OPERATION & MAINTENANCE MANUAL

DFI No.: D00111
Facility Type: Water Quality Biofiltration Swale

JUNE 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00111**
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) 37V-041
Location:	District: 02B
	Highway No.: 047
	Mile Post: 66.13/66.08 (beg./end)
	Description: This facility is located along the unobstructed right shoulder north of the westbound lanes of US26 (Highway 047) near their connection to the off ramp to NW Cornell Road. Vehicles can access the facility from this shoulder. This facility is northwest of a water quality manhole (DFI D00234.)

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 Hydro Unit Manager

Or

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

3. Construction

Engineer of Record:	ODOT Designer – Region 1 Tech. Center, Bruce Council
Facility construction:	March 11, 2004
Contractor:	Mowat Construction (Contract Number 12962)

4. Storm Drain System and Facility Overview

A water quality swale is a flat-bottomed open channel designed to treat stormwater runoff from highway pavement areas. This type of facility is lined with grass. Treatment by trapping sedimentation occurs when stormwater runoff flows through the grass.

This swale, approximately 270 feet in length, is located along the unobstructed right shoulder north of the westbound lanes of US26 (Highway 047) near their connection to the off ramp to NW Cornell Road (Exit 65). Vehicles can access the facility from the shoulder (**Photo 1**). Near this facility, to the southeast, there is a water quality manhole (DFI D00111.)

The swale treats a drainage area composed of the westbound lanes of US 26 (Hwy 047) extending approximately 1214 feet of US 26 (Hwy 047) east of the facility (**Photo 2**). Stormwater runoff is collected by a series of inlet structures connected by conveyance pipes. Pipes further upstream are 12-inches in diameter, and pipes further downstream are 18-inches in diameter. All drainage that enters the series of conveyance pipes is pretreated at a water quality manhole (**Point A on the Operational Plan in Appendix A**) prior to discharge into the swale. Additional drainage that escapes the catch basins is captured by a roadside ditch and conveyed towards the swale (**Photo 3; Points &**).

After treatment through the swale, the water is discharged into a series of ditch inlet structures at the swale outlet (**Point D**). These structures consist of a primary outlet (a type M-E structure upstream) and a secondary outlet (a type D structure downstream.) Treatment flows exit the swale via the primary outlet. They then pass through an 18-inch conveyance pipe, the secondary outlet and another 18-inch conveyance pipe, which outfalls 48 feet from the end of the swale (**Point E**).

Photo 1: View of water quality biofiltration swale (DFI D00111) from east end facing west. Exit 65 in the background.

Photo 2: Water Quality Manhole (DFI D00234) receives drainage from the westbound lanes of US26.

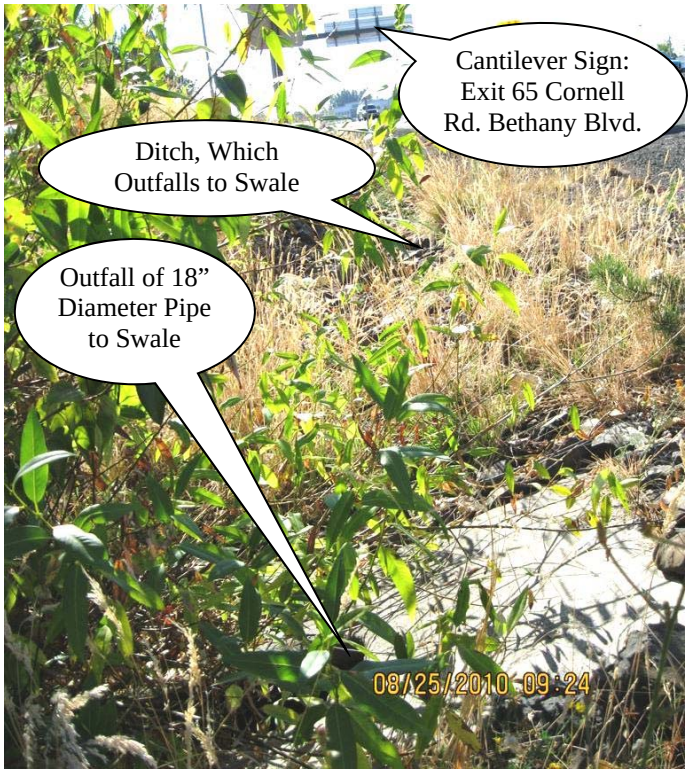


Photo 2: Inlet of water quality swale. Photo taken facing east. Westbound lanes of US26 in background.

Photo 3: Location of ditch inlet structures at outlet of water quality biofiltration swale (DFI D00111.) Photo taken facing west.

Photo 4: Ditch inlet structures at swale outlet.

For further information and details regarding the system refer to Appendix A for the Operational Plan and Appendix B for the Construction Project Plan sheets.

A. Maintenance equipment access:
Vehicles and personnel can access the facility from the unobstructed right shoulder north of the westbound lanes of US26 (Highway 047) near their connection to the off ramp to NW Cornell Road.

B. Heavy equipment access into facility:

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

C. Special Features:

☒ Amended Soils
☐ Porous Pavers
☐ Liners
☒ Underdrains

5. Facility Haz Mat Spill Feature(s)

If necessary, this water quality biofiltration swale may be used as a containment facility for hazardous materials/liquids. When the ditch inlet structures at the facility's outlet area are blocked off, the facility can hold a significant volume. Sandbags or metal plates placed on top of the grates of the ditch inlet structures can be used to block them.

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:
The high flow bypass for this swale is a secondary outlet, which is one of the two ditch inlet structures at the swale outlet area. Treatment flows exit the swale via the primary outlet, a type M-E ditch inlet structure. If runoff received by the swale exceeds its treatment capacity, the water level in the swale rises until it reaches the elevation of the secondary outlet, which is a type D ditch inlet structure. High flows bypass the primary outlet and exit the swale through the secondary outlet.

☐ Other, as noted below

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, swales, 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 or biofiltration swales)
☐ 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:

8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the road waste 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

