OPERATION & MAINTENANCE MANUAL

DFI No.: D00377
Facility Type: Water Quality Bioslope / Media Filter Strip

MARCH, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00377**
Facility Type:	Water Quality Bioslope / Medial Filter Strip
Construction Drawings:	(V-File Number) 43V-063
Location:	District: 7
	Highway No.: 035
	Mile Post: 69.60 / 69.63 (beg./end)
	Description: This facility is located on the northern side of OR42 (Hwy 035, Coos Bay-Roseburg Highway). Access can be obtained from the westbound shoulder of the highway.

2. Facility Contact Information

Contact the Engineer of Record, Region Technical Center, or Geo-Environmental's Senior Hydraulics Engineer for:

- Operational clarification
- Maintenance clarification
- Repair or restoration assistance

Engineering Contacts:

Region Technical Center Hydraulics Engineer (541) 957-3693

Or

Geo-Environmental Senior Hydraulics Engineer (503) 986-3365.

3. Construction

Engineer of Record:	ODOT Designer – Region 3 Tech. Center, Brian Banta, 541-957-3573
Facility construction:	2006
Contractor:	LTM Inc. Construction Company.]

4. Storm Drain System and Facility Overview

Bioslopes are flow-through stormwater treatment facilities incorporated into roadside embankments and placed between pavement and a downstream conveyance system. These facilities utilize physical straining or filtration, sorption, carbonate precipitation, vegetative uptake and microbial degradation to provide stormwater treatment. Bioslopes are recommended for highway application because of their minimal right-of-way requirements and maintenance schedule. Other names for bioslopes that have been used include ecology embankment and media filter drain.

Bioslopes are designed to treat sheet flow from an adjacent impervious surface. A typical bioslope has the following facility features and components:

- **Vegetated filter strip** – It is provided upstream of the bioslope to evenly distribute flow into the treatment zone, reduce the runoff velocity, and provide pretreatment.
- **Treatment Zone using Ecology mix** – It is provided to remove pollutants as stormwater runoff drains through this zone. The ecology mix is a mixture of aggregate, dolomite, gypsum, and perlite.
- **Sub surface drain** – it is provided to allow positive outflow for runoff at the toe of the bioslope.

Stormwater is conveyed to the facility from sheet flow generated by OR42. Refer to the Operational Plan in Appendix A for further information. Water conveyed into the bioslope undergoes treatment as it flows through the length of the slope. The treated water flows into an adjacent water quality biofiltration swale (DFI D00376), and then conveyed into an 18-inch culvert. This culvert discharges into a roadside ditch on the south side of OR42.

A. Maintenance equipment access:

   Maintenance crews can access the facility from the westbound shoulder of OR42.

B. Heavy equipment access into facility:

   ☐ Allowed (no limitations)
   ☒ Allowed (with limitations)
   ☐ Not allowed

C. Special Features:

   ☒ Amended Soils

☐ Porous Pavers
☐ Liners
☐ Underdrains

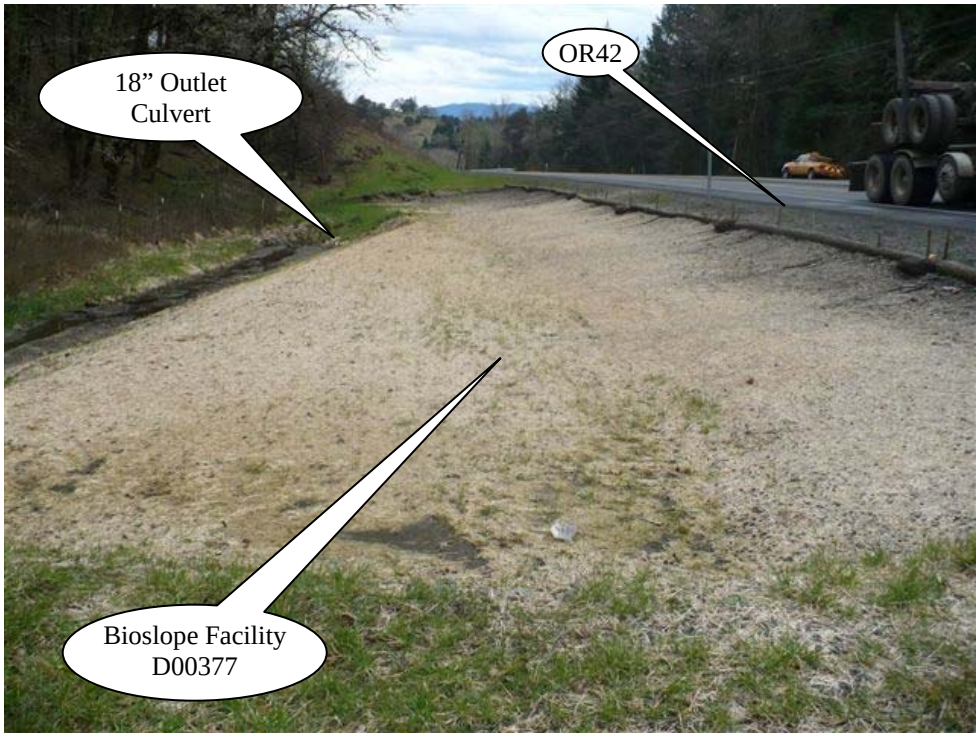


Photo 1: Looking east, stormwater flowing from OR42 sheet flows onto the bioslope.

