OPERATION & MAINTENANCE MANUAL

DFI No. : D00166
Facility Type: Detention Pond/Water Quality Biofiltration Swale Combo

June, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00166**
Facility Type:	Detention Pond/Water Quality Biofiltration Swale
Construction Drawings:	37V-041
Location:	District: 2B (Old 2A) Highway No.: 047 Mile Post: 67.09 – 67.12 Description: This facility is located on the southwestern quadrant of the US 26 (Hwy 047) and Murray Blvd Interchange, and adjacent to the eastbound off ramp (left side), prior to the ramp's curve, approaching Murray Blvd.

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, Henry Minton Allen, (503)-731-8417
Facility construction:	2004
Contractor:	Mowat Construction Co.

4. Storm Drain System and Facility Overview

A detention pond/water quality biofiltration swale combo (referred to from this point forward as a pond/swale combo) combines the forms and functions of a water quality swale and a detention pond. In a pond/swale combo, the biofiltration swale is situated within the bottom confines of the detention facility. The facility provides water quality treatment of the smaller storm events and detention of the larger storm events.

The biofiltration swale is designed as if it was a separate facility and consists of a grassy-lined facility with a flat trapezoidal cross section and gradual slope. Treatment is provided through sedimentation and filtration processes. If amended soils are present, additional treatment is obtained through infiltration through the amended soil media.

When the flows exceed the water quality flows, the pond/swale combo facility begins to provide detention. Detention is required to reduce or mitigate the increases in discharge, resulting from development. The facility is designed to store and gradually release (or attenuate) stormwater runoff via a control structure or release mechanism, then releasing it slowly over a more extended period of time. The flow control mechanism for this facility involves a 4-inch orifice surrounded by a wirecloth strainer assembly. When flows exceed the water quality design flow, the orifice restricts the flow causing the water to backup within the facility.

This water quality facility (Photo 1) is approximately 165 feet in length, and is located on the southwest quadrant of the Murray Blvd and US 26 (Hwy 047) Interchange. The swale is located between the off ramp from US 26 (Hwy 047) and the highway' eastbound travel lanes. Access to the facility (Photo 2) can be obtained from the off ramp.

Stormwater runoff from the Murray Blvd Interchange and the off-ramp is collected by a number of inlets at the intersection where Murray Blvd and the off-ramp join. The stormwater is then pre-treated through a pollution control manhole (DFI D00361) which removes debris and some sediment, prior to being discharged into the facility through a 12-inch inlet pipe (Point A, Photo 5). The water is then treated through the swale and discharged first through an "M-E" modified detention inlet (Point B, Operational Plans, Appendix A, and Photo 3), then through a 12-inch pipe that leads to a type "D" inlet (Point D and Photo 3) before flowing westward through an 18-inch storm pipe that connects to a nearby stormwater drainage system. When high flows occur, a 1-inch wide orifice in the "M-E" modified detention inlet (at the outlet control structure; see Point C, Operational Plan, Appendix A, and Photo 3) restricts the flow of water and detains the water in the swale, which effectively causes the swale to temporarily act as a detention pond for a brief period of time.

A. Maintenance equipment access:
Maintenance access may be obtained from the off-ramp, leaving eastbound US26 (Hwy 047) at the Murray Blvd exit. Refer to the Operational Plans and Photo 2 for more.