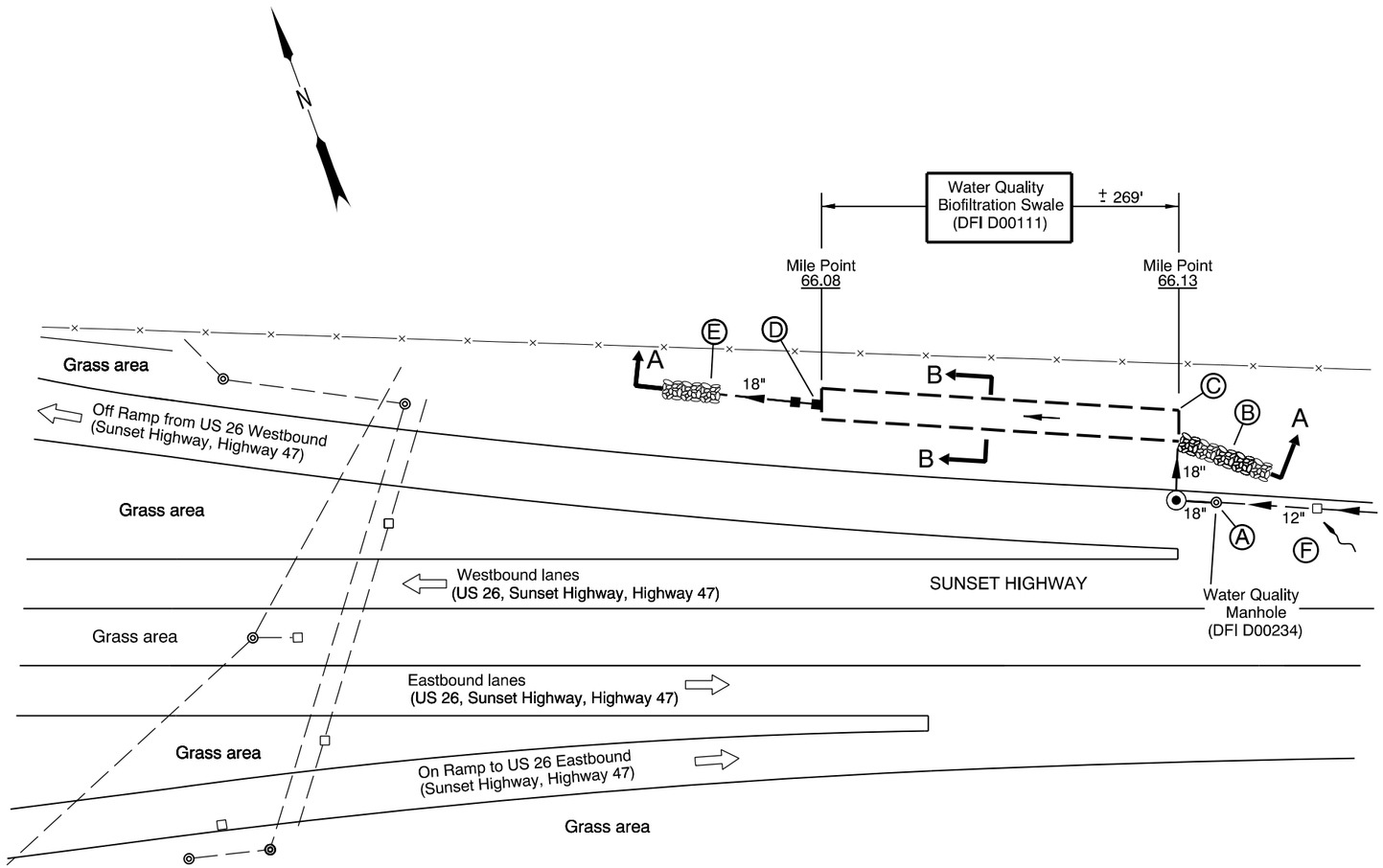
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129
ODOT Region Hazmat Coordinator	(503) 731-8304
ODEQ Northwest Region Office	(503) 229-5263

Appendix A

Content:

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



PLAN
N.T.S.

LEGEND:

- Photo Location / Direction
- (A) Water Quality Manhole (DFI D00234)
- (B) Ditch with riprap channel
- (C) Pipe Outfall beside Ditch Outfall at Swale Outlet
- (D) Inlet Structure Swale Outlet
- (E) Outfall to Ditch with Riprap Channel
- (F) Sign "EXIT 65 Cornell Rd. Bethany Blvd."
- Manhole and or
- Inlet and or
- Traffic Direction / Flow
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Rip rap

Sheet 1 of 2

OREGON DEPARTMENT OF TRANSPORTATION

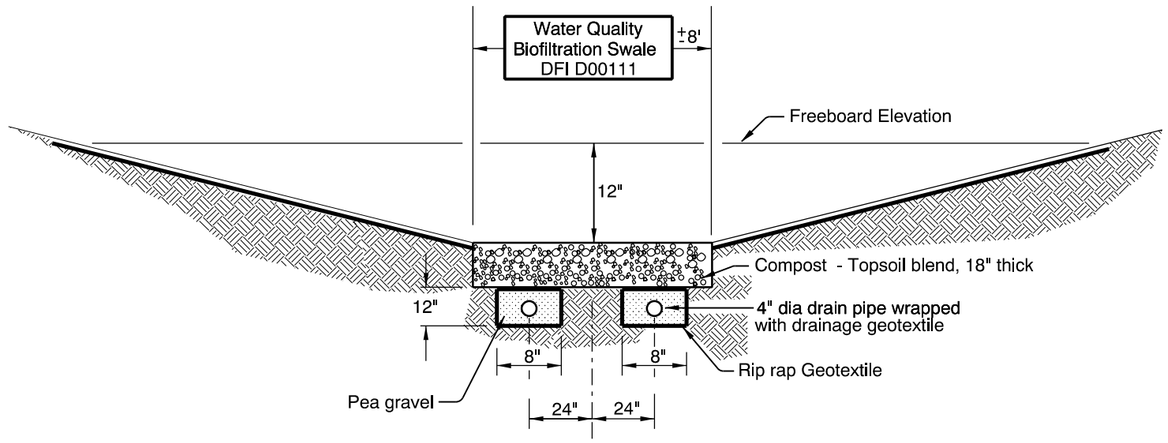
Prepared By: Wynee Hu

Drafted By: Chris Wallen

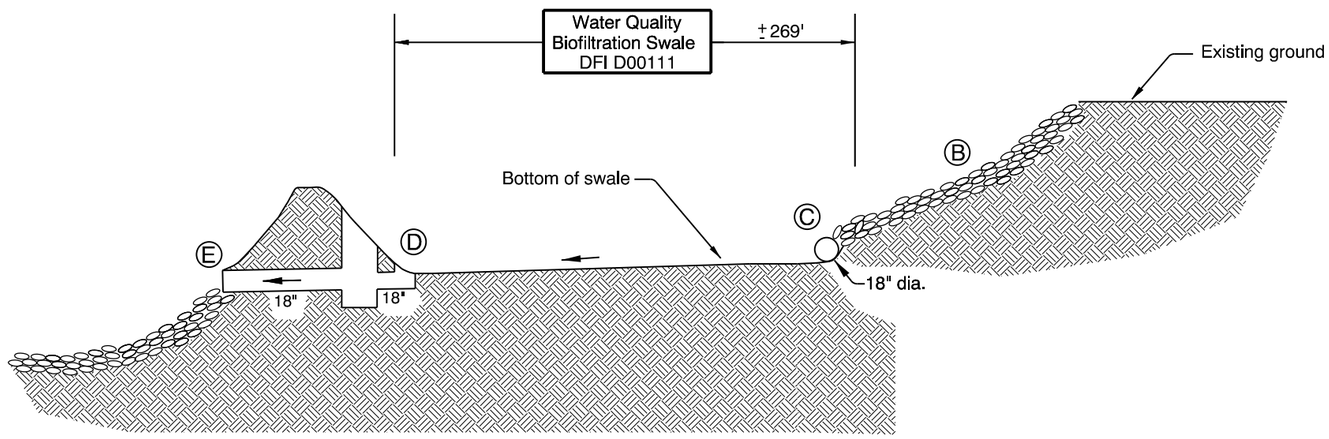
DFI D00111
MAINTENANCE DISTRICT 2B HWY 047
WATER QUALITY BIOFILTRATION SWALE
SUNSET HIGHWAY 66.13 to 66.08
WASHINGTON COUNTY

DFI_D00111.dgn :: Default 5/17/2018 3:37:07 PM Hwyr33e

DFI_D00111.dgn



SECTION B-B
N.T.S.