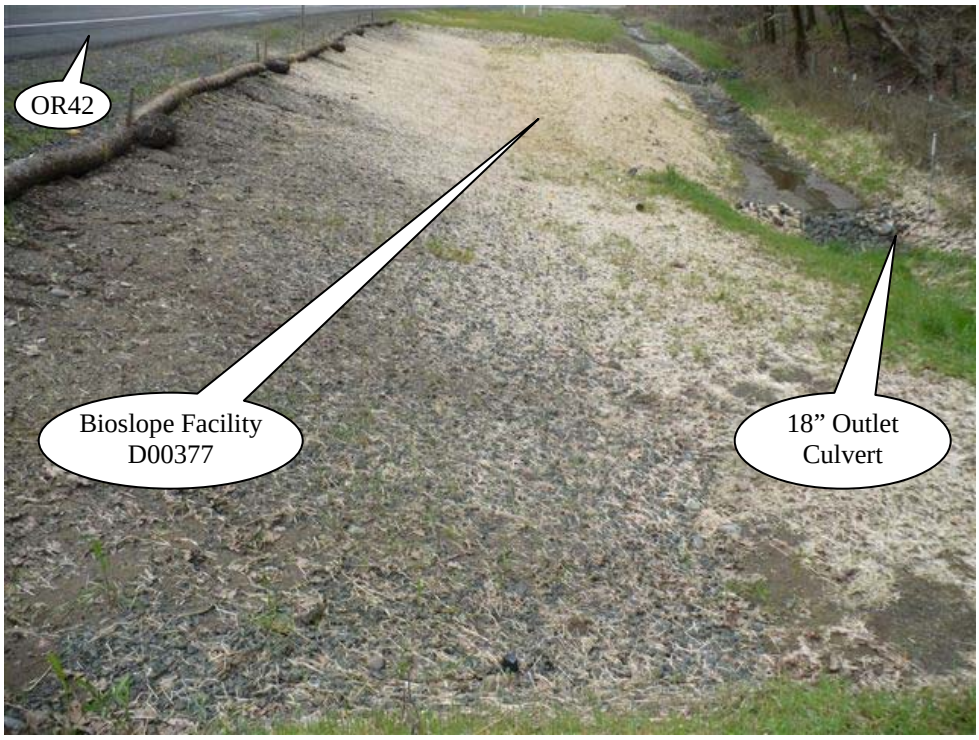


Photo 2: Looking west, sheet flow from OR42 on the left side of the picture contributes stormwater onto the bioslope.

5. Facility Haz Mat Spill Feature(s)

The water quality bioslope/media filter strip can not be used to store a volume of liquid due to the porous nature of the soils and the proximity of the facility to an adjacent swale facility (DFI D00376).

6. Auxiliary Outlet (High Flow Bypass)

Auxiliary Outlets are provided if the primary outlet control structure can not safely pass the projected high flows. Broad-crested spillway weirs and over flow risers are the two most common auxiliary outlets used in stormwater treatment facility design. The auxiliary outlet feature is either a part of the facility or an additional storm drain feature/structure.

The auxiliary outlet feature for this facility is:

☐ Designed into facility

☒ Other, as noted below
There is no auxiliary outlet for this facility.

7. Maintenance Requirements

Routine maintenance table for non-proprietary stormwater treatment and storage/detention facilities have been incorporated into ODOT's Maintenance Guide. These tables summarize the maintenance requirements for ponds, bioslopes, filter strips, bioslopes, and detention tanks and vaults. Special maintenance requirements in addition to the routine requirements are noted below when applicable.

The ODOT Maintenance Guide can be viewed at the following website:

http://www.oregon.gov/ODOT/HWY/OOM/MGuide.shtml

Maintenance requirements for proprietary structures, such as underground water quality manholes and/or vaults with filter media are noted in Appendix C when applicable.

The following stormwater facility maintenance table (See ODOT Maintenance Guide) should be used to maintain the facility outlined in this Operation and Maintenance Manual or follow the Maintenance requirements outlined in Appendix C when proprietary structure is selected below:

☒ Table 1 (general maintenance)
☐ Table 2 (stormwater ponds)
☐ Table 3 (water quality biofiltration bioslopes)
☐ Table 4 (water quality filter strips)
☒ Table 5 (water quality bioslopes)
☐ Table 6 (detention tank)
☐ Table 7 (detention vault)
☐ Appendix C (proprietary structure)
☐ Special Maintenance requirements:

Note: Special maintenance Requirements Require Concurrence from ODOT SR Hydraulics Engineer.

8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the roadwaste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options: http://egov.oregon.gov/ODOT/HWY/OOM/EMS.shtml

