OPERATION & MAINTENANCE MANUAL

DFI No.: D00167
Facility Type: Water Quality Biofiltration Swale

JUNE, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00167**
Facility Type:	WQ Biofiltration Swale
Construction Drawings:	(V-File Number) 37V-041
Location:	District: 2B (Old 2A)
	Highway No.: 047
	Mile Post: 66.76/66.80 (beg./end)
	Description: This facility is located on the south side of US 26 (Hwy 047). Access to the facility can be obtained from US 26 (Hwy 047).

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 S. Council, (503) 731-8319
Facility construction:	2004
Contractor:	Mowatt Construction

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.

The swale, approximately 165 feet in length, is located on the south side of US 26 (Hwy 047). Access to the swale can be obtained from the highway. The swale treats drainage from the south half of the eastbound lanes of US 26 (Hwy 047), between the Murray Blvd overpass and the facility.

The swale is considered an online facility with no high flow bypass. The roadway drainage is directed into a catch basin immediately adjacent to the facility. The runoff is either captured by this catch basin or may overflow the catch basin and be collected by a nearby ditch, both of which are directed to the swale. The runoff captured by the catch basin is pretreated with a pollution control manhole before being discharged into the swale at Facility Inlet A; see photos 1 and 2. The runoff from the ditch is conveyed to the swale at the same point as facility Inlet A. After treatment through the swale, the water outlets through a ditch inlet outlet control structure before being directed into 110 feet of 18-inch storm pipe and discharging into a nearby wetlands area; see photos 3 and 4.

A second inlet, facility Inlet B, is located at the downstream end of the swale. This inlet receives stormwater runoff from a ditch located north of the eastbound lanes of US 26. The water discharged from Inlet B does not receive treatment in the swale and is directed toward the swale outlet control structure; see photo 5.

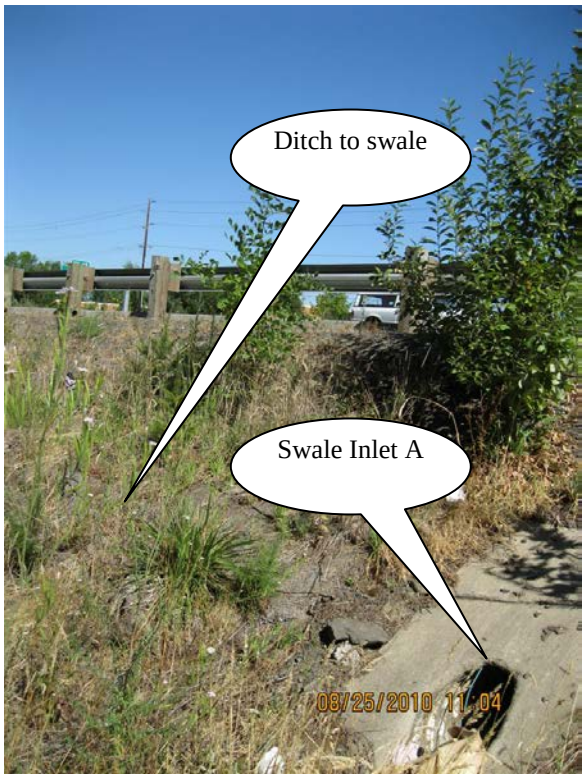


Photo 1: Swale Inlet A at start of swale. Photograph is looking towards the north at US26 (Hwy 047).

Photo 2: Swale Inlet A at start of swale.

Photo 3: Water quality swale looking east.

Photo 4: Ditch inlets serving as outlet for swale.

Photo 5: Swale Inlet B at east end of swale.

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

A. Maintenance equipment access:
The facility can be accessed for maintenance from the east bound US 26 (Hwy 047).

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)

The WQ biofiltration swale is considered an online system (no flow is bypassed) and can be used to store a volume of liquid by blocking the outlet to the swale at either the grates of the ditch inlets or the 12-inch diameter outlet pipe. (Point C and Photo 4).

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, 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:

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

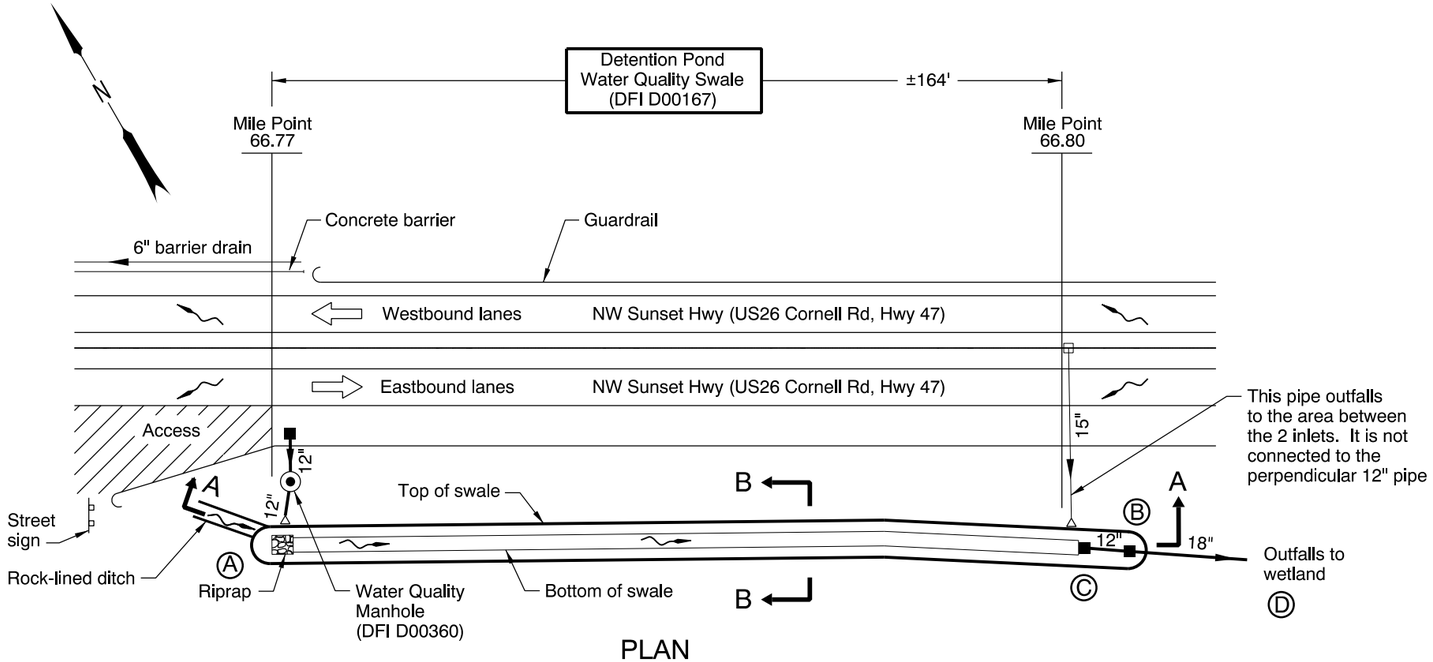
Contact any of the following for more detailed information about management of waste materials found on site:

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

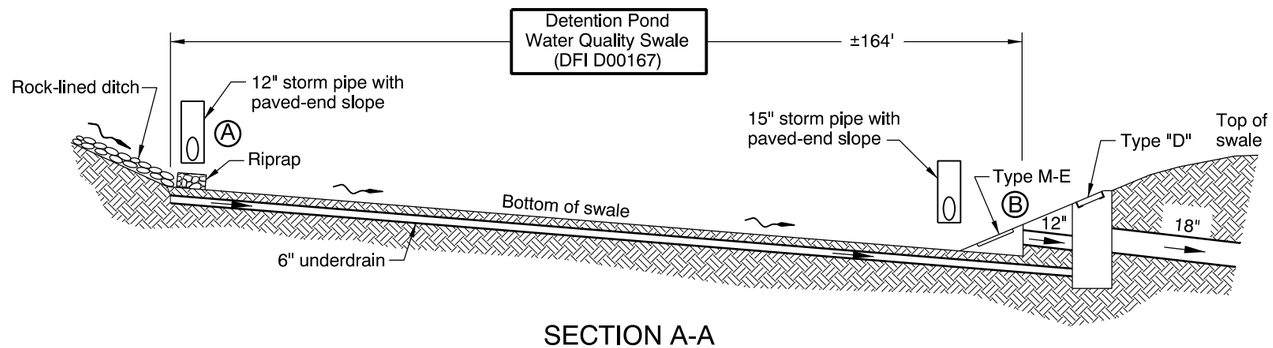
Appendix A

Content:

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



PLAN
N.T.S.



SECTION A-A
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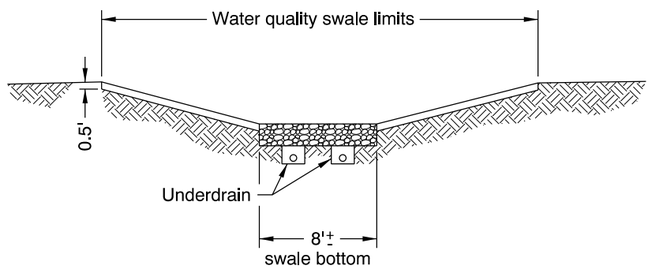

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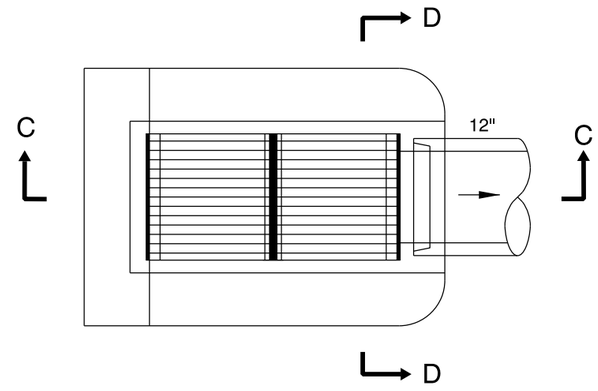
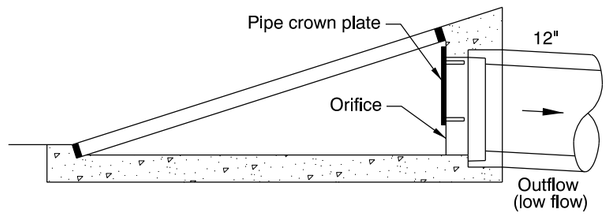


TYPE M-E INLET/OUTLET DETAIL AT POINT Ⓒ
N.T.S.



SECTION C-C
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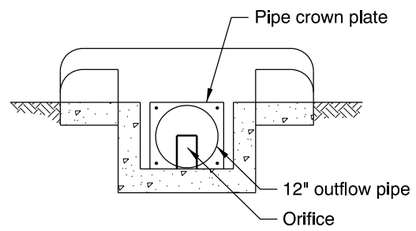


SECTION D-D
N.T.S.

LEGEND:

- Photo Location / Direction
- Ⓐ Facility Inlet
- Ⓑ Control Structure
- Ⓒ Type M-E Inlet/Outlet
- Ⓓ Outfall
- ◉ and/or ◎ Manhole
- ■ and/or □ Inlet
- Traffic Direction / Flow
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Maintence Access

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Bob Knorr

Drafted By: Y. Garzenelli/K. Taylor

DFI D00167
MAINTENANCE DISTRICT 2B HWY 047
DETENTION POND/WQ SWALE
SUNSET HWY. MP 66.77-66.80
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