B. Heavy equipment access into facility:

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

C. Special Features:

☐ Amended Soils
☐ Porous Pavers
☐ Liners
☒ Underdrains

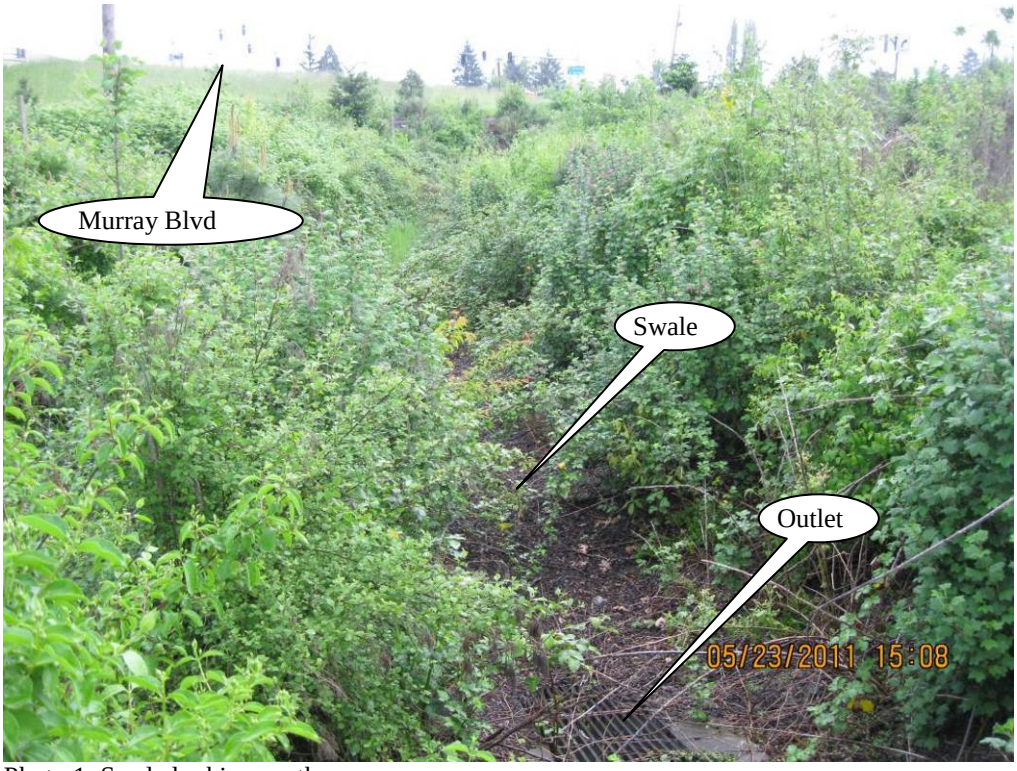


Photo 1: Swale looking south

Photo 2: Swale looking south

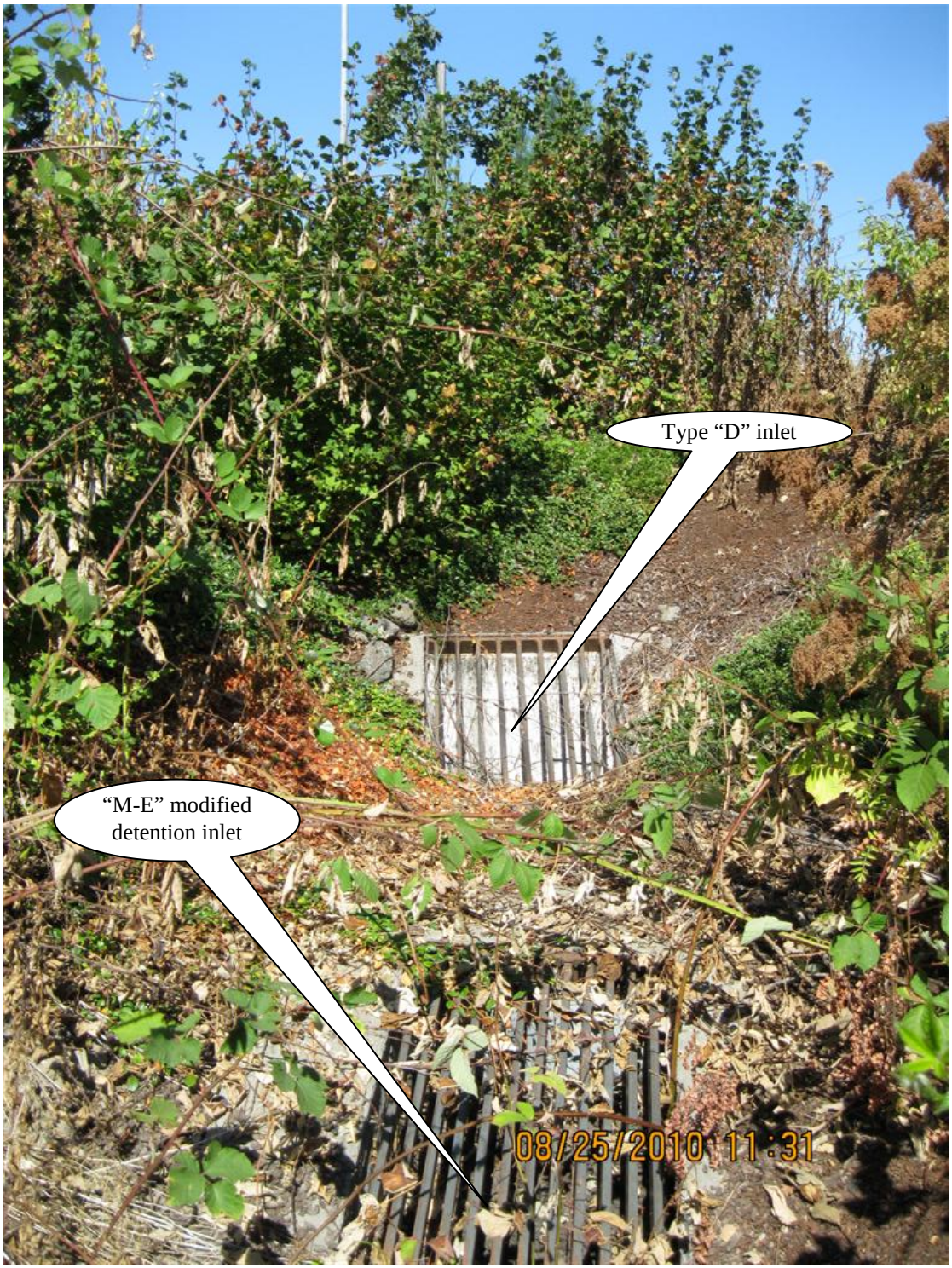


Photo 3: Swale outlet control structure looking west.

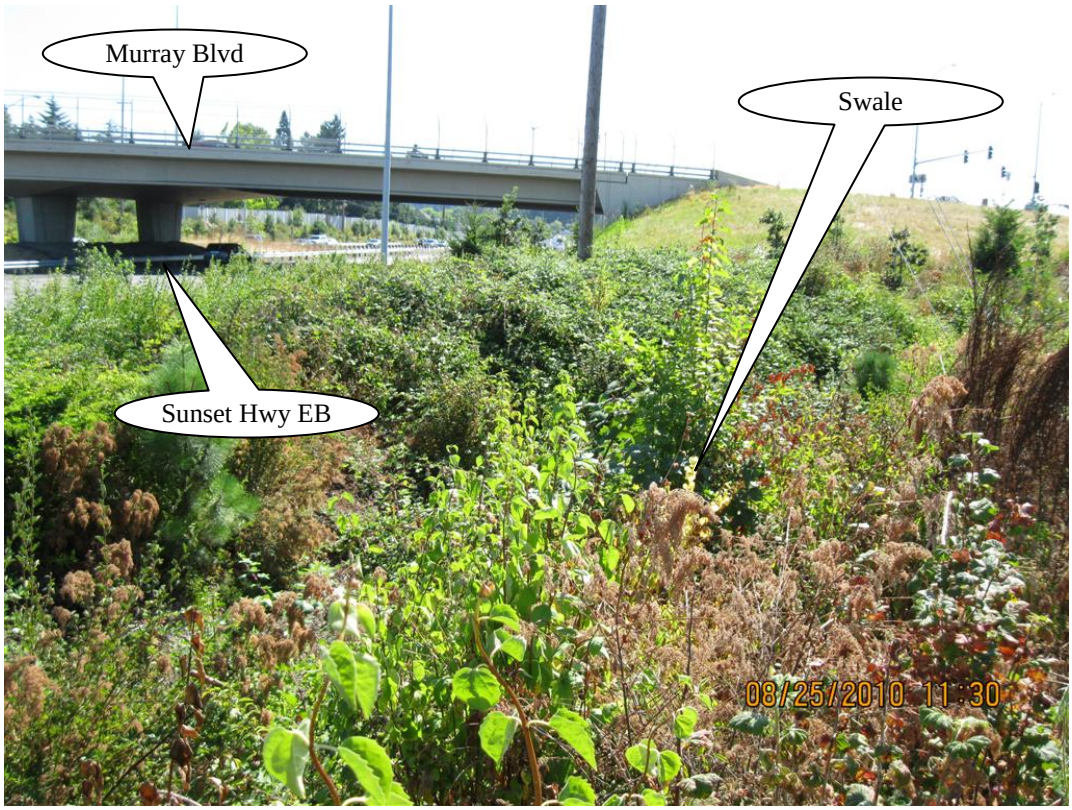


Photo 4: Water quality swale looking towards the east.

Photo 5: Swale inlet looking south

5. Facility Haz Mat Spill Feature(s)

The detention pond/water quality biofiltration swale combo is considered an online system (no flow is bypassed) and can be used to store a volume of liquid by blocking either the grates of the outlet control structure, or the 18" diameter outlet of the outlet pipe (Point B of the Operational Plans, Appendix A, and Photo 3).

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
In the event of high flows, the water will overtop the first "M-E" inlet (Point C, Operational Plan, and Photo 3) and exit through the type "D" inlet (Point D, Operational Plan, and Photo 3) and exit out of an 18-inch outlet pipe.