SECTION A-A
N.T.S.

Sheet 2 of 2

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Wynee Hu

Drafted By: Chris Wallen

DFI D00111
MAINTENANCE DISTRICT 2B HWY 047
WATER QUALITY BIOFILTRATION SWALE
SUNSET HIGHWAY 66.13 to 66.08
WASHINGTON COUNTY

Appendix B

Content:

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

37V-41

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A, 1A-2	Index Of Sheets Cont'd.
1A-3	Std. Drg. Nos.
1B	Sheet Layout
2, 2A, 2A-2 Thru 2A-65 Incl.	Typical Sections
2B, 2B-2 Thru 2B-18 Incl.	Details
2C, 2C-2	Traffic Control Details
2CA, 2CA-2, 2CA-2A, 2CA-3 Thru 2CA-57 Incl.	Traffic Control Plans - Murray Work Area
2CB, 2CB-2 Thru 2CB-12 Incl.	Traffic Control Plans - Cornell Work Area
2D, 2D-2, Thru 2D-12, Incl.	Pipe Data Sheet

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

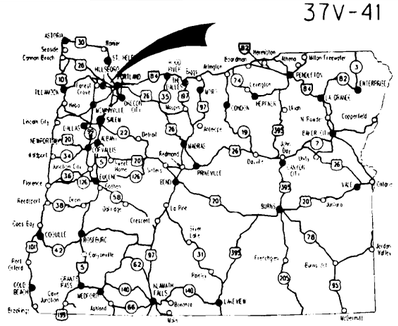
PLANS FOR PROPOSED PROJECT

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

US26: CORNELL RD. - OR217 (BEAVERTON) SEC.

SUNSET HIGHWAY

WASHINGTON COUNTY
MARCH 2004

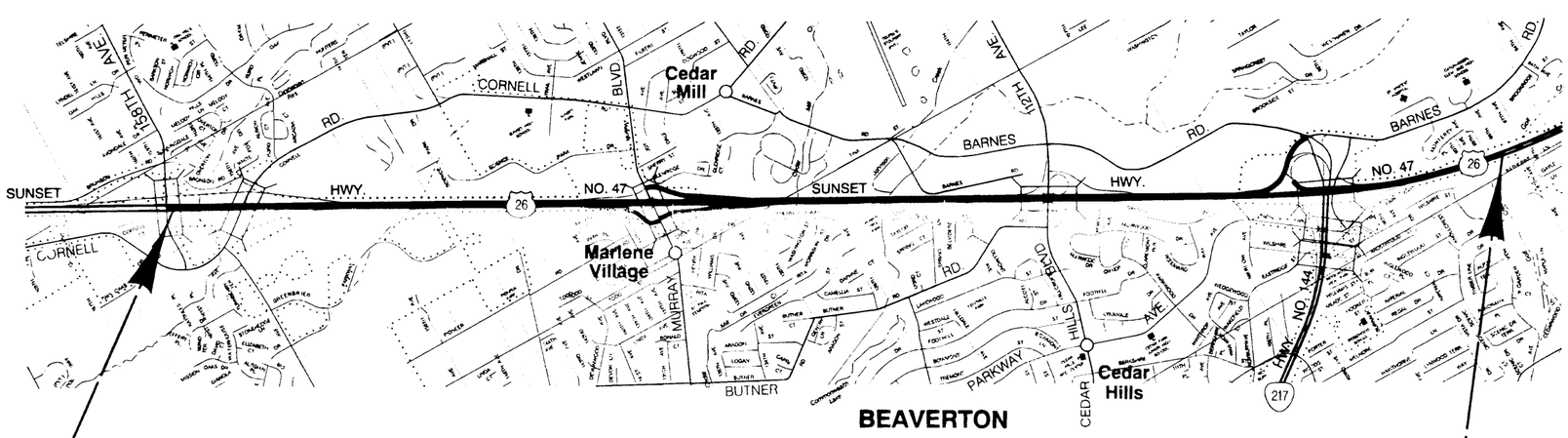


Overall Length Of Project - 6.51 km (4.05 Miles)

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.)

OTIA
OREGON TRANSPORTATION INVESTMENT ACT

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE



BEGINNING OF PROJECT
NH-OTIA-S047(052)
STA. "LW" 91+660.00 (M.P. 65.68)

END OF PROJECT
NH-OTIA-S047(052)
STA. "L" 98+160.00 (M.P. 69.73)

T. 1 N., R. 1 W., W.M.

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Papé	COMMISSIONER
John Russell	COMMISSIONER
Bruce A. Warner	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
13,704
OREGON
JULY 16, 1987
CATHERINE M. NELSON
Expires Dec. 31, 2004