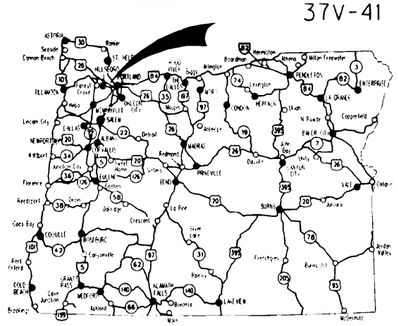
PLANS FOR PROPOSED PROJECT

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

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

SUNSET HIGHWAY

WASHINGTON COUNTY
MARCH 2004

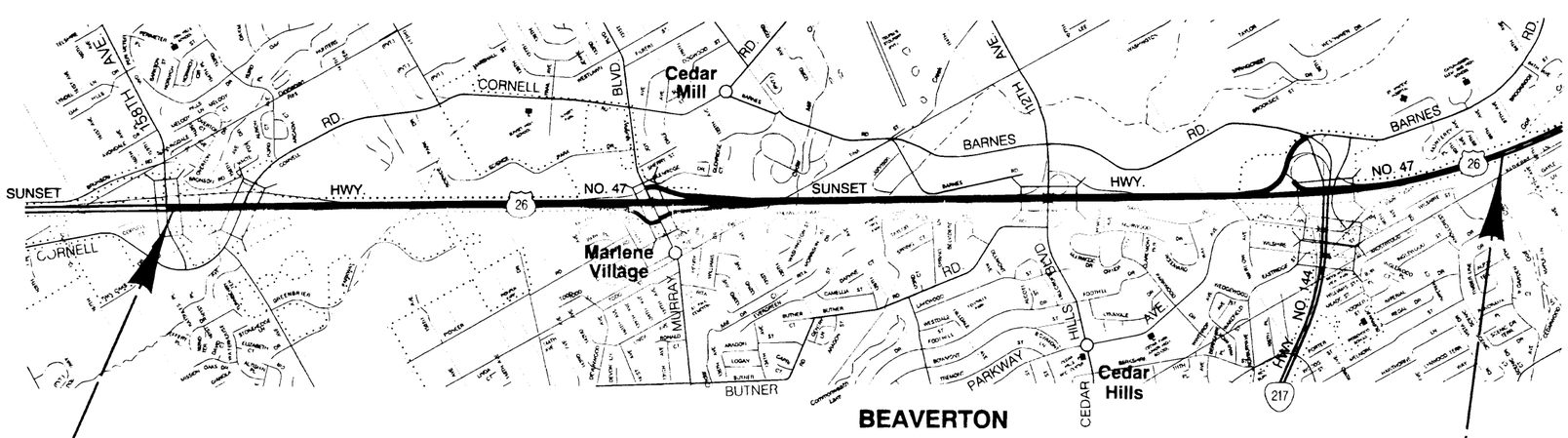


Overall Length Of Project - 6.51 km (4.05 Miles)

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

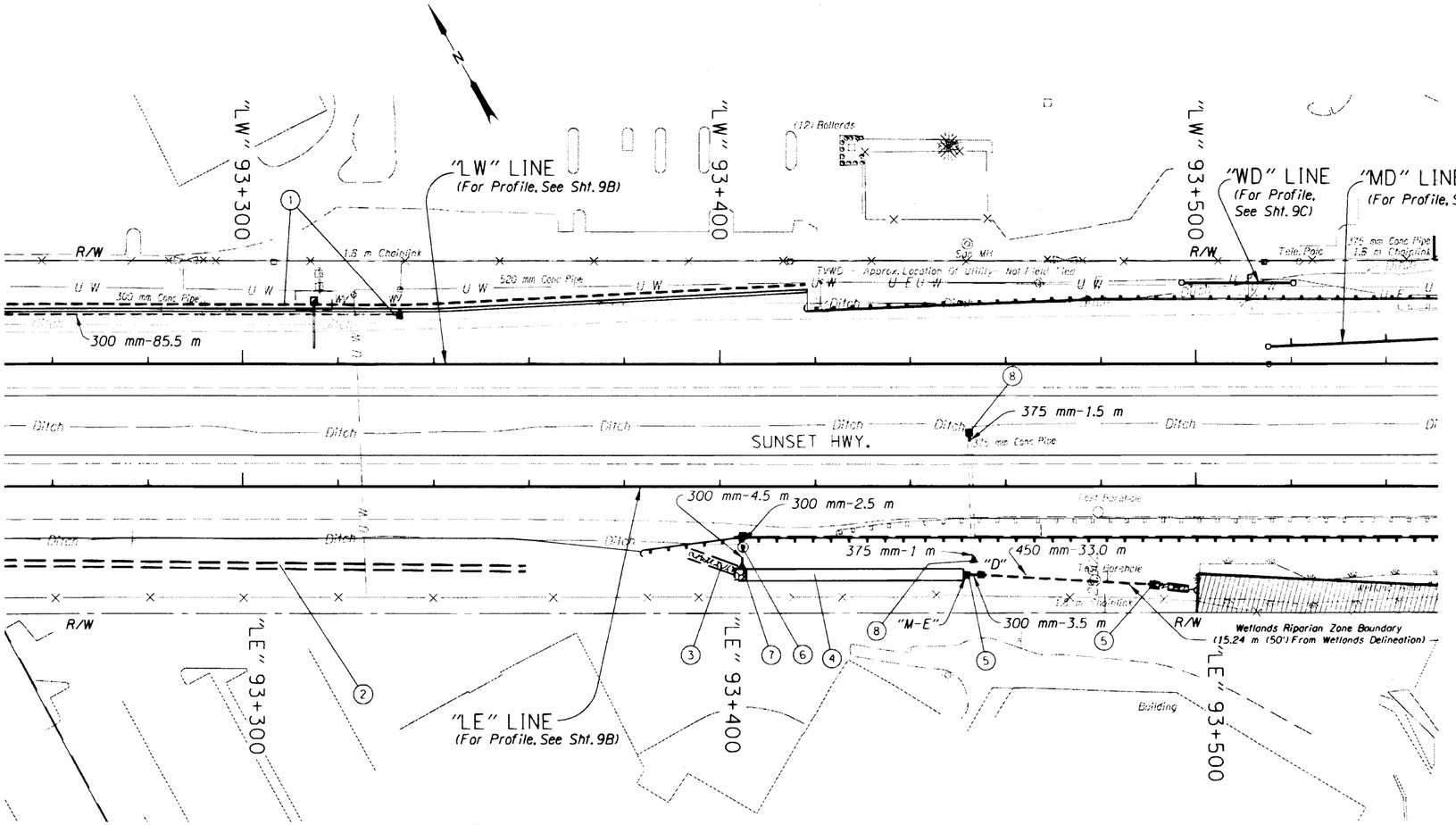
US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

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

PE000656/C0341403-011

F:\ODOT DATA\Projects\13459 Cornell 217\13459r1.tsl 1/16/2004 1:19:56 PM bwve07n

Sec. 33, T. 1N, R. 1W, W.M.



Wetland Area No Work Zone, Shown Thus:

① See Sht. 8A, Note 9

② See Sht. 8A, Note 8

③ Sta. "LE" 93+407.591, 14.824 m Rt.
Const. Ditch
1.2 m Flat Bottom, 1:3 Slopes
Const. Loose Riprap (Class 25) - 44 MG
Riprap Geotextile Matl. Type "1" - 70 M²
Dt. Exc. - 28 M³
(For Details, See Sht. GHJ-8)

④ Const. Water Quality Swale "WC3A"
(For Details, See Shts. R-28 & GHJ-39)

⑤ Sta. "LE" 93+491.375, 18.982 m Rt.
Const. Ditch
1.2 m Flat Bottom, 1:3 Slopes
Const. Type "M-E" Detention Mod. Inlet
Const. Type "D" Mod. Inlet
Const. Paved End Slope - 5 m²
Const. Loose Riprap (Class 25) - 44 MG
Inst. 300 mm Storm Sew. Pipe - 3.5 m
1.5 m Depth
Inst. 450 mm Storm Sew. Pipe - 33.0 m
1.5 m Depth
Riprap Geotextile Matl. Type "1" - 70 mm²
Dt. Exc. - 28 m³
(For Details, See Sht. GHJ-8)

⑥ Sta. "LE" 93+404.814, 12.65 m Rt.
Const. Pollution Control Manhole
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 2.5 m
1.5 m Depth
(For Details, See Sht. GHJ-23)