☐ 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 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

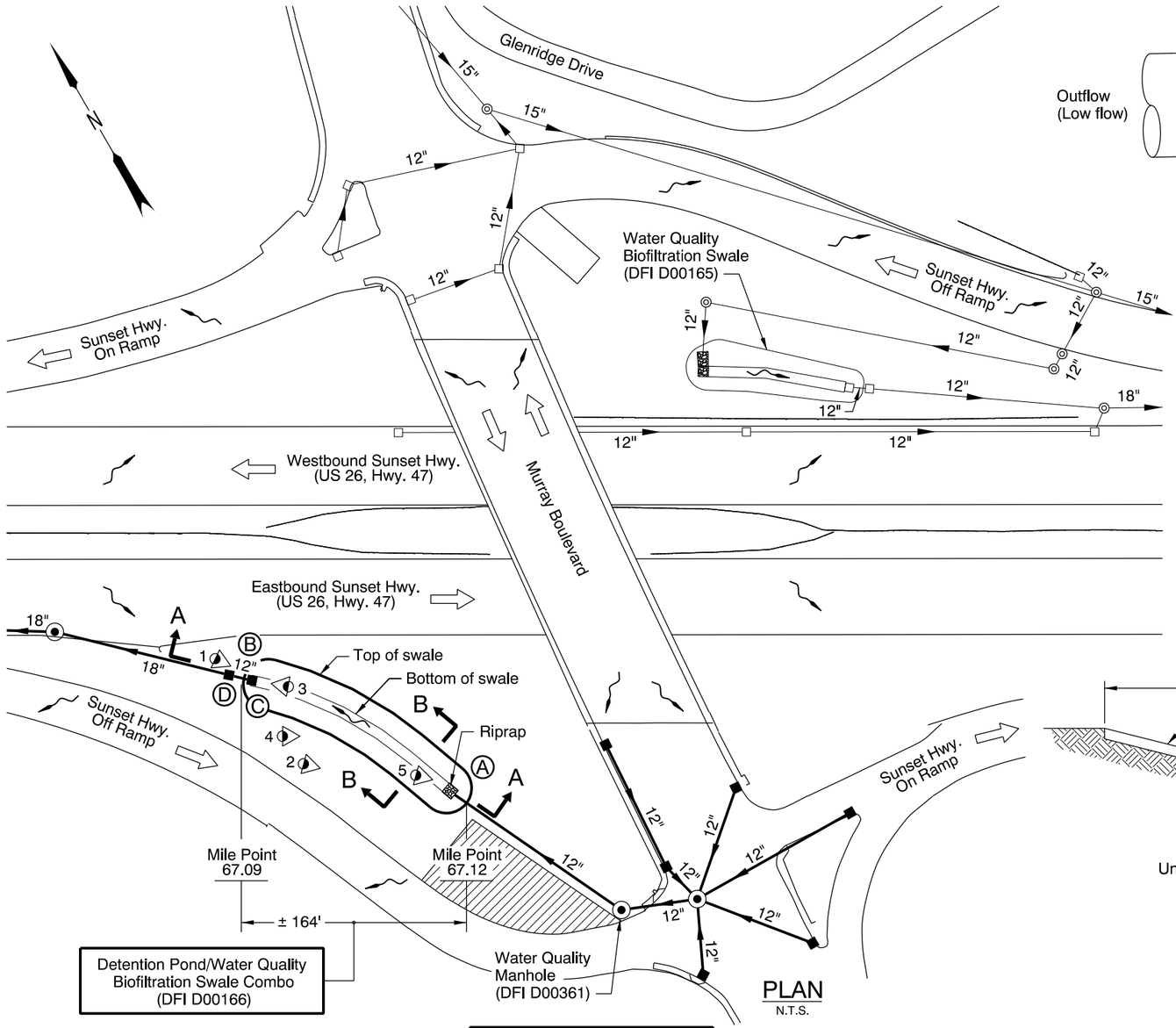
Contact any of the following for more detailed information about management of waste materials found on site:

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

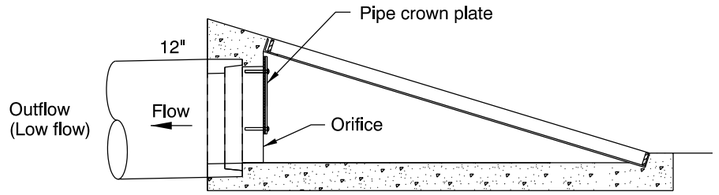
Appendix A

Content:

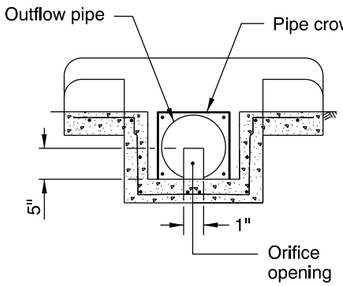
- **Operational Plan and Profile Drawing(s)**



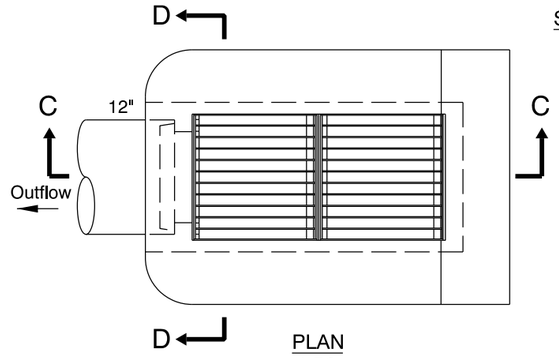
PLAN
N.T.S.



SECTION C-C
N.T.S.

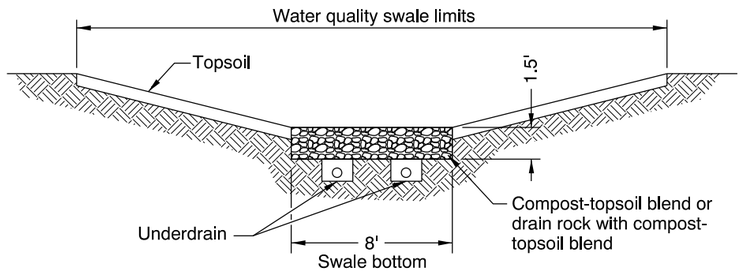


SECTION D-D
N.T.S.



PLAN
N.T.S.

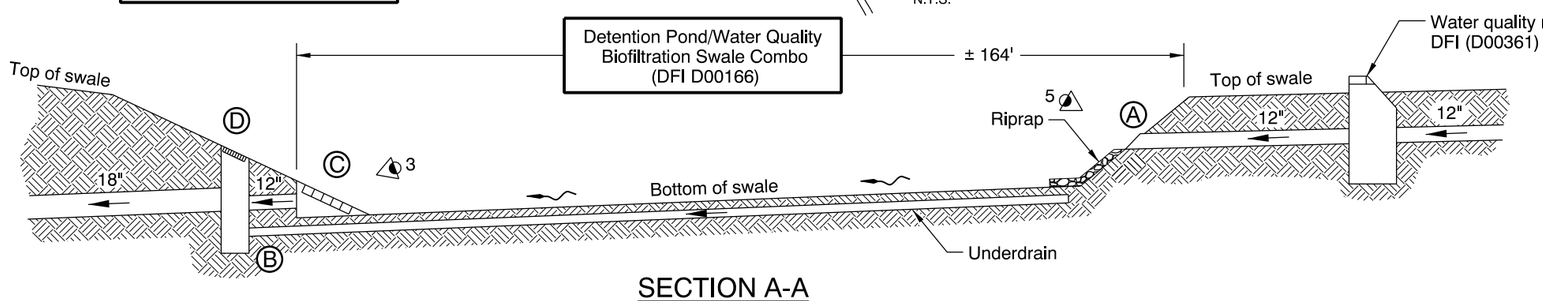
M-E MODIFIED DETENTION INLET DETAIL AT POINT Ⓒ
N.T.S.