Catherine M. Nelson
TECHNICAL SERVICES MANAGING ENGINEER

METRIC

US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	NH-OTIA-S047(052)	1

PE000656/C0341403-011

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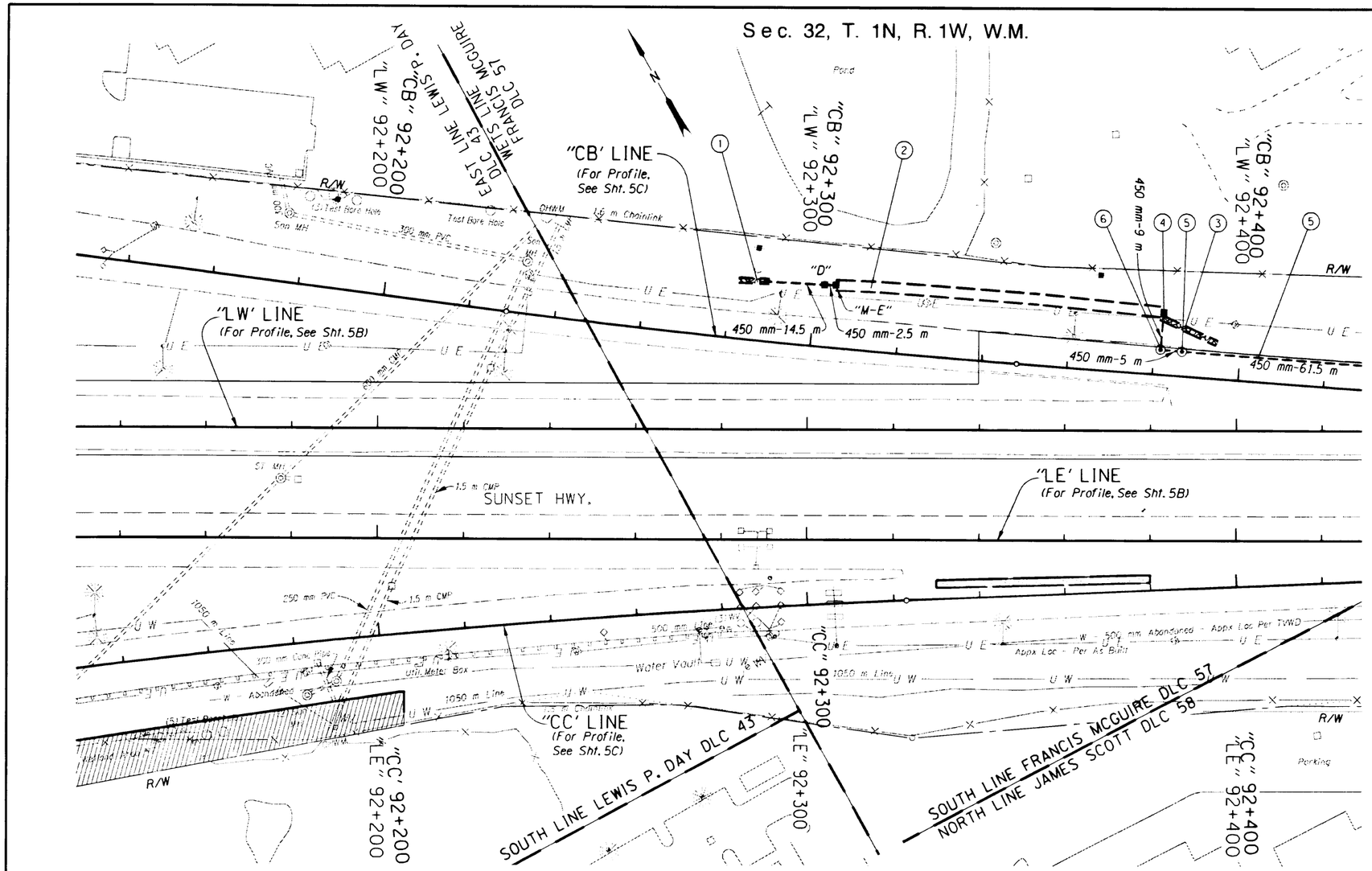

(1) Sta. "CB" 92+287.792, 13.664 m Lt.
Const. Ditch
1.2 m Flat Bottom, 1:2 Slopes
Const. Type "M-E" Detention Mod. Inlet
Const. Type "D" Mod. Inlet
Inst. 450 mm Storm Sew. Pipe - 17.0 m
1.5 m Depth
Const. Paved End Slope - 2.9 m²
Const. Loose Riprap (Class 25) - 14 MG
Riprap Geotextile Matl., Type "1" - 30 m²
Dt. Exc. - 12 m³
(For Details, See Sht. GHJ-8)
(See Drg. Nos. RD316, RD318, RD320, RD368 & RD370)

(2) Const. Water Quality Swale "WC1"
(For Details, See Shts. R-28 & GHJ-34)

(3) Const. Ditch
1.2 m Flat Bottom, 1:3 Slopes
Const. Loose Riprap (Class 25) - 29 MG
Riprap Geotextile Matl., Type "1" - 30 m²
Dt. Exc. - 12 m³
(For Details, See Sht. GHJ-8)

(4) Sta. "CB" 92+381.621, 14.467 m Lt.
Const. Type "D" Mod. Inlet
Inst. 450 mm Storm Sew. Pipe - 9.0 m
1.5 m Depth
(For Details, See Sht. GHJ-3)
(See Drg. No. RD370)

(5) Sta. "CB" 92+386.500, 5.79 m Lt.
Const. Pollution Control Manhole
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 90.5 m
1.5 m Depth
Inst. 450 mm Storm Sew. Pipe - 61.5 m
1.5 m Depth
(For Details, See Sht. GHJ-22)
(See Drg. No. RD314)

(6) Sta. "CB" 92+381.500, 5.79 m Lt.
Const. Manhole
Inst. 450 mm Storm Sew. Pipe - 5.0 m
1.5 m Depth

REGISTERED PROFESSIONAL ENGINEER 19156 OREGON JULY 15, 1997 BRUCE S. COUNCIL Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

Design Team Leader - Eileen J. Phelan
Designed By - Bruce S. Council
Drafted By - Tien Nguyen

DRAINAGE & UTILITIES

SHEET NO. 5A

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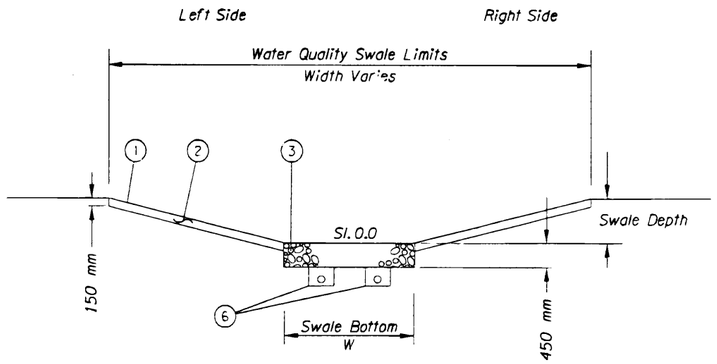
R O A D S I D E D E V E L O P M E N T

CEDAR MILL CREEK ENHANCEMENT AREA

12/02/03

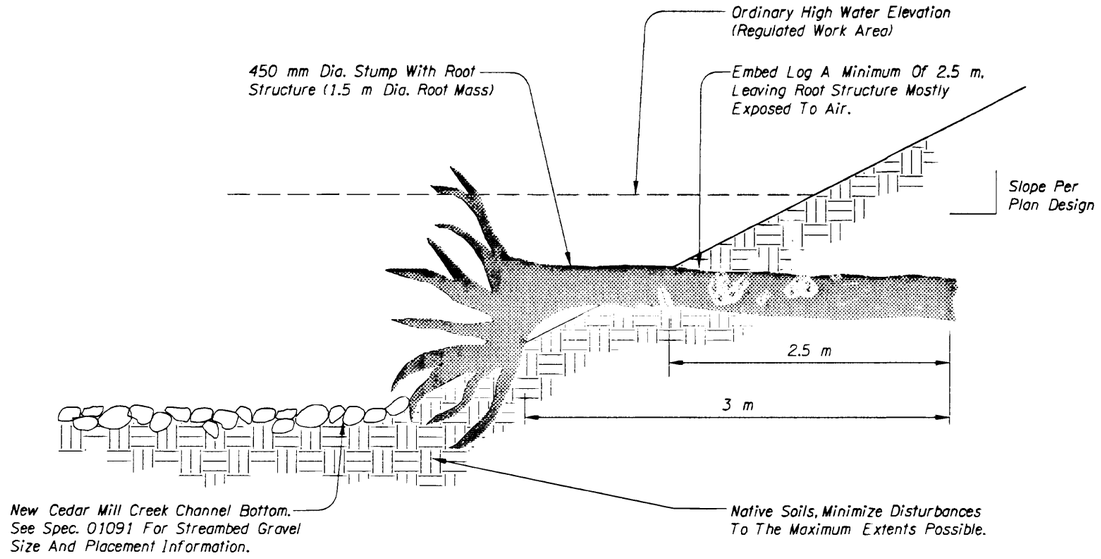


Min. Swale Length - 33 m
Min. (Max.) Longitudinal Swale Slope - .005 (0.5%)
Min. Swale Depth - 0.45 m

VEGETATED STORM WATER QUALITY SWALE

Detail Shown For Reference Only. Design By H. Allen (ODOT).