⑦ Sta. "LE" 93+404.544, 17.234 m Rt.
Const. Pave End Slope - 3.1 m2
Inst. 300 mm Storm Sew. Pipe - 4.5 m
1.5 m Depth

⑧ Sta. "LE" 93+453.222, 15.345 m Rt.
Const. Type "M-E" Mod. Inlet
Connect To Extg. Pipe
375 mm Extg. Pipe, In Pl.
Extend - 1.5 m, Lt.
1.0 m, Rt.
Const. Paved End Slope - 3.7 m²

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

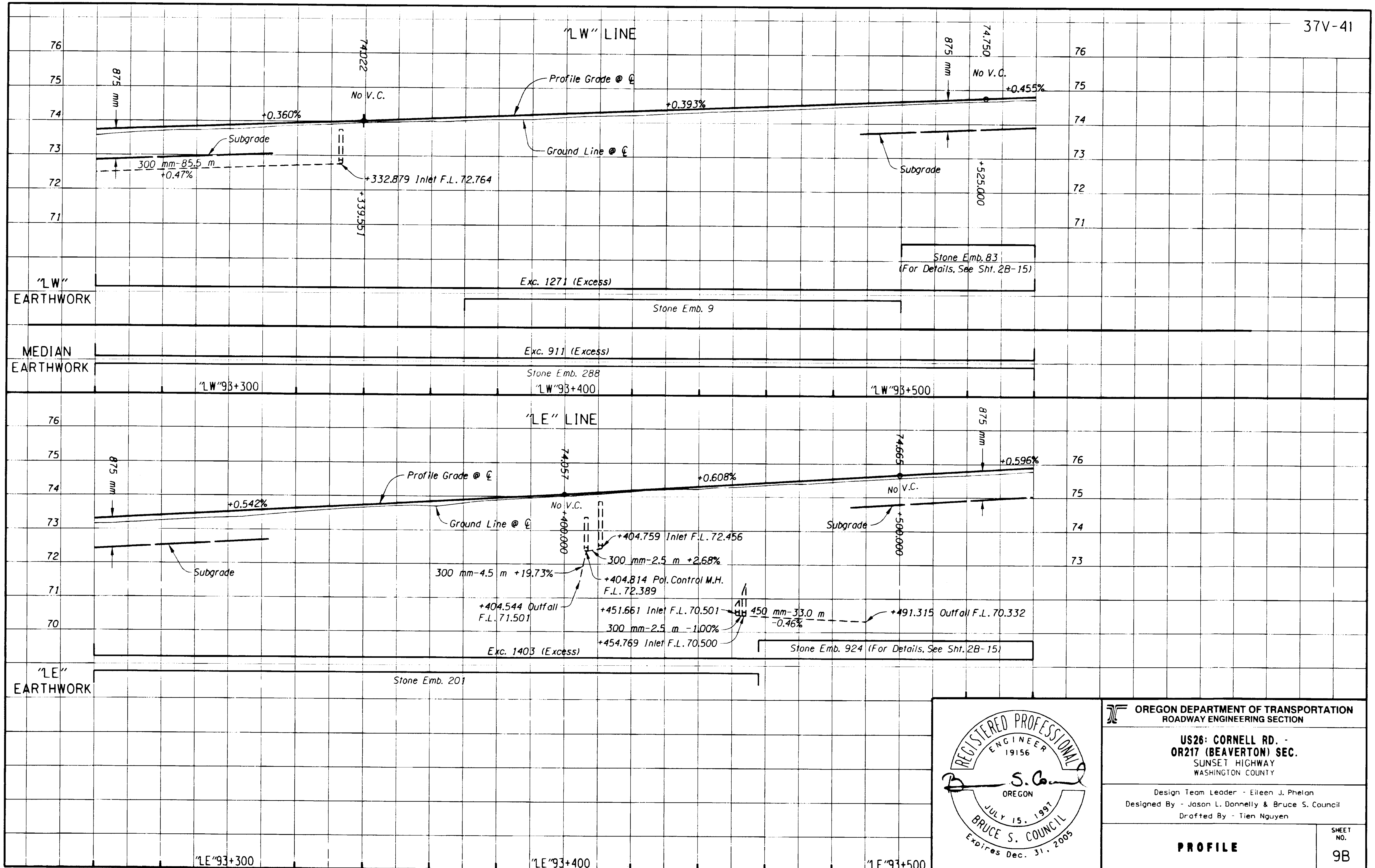
OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

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. 9A



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

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

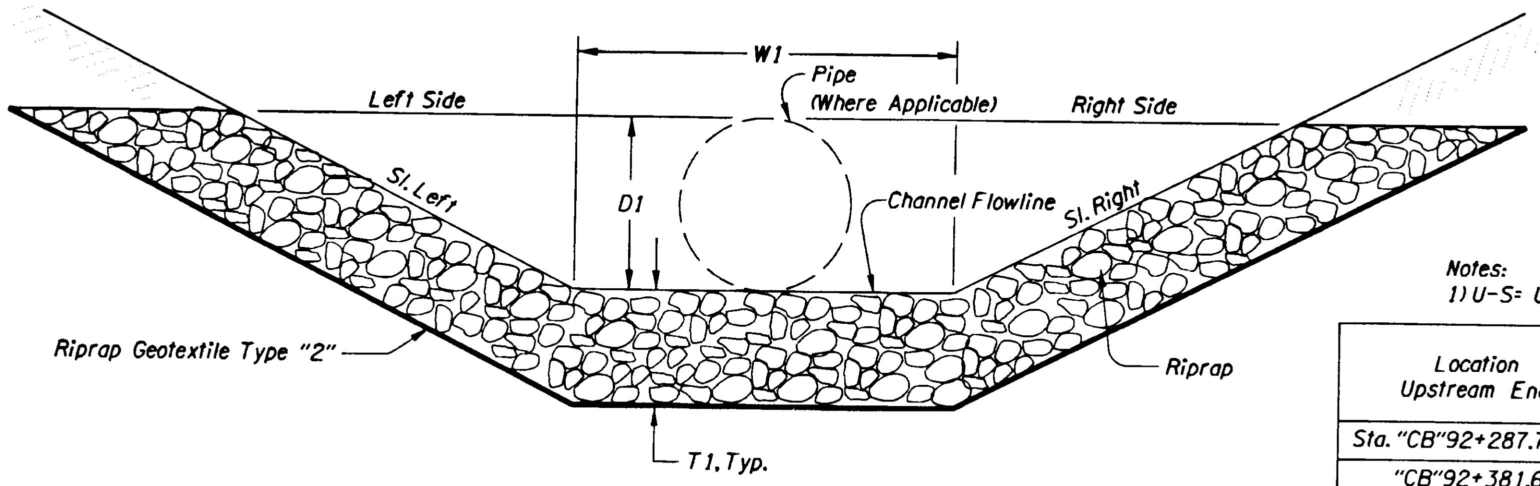
US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