SECTION B-B
N.T.S.

LEGEND:

- Photo Location / Direction
- Ⓐ Swale Inlet
- Ⓑ Swale Outlet
- Ⓒ Type "M-E" Modified Detention Inlet w/Orifice
- Ⓓ Type "D" Inlet
- ◉ and/or ◎ Manhole
- ■ and/or □ Inlet
- Traffic Flow/Direction
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Maintenance Access



SECTION A-A
N.T.S.

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Craig Fox

Drafted By: H. Gonsior/HDR

DFI D00166
MAINTENANCE DISTRICT 2B HWY 47
DETENTION POND / WQ SWALE COMBO
SUNSET HIGHWAY MP 67.09-67.12
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

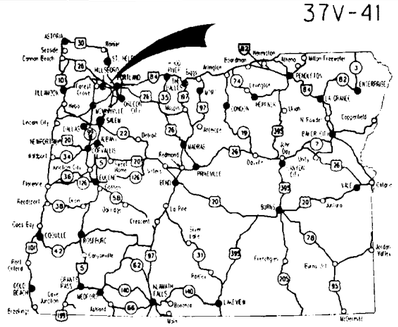
PLANS FOR PROPOSED PROJECT

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

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

SUNSET HIGHWAY

WASHINGTON COUNTY
MARCH 2004

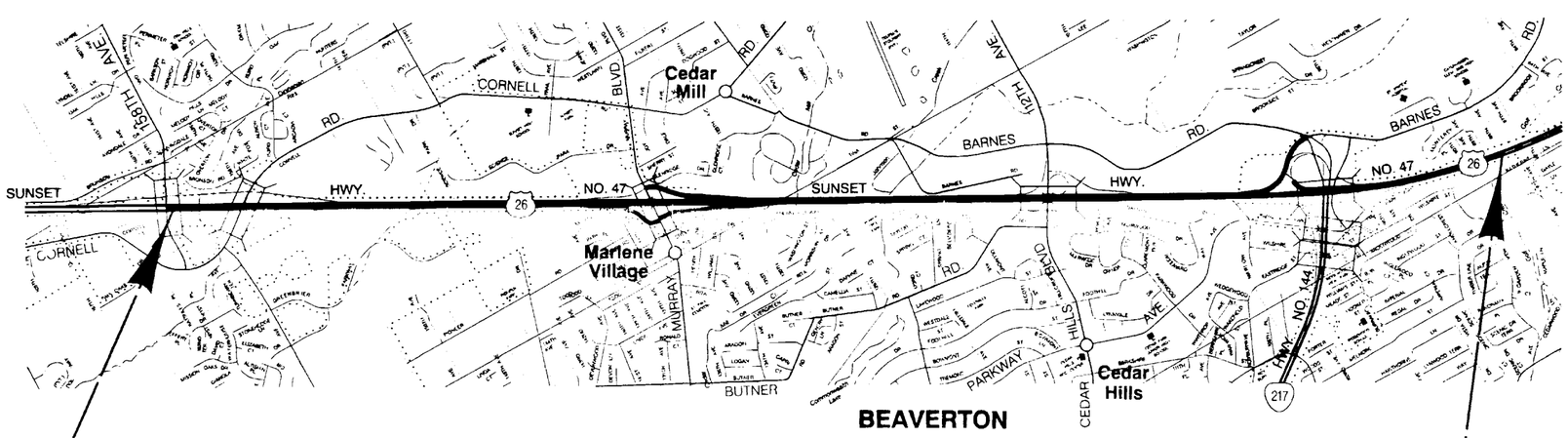


Overall Length Of Project - 6.51 km (4.05 Miles)

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)

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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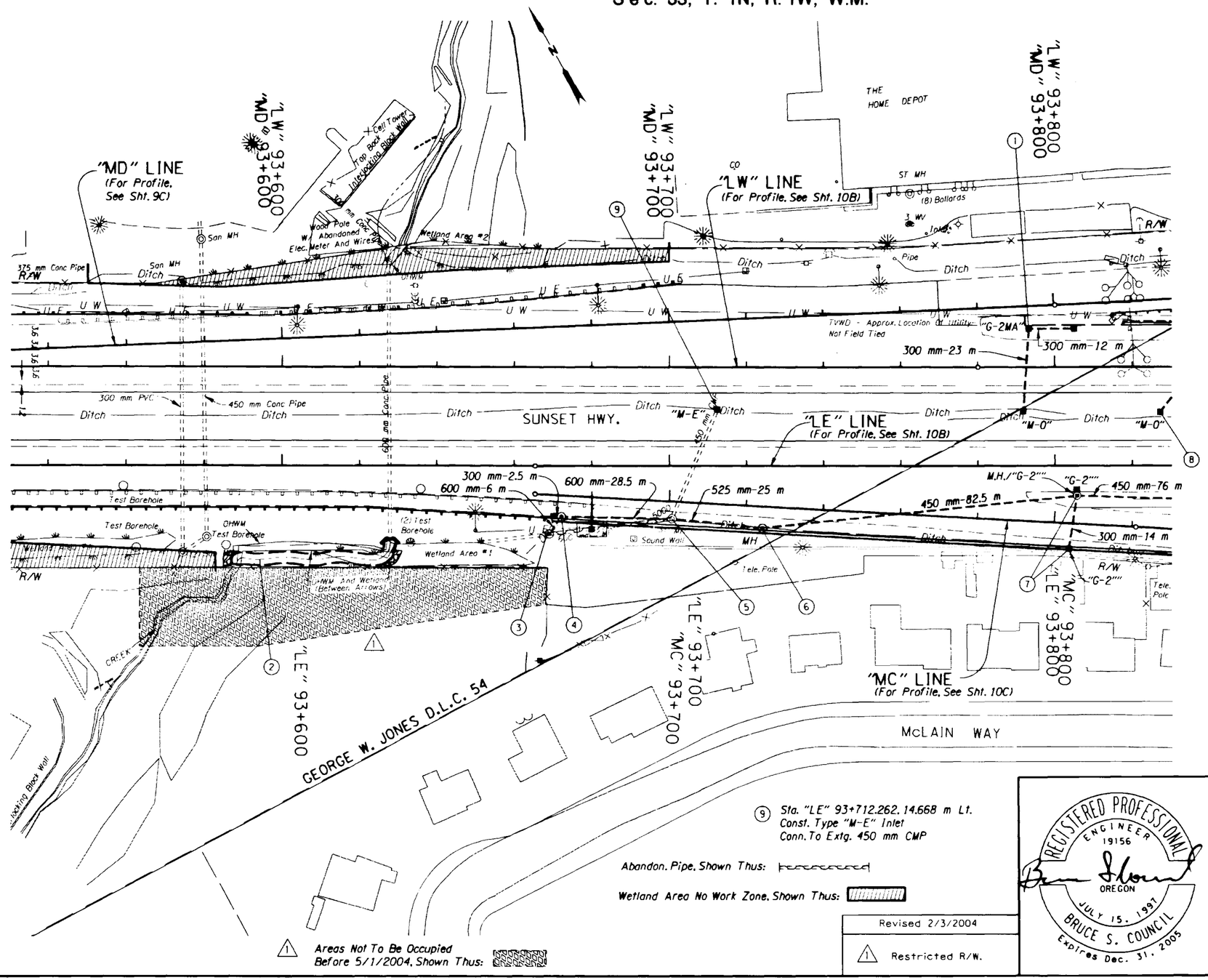
37V-41