1. Provide And Install Jute Mat Per Specifications.
2. Provide And Place 150 mm Deep Topsoil Throughout Swale.
3. Swale Bottom Medium - Provide And Place 450 mm Deep Medium In Bottom Of Swale, Continuous Full Length Of Swale. Medium Composed Of Compost-Topsoil Blend Or Drain Rock With Compost-Topsoil Blend.
4. Not Used
5. Seed Swale Using Mix No. 4. See Specifications.
6. Under Drains, Where Recommended By The Engineer. Contact Henry Allen 503-731-8299.
7. For Details Not Shown, See Water-Quality Swale Details In GHJ Series Sheets.



STREAM BANK LOG WITH ROOT WAD

NOTE:
Recruit Log With Root Wad From Conifer Material Within Project Clearing Limits. See Specs.

The Log Must Be Anchored And/Or Ballasted To Maintain Design Placement. Details Of The Anchoring And/Or Ballast Will Be Provided By The Engineer At The Time Of Installation.

W&H PACIFIC
9755 SW Barnes Rd
Suite 300
Portland, Oregon
97225
(503)526-0455
(503)526-0775 Fax
whpacific.com

REGISTERED
317
MICHAEL D. SMYTH
OREGON
4/4/94
LANDSCAPE ARCHITECT

OREGON DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL SECTION

US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

Reviewed By - Mark A. Hadley
Designed By - Mike D. Smyth
Drafted By - Tammy J. Taggart

BIO-STABILIZATION DETAILS

SHEET NO. R28

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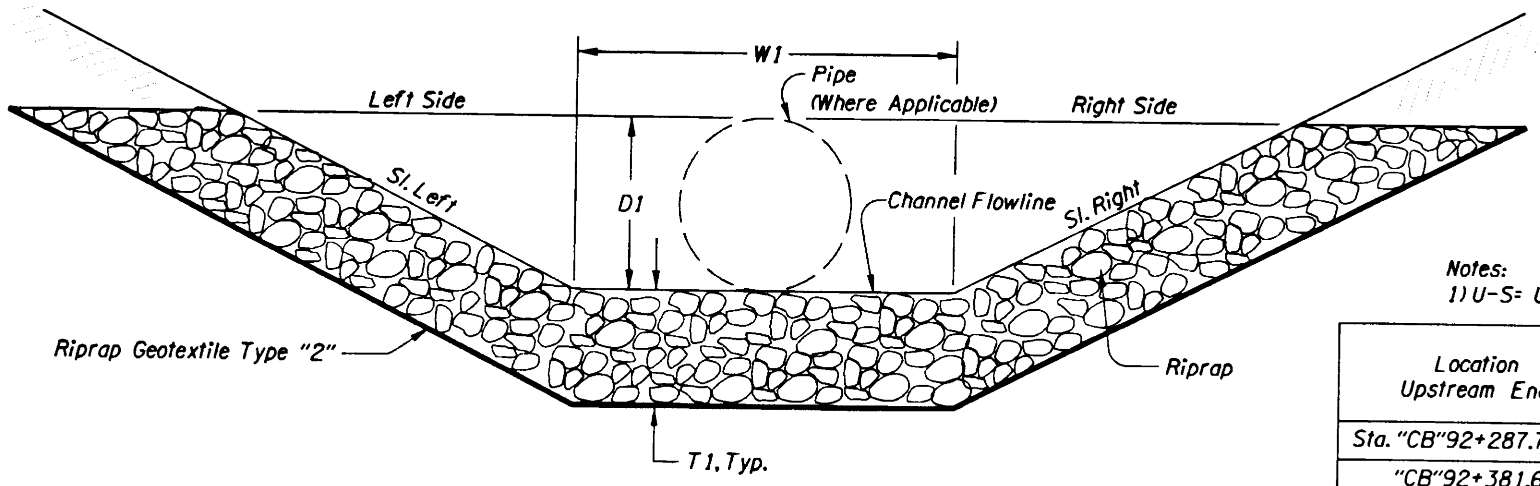
VIEW 2