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

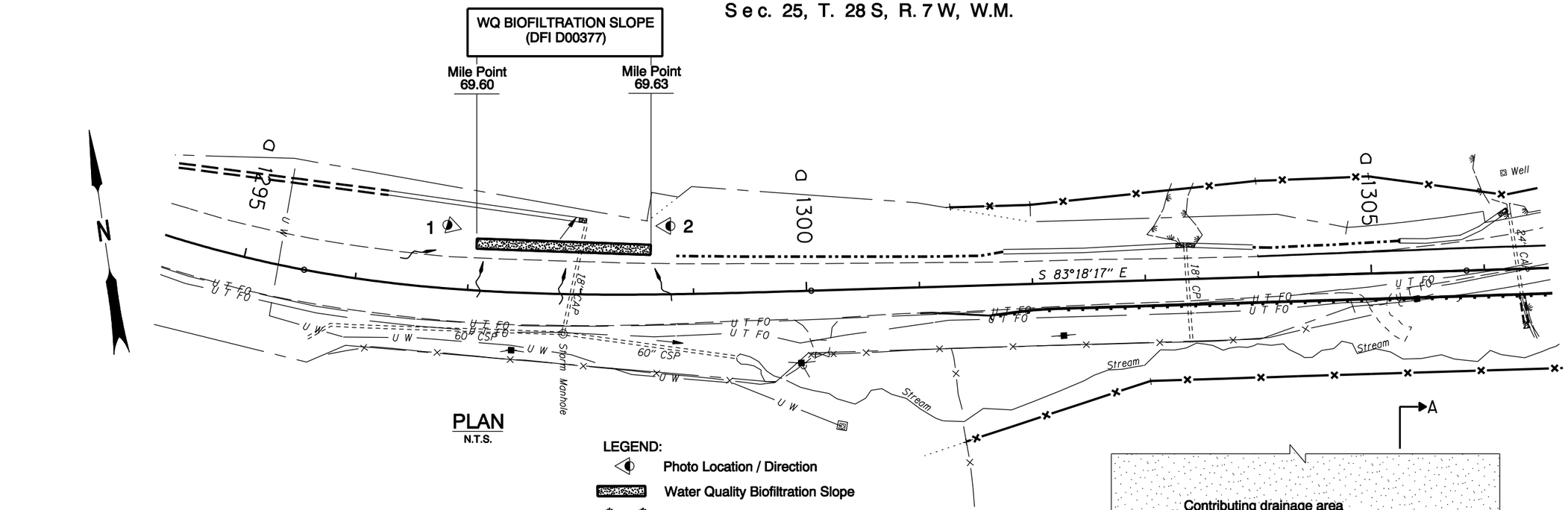
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129
ODOT Region Hazmat Coordinator	(541) 957-3594
ODEQ Northwest Region Office	(503) 229-5263

Appendix A

Content:

- **Operational Plan and Profile Drawing(s)**

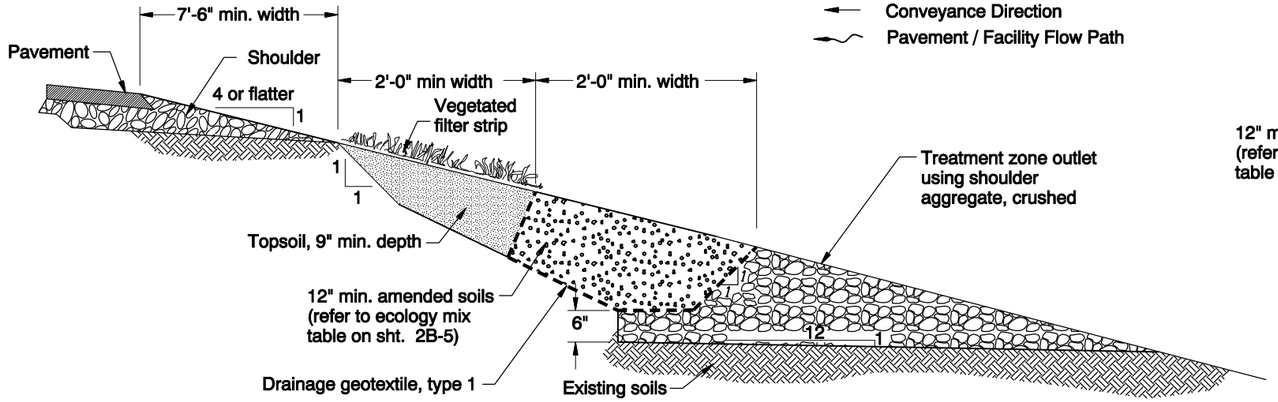
Sec. 25, T. 28 S, R. 7 W, W.M.



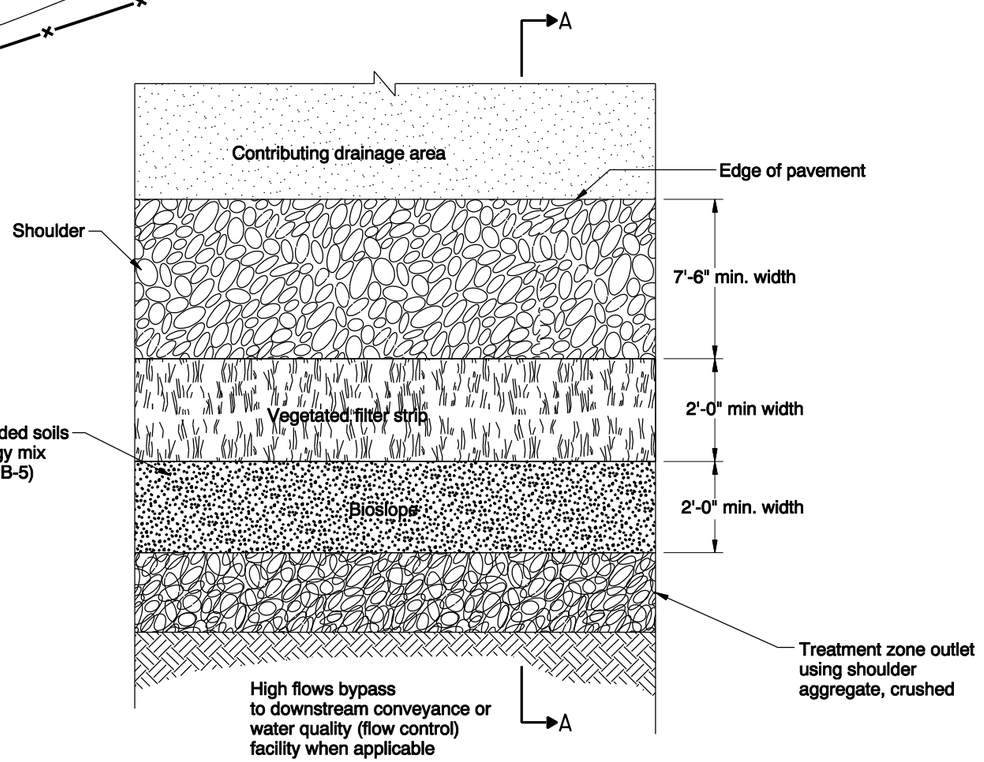
PLAN
N.T.S.