(1) *Sta. "LW" 93+712.263, 10.893 m Rt.*
Const Type "G-2" Open Grade HMAC Mod. Inlet - 2
Const. Type "M-0" Mod. Inlet
Inst. 300 mm Storm Sew. Pipe - 35.0 m 1.5 m Depth
(See Drg. No. RD368)

(2) *Sta. "LE" 93+588.190, 25.466 m Rt.*
Const. Stream Channel
Channel Exc. - 69 m
(For Details, See Shts. R-41B, GHJ-53 & GHJ-54)

(3) *Sta. "MC" 93+669.573, 10.088 m Rt.*
Const. Manhole
Over Extg. 600 mm CMP
Inst. 600 mm Storm Sew. Pipe - 6.0 m 3 m Depth

(4) *Sta. "MC" 93+672.469, Rt.*
Const. Manhole
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 2.5 m 1.5 m Depth
Inst. 600 mm Storm Sew. Pipe - 28.5 m 3 m Depth

(5) *Sta. "MC" 93+700.845, 4.468 m Rt.*
Extg. Manhole
Inst. 525 mm Sew. Pipe - 25.0 m 1.5 m Depth

(6) *Sta. "MC" 93+724.465, Rt.*
Const. Manhole
Inst. 450 mm Storm Sew. Pipe - 82.5 m 3 m Depth

(7) *Sta. "MC" 93+805.501, 7.194 m Lt.*
Const. Manhole W/Type "G-2" Open Grade HMAC Inlet
Const. Type "G-2" Inlet
Inst. 300 mm Storm Sew. Pipe - 14.0 m 1.5 m Depth
Inst. 450 mm Storm Sew. Pipe - 76.0 m 1.5 m Depth

(8) *Sta. "LW" 93+827.313, 10.928 m Rt.*
Const. Type "M-0" Mod. Inlet
Inst. 450 mm Sew. Pipe - 29.0 m 1.5 m Depth

(9) *Sta. "LE" 93+712.262, 14.668 m Lt.*
Const. Type "M-E" Inlet
Conn. To Extg. 450 mm CMP

Abandon. Pipe, Shown Thus:

Wetland Area No Work Zone, Shown Thus:

(1) *Areas Not To Be Occupied Before 5/1/2004, Shown Thus:*

Revised 2/3/2004
(1) Restricted R/W.

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. 10A

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37V-41

"MB" LINE

-3.148%
"MB" 94+175.596
77.482
75.703
110 m V.C.
94+232.117
-3.475%
Profile Grade @ ℄
700 mm
70.898
80 m V.C.
Subgrade
370.354
Exc. 122 (Excess)
-1.356%
Ground Line @ ℄
"MB" 94+534.279 =
"LE" 94+534.279 (3.6m Rt.)
"MB"94+200
"MB"94+300
"MB"94+400
"MB"94+500

"MC" LINE

Exc. 360 (Excess)
Stone Emb. 61
"LE" 93+665.396 =
"MC" 93+665.396 (3.6m Rt.)
+672.469 Inlet F.L. 74.570
75.666
700 mm
75.855
75.991
76.064
76.139
76.193
76.645
76.921
77.169
77.564
78.299
700 mm
+1.753%
+0.663%
+0.586%
+0.407%
+0.720%
+0.250%
+0.164%
+1.685%
+1.962%
+1.559%
+1.973%
+1.754%
Profile Grade @ ℄
47.260 m V.C.
No V.C.
Subgrade
Ground Line @ ℄
"MC" 93+941.179
"MC" 94+000.000
+042.907 Inlet F.L. 78.224
+032.343 Pol. M.H. F.L. 77.393
300 mm-17.5 m -2.29%
300 mm-47.0 m +2.49%
300 mm-18.0 m +2.49%
+049.407 Extg. M.H. F.L. 77.825
+970.190 Inlet F.L. 75.844 (Beginning Of Swale)
+920.380 Lt. Inlet F.L. 75.165 (End Of Swale)
300 mm-2.5 m +2.49%
+716.745
+750.129
+760.144
+790.189
+850.000
+864.072
+900.000
+880.000
+823.165
+684.422
300 mm-2.5 m -8.00%
Extg. 600 mm CMP
600 mm-28.5 m +1.51%
450 mm-82.5 m +1.26%
300 mm-14 m -1.20%
450 mm-76.0 m +0.40%
450 mm-48.5 m +0.40%
+700.845 M.H. F.L. 72.325
525 mm-28.5 m +3.0%
Extg. 600 mm CMP (Connects To Median Ditch)
+804.114 Inlet F.L. 74.852
+805.501 M.H. W/Inlet F.L. {74.684 74.084
+878.833 M.H. F.L. 74.356
+918.391 Inlet F.L. 74.536
+672.469 M.H. F.L. {73.600 72.325
600 mm-6.0 m +15.4%
+669.573 M.H. F.L. 71.399
+669.573 M.H. F.L. {72.876 72.756
Extg. 600 mm CMP (Abandon)
"MC"93+700
"MC"93+800
"MC"93+900
"MC"94+000

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. 10C

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

37V-41

(10) Sta. "LE" 94+035.100, 35.766 m Rt.
Const. Type "D" Inlet
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Sew. Pipe - 6.5 m
1.5 m Depth

(11) See Sht. 10A, Note 8

(12) Sta. "MC" 93+970.190, 25.361 m Lt.
Const. Type "D" Mod. Inlet
Inst. 300 mm Storm Sew. Pipe - 47.0 m
1.5 m Depth

(13) Sta. "MC" 94+042.91, Rt..
Const. Type "G-2" Inlet
Connect To Extg. Structure
Inst. 300 mm Storm Sew. Pipe - 17.5 m
1.5 m Depth
Tr. Resurfacing - 16 m²

(14) Sta. "LW" 93+817.54 To Sta. "LW" 93+889.59, Lt.
Const. Conc. Barrier Drain - 72.5 m
Drain To Gutter
Emb. In Place - 50 m³
(For Details, See Sht. GHJ-1)

(1) Sta. "LW" 94+039.86, Lt.
Const. Type "G-2" Open Graded HMAC Inlet - 2
Inst. 300 mm Storm Sew. Pipe - 80.0 m
1.5 m Depth

(2) Sta. "LW" 94+030.06, Lt.
Inst. 300 mm Storm Sew. Pipe - 5.5 m
3 m Depth
Const. Paved End Slope - 2.2 m²

(3) Sta. "LW" 94+030.08, Lt.
Const. Loose Riprap Channel
(Class 25) - 9 MG
Riprap Geotextile, Type 2 - 15 m²
(For Details, See Sht. GHJ-8)

(4) Sta. "LW" 94+030.10, Lt.
Const. Manhole
Inst. 300 mm Storm Sew. Pipe - 80 m
3 m Depth

