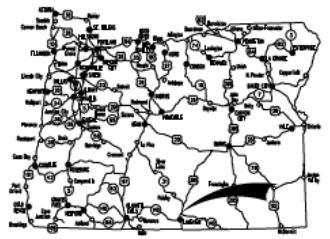
STATE OF OREGON
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, STRUCTURE & PAVING

US395: COGSWELL CREEK & CROOKED CREEK CULVERTS PROJECT

FREMONT HIGHWAY

LAKE COUNTY
SEPTEMBER 2019



Overall Length Of Project – 0.37 Miles

ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)

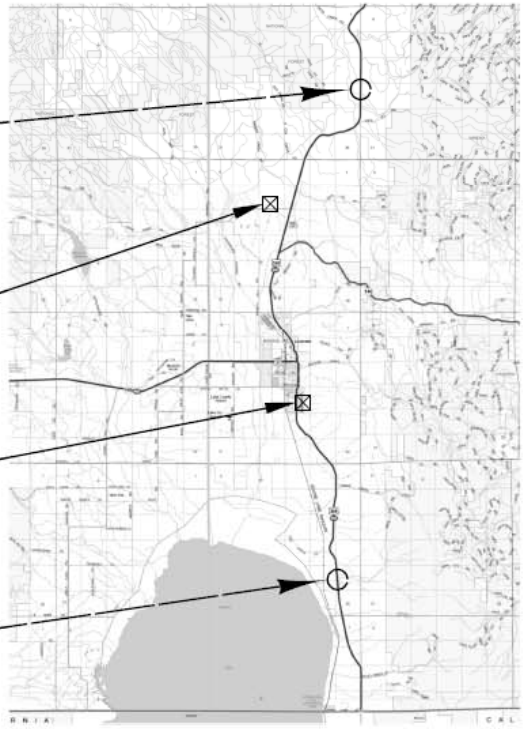
LET'S ALL
WORK TOGETHER
TO MAKE THIS
JOB SAFE

CROOKED CREEK
STA. "CR" 633+10 to STA. "CR" 642+58
M.P. 130.40 to M.P. 130.58

LAKE COUNTY LANDFILL
PROSPECTIVE DISPOSAL SITE
(M.P. 136.57)

KADRMAS QUARRY
PROSPECTIVE DISPOSAL SITE
(M.P. 145.07)

COGSWELL CREEK
STA. "CO" 432+40 to STA. "CO" 442+50
M.P. 152.26 to M.P. 152.45



N

T. 37 S., R. 20 E., W.M.
T. 37 S., R. 21 E., W.M.
T. 40 S., R. 20 E., W.M.

OREGON TRANSPORTATION COMMISSION

Tammy Baney	CHAIR
Bob Van Brocklin	COMMISSIONER
Alando Simpson	COMMISSIONER
Julie Brown	COMMISSIONER
Martin Callery	COMMISSIONER
Paul Mather	DEPUTY 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: [redacted]
Signature & date

Russel G. Frost, Interim Region 4 TCM
Print name and title

[redacted]
Concurrence by ODOT Chief Engineer

US395: COGSWELL CREEK & CROOKED CREEK CULVERTS PROJECT
FREMONT HIGHWAY
LAKE COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	S019(025)	A01