LEGEND:

- Photo Location / Direction
- Water Quality Biofiltration Slope
- Water Quality Biofiltration Swale
- Manhole and/or
- Inlet and/or
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path



SECTION A-A
N.T.S.



PLAN
N.T.S.

BIOSLOPE DETAIL
N.T.S.

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: J. Carpenter

Drafted By: B. Shafer

DFI D00377
MAINTENANCE DISTRICT 7 HWY 035
WATER QUALITY BIOFILTRATION SLOPE
COOS BAY - ROSEBURG HIGHWAY MP 69.60/69.63
DOUGLAS COUNTY

Appendix B

Content:

- **ODOT Project Plan Sheets**
  - ***Cover/Title Sheet***
  - ***Water Quality/Detention Plan Sheets***
  - ***Other Details***

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

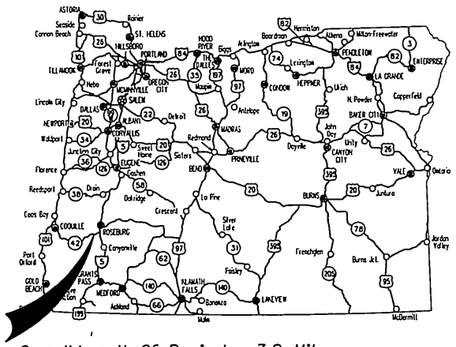
GRADING, DRAINAGE, PAVING, & SIGNING

43V-063

OR42: HOOVER HILL TO LOOKINGGLASS CREEK

COOS BAY - ROSEBURG HIGHWAY

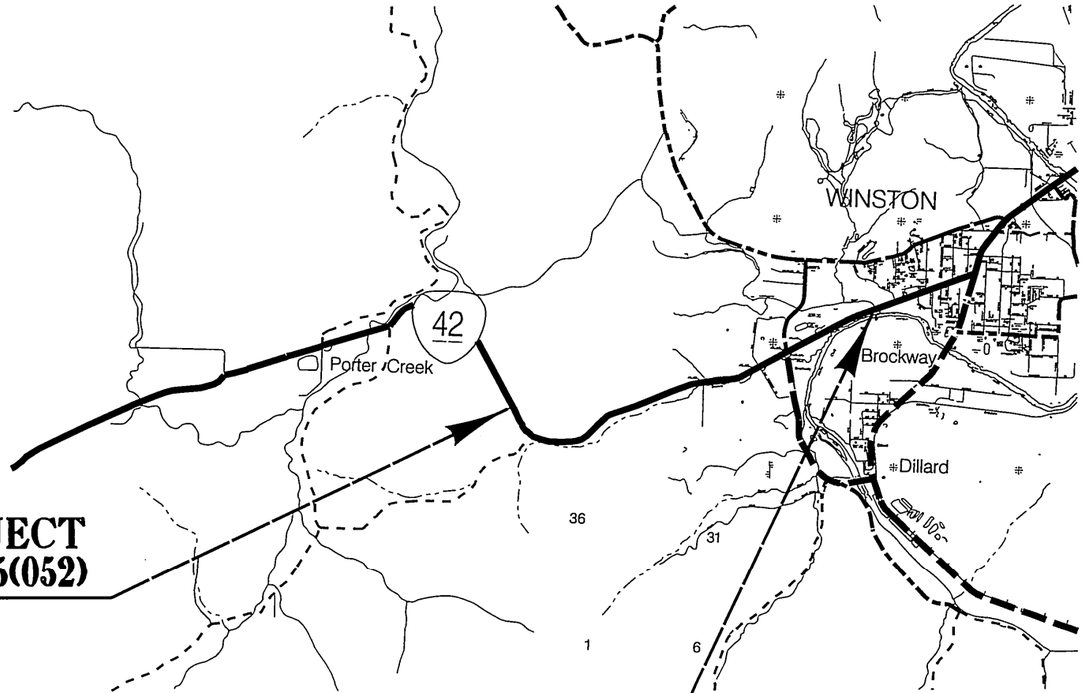
DOUGLAS COUNTY
FEBRUARY 2010



Overall Length Of Project - 3.2 Miles

ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 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 PROJECT
STP-PLH-NH-HSIP-S035(052)
1282+50.0 (M.P. 69.32)

END OF PROJECT
STP-PLH-NH-HSIP-S035(052)
1451+24.0 (M.P. 72.52)

T. 28 S., R. 6 & 7 W.,SECT 25, 26, & 30 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: M. Thompson
Signature & date 11/25/09

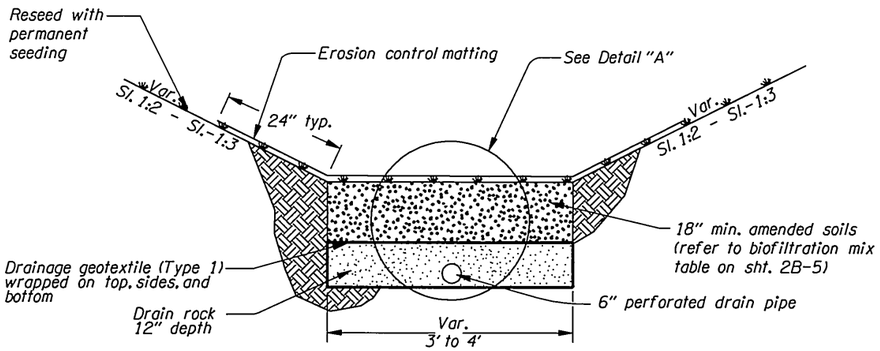
Mark Thompson Rg.3 Tech Ctr. Mgr.
Print name and title