(5) Const. Basin
Const. Water Quality Swale "MA1"
Clearing And Grubbing - 0.4 ha
Gen. Exc. - 4300 m³
(For Details, See Shts. GHJ-41 & GHJ-42)

(6) Sta. "LW" 93+844.827, 10.912 m Lt.
Const. Manhole
Const. Type "G-2" Inlet
Inst. 300 mm Sew. Pipe - 17.0 m
1.5 m Depth
Tr. Resurfacing - 11 m²
(See Drg. No. RD302)

(7) Sta. "LE" 93+881.257, 10.010 m Rt.
Const. Manhole
Const. Type "M-E" Detention Mod. Inlet
Const. Type "D" Detention Mod. Inlet
Inst. 300 mm Storm Sew. Pipe - 2.5 m
1.5 m Depth
Inst. 450 mm Storm Sew. Pipe - 51.0 m
1.5 m Depth

(8) Const. Water Quality Swale
(For Details, See Shts. R-28 & GHJ-40)

(9) Sta. "MC" 94+032.343, 7.225 m Lt.
Const. Pollution Control Manhole
Inst. 300 mm Sew. Pipe - 18.0 m
3 m Depth
Trench Resurfacing - 14 m²
(For Details, See Sht. GHJ-26)

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

Revised 2/18/2004
1 Revised Note

REGISTERED PROFESSIONAL ENGINEER 62.609 OREGON MAY 9, 2000 HENRY MINTON ALLEN 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 & Henry M. Allen
Drafted By - Tien Nguyen

DRAINAGE & UTILITIES

SHEET NO. 11A

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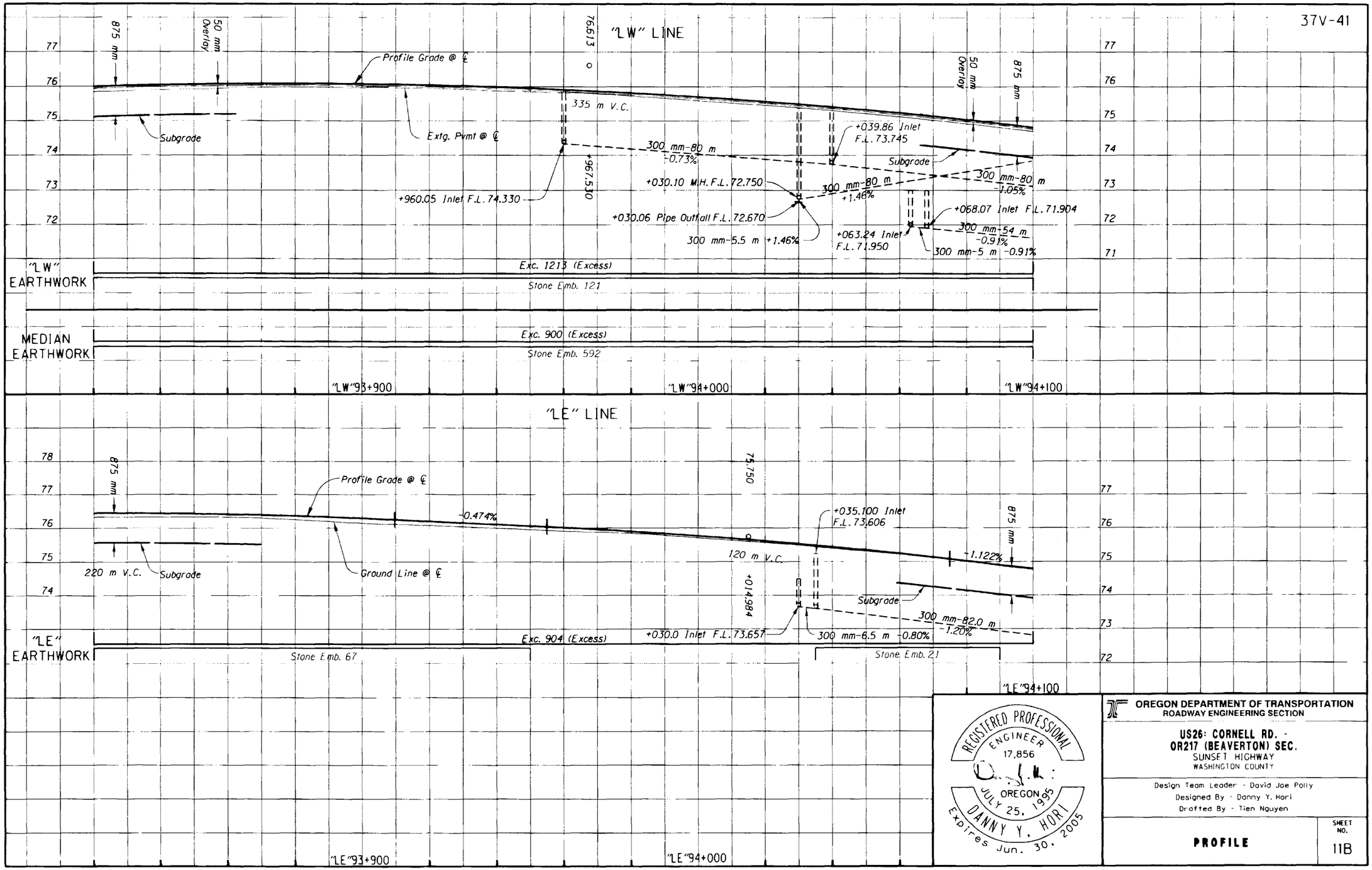


REGISTERED PROFESSIONAL ENGINEER
17,856
OREGON
JULY 25, 1995
DANNY Y. HORI
Expires Jun. 30, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

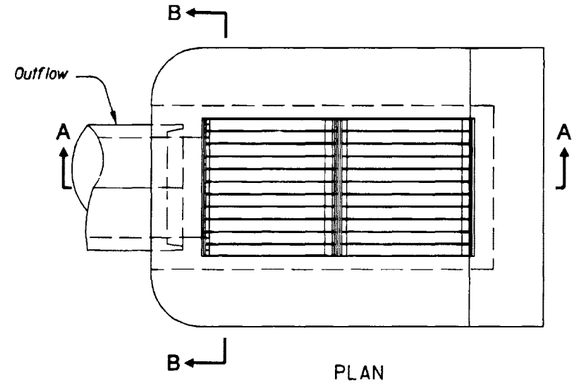
US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

Design Team Leader - David Joe Polly
Designed By - Danny Y. Hori
Drafted By - Tien Nguyen

PROFILE

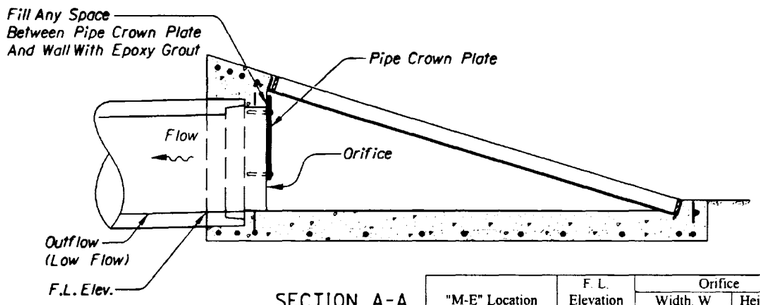
SHEET NO. 11B

TYPE "M-E" DETENTION MODIFIED INLET



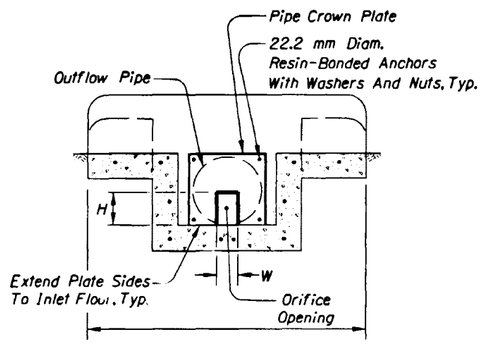
PLAN

Note:
1. For Details Not Shown, See RD368 And Sht. GHJ-20
2. Curved Edge Not Required On M-E Inlet.



