OPERATION & MAINTENANCE MANUAL

DFI No. D00177
Facility Type: Water Quality Biofiltration Swale

JUNE, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00177**
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) 37V-041
Location:	District: 2B (Old 2A)
	Highway No.: 047
	Mile Post: 67.93/67.98 (beg./end)
	Description: This facility is located on the north side of westbound US 26 (Hwy 047), 1,380 feet west of SW Cedar Hills Blvd. Access to the facility can be obtained from Corby Drive.

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:	March 11, 2004
Contractor:	Mowatt Construction Company

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 is located on the north side of westbound US 26 (Hwy 047). Access to the swale can be obtained from SW Corby Drive through an access gate. The swale is approximately 279 feet in length. It is composed of five segments separated by riprap channels, and it drains from the east to the west. A ditch inlet serves as the swale outlet, and ties into a 12-inch and 22-inch storm pipe that conveys the water to the west.

The drainage area for the swale includes both the onramp to westbound US 26 (Hwy 047) and the north half of the westbound US 26 (Hwy 047) from the facility to Cedar Hills Blvd, which is approximately 1,350 feet to the east. The flow is collected by a series of inlets, and is conveyed by 12 and 15-inch diameter storm pipes.

A high-low split flow manhole (See the Operational Plan, Point A) is located at the east end of the water quality swale. This manhole diverts the high flow into a detention pipe facility (DFI D00178) just south of the water quality facility. The swale is considered an offline facility with only the low flow being directed into the swale. After the split flow manhole, the runoff is pretreated through a water quality manhole (D00184) before being discharged into the swale (Points B & C).

After the water is treated through the swale, it is discharged into a 21-inch storm pipe that drains towards the west. The detention facility (DFI D00178) discharges into the same storm pipe.

Photo 1: Water quality swale looking west. US 26 (Hwy 047) is located to the left.


Photo 2: Water quality swale looking west. Westbound onramp to US 26 (Hwy 047) is located to the left.

Photo 3: Water quality swale looking west. Riprap channel with flow spreader in foreground.

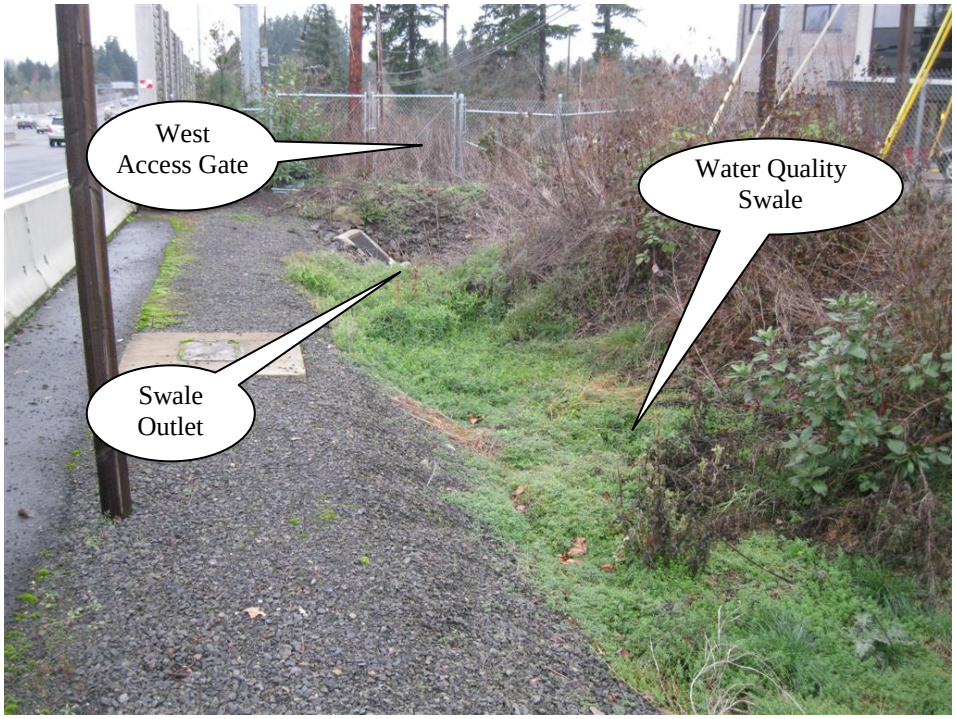


Photo 4: Swale outlet and access gate looking west.

Photo 5: Water quality swale looking east. US 26 (Hwy 047) is located to the right.

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:
The facility can be accessed from west via SW Corby Dr. just north of US26 (Hwy 047).

B. Heavy equipment access into facility:

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

C. Special Features:

☒ Amended Soils – Compost-Topsoil blend
☐ Porous Pavers
☐ Liners
☐ Underdrains

5. Facility Haz Mat Spill Feature(s)

The Water Quality Biofiltration swale can effectively trap a volume of liquid by blocking the swale outlet with either sandbags or a plate. See Photo 4 and Point D in the Operational Plan for the swale outlet.

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 – This facility does not contain an auxiliary outlet

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