PE002760-000

R_K19943_ts_01.dgn :: Default 7/22/2019 9:56:50 AM hwye411

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

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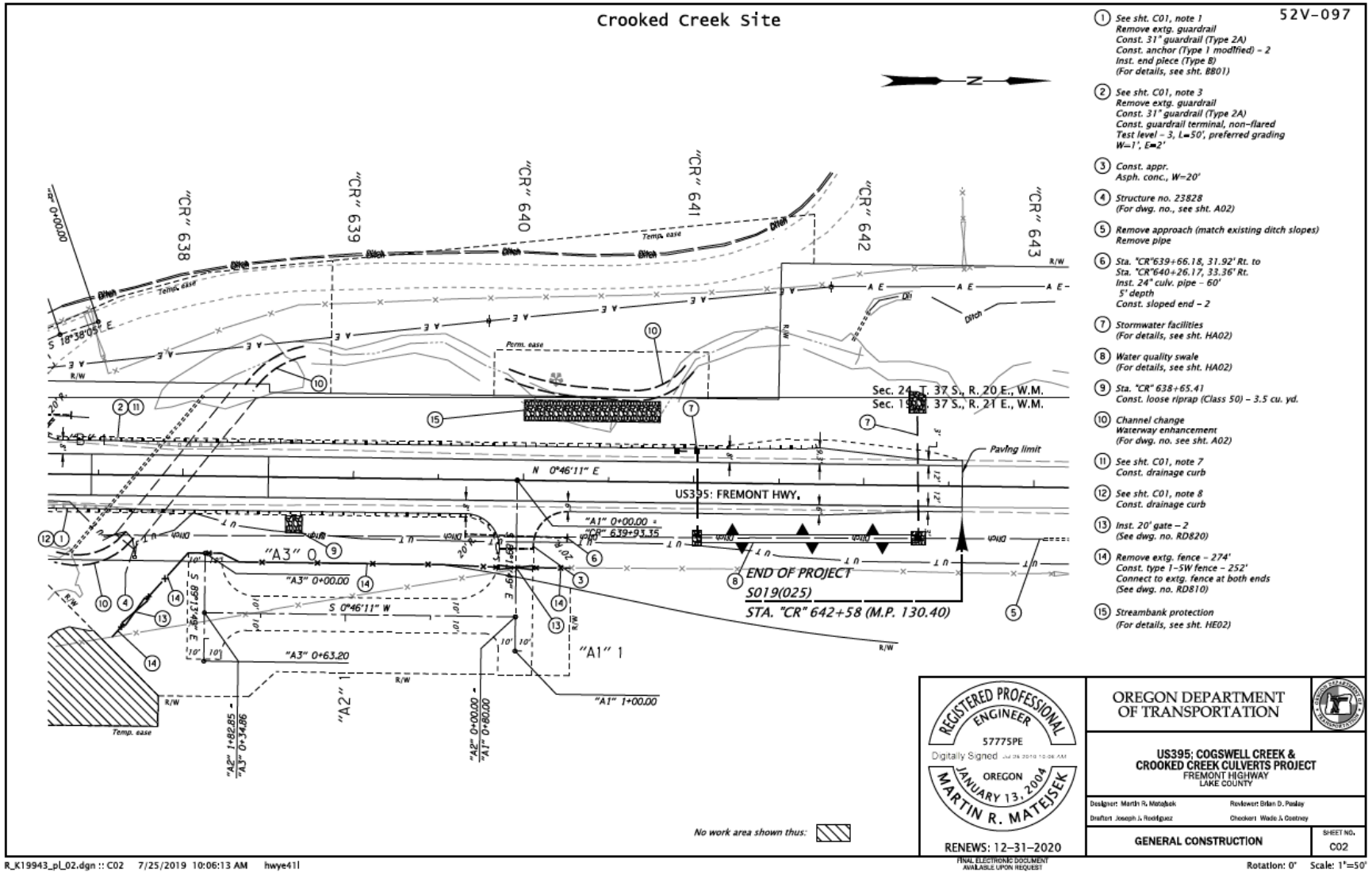
Crooked Creek Site
52V-097
N
"CR" 638
"CR" 639
"CR" 640
"CR" 641
"CR" 642
"CR" 643
Temp. ease
Ditch
Perm. ease
Sec. 24, T. 37 S., R. 20 E., W.M.
Sec. 19, T. 37 S., R. 21 E., W.M.
Paving limit
N 0°46'11" E
US395: FREMONT HWY.
"A1" 0+00.00 =
"CR" 639+93.35
"A3" 0
"A3" 0+00.00
S 0°46'11" W
"A3" 0+63.20
"A1" 1
"A2" 1
"A1" 1+00.00
"A2" 0+00.00 =
"A1" 0+60.00
"A2" 1+82.85 =
"A3" 0+34.86
END OF PROJECT
S019(025)
STA. "CR" 642+58 (M.P. 130.40)
Temp. ease
No work area shown thus:
1 See sht. C01, note 1
Remove extg. guardrail
Const. 31" guardrail (Type 2A)
Const. anchor (Type 1 modified) – 2
Inst. end piece (Type B)
(For details, see sht. BB01)
2 See sht. C01, note 3
Remove extg. guardrail
Const. 31" guardrail (Type 2A)
Const. guardrail terminal, non-flared
Test level – 3, L=50', preferred grading
W=1', E=2'
3 Const. appr.
Asph. conc., W=20'
4 Structure no. 23828
(For dwg. no., see sht. A02)
5 Remove approach (match existing ditch slopes)
Remove pipe
6 Sta. "CR"639+66.18, 31.92' Rt. to
Sta. "CR"640+26.17, 33.36' Rt.
Inst. 24" culv. pipe – 60'
5' depth
Const. sloped end – 2
7 Stormwater facilities
(For details, see sht. HA02)
8 Water quality swale
(For details, see sht. HA02)