SECTION A-A

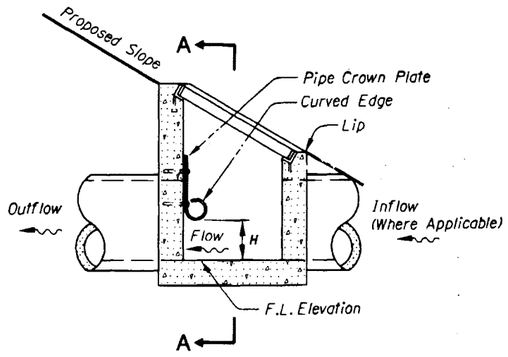
"M-E" Location	F. L. Elevation (m)	Orifice Width, W (mm)	Orifice Height, H (mm)
Sta. "CB" 92+305	66.540	25	150
Sta. "LE" 93+452	69.961	25	150
Sta. "MC" 93+920	74.158	25	150
Sta. "LW"94+062	72.000	62	75
Sta. "D"95+942	90.800	100	100



SECTION B-B

Notes:
1. Extg. Pipe Sizes, Types, And Invert Elevations Are To Be Verified In The Field.
2. Pipe Crown Plate, Weir Plate, And Support Angles Shall Be Steel And Shall Be At Least 12.7 mm Thick, Min.
3. Center Curved Edge Of Pipe Crown Plate On Center Of Outflow Pipe.
4. Embed Resin-Bonded Anchors 100 mm, Min., Into Concrete. Use High Or Low Strength Resin From ODOT's Qualified Products List, Suitable For Wet Or Submerged Locations.
5. For Resin-Bonded Anchors, Use Steel Threaded Rods.
6. Anchors Shall Be 25 mm, Min., Inside Pipe Crown Plate Edges.
7. Hole Diameters In The Plates And Angles For The Anchors And Bolts Shall Be 3.2 mm Larger Than The Anchor Or Bolt Diameters.
8. Metal Plates And All Hardware Shall Be Stainless Steel Or, Hot-Dipped Galvanized.
9. The Curved Edge On The Pipe Crown Plate May Be Achieved By Bending The Plate Edge, Or By Welding A Section Of 100 mm Pipe To The Bottom Edge Of The Plate, Or Other Durable Device That Produces A Rounded Edge, To Be Approved By The Engineer.
10. All Dimensions Are In Millimeters (mm) Unless Otherwise Noted.

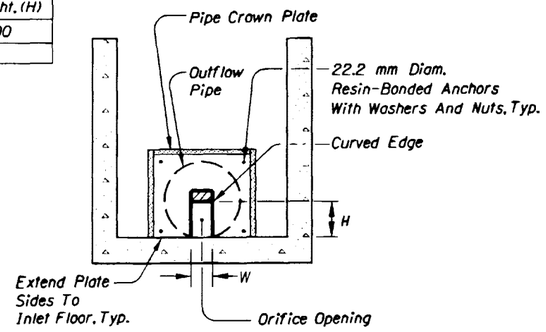
TYPE "D" DETENTION MODIFIED INLET



ELEVATION

Note:
1. For Details Not Shown, See RD370 And GHJ-20

"D" Location	F.L. Elevation	Orifice Width, (W)	Orifice Height, (H)
Sta. "BR"96+214.25	93.079	190	190



SECTION A-A

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

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

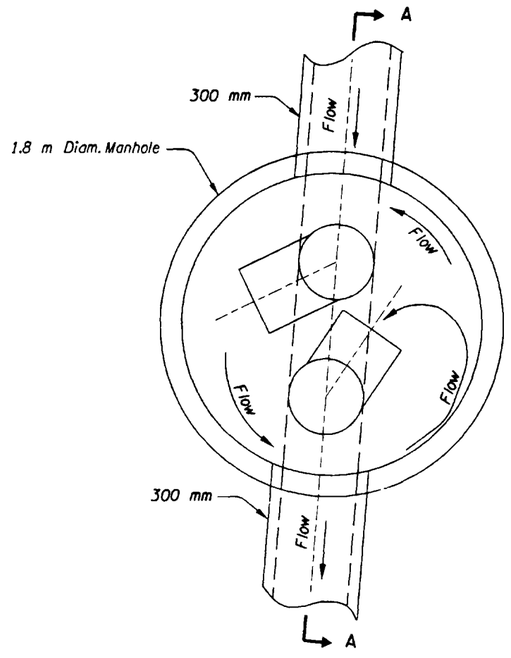
US26: CORNELL RD. - OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

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

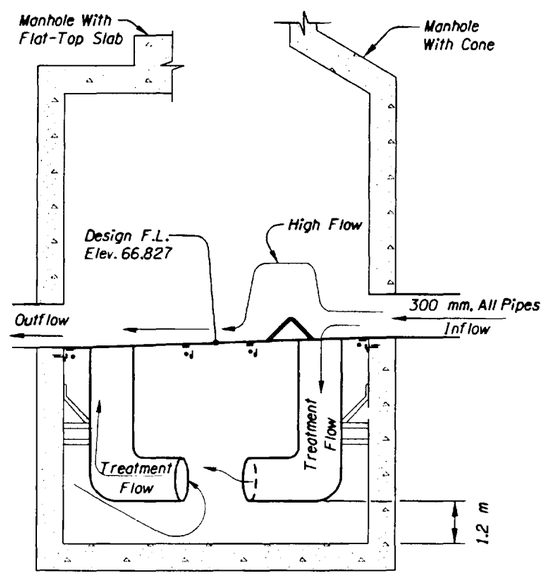
WATER QUALITY DETAILS

SHEET NO. GHJ-5

VIEW 1



PLAN



SECTION A-A

For Details Not Shown, See Sht. GHJ-31

POLLUTION CONTROL MANHOLE

Sta. "LE" 94+538.75, Rt.