Concurrence by ODOT Chief Engineer

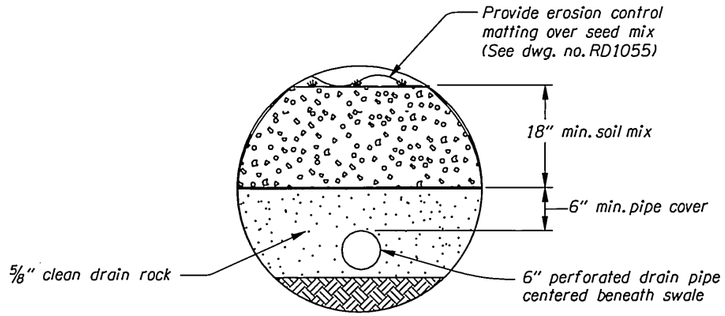
OR42: HOOVER HILL TO LOOKINGGLASS CREEK
COOS BAY - ROSEBURG HWY
DOUGLAS COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	STP-PLH-NH-HSIP-S035(052)	1

43V-063



BIOFILTRATION SWALE W/ UNDER DRAIN
Not to scale



DETAIL "A"
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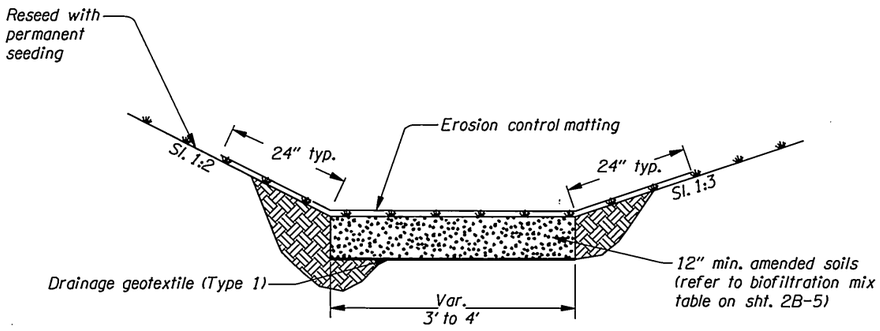

BIOFILTRATION SWALE
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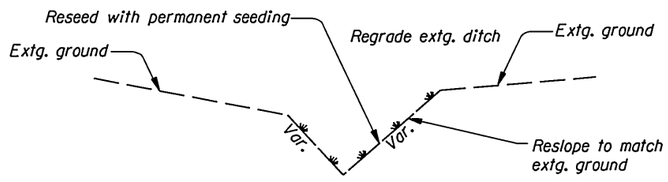
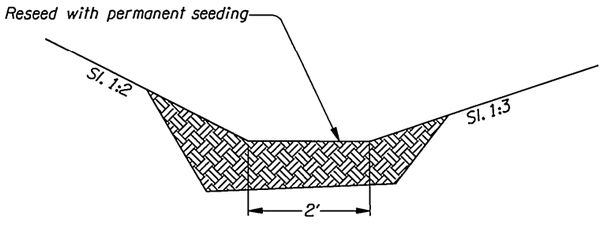