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

PROFILE

SHEET NO. 9B

RIPRAP CHANNEL

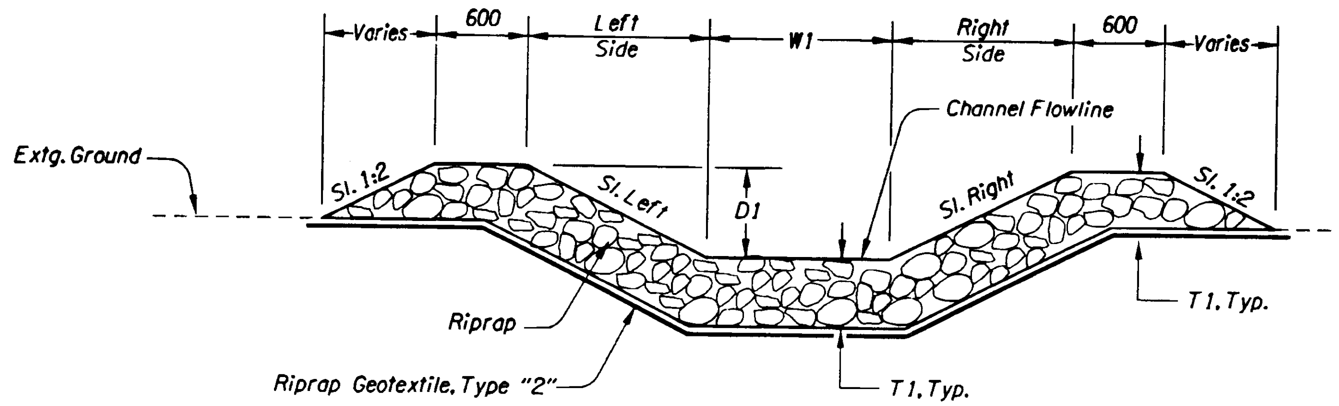


LOOKING DOWNSTREAM

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



LOOKING DOWNSTREAM

RIPRAP CHANNEL, TYPE 2

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

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

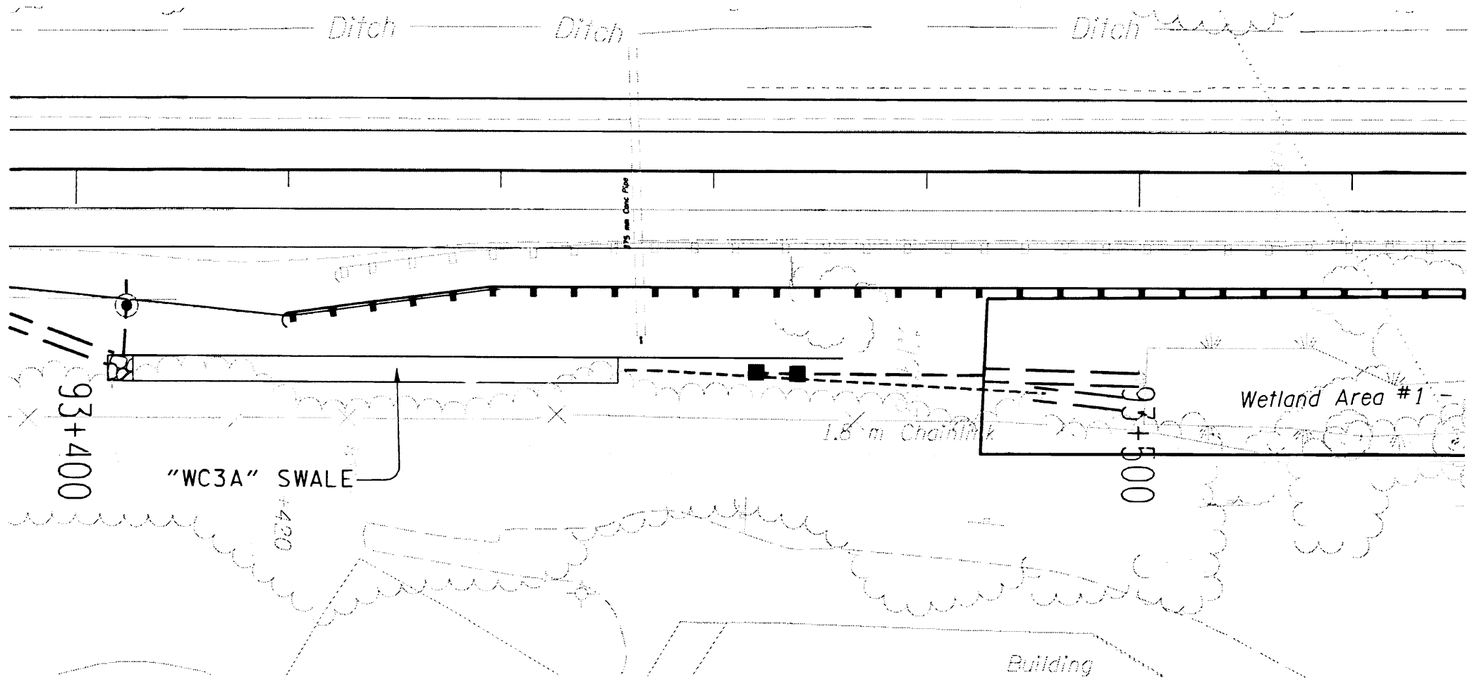
OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