VIEW 2

RIPRAP CHANNEL



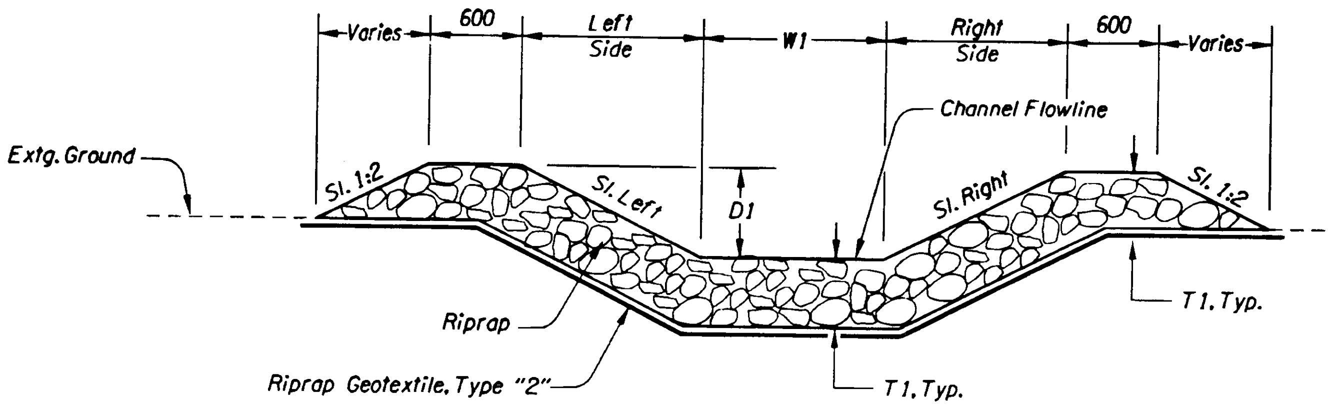
LOOKING DOWNSTREAM

RIPRAP CHANNEL, TYPE 1

Notes:
1) U-S= Upstream, D-S= Downstream

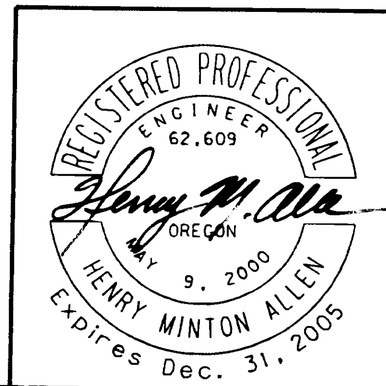
Location Upstream End	Type, (1 Or 2)	Length, L1 (m)	W1, (m)	D1, (mm)	T1, (mm)	F.L.U-S (m)	F.L.D-S (m)	Sideslope Left	Sideslope Right	Riprap Class	Outlet Structure
Sta. "CB"92+287.79, Lt.	1	7.5	0.6	450	300	66.192	64.839	1:2	1:2	25	Extg. Inlet
"CB"92+381.62, Lt	1	14.8	0.6	300	300	68.864	67.400	1:3	1:3	25	Flow Spreader
"LW"92+890.69, Lt	2	10.5	0.6	450	450	70.875	69.800	1:2	1:2	25	Wetlands
"LW"92+964.84, Lt	1	11	0.6	450	450	68.814	68.364	1:2	1:2	25	Flow Spreader
"LE"93+407.59, Rt.	1	10.3	0.6	300	450	70.073	69.600	1:4	1:4	25	Tributary 3 Wetlands
"LE"93+491.375, Rt.	1	10.3	0.6	300	450	70.073	69.600	1:4	1:4	25	Tributary 3 Wetlands
"LW"94+030.08, Lt	1	3.5	0.9	300	450	72.670	72.210	1:2	1:2	25	Swale "MA1"
"LW"94+546.19, Lt	2	92.1	1.2	600	450	65.700	65.300	1:2	1:2	25	Extg. Ground
"LW"94+638.35, Lt	2	31.5	1.2	450	450	66.490	66.400	1:2	1:2	25	Extg. Ground
"LW"94+487.16, Lt	2	3	1.2	600	525	65.460	65.447	1:2	1:2	50	Riprap Channel
"LE"95+268.02, Rt.	1	122	1.8	600	525	71.350	59.600	1:2	1:2	50	Johnson Creek
"LW"95+308.28, Lt	1	122.5	1.2	450	450	69.800	60.200	1:2	1:2	25	Johnson Creek
"LW"95+456.20, Lt	1	3	2.4	150	450	82.005	81.760	1:4	1:4	25	Downstream Swale
"LW"95+474.20, Lt	1	3	2.4	150	450	81.500	80.960	1:4	1:4	25	Downstream Swale
"LW"95+490.20, Lt	1	3	2.4	150	450	80.700	80.400	1:4	1:4	25	Downstream Swale
"LW"95+506.20, Lt	1	3	2.4	150	450	79.900	79.800	1:4	1:4	25	Downstream Swale
"D"95+963.17, Rt	2	26.5	1.2	450	450	90.950	90.800	1:2	1:2	25	ME Inlet
"D"95+973.85, Rt	1	10	2.4	300	450	93.370	90.950	1:2	1:2	25	Riprap Basin
"SC"96+034.54, Rt	1	5	0.6	300	450	101.800	101.280	1:4	1:4	25	Riprap Channel
"BR"96+068.63, Rt	1	30	0.6	300	450	101.650	101.200	1:4	1:4	25	Inlet
"NW"96+098.56, Lt	1	3	1.6	300	450	104.241	104.200	1:4	1:4	25	Flow Spreader
"BR"96+103.82, Lt	1	3.5	1.5	450	750	94.000	93.300	1:2	1:2	350	Riprap Basin
"BR"96+115.61, Lt	2	37	1.5	600	450	93.300	93.100	1:2	1:2	25	ME Inlet

All Dimensions Are In Millimeters (mm) Unless Otherwise Noted.



LOOKING DOWNSTREAM

RIPRAP CHANNEL, TYPE 2



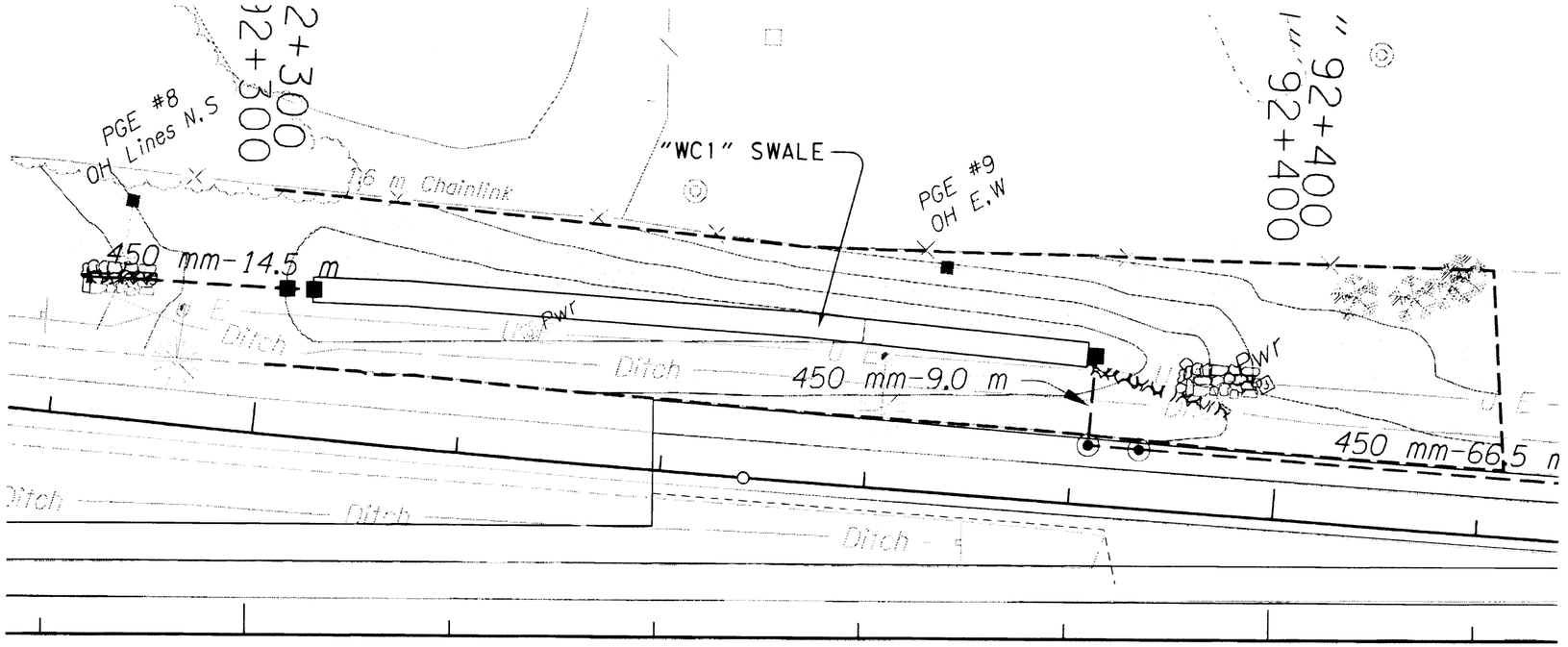
OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