REGRADED EXISTING DITCH
Not to scale



2' FLAT BOTTOM CONVEYANCE DITCH
Not to scale

REGISTERED PROFESSIONAL ENGINEER
19202
OREGON
JULY 15, 1997
WADE RYDER HOLADAY
EXPIRES: 6/30/11

OREGON DEPARTMENT OF TRANSPORTATION

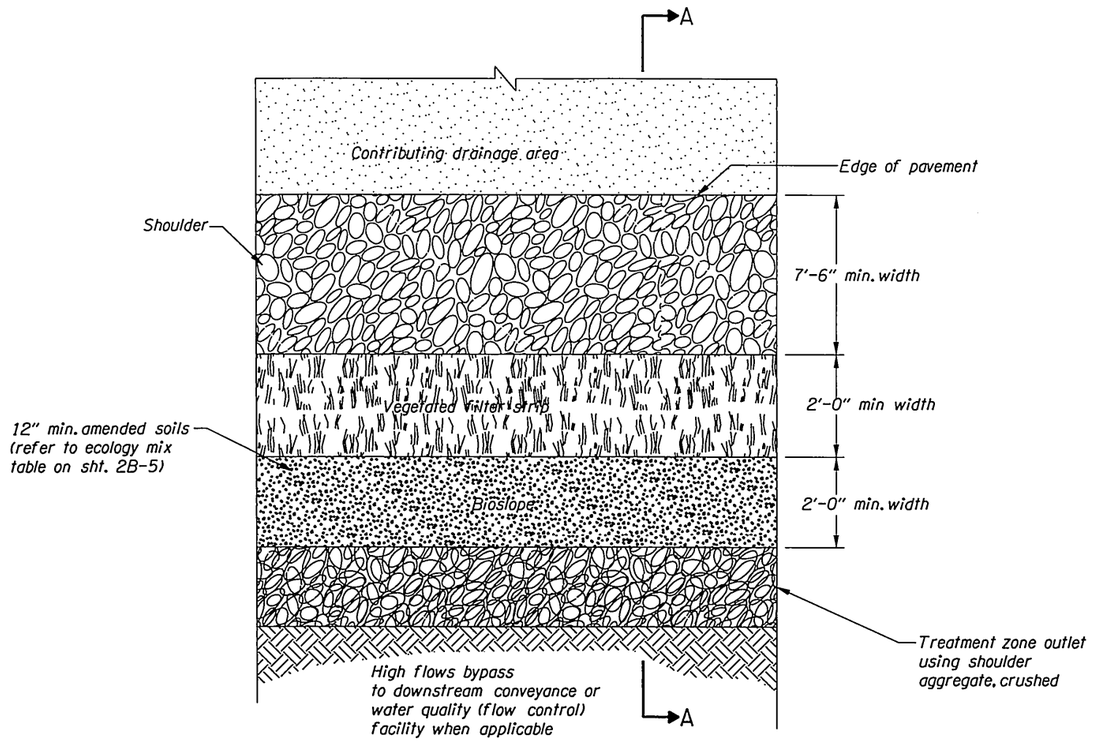
REGION 3 - TECHNICAL CENTER

OR42: HOOVER HILL TO LOOKINGGLASS CREEK
COOS BAY - ROSEBURG HWY
DOUGLAS COUNTY

Design Team Leader - James Burford
Designed By - Brian Banta
Drafted By - Billy Shafer

DETAILS

SHEET NO. 2B-3



PLAN VIEW
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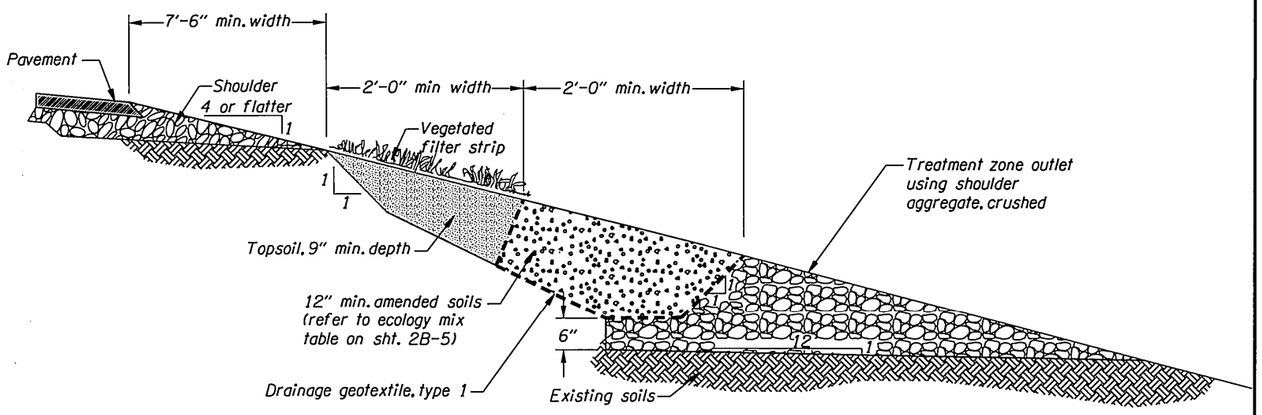

SECTION A-A
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BIOSLOPE DETAIL
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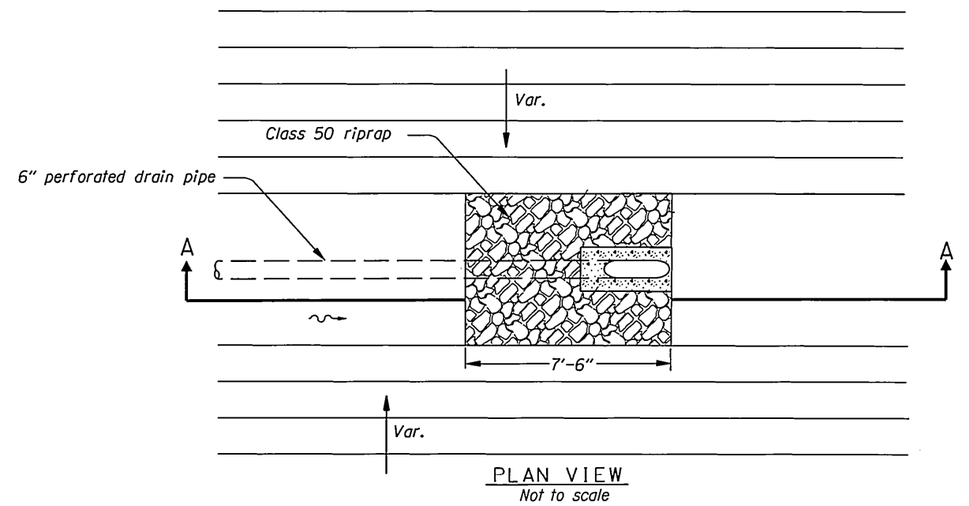

PLAN VIEW
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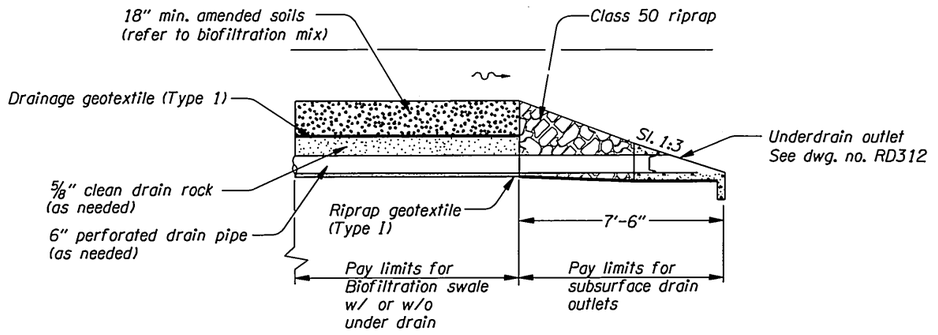