9 Sta. "CR" 638+65.41
Const. loose riprap (Class 50) – 3.5 cu. yd.
10 Channel change
Waterway enhancement
(For dwg. no. see sht. A02)
11 See sht. C01, note 7
Const. drainage curb
12 See sht. C01, note 8
Const. drainage curb
13 Inst. 20' gate – 2
(See dwg. no. RD820)
14 Remove extg. fence – 274'
Const. type 1-5W fence – 252'
Connect to extg. fence at both ends
(See dwg. no. RD810)
15 Streambank protection
(For details, see sht. HE02)
REGISTERED PROFESSIONAL ENGINEER
57775PE
Digitally Signed
OREGON
JANUARY 13, 2004
MARTIN R. MATEISEK
RENEWS: 12-31-2020
FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST
OREGON DEPARTMENT OF TRANSPORTATION
US395; COGSWELL CREEK & CROOKED CREEK CULVERTS PROJECT
FREMONT HIGHWAY
LAKE COUNTY
Designer: Martin R. Mateisek
Reviewer: Brian D. Pasley
Drafter: Joseph J. Rodriguez
Checker: Wade A. Cootney
GENERAL CONSTRUCTION
SHEET NO. C02
R_K19943_pl_02.dgn :: C02 7/25/2019 10:06:13 AM hwye41l
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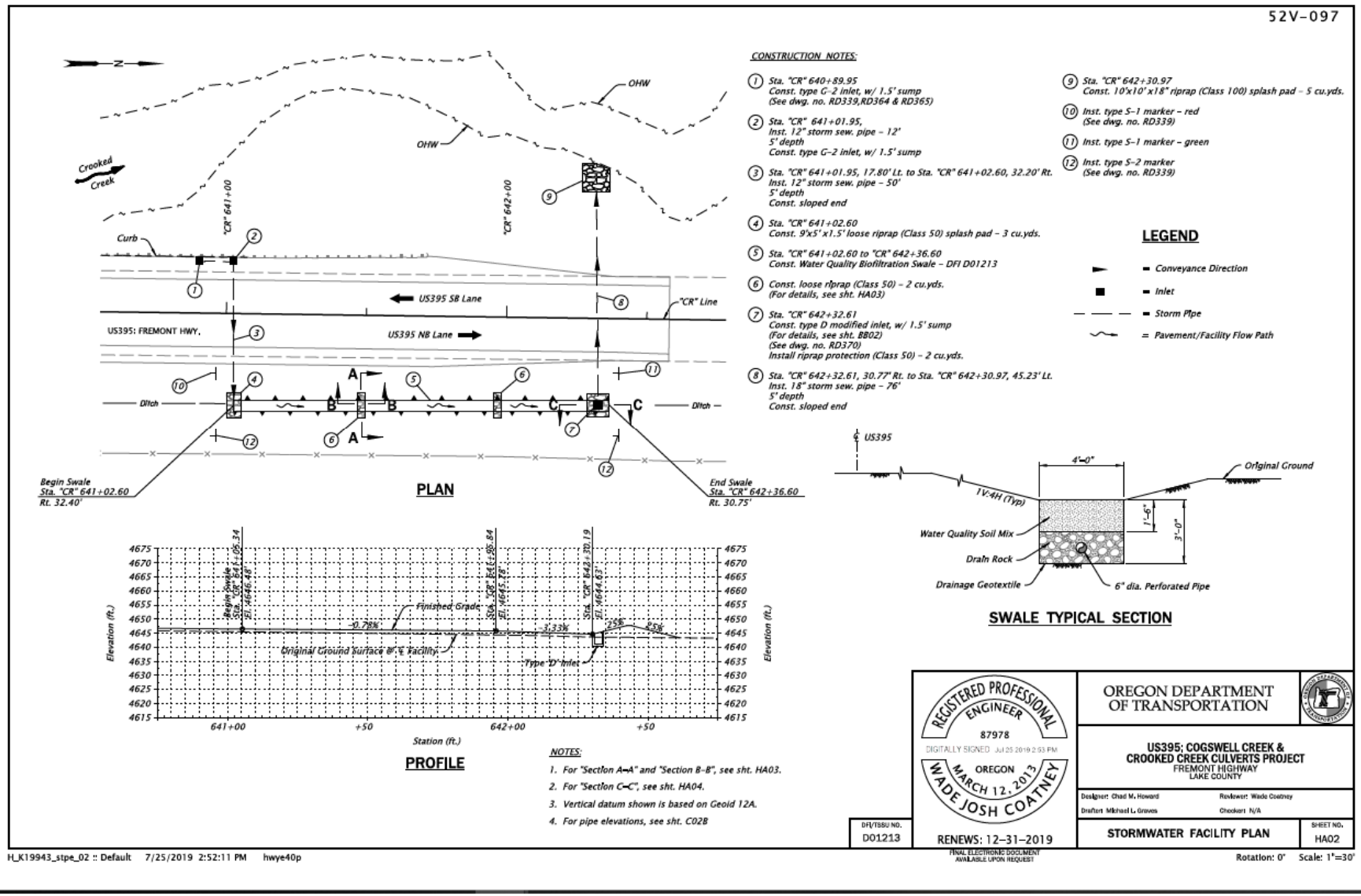
52V-097
CONSTRUCTION NOTES:
1 Sta. "CR" 640+89.95
Const. type G-2 inlet, w/ 1.5' sump
(See dwg. no. RD339,RD364 & RD365)
2 Sta. "CR" 641+01.95,
Inst. 12" storm sew. pipe - 12'
5' depth
Const. type G-2 inlet, w/ 1.5' sump
3 Sta. "CR" 641+01.95, 17.80' Lt. to Sta. "CR" 641+02.60, 32.20' Rt.
Inst. 12" storm sew. pipe - 50'
5' depth
Const. sloped end
4 Sta. "CR" 641+02.60