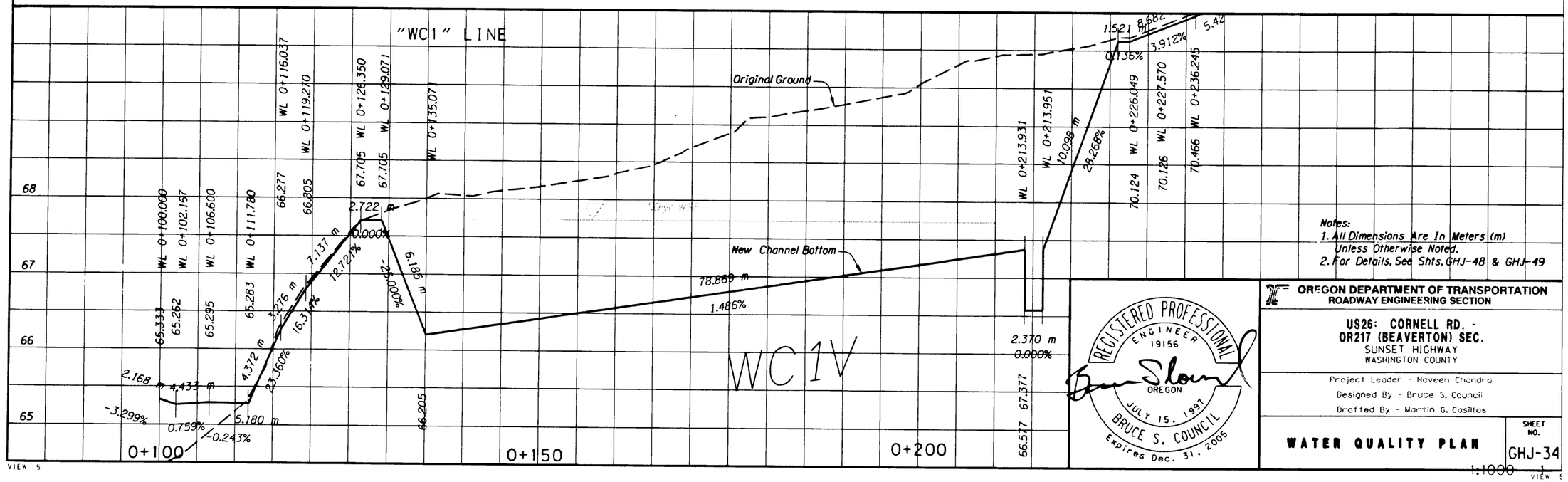
US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

Project Leader - Naveen Chandra
Designed By - Henry M. Allen
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. GHJ-8





Notes:
1. All Dimensions Are In Meters (m) Unless Otherwise Noted.
2. For Details, See Shts. GHJ-48 & GHJ-49

REGISTERED PROFESSIONAL ENGINEER
19156
OREGON
JULY 15, 1997
BRUCE S. COUNCIL
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

Project Leader - Naveen Chandra
Designed By - Bruce S. Council
Drafted By - Martin G. Casillas