SECTION A-A
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BIOFILTRATION SWALE END TREATMENT

REGISTERED PROFESSIONAL ENGINEER
19202
OREGON
JULY 15, 1997
WADE RYDER HOLADAY
EXPIRES: 6/30/11

OREGON DEPARTMENT OF TRANSPORTATION

REGION 3 - TECHNICAL CENTER

OR42: HOOVER HILL TO LOOKINGGLASS CREEK
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DOUGLAS COUNTY

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Drafted By - Billy Shafer

DETAILS

SHEET NO. 2B-4

ECOLOGY MIX TABLE

Use this mix for bioslopes

AMENDMENT	DESCRIPTION	MIX RATIO
Aggregates	Aggregates ⅜ inch to #10 sieve shall meet the following requirements: • Tests: • Abrasion (Test Method T96) 35% max. • Oregon Air Aggregate Degradation 30% max. • Grading and quality: Sieve Size — Percent Passing (by weight) 59/64" square — 100 ⅜" square — 90-100 U.S. No. 4 — 35-56 U.S. No. 10 — 0-10 U.S. No. 200 — 0-1.5 % fracture, by weight, min. — 75 Static stripping test — Pass • Fracture: At least one fractured face required on material retained on a No. 20 sieve if that sieve retains more than 5 percent of the total sample. • Finished product: Clean, uniform in quality, and free from wood, bark, roots, and other deleterious materials. • Aggregates: Substantially free from adherent coatings. The presence of a thin, firmly adhering film of weathered rock not be considered as coating unless it exists on more than 50% of the surface area of any size between successive laboratory sieves.	3 cubic yards (c.y.)
Perlite	• Horticulture grade, free of any toxic materials • Size gradation: • Min 70% retained by a No. 18 sieve • Max. 10% smaller than that which passes through a No. 30 sieve.	1 cubic yard per 3 cubic yards of aggregate
Dolomite	• Calcium mangnesium carbonate - $CaMg(CO_3)_2$ • Agriculture grade, free of any toxic materials • Size gradation: 100% passes through a No. 8 sieve and 100% retained by a No. 16 sieve.	10 pounds per 1 c.y. of Perlite
Gypsum	• Non-calcined, agricultural gypsum - $CaSo_4 \cdot 2H_2O$ (hydrated calcium sulfate) • Agriculture grade, free of any toxic materials • Size gradation: 100% passes through a No. 8 sieve and 100% retained by a No. 16 sieve.	1.5 pounds per 1 c.y. of Perlite

BIOFILTRATION MIX TABLE

Biofiltration mix is used for the treatment zone along the entire biofiltration swale bottom to remove pollutants as stormwater runoff drains through this media mix. General design criteria includes:

- The minimum depth is 12 inches
- The biofiltration mix consists of the following materials:

MEDIUM	DESCRIPTION	PERCENTAGE OF MEDIUM IN FILTER LAYER
Sand	• Coarse grade with an effective particle size (D10) of 0.012" - 0.20" (0.3 - 0.5 mm) • Uniformity coefficient of less than 4 • Washed	40% - 50%
Topsoil	• Loam or loamy sand texture per USDA Soil Textural Classification • Clay content of less than 5%	30% if loam or 40% if loamy sand
Compost	Coarse compost conforming to special provision 01040.15(b)	20% - 30%
Total Composition		100%
Total Organic Matter Content	Measured per ASTM Designation D2974 (Standard test method for Moisture, Ash and Organic Matter of Peat and other organic soils)	Approx. 10% by dry weight

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OREGON
JULY 15, 1997
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OREGON DEPARTMENT OF TRANSPORTATION