Const. 9'x5'x1.5' loose riprap (Class 50) splash pad - 3 cu.yds.
5 Sta. "CR" 641+02.60 to "CR" 642+36.60
Const. Water Quality Biofiltration Swale - DFI D01213
6 Const. loose riprap (Class 50) - 2 cu.yds.
(For details, see sht. HA03)
7 Sta. "CR" 642+32.61
Const. type D modified inlet, w/ 1.5' sump
(For details, see sht. BB02)
(See dwg. no. RD370)
Install riprap protection (Class 50) - 2 cu.yds.
8 Sta. "CR" 642+32.61, 30.77' Rt. to Sta. "CR" 642+30.97, 45.23' Lt.
Inst. 18" storm sew. pipe - 76'
5' depth
Const. sloped end
9 Sta. "CR" 642+30.97
Const. 10'x10'x18" riprap (Class 100) splash pad - 5 cu.yds.
10 Inst. type S-1 marker - red
(See dwg. no. RD339)
11 Inst. type S-1 marker - green
12 Inst. type S-2 marker
(See dwg. no. RD339)
LEGEND
= Conveyance Direction
= Inlet
= Storm Pipe
= Pavement/Facility Flow Path
N
OHW
Crooked Creek
"CR" 641+00
"CR" 642+00
Curb
US395 SB Lane
"CR" Line
US395: FREMONT HWY.
US395 NB Lane
Ditch
Begin Swale
Sta. "CR" 641+02.60
Rt. 32.40'
End Swale
Sta. "CR" 642+36.60
Rt. 30.75'
PLAN
Begin Swale Sta. "CR" 641+02.60 El. 4646.48'
Sta. "CR" 641+95.84' El. 4645.78'
Sta. "CR" 642+30.19' El. 4644.63'
Finished Grade
-0.78%
-3.33%
25%
5%
Original Ground Surface @ ± Facility
Type 'D' Inlet
Elevation (ft.)
Station (ft.)
641+00
+50
642+00
+50
PROFILE
NOTES:
1. For "Section A-A" and "Section B-B", see sht. HA03.
2. For "Section C-C", see sht. HA04.
3. Vertical datum shown is based on Geoid 12A.