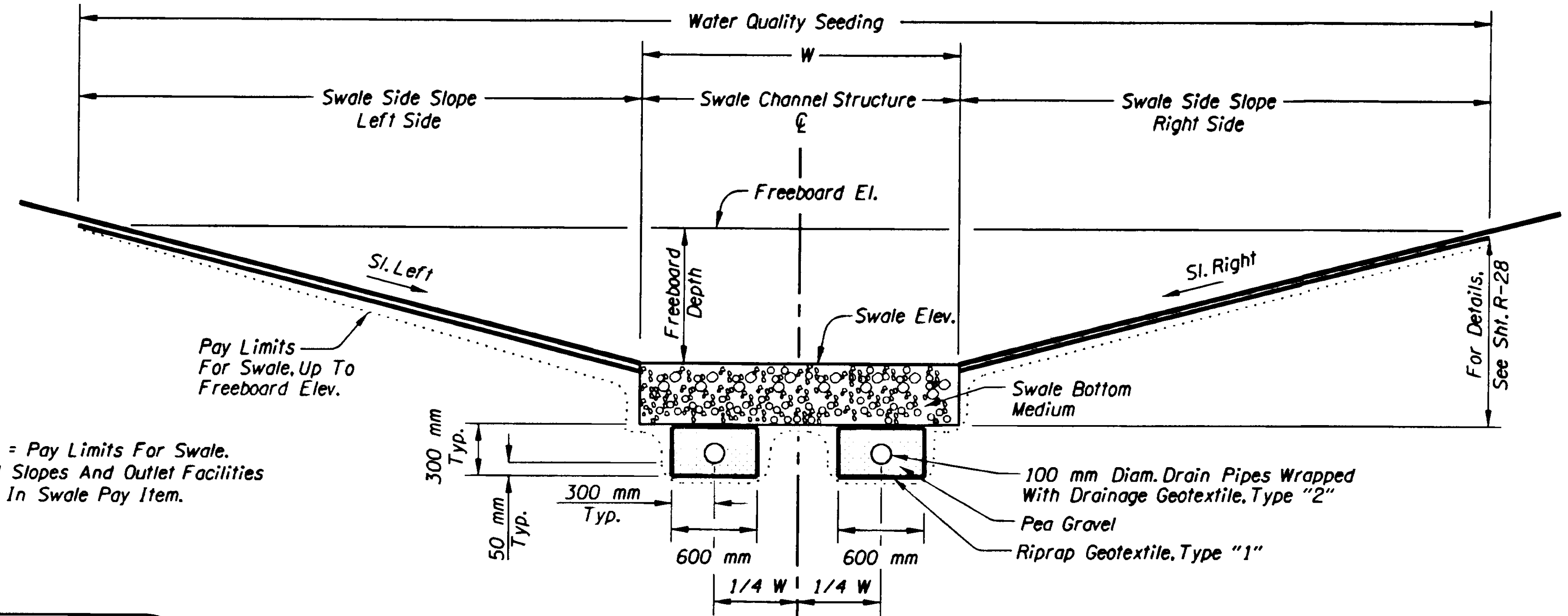
WATER QUALITY PLAN

SHEET NO. GHJ-34

1:1000

VIEW 5

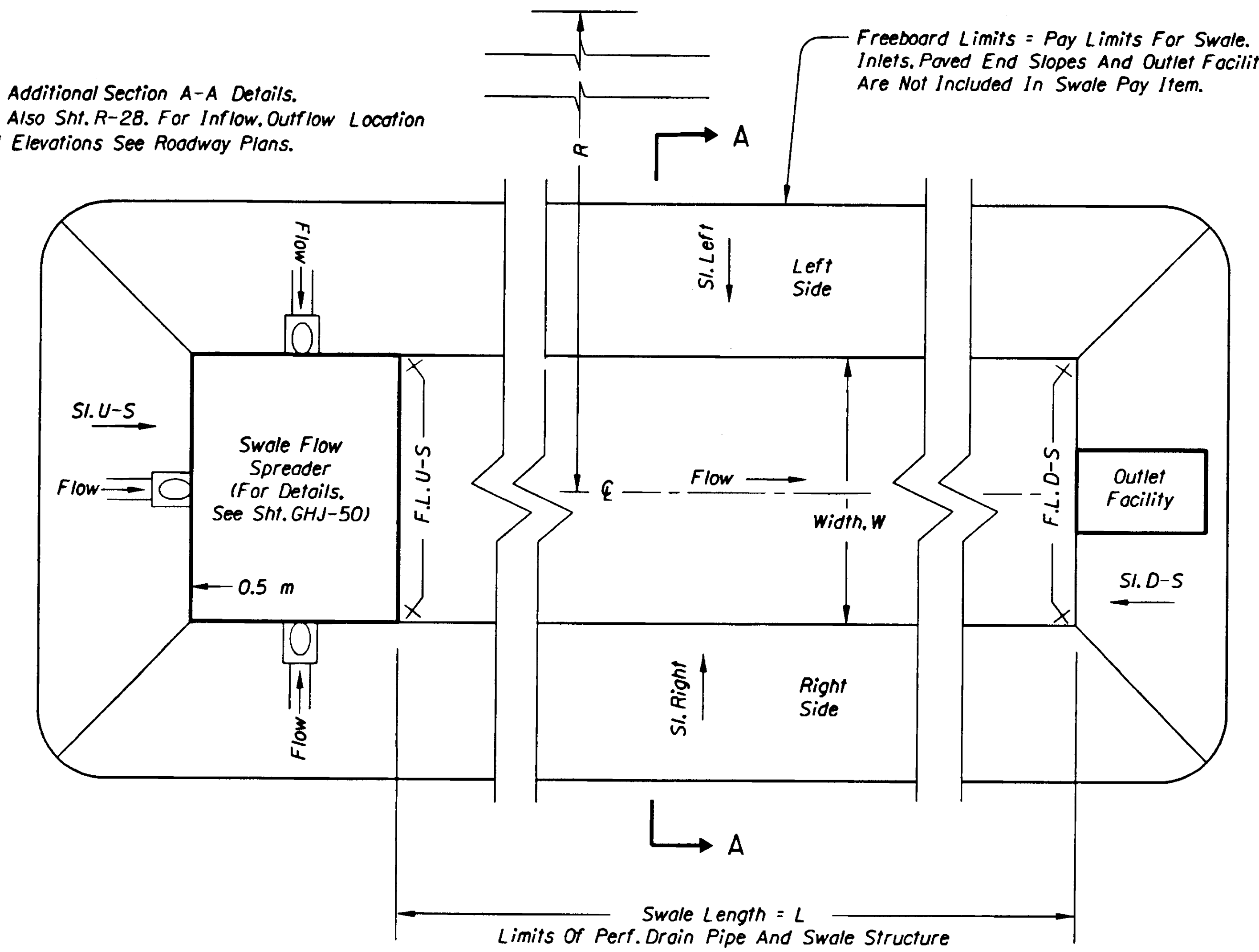
WATER QUALITY SWALE GENERAL DETAILS
PLAN AND TYPICAL CROSS-SECTION



Note:
See Sht. R-28 For Seeding, Planting, And Swale Bottom Medium Details.

SECTION A-A, AND UNDER DRAIN

For Additional Section A-A Details,
See Also Sht. R-28. For Inflow, Outflow Location
And Elevations See Roadway Plans.



Note:
For Swale Specifics, See Sht. GHJ-49.

PLAN

All Dimensions Are In Millimeters (mm)
Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER 19156 OREGON JULY 15, 1997 BRUCE S. COUNCIL Expires Dec. 31, 2005

REGISTERED PROFESSIONAL ENGINEER 62,609 OREGON MAY 9, 2000 HENRY MINTON ALLEN Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

Project Leader - Naveen Chandra
Designed By - Henry M. Allen
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. GHJ-48

WATER QUALITY SWALES
SITE SPECIFIC INFORMATION

Notes:
1) U-S= Upstream, D-S= Downstream
2) See Site Plans For Pipe Inverts At Inlets.
3) "C-T Blend" = Compost-Topsoil Blend,
"Rock+C-T" = Drain Rock With Compost-Topsoil Blend.

Swale ID	L, m	W, m	F.L. U-S, m	F.L. D-S, m	Long. Slope, %	Centerline Curve Radius, m	U-S	Swale Sideslopes Left	Swale Sideslopes Right	D-S	Freeboard Depth, m	Swale Bottom Medium	No. Under-Drain Segments	Under Drain Tie-In Location	Swale Outlet Facility
WCW	340	1.2	See GHJ-32	See GHJ-32	Varies	None	1:3	1:4	1:6	1:4	0.3	Rock+C-T	2	"G-2MA" Mod. Inlet	"G-2MA" Mod. Inlet
WCE	322	2.4	See GHJ-33	See GHJ-33	Varies	None	1:20	1:6	1:4	1:18	0.3	Rock+C-T	2	"G-2MA" Mod. Inlet	"G-2MA" Mod. Inlet
WC1	82	2.4	68.062	66.543	1.85	None	1:4	1:3	1:6	1:4	0.3	C-T Blend	2	"D" Mod. Inlet	"M-E" Mod. Inlet
WC2A	30	0.6	70.673	70.197	1.50	None	1:2	1:2	1:2	1:2	0.3	C-T Blend	1	"D" Mod. Inlet	"D" Mod. Inlet
WC2B	474	0.7	70.815	70.637	0.32	None	1:3	1:3	1:3	1:3	0.3	C-T Blend	1	"D" Mod. Inlet	"D" Mod. Inlet
WC2C	37	0.8	71.042	70.839	0.55	None	1:4	1:4	1:4	1:4	0.45	C-T Blend	1	"D" Mod. Inlet	"D" Mod. Inlet
WC2D	41	0.9	72.556	71.634	Varies	None	1:5	1:5	1:5	1:5	0.3	Rock+C-T	1	"D" Mod. Inlet	"D" Mod. Inlet
WC3A	50	2.4	70.195	69.961	0.5	None	1:4	Var.	Var.	1:4	.8	C-T Blend	2	"D" Mod. Inlet	"V"-Bottom Ditch
WC3B	50	2.4	74.408	74.158	0.5	80	1:4	1:4	1:6	1:4	0.45	C-T Blend	2	"D" Mod. Inlet	"M-E" Mod. Inlet
MA1	31.5	2.4	72.160	72.000	0.51	None	1:3	1:3	Var.	1:6	0.45	C-T Blend	None	N.A.	"M-E" Mod. Inlet
CBR	See GHJ-43	2.4	See GHJ-43	See GHJ-43	Varies	None	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	"D" Inlet
N1a	23	2.4	102.150	102.035	0.5	100	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Riprap Basin
N1b	12.3	2.4	101.812	101.750	0.5	25	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Channel
N2	36	2.4	102.750	102.570	0.5	100	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Pipe
N3	36	2.4	103.350	103.170	0.5	100	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Pipe
N4	36	2.4	103.850	103.670	0.5	100	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Pipe
N5a	12.6	2.4	104.404	104.341	0.5	None	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Channel
N5b	24	2.4	104.150	104.030	0.5	100	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Pipe
S1	36	2.4	93.550	93.370	0.5	20, Each	1:4	1:4	1:4	1:4	0.45	C-T Blend	None	N.A.	Channel

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