REGION 3 - TECHNICAL CENTER

OR42: HOOVER HILL TO LOOKINGGLASS CREEK
COOS BAY - ROSEBURG HWY
DOUGLAS COUNTY

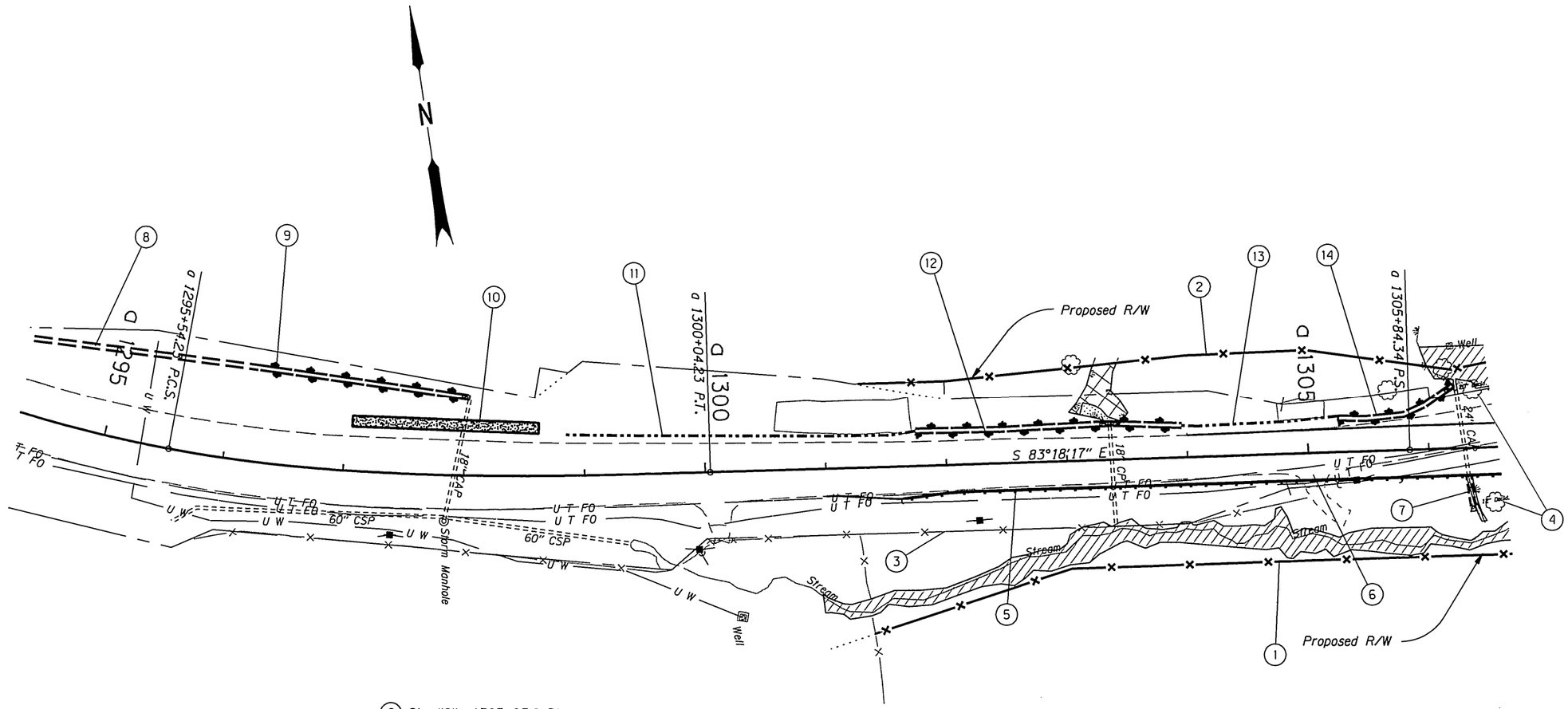
Design Team Leader - James Burford
Designed By - Brian Banta
Drafted By - Billy Shafer

DETAILS

SHEET NO. 2B-5

Sec. 25, T. 28 S, R. 7 W, W.M.

43V-063



(1) Sta. "C"a 1301+37.0, Rt. to Sta. "C"a1307+95.0, Rt.
Const. type 2 fence - 669'
(See dwg. no. RD810)

(2) Sta. "C"a 1301+29.0, Lt. to Sta. "C"a 1307+90.0, Lt.
Const. type 2 fence - 662'

(3) Sta. "C"a 1301+27.0, Rt. to Sta. "C"a 1304+98.0, Rt.
Remove extg. fence - 374'

(4) Remove tree - 2

(5) Sta. "C"a 1301+64.0, Rt. to Sta. "C"a 1307+90.0, Rt.
Const. guardrail - 612.5' (Type 2A)
Const. guardrail terminal, non-flared
W=2', E=2'
Inst. guardrail anchor (Type 1 mod.)
Inst. guardrail end pieces (Type B)
(See dwg. nos. RD400, RD405, RD415, RD420 & RD450)

(6) Sta. "C"a 1305+03.0, Rt.
Remove approach

(7) Sta "C"a 1306+32.6, Rt. to Sta. "C"a 1306+36.0, Rt.
Inst. 24" Culv. pipe - 30'
5' depth
Connect to extg. culvert.
S= .0056ft./ft.
I.E. (in)= 707.79'
I.E. (out))= 707.64'
Inst. paved culvert end slope- 37 sq. ft.
(See dwgs. RD320 & RD326)

(8) See sht. 3, note 3

(9) Sta. "C"a 1296+20.1, Lt. to
Sta. "C"a 1298+04.7, Lt.
Const. biofiltration swale, 4' width - 177'
(For details see sht. 2B-4)

(10) Sta. "C"a 1297+05.6, Lt. to
Sta. "C"a 1298+62.3, Lt.
Const. bioslope
(For details see sht. 2B-4)

(11) Sta. "C"a 1298+85.2, Lt. to Sta. "C"a 1301+75.1 Lt.
Regrade extg. ditch - 290'
(For details see sht. 2B-3)

(12) Sta. "C"a 1301+75.1, Lt. to Sta. "C"a 1303+95.7 Lt.
Const. biofiltration swale w/underdrain, 4' width - 221'
Inst. subsurface drain outlet - 2
(For details see shts. 2B-3 & 2B-4)
(See dwg. RD312)

(13) Sta. "C"a 1303+95.7, Lt. to Sta. "C"a 1305+25.6 Lt.
Regrade extg. ditch - 130'
(For details see sht. 2B-3)

(14) Sta. "C"a 1305+25.6, Lt. to Sta. "C"a 1306+21.5 Lt.
Const. biofiltration swale w/underdrain, 4' width - 104'
Inst. subsurface drain outlet
(For details see shts. 2B-3 & 2B-4)

No Work Zone areas apply to the hatched areas shown, all areas outside state right of way or easements, and all undisturbed areas outside the roadway prism between Brockway Rd. and Lookingglass Creek Bridge

No work zone

Temporarily impacted wetlands

Permanently impacted wetlands

REGISTERED PROFESSIONAL ENGINEER
69460PE
Brian L. Banta
OREGON
NOV. 13, 2007
BRIAN LEE BANTA
EXPIRES: 12-31-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 3 - TECHNICAL CENTER

OR42: HOOVER HILL TO LOOKINGGLASS CREEK
COOS BAY - ROSEBURG HWY
DOUGLAS COUNTY

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Drafted By - Billy Shafer

GENERAL CONSTRUCTION

SHEET NO. 4