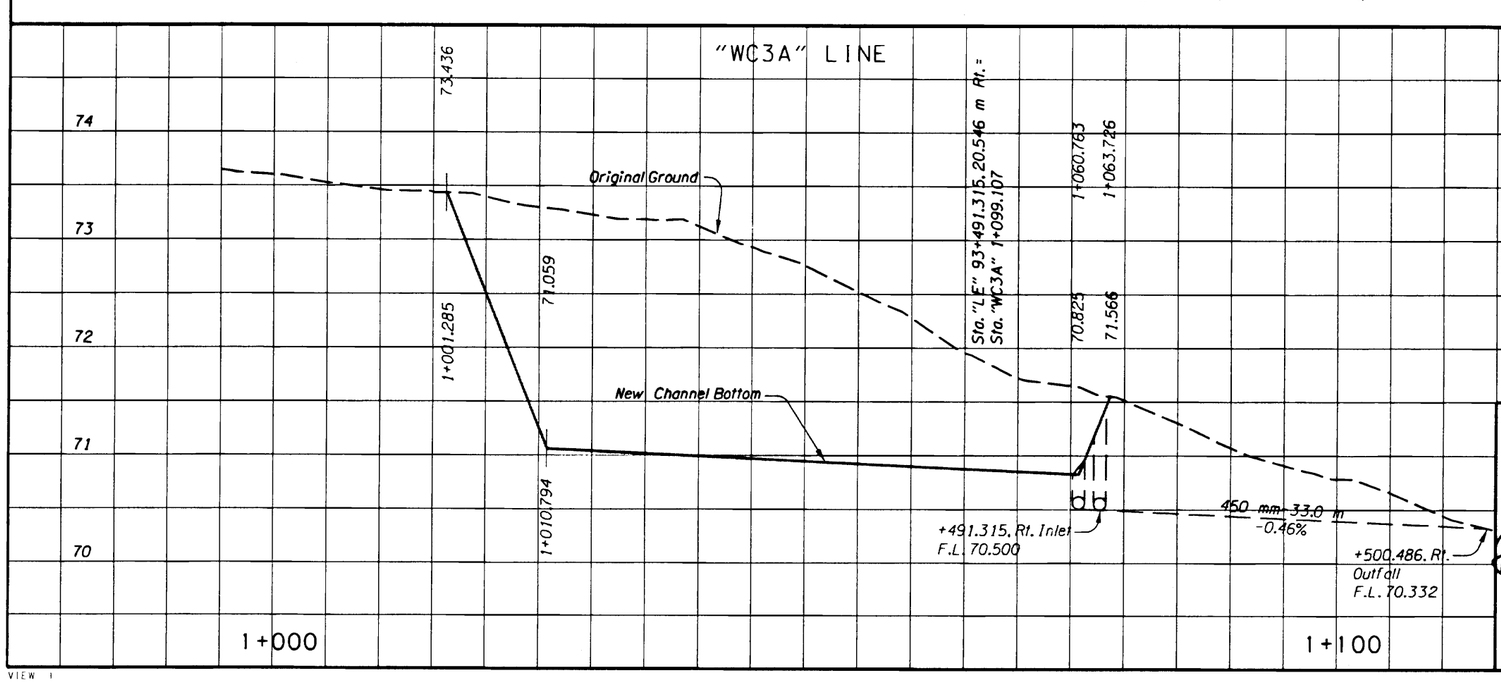
US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

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

WATER QUALITY DETAILS

SHEET NO. GHJ-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
S. Council
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

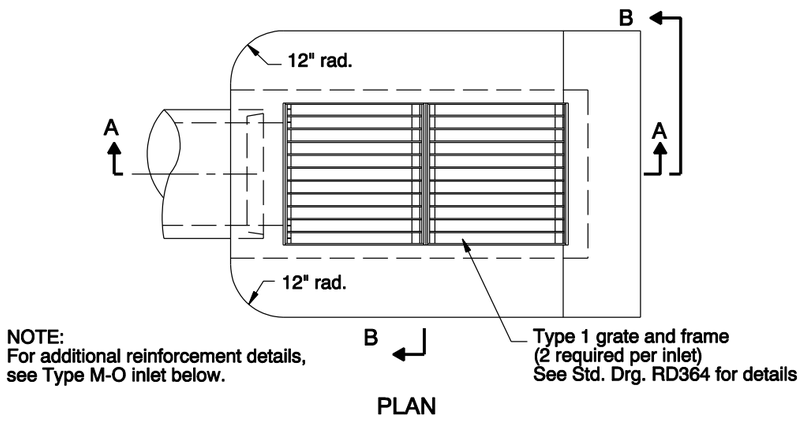
WATER QUALITY PLAN

SHEET NO. GHJ-39

VIEW 1 1:1000 VIEW 1

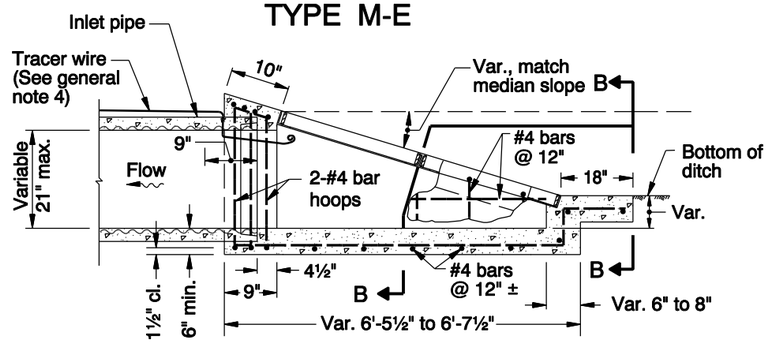
rd368.dgn 30-JUN-2009

TYPE M-E

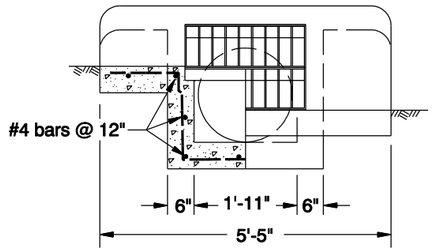


NOTE:
For additional reinforcement details, see Type M-O inlet below.

PLAN

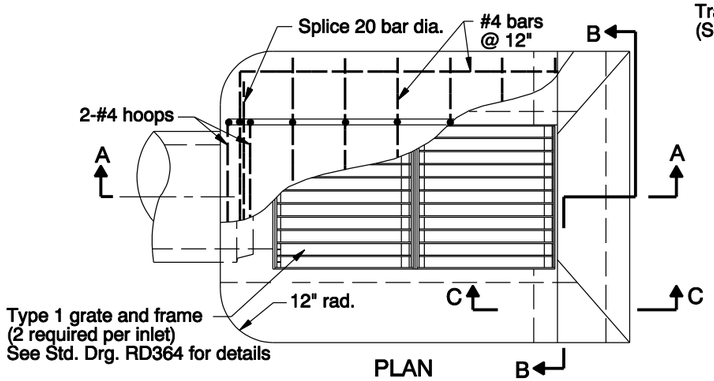


SECTION A-A



SECTION B-B

TYPE M-O



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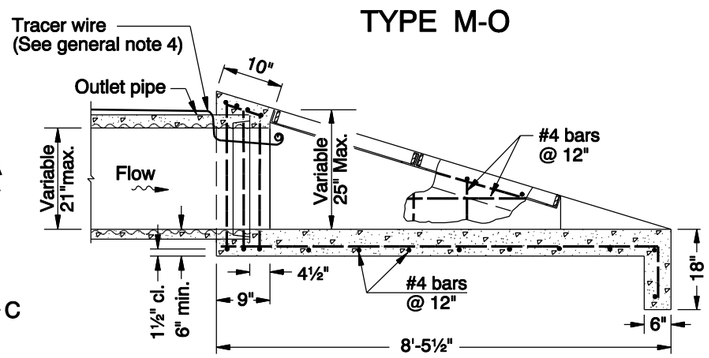
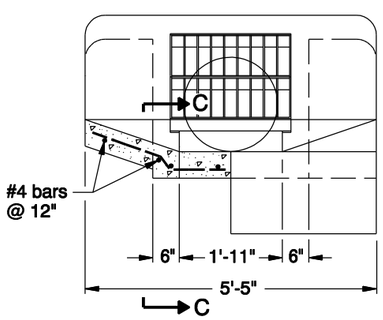
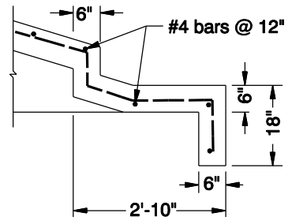


SECTION A-A



SECTION B-B

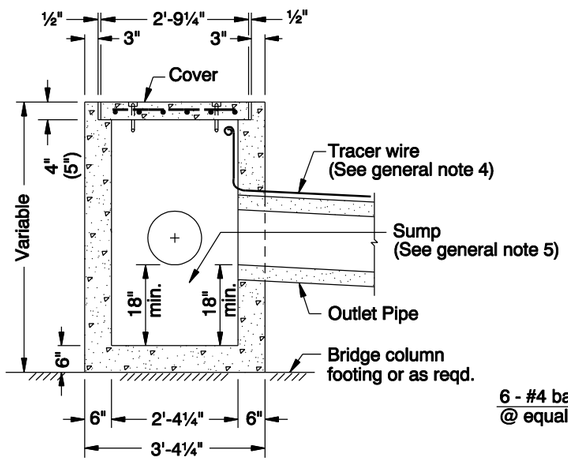


SECTION C-C

GENERAL NOTES FOR ALL DETAILS:

1. Maximum pipe sizes for use with type M-E and M-O inlets are 21" round and 21" x 15" arch pipe.
2. All reinforcement to be placed a minimum of 2" clear of nearest face of concrete unless otherwise shown or noted. Reinforcement to be lapped 20 bar diameters at splices.
3. When uncoated metal pipe or arch pipe are used, an asphaltic or similar type protective coating shall be applied to the exterior surface.
4. See Std. Drg. RD336 for tracer wire details, or approved alternate.
5. Provide sump only where shown on plans, and allowed by jurisdiction.
   For sump details, see Std. Drg. RD364.

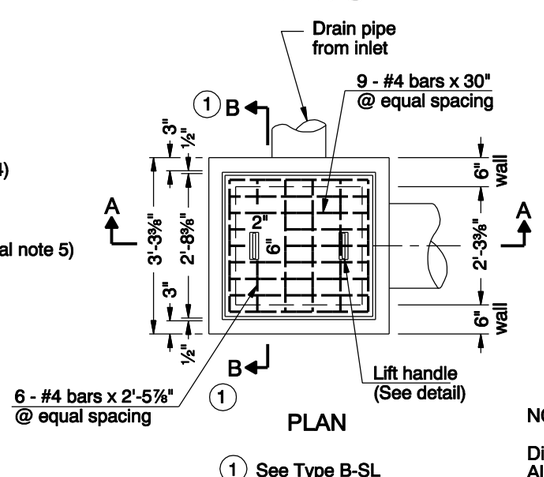
TYPE B



SECTION A-A

* All cover bars for Type B & B-SL inlets to be placed 1½" clear of nearest face of concrete unless shown or noted otherwise.

TYPE B-SL

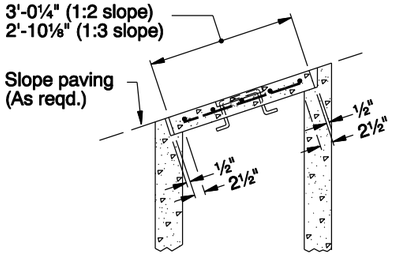


PLAN

1 See Type B-SL

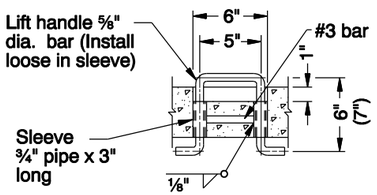
SLOPE INSTALLATION

(For details not shown, see Type B)



SECTION B-B

LIFT HANDLE



NOTE: ("TYPE B" MODIFIED INLET)

Dimensions shown in parenthesis are for Type B Modified inlet. All cover bars for "Type B" Modified inlet are to be placed 1" min. clear of bottom face of concrete and 2½" min. clear of top face of concrete. "Type B" modified inlet to be used if B inlet is under traffic.