REGISTERED PROFESSIONAL ENGINEER
19156
OREGON
JULY 15, 1997
BRUCE S. COUNCIL
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 - Bruce S. Council
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. GHJ-26

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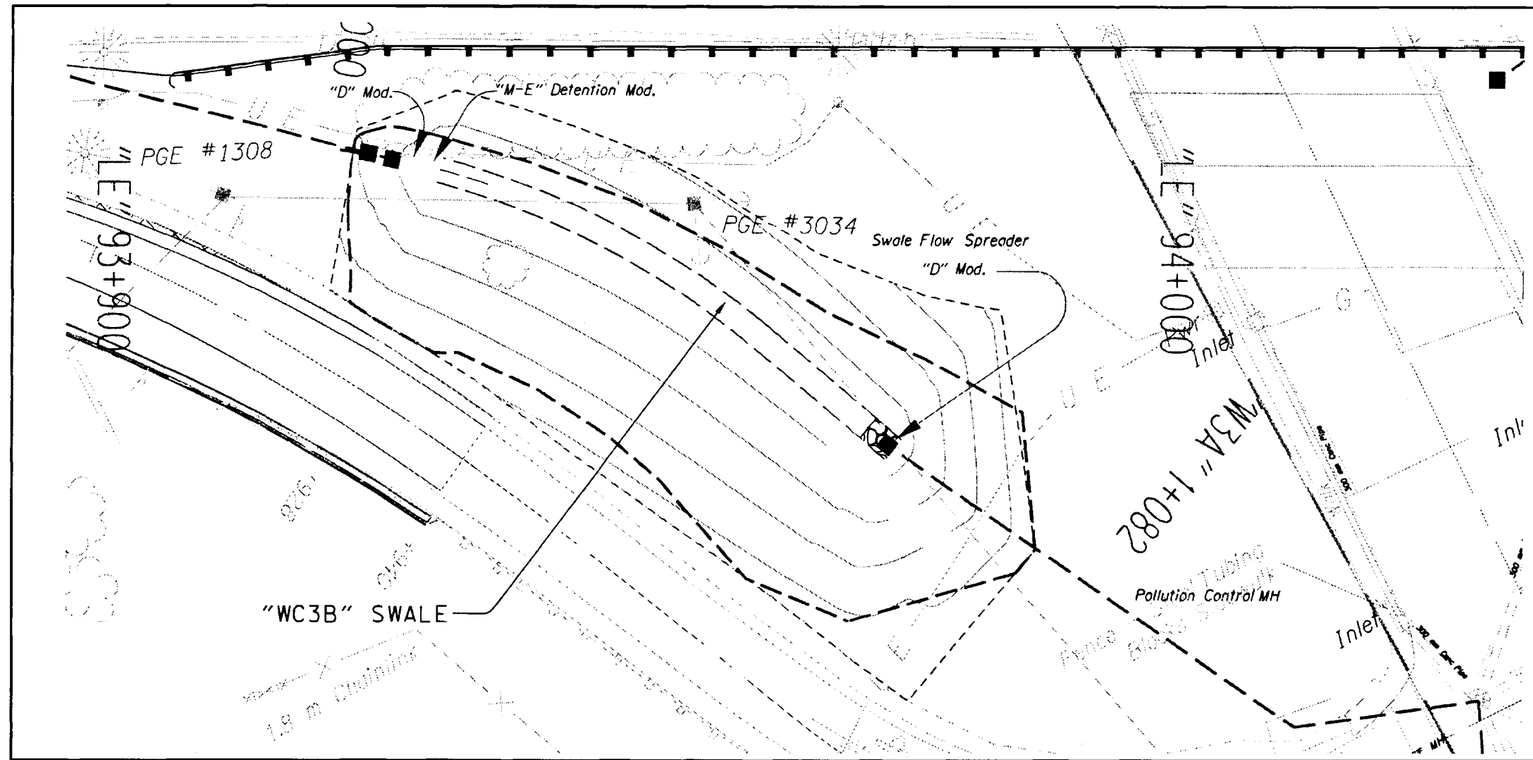
VIEW S

VIEW S



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-40

1.1000

VIEW E

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	Swale Sideslopes U-S	Left	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

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

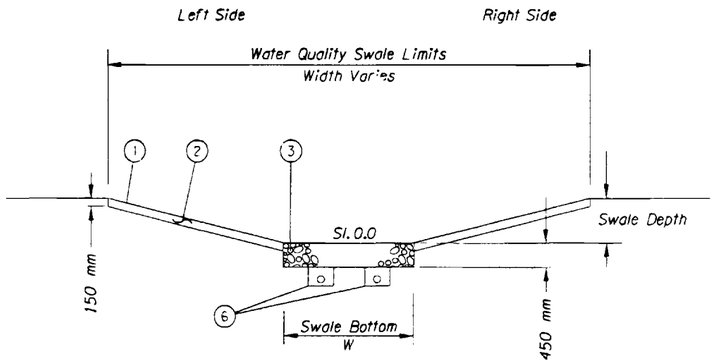
WATER QUALITY DETAILS

SHEET NO. GHJ-49

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

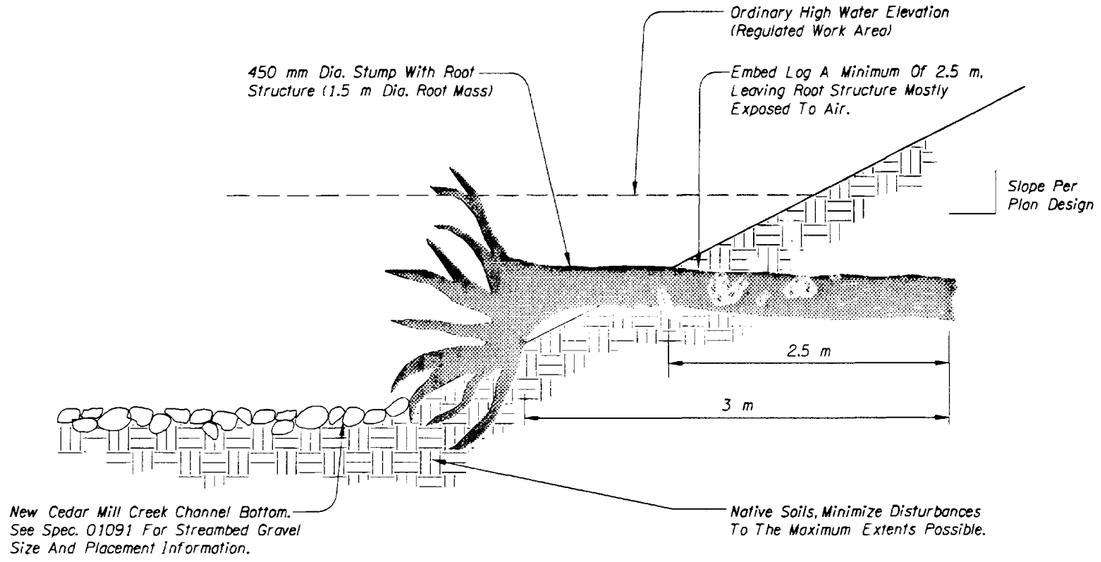


Min. Swale Length - 33 m
Min. (Max.) Longitudinal Swale Slope - .005 (0.5%)
Min. Swale Depth - 0.45 m

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
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(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 - Tommy J. Taggart

BIO-STABILIZATION DETAILS

SHEET NO.
R28

c:\projects\0001\3107 Murray Blvd\MicroStation\0602lcm.dtl

VIEW 2

VIEW 2