4. For pipe elevations, see sht. C02B
℄ US395
4'-0"
Original Ground
1V:4H (Typ)
Water Quality Soil Mix
Drain Rock
Drainage Geotextile
1'-6"
3'-0"
6" dia. Perforated Pipe
SWALE TYPICAL SECTION
REGISTERED PROFESSIONAL ENGINEER
87978
DIGITALLY SIGNED Jul 25 2019 2:53 PM
OREGON
MARCH 12, 2013
WADE JOSH COATNEY
RENEWS: 12-31-2019
FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST
OREGON DEPARTMENT OF TRANSPORTATION
US395: COGSWELL CREEK & CROOKED CREEK CULVERTS PROJECT
FREMONT HIGHWAY
LAKE COUNTY
Designer: Chad M. Howard
Reviewer: Wade Coatney
Drafter: Michael L. Graves
Checker: N/A
STORMWATER FACILITY PLAN
SHEET NO. HA02
DR/TSSU NO. D01213
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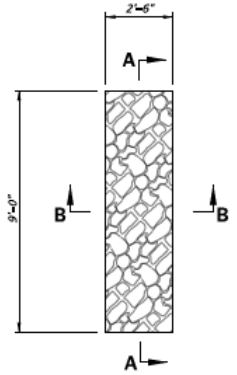
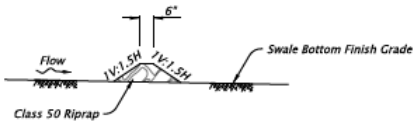
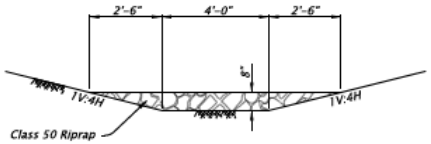
52V-097



PLAN



SECTION B-B



SECTION A-A

RIPRAP FLOW SPREADER

REGISTERED PROFESSIONAL ENGINEER
87978
DIGITALLY SIGNED Jul 23 2019 4:38 PM
OREGON
MARCH 12, 2013
WADE JOSH COATNEY
RENEWS: 12-31-2019
FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

OREGON DEPARTMENT OF TRANSPORTATION

US395; COGSWELL CREEK & CROOKED CREEK CULVERTS PROJECT
FREMONT HIGHWAY
LAKE COUNTY

Designer: Chad M. Howard | Reviewer: Wade Coatney
Drafter: Mikhael L. Graves | Checker: N/A

DFI/TSSU NO. D01213

DETAILS

SHEET NO. HA03

H_K19943_stdt_01 :: Default 7/23/2019 4:37:09 PM hwye40p

Rotation: 0° Scale: 1/4"=1'-0"