CALC. BOOK NO. _____

BASELINE REPORT DATE _____

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

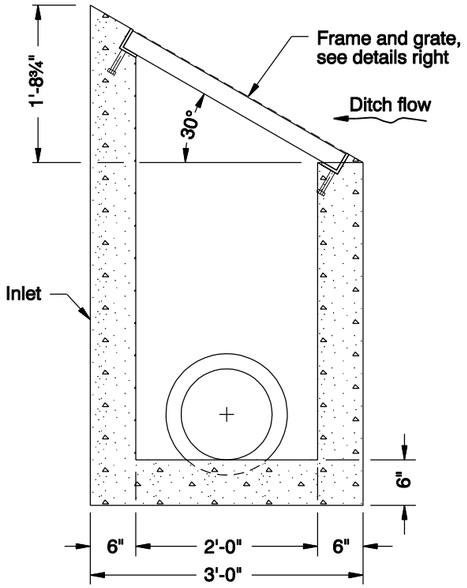
OREGON STANDARD DRAWINGS

CONCRETE INLETS
TYPE M-E, M-O, B AND B-SL

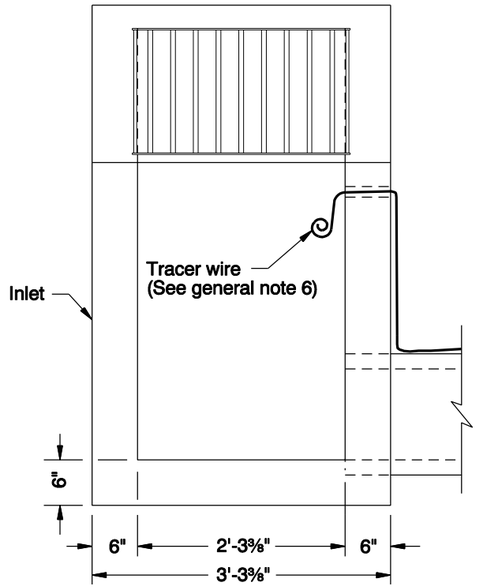
2008

DATE	REVISION DESCRIPTION
06-2009	REVISED & ADDED NOTES

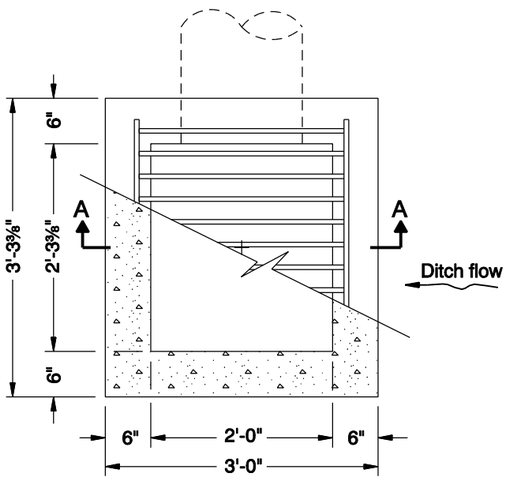
RD368



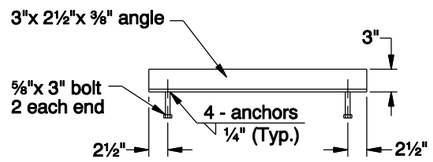
SECTION A - A



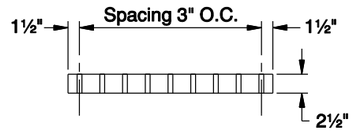
ELEVATION



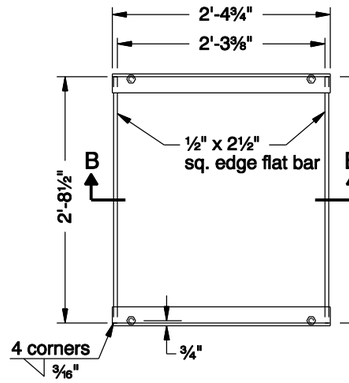
PLAN



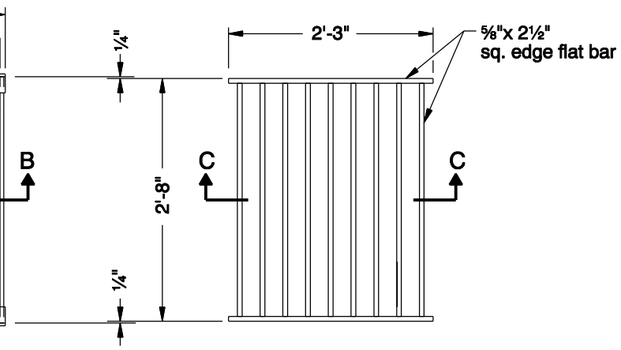
SECTION B-B



SECTION C-C



PLAN
FRAME



PLAN
GRATE - TYPE 1

GENERAL NOTES FOR ALL DETAILS:

1. All concrete shall be commercial grade concrete.
2. G-2 grates may be used if approved by the engineer.
3. Catch basin, frame, and grates shall meet H20 loading.
4. Provide sump only when shown on plans, and allowed by jurisdiction. For sump details, see Std. Drg. RD364.
5. ⅝" cross bars shall be flush with the grate surface and may be fillet welded, resistance welded or electroforged to bearing bars.
6. See Std. Drg. RD336 for tracer wire details, or approved alternate.

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

CALC. BOOK NO. N/A

BASELINE REPORT DATE 02-JUL-2010

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

DITCH INLET
TYPE D

2008

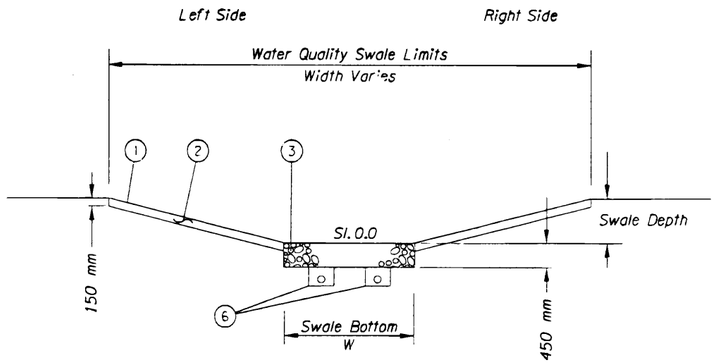
DATE	REVISION DESCRIPTION
06-2009	REVISED NOTES
07-2010	ADDED DIMENSIONS

RD370

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

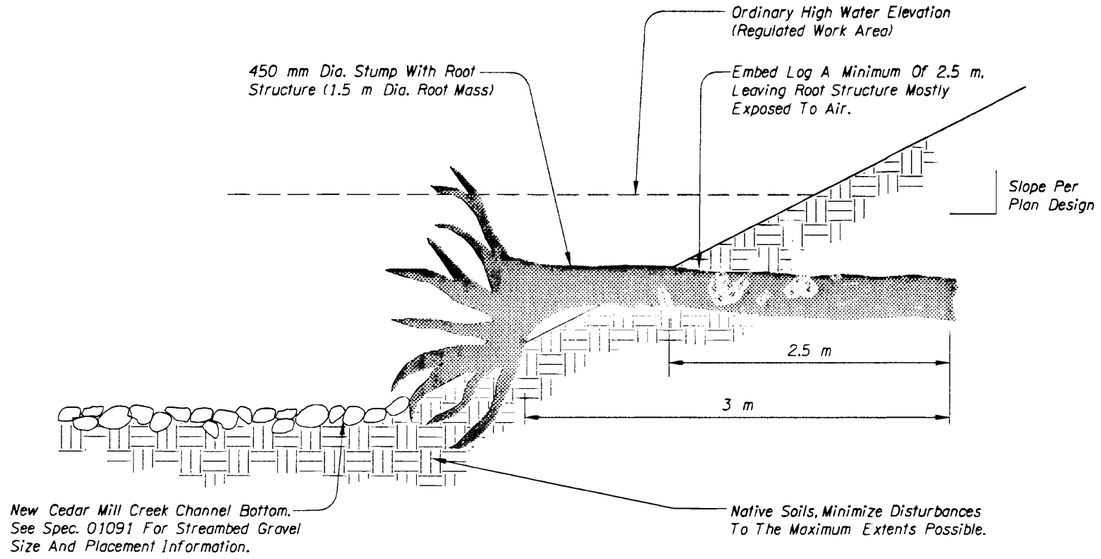


Min. Swale Length - 33 m
Min. (Max.) Longitudinal Swale Slope - .005 (0.5%)
Min. Swale Depth - 0.45 m

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.

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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

c:\projects\0001\3017 Murray Blvd\MicroStation\0602lcm.dtl

VIEW 2

VIEW 2