OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: May 2018

DFI No. D00002

Figure 1: DFI No. D00002, looking north

Identification

Drainage Facility ID (DFI):	D00002
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 43V-098
Location:	District: 08
	Highway No.: 025
	Mile Post: 10.76-10.80, 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, side streets, access location, and stormwater flow directions are noted on the map.

Facility location type: Roadway shoulder

Flow direction: north

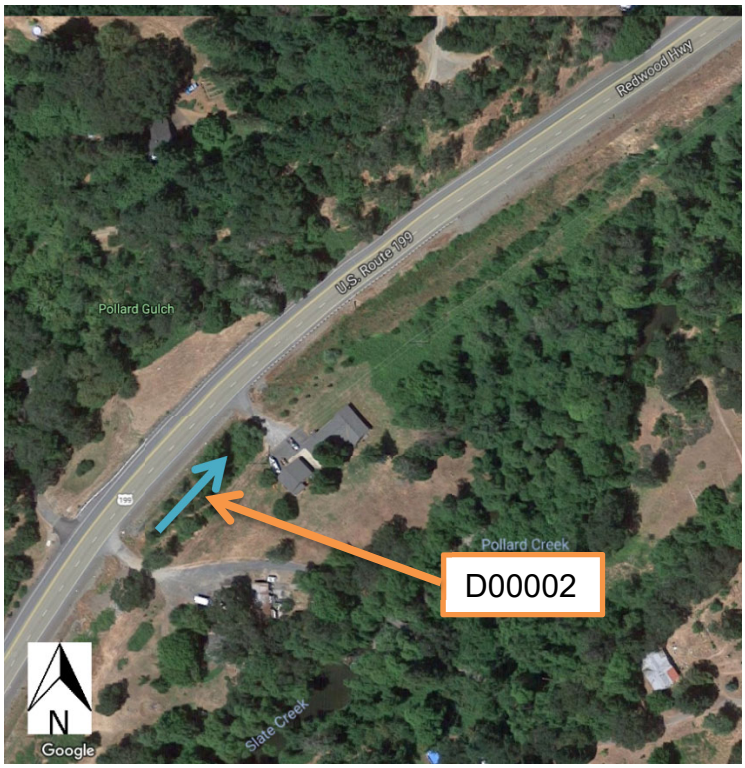


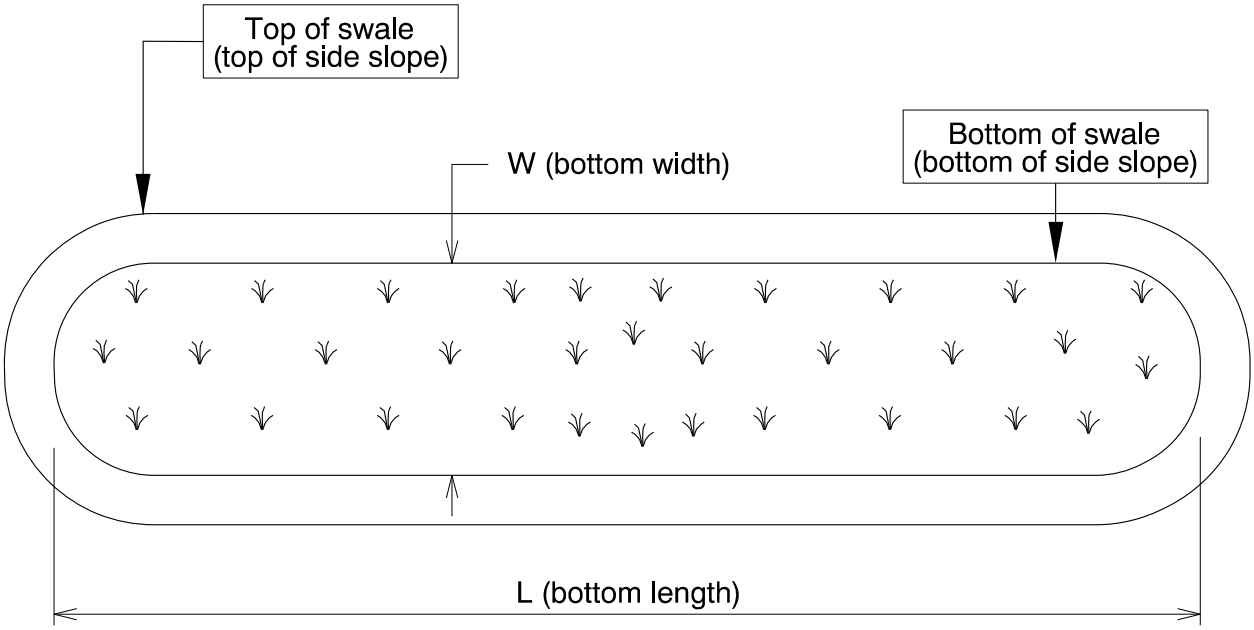
Figure 2: Facility location map with flow direction

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:

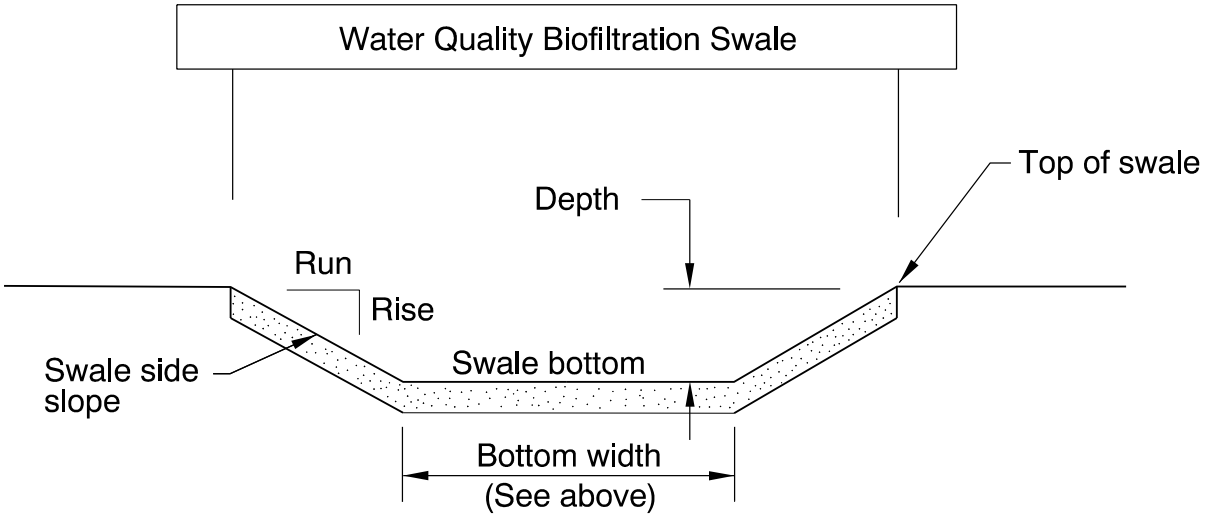
Bottom Length (feet)	Bottom Width (feet)
210	5



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)
0.5	**1**	**L: 2** **R: 4**



Site Specific Information: D00002 is a typical swale with the exception of a steeper slope on the left side.

4. Facility Access

Maintenance access to the facility:

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

Figure 3: Roadside pad adjacent to DFI D00001, just south of D00002

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: Standard Curb	☒	**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

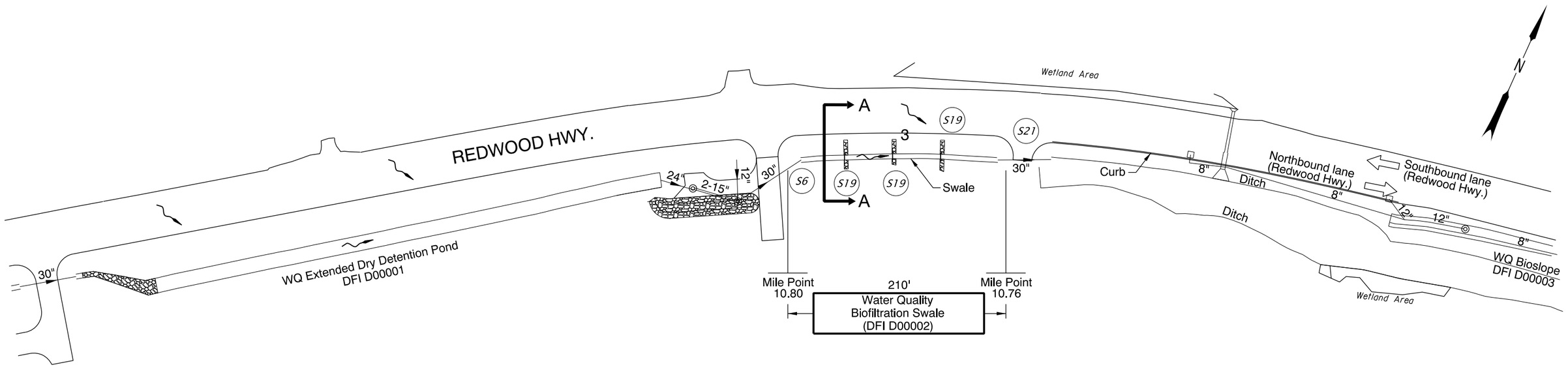
Contact any of the following for more detailed information about management of waste materials found on site:

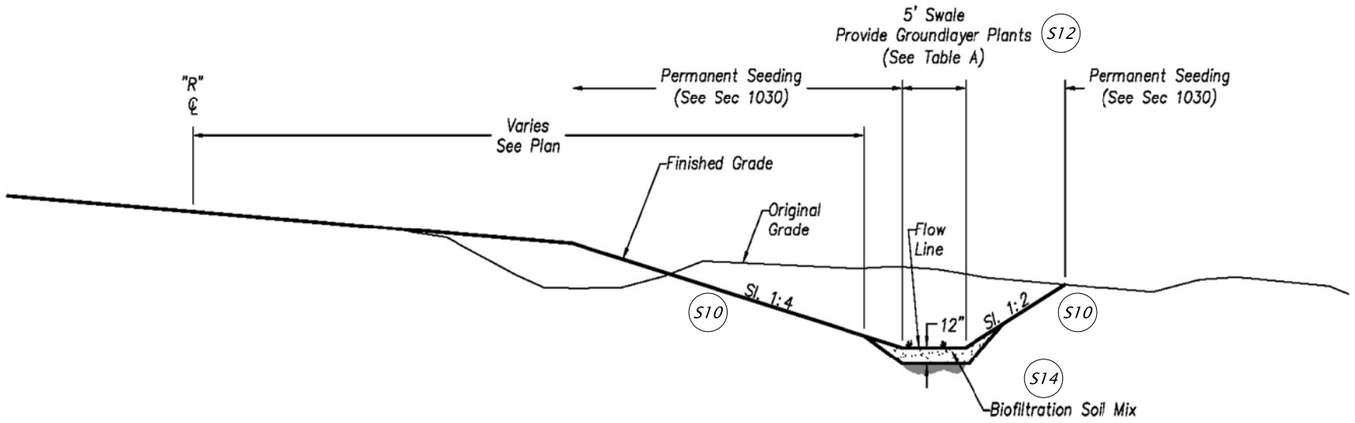
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442
ODOT Region 1 Hazmat Coordinator	(503) 731-8290
ODOT Region 2 Hazmat Coordinator	(503) 986-2647
ODOT Region 3 Hazmat Coordinator	(541) 957-3594
ODOT Region 4 Hazmat Coordinator	(541) 388-6186
ODOT Region 5 Hazmat Coordinator	(541) 963-1590
ODEQ Northwest Region Office	(503) 229-5263

A Appendix A – Site Specific Operational Plan

Contents:

Operational Plan: DFI D00002





SECTION A-A
N.T.S.

LEGEND:

X#	Facility Component (see table 1 in O&M Manual)
◉ and/or ◎	Manhole
■ and/or □	Inlet
———	Storm Pipe (Facility)
———	Storm Pipe
◄	Conveyance Direction
◄~	Pavement / Facility Flow Path
⇦	Traffic Flow Direction

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Jaime Jordan

Drafted By: Judy Hardin

DFI D00002
MAINTENANCE DISTRICT 8 HWY 25
WATER QUALITY BIOFILTRATION SWALE
REDWOOD HIGHWAY MP 10.80-10.76
JOSEPHINE COUNTY

DFI_D00002.dgn :: Sheet 11/27/2018 5:56:03 PM hwyr33e

DFI_D00002.dgn

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 43V-098

43V-098

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd. & Std. Drg. Nos.

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

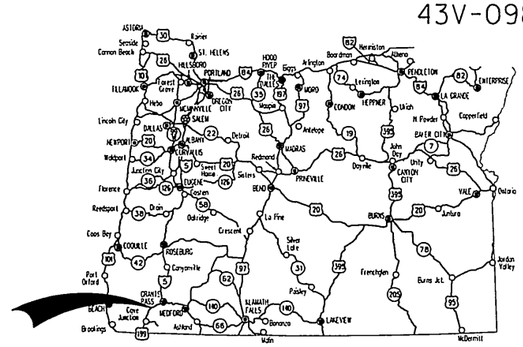
PLANS FOR PROPOSED PROJECT

GRADING, PAVING, DRAINAGE & SIGNING

US 199: PASSING LANE (JOSEPHINE COUNTY)

REDWOOD HIGHWAY

JOSEPHINE COUNTY
MARCH 2010

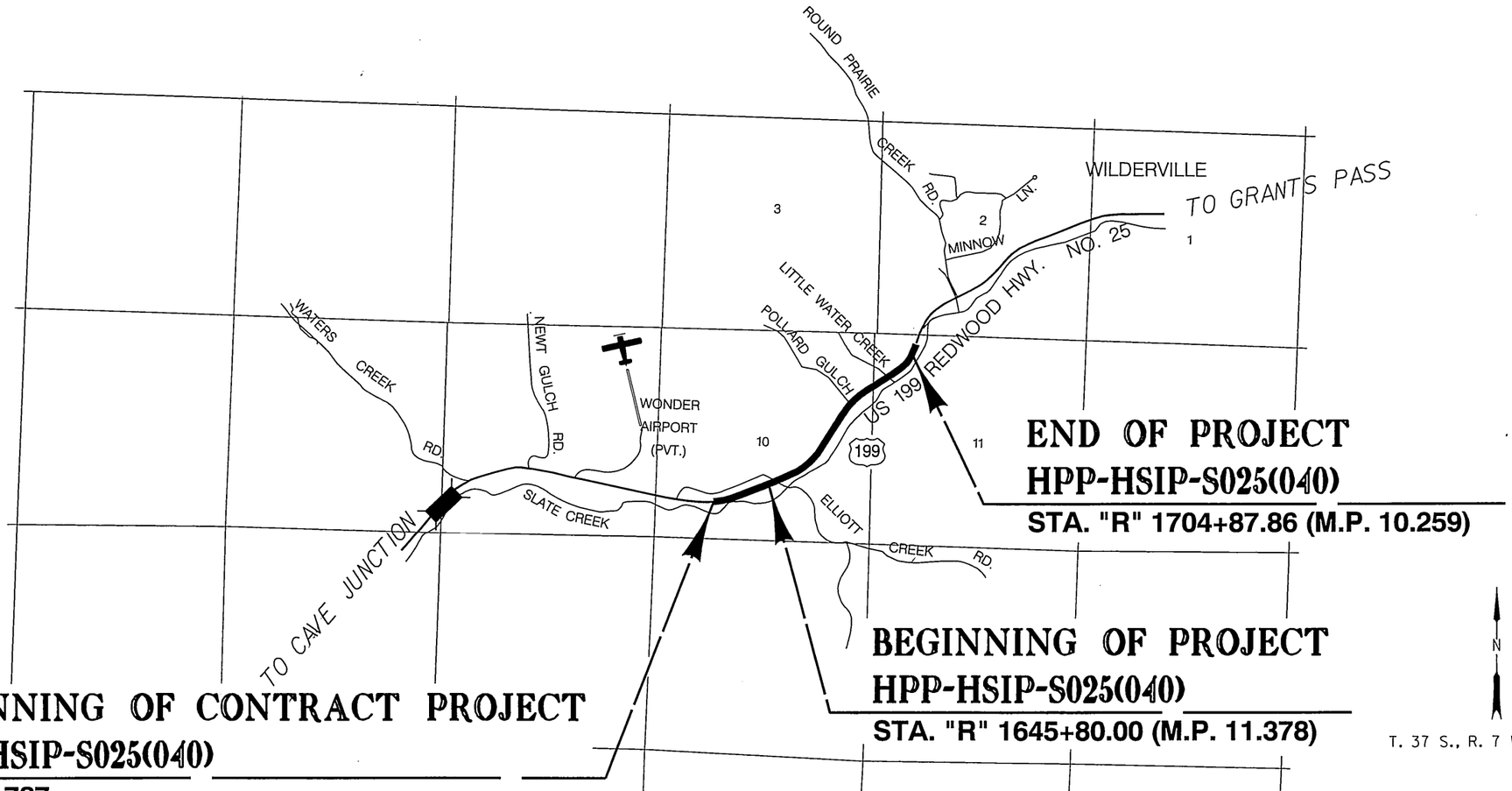


Overall Length Of Project - 1.53 Miles

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



BEGINNING OF CONTRACT PROJECT
HPP-HSIP-S025(040)
M.P. 11.787

END OF PROJECT
HPP-HSIP-S025(040)
STA. "R" 1704+87.86 (M.P. 10.259)

BEGINNING OF PROJECT
HPP-HSIP-S025(040)
STA. "R" 1645+80.00 (M.P. 11.378)

N

T. 37 S., R. 7 W., W.M.

OREGON TRANSPORTATION COMMISSION

Gail Achterman	CHAIR
Michael Nelson	VICE-CHAIR
Janice Wilson	COMMISSIONER
Alan Brown	COMMISSIONER
David Lohman	COMMISSIONER
Matthew L. Garrett	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 12-22-09

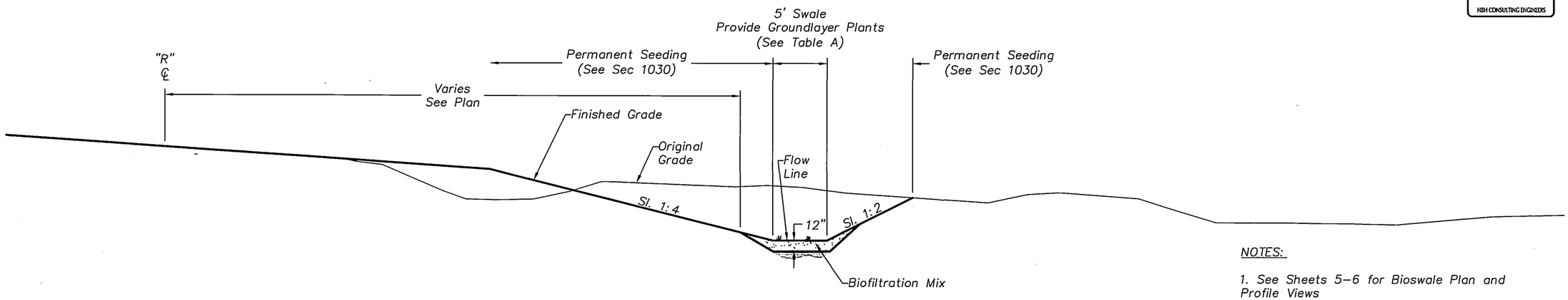
MARK THOMPSON, TECH CENTER MGR
Print name and title

_____
Concurrence by ODOT Chief Engineer

US 199: PASSING LANE (JOSEPHINE COUNTY)
REDWOOD HIGHWAY
JOSEPHINE COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	HPP-HSIP-S025(040)	1

43V-098
HBH CONSULTING ENGINEERS



TYPICAL BIOSWALE SECTION

Not To Scale

STA. "R" 1675+82 To STA. "R" 1677+88

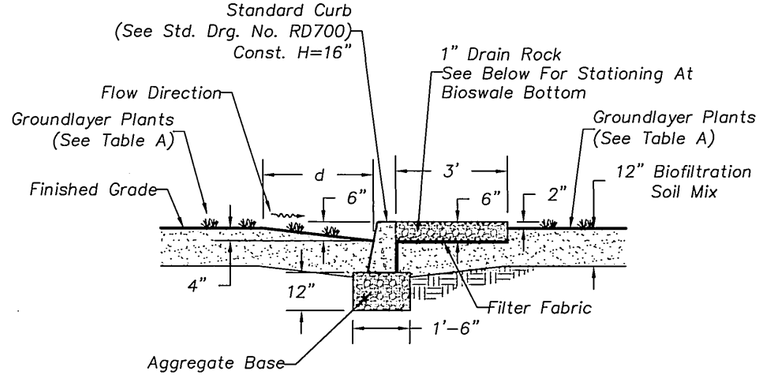
NOTES:

1. See Sheets 5–6 for Bioswale Plan and Profile Views
2. See Special Provision Section 1092 for Biofiltration Soil Mix

TABLE A

ACCEPTABLE GROUNDLAYER PLANTS

SCIENTIFIC NAME	COMMON NAME	TYPE	DENSITY	QUANTITY
Carex Densa	*Dense Sedge*	*Plugs*	*2/sq.ft.*	*2060*
Eleocharis Palustris	*Common Spikebrush*	*Plugs*	*2/sq.ft.*	*2060*
Juncus Tenuis	*Poverty Rush*	*Plugs*	*2/sq.ft.*	*2060*
Mimulus Guttatus	*Seep Monkeyflower*	*Plugs*	*2/sq.ft.*	*2060*
		TOTAL	*8/sq.ft.*	*8240*



LEVEL SPREADER DETAIL

Not To Scale

STA. "R" 1676+32 , d = 31.76'
"R" 1676+82, d = 31.63'
"R" 1677+32, d = 31.63'

NOTES:

1. Level Spreader Shall be Spaced at 50' Max. Intervals – 3 Each
2. Curbs Shall be Constructed Level
3. Curbs Shall be Extended a Min. of 3' into Sideslopes.
4. Sideslopes at Level Spreaders Shall be Reinforced Locally with Class 50 Riprap
5. Transverse Construction Joints Shall Be Spaced Not More Than 10' Apart With a Depth of at Least One Fourth of the Cross Sectional Area

REGISTERED PROFESSIONAL ENGINEER
65498PE
OREGON
JANUARY 10, 2006
JAIME LEE JORDAN
RENEWS: 06/30/11

OREGON DEPARTMENT OF TRANSPORTATION

H B H Consulting Engineers
4497 Brownridge Terrace, Suite 202
Medford, Oregon 97504
541/779-5216 fax 541/776-7376

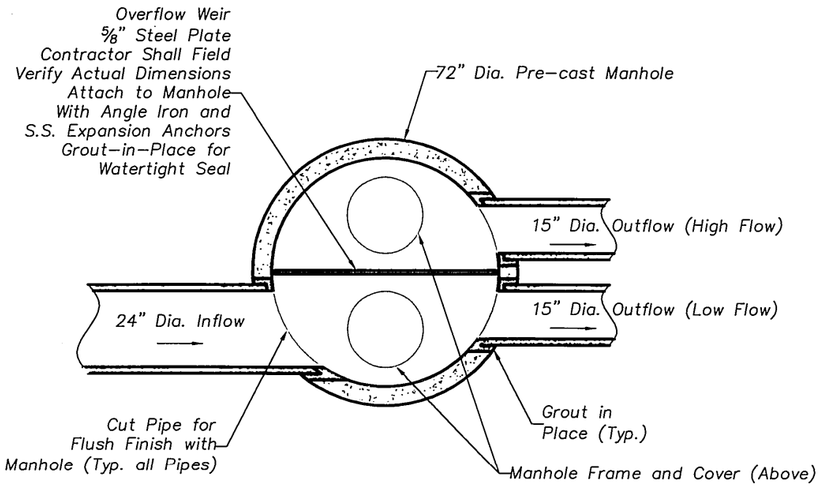
US 199: PASSING LANE (JOSEPHINE COUNTY)
REDWOOD HIGHWAY
JOSEPHINE COUNTY

Design Team Leader - Chris Zelmer (ODOT)
Designed By - Neil Burgess (HBH)
Drafted By - Neil Burgess (HBH)

DETAILS

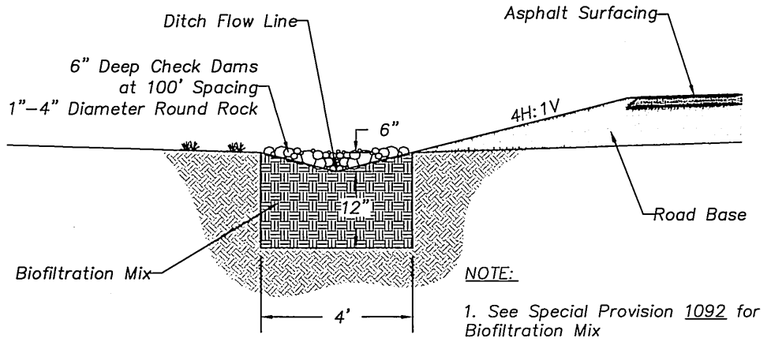
SHEET NO. 2B-8

43V-098
HBH CONSULTING ENGINEERS



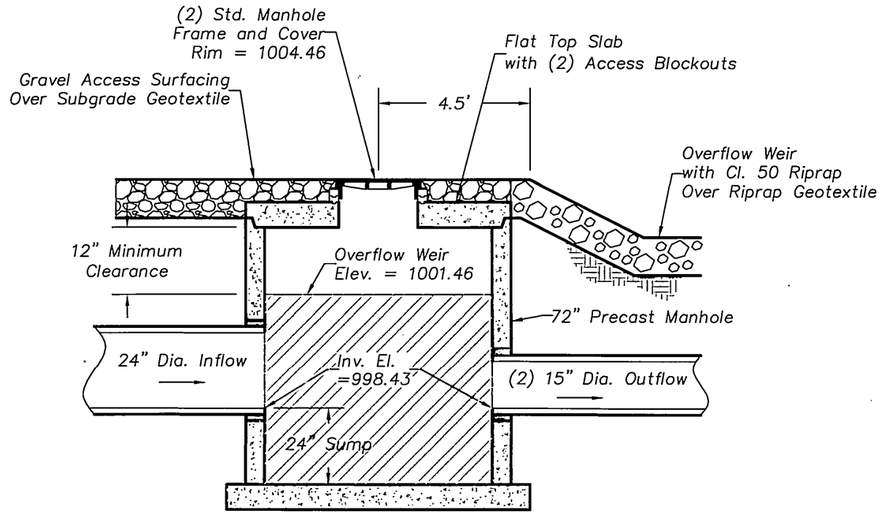
OUTLET CONTROL MANHOLE PLAN

Not To Scale



BIOFILTRATION CHECK DAM SECTION

Not To Scale



OUTLET CONTROL MANHOLE SECTION

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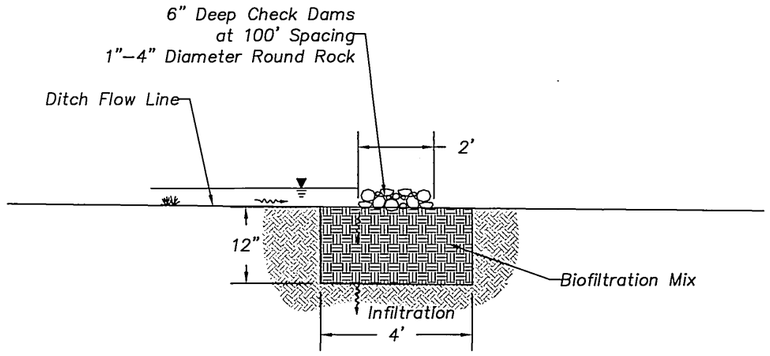


BIOFILTRATION CHECK DAM PROFILE

Not To Scale

REGISTERED PROFESSIONAL ENGINEER
65498PE
OREGON
JANUARY 10, 2006
JAIME LEE JORDAN
RENEWS: 06/30/11

OREGON DEPARTMENT OF TRANSPORTATION

H B H Consulting Engineers
4497 Brownridge Terrace, Suite 202
Medford, Oregon 97504
541/779-5216 fax 541/776-7376

US 199: PASSING LANE (JOSEPHINE COUNTY)
REDWOOD HIGHWAY
JOSEPHINE COUNTY

Design Team Leader - Chris Zelmer (ODOT)
Designed By - Nell Burgess (HBH)
Drafted By - Nell Burgess (HBH)

DETAILS

SHEET NO. 2B-11

Sec. 10D & 10A, T. 37 S, R. 7W, W.M.

43V-098

STA. "R" 1668+02.00 = STA. "D2" 10+00.00

Extg. fiber line abandoned in place

"R" 1670

"R" 1671+92.61 P.S.

"R" 1671+90.49 P.I.

"R" LINE

"R" 1674+39.61 P.S.C.

"R" 1675

Paving limit

R/W

REDWOOD HWY.

STA. "R" 1675+48.00 = STA. "D3" 10+00.00

Aerial fiber optics follows aerial electric from Sta. "R" 1653+00 to Sta. "R" 1705+70

"D2" 10+78.82 P.C.

Slope catch line

22' +44 Gravel

22' +02 Asph. conc. +02 Gravel

"D2" 11+27.52 P.T.

Wetland permanently filled or excavated

Paving limit

"D2" LINE

Slope catch line

"D3" 11+41.15

Paving limit

+48 Asph. conc. +48 Gravel

"D3" LINE

SCALE 1" = 100'

50 0 100 200

FEET

"R" LINE

1020 1015 1010 1005 1000 995

From +59.71, 27.38' Lt. to +64.32, 50.06' Rt.
24" Culvert - 78'
Sl. 1.52%
F.L. 1006.35 Lt., 1005.17 Rt.

Profile Grade @ ℄

1005.12 @ +74.07

-0.83%

30" - 58'

1004.64 @ +48.52

-0.88%

1004.49 @ +31.82

-10.66%

999.00 @ +00.00

Finish Grade @ Flow Line Of Ditch, Rt.

-0.10%

+68.5 Outlet control manhole

+68.00, F.L. 998.43

998.46 @ +35.17

-0.1% -0.1%

24" - 34.4'
+68.14, F.L. 998.43
+68.82, F.L. 998.43
(2) 15" - 46.6'
+13.36, F.L. 998.40

+13.67 Manhole with inlet

+13.67
12" Culvert - 42.4'
Sl. 2.17%
F.L. 999.32 Lt., 998.40 Rt.

+13.67, F.L. 998.40
+13.99, F.L. 998.40

Culvert
30" - 76.7', Sl. 0.31%

998.16 @ +83.21

STA. 1666+00 To STA. 1677+00 Exc. 5176 C.Y.

Emb. 1883 C.Y.

1670+00

1675+00

Wetland permanently filled or excavated shown thus:

NO WORK ZONE shown thus:

Remove pipe shown thus:

Construct ditch flat bottom shown thus:

Limits of wetland:

Rev. No.	Description	Engineer
1	Chg'd Exc. & Emb. amounts Revised on 2-24-10	CZ

REGISTERED PROFESSIONAL ENGINEER 63,243 OREGON JULY 9, 2001 CHRIS R. ZELMER

EXPIRES: June-30-2010

OREGON DEPARTMENT OF TRANSPORTATION

REGION 3 - TECHNICAL CENTER

US 199: PASSING LANE (JOSEPHINE COUNTY)
REDWOOD HIGHWAY
JOSEPHINE COUNTY

Design Team Leader - Chris Zelmer
Designed By - Nelly Salazar Lazaro
Drafted By - Judy Hardin

ALIGNMENT AND GENERAL CONSTRUCTION

SHEET NO. 5

F:\ODOT_DATA\PROJECTS\13823_Hwy199_Passing_Lanes\05_MylarRevI\13823revI.pli :: Default 2/24/2010 1:48:53 PM hwye32o

1:1200 - 05

(1) *Sta. "R" 1667+59.71, 27.38' Lt. to*
Sta. "R" 1667+64.32, 50.06' Rt.
Inst. 24" culv. pipe - 78'
5' depth
S = 0.0152'/Ft.
I.E. (24" In) = 1006.35 (Lt.)
I.E. (24" Out) = 1005.17 (Rt.)
Const. slope ends
Trench resurfacing - 35 sq. yd.
(Trench backfill class E)

(2) *Sta. "R" 1668+02, Rt.*
Const. asph. conc. dwy. Type "A-1"
(For details, see sht. 2B-2)

(3) *Sta. "R" 1668+02.0, Rt.*
Const. gravel appr., w=22'
(For details, see sht. 2B-2)

(4) *Sta. "R" 1667+74.07, 52.47' Rt. to*
Sta. "R" 1668+31.82, 53.10' Rt.
Inst. 30" culv. pipe - 58'
5' depth
S = 0.0083'/Ft.
I.E. (30" In) = 1005.12
I.E. (30" Out) = 1004.64
Const. slope ends

(5) *Sta. "R" 1675+48.0, Rt.*
Const. asph. conc. dwy. Type "A-1"
(For details, see sht. 2B-3)

(6) *Sta. "R" 1675+48.0, Rt.*
Const. gravel appr., w=22'
(For details, see sht. 2B-3)

(7) *Sta. "R" 1675+13.67, 92.61' Rt. to*
Sta. "R" 1675+83.21, 54.99' Rt.
Inst. 30" culv. pipe - 77'
5' depth
S = 0.0031'/Ft.
I.E. (30" In) = 998.40
I.E. (30" Out) = 998.16
Const. slope end

(8) *Sta. "R" 1669+00.00 to Sta. "R" 1675+00.00, Rt.*
Const. detention pond
(For details, see shts. 2A, 2B-10)

(9) *Sta. "R" 1675+82.00 to Sta. "R" 1677+88.00, Rt.*
Const. bioswale
(For details, see shts. 2A, 2B-8)

(10) *Sta. "R" 1668+38.52 to*
Sta. "R" 1669+10.00, Rt.
Const. loose riprap (Class 50) - 26 cu. yd.
Riprap geotextile type 1 - 79 sq. yd.

(11) *Const. detention pond outlet control and overflow weir*
(For details, see shts. 2B-9, 2B-10, 2B-11, 2B-13)

(12) *Sta. "R" 1675+67.62, Rt.*
Inst. S2 marker
(For details, see sht. 2B-15)

(13) *Const. biofiltration check dam - 3*
(For details, see sht. 2B-11)

(14) *Sta. "R" 1674+67.5, Rt.*
Const. gravel appr., w=15'
(For details, see shts. 2B-9, 2B-11)

(15) *Relocate telephone riser on concrete pad by others*

(16) *Relocate concrete pad for telephone riser by others*

(17) *Sta. "R" 1676+32.00, Rt. to Sta. "R" 1676+82.00, Rt.*
Const. level spreaders - 2
(For details, see sht. 2B-8)

(18) *Sta. "R" 1668+21.82, Rt.*
Inst. red S1 marker
(For details, see sht. 2B-15)

(19) *Sta. "R" 1668+21.82, Rt.*
Inst. S2 marker
(For details, see sht. 2B-15)

REGISTERED PROFESSIONAL ENGINEER
63,243
OREGON
JULY 9, 2001
CHRIS R. ZELMER
EXPIRES: June-30-2010

OREGON DEPARTMENT OF TRANSPORTATION

REGION 3 - TECHNICAL CENTER

US 199: PASSING LANE (JOSEPHINE COUNTY)
REDWOOD HIGHWAY
JOSEPHINE COUNTY

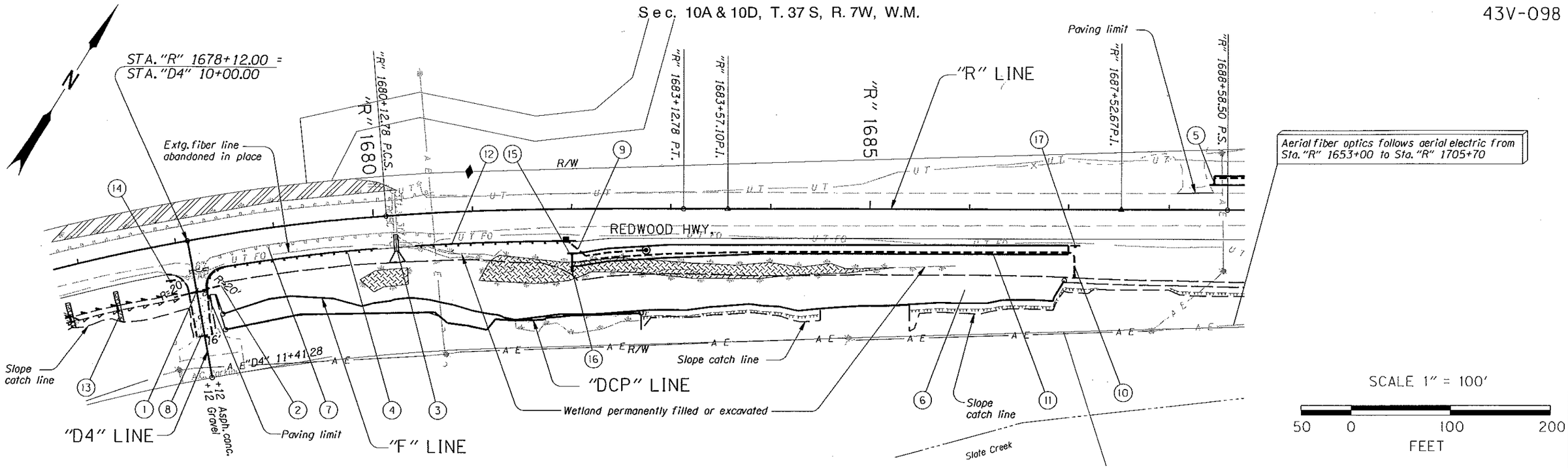
Design Team Leader - Chris Zelmer
Designed By - Nelly Salazar Lazaro
Drafted By - Judy Hardin

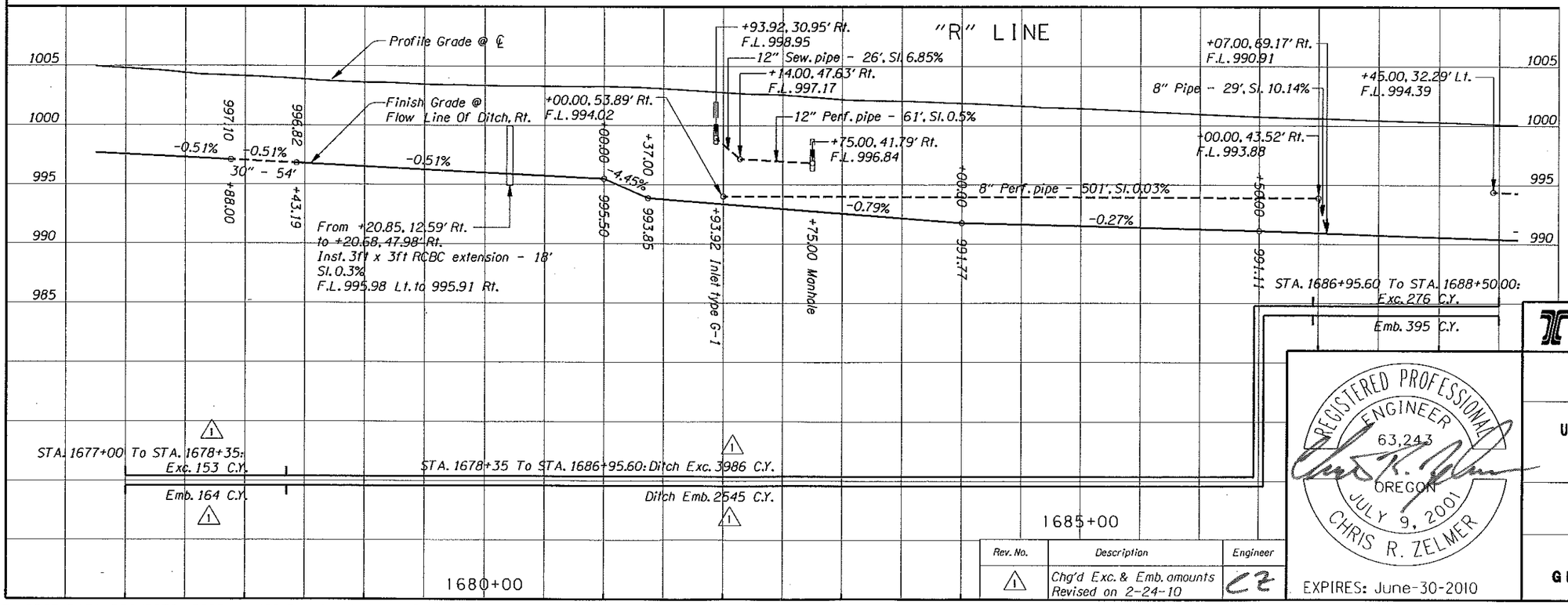
ALIGNMENT AND GENERAL CONSTRUCTION

SHEET NO. 5A

43V-098

Sec. 10A & 10D, T. 37 S, R. 7W, W.M.





Wetland permanently filled or excavated shown thus:

NO WORK ZONE shown thus:

Remove pipe shown thus:

Construct ditch flat bottom shown thus:

Limits of wetland:

Note:
From Sta. "R" 1682+70.00 to Sta. "R" 1691+50.00 there are small embankment areas to extend the backslope of the ditch.

Rev. No.	Description	Engineer
1	Chg'd Exc. & Emb. amounts Revised on 2-24-10	CZ

REGISTERED PROFESSIONAL ENGINEER
63,243
OREGON
JULY 9, 2001
CHRIS R. ZELMER
EXPIRES: June-30-2010

OREGON DEPARTMENT OF TRANSPORTATION

REGION 3 - TECHNICAL CENTER

US 199: PASSING LANE (JOSEPHINE COUNTY)
REDWOOD HIGHWAY
JOSEPHINE COUNTY

Design Team Leader - Chris Zelmer
Designed By - Nelly Salazar Lazaro
Drafted By - Judy Hardin

ALIGNMENT AND GENERAL CONSTRUCTION

SHEET NO. 6

F:\ODOT_DATA\PROJECTS\13823_Hwy199_Passing_Lanes\05_MylarRevl\13823revl.plt :: Default 2/24/2010 1:48:57 PM hwye32o

1:1200 - 06

(1) *Sta. "R" 1678+12.0 Rt.*
Const. asph. conc. dwy. Type "A-1"
(For details, see sht. 2B-4)

(2) *Sta. "R" 1677+88.00, 54.26' Rt. to*
Sta. "R" 1678+43.19, 50.03' Rt.
Inst. 30" culv. pipe - 54'
5' depth
S = 0.0051'/Ft.
I.E. (30" In) = 997.10
I.E. (30" Out) = 996.82
Const. slope ends

(3) *Sta. "R" 1680+20.85, Rt.*
Const. 3ft.x3ft. RCBC extension with parapet, wingwalls and apron - 18'
Conn. to extg. 3ft.x3ft. RCBC
(For details, see shts. 2B-6, 2B-7)

(4) *Sta. "R" 1678+22.00 to Sta. "R" 1682+03.92, Rt.*
Const. guardrail - 312.5' (Type 2A)
Const. guardrail over low fill culvert - 37.5'
(Modified Type 2A 12.5' span)
Const. anchor -2 (Type 1 Modified)
Inst. end piece (Type C)
Const. guardrail terminal, non-flared
Test level - 3, 37.5'
(For details, see sht. 2B-5)
(See drg nos. RD400, RD405, RD415, RD420, RD450 & RD470)

(5) *Sta. "R" 1688+45.00, Lt.*
Inst. green S1 marker
(For details, see sht. 2B-15)

(6) *Const. wetland mitigation site*
(For details, see shts. GN & GN-2)

(7) *Remove guardrail*

(8) *Sta. "R" 1678+12.0, Rt.*
Const. gravel appr., w=16'
(For details, see sht. 2B-4)

(9) *Sta. "R" 1681+93.92 to Sta. "R" 1687+00.00, Rt.*
Const. bioslope 1 with flow spreader
(For details, see sht. 2B-12)

(10) *Sta. "R" 1687+00.00, 43.52' Rt. to*
Sta. "R" 1687+07.00, 69.17' Rt.
Const. subsurface drain outlet
5' depth
S = 0.1014'/Ft.
I.E. (8" In) = 993.88
I.E. (8" Out) = 990.91
Connect to 8" perforated drain pipe
(See std. drg. no. RD312)

(11) *Sta. "R" 1682+00.00, 53.89' Rt. to*
Sta. "R" 1687+00.00, 43.52' Rt.
Inst. 8" perforated drain pipe - 501'
5' depth
S = 0.0003'/Ft.
I.E. (8" In) = 994.02
I.E. (8" Out) = 993.88
(For details, see sht. 2B-12)

(12) *Sta. "R" 1678+42.87, 31.94' Rt. to*
Sta. "R" 1682+04.03, 31.94' Rt.
Const. P.C. conc. drainage curb
(See std. drg. no. RD700)

(13) *Sta. "R" 1677+32.00, Rt.*
Const. level spreader
(For details, see sht. 2B-8)

(14) *Sta. "R" 1677+88.00, Rt.*
Inst. S1 marker
(For details, see sht. 2B-15)

(15) *Sta. "R" 1682+00.00, Rt.*
Inst. red S1 marker
(For details, see sht. 2B-15)

(16) *Sta. "R" 1682+00.00, Rt.*
Inst. S2 marker
(For details, see sht. 2B-15)

(17) *Sta. "R" 1687+07.00, Rt.*
Inst. green S1 marker
(For details, see sht. 2B-15)

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SHEET NO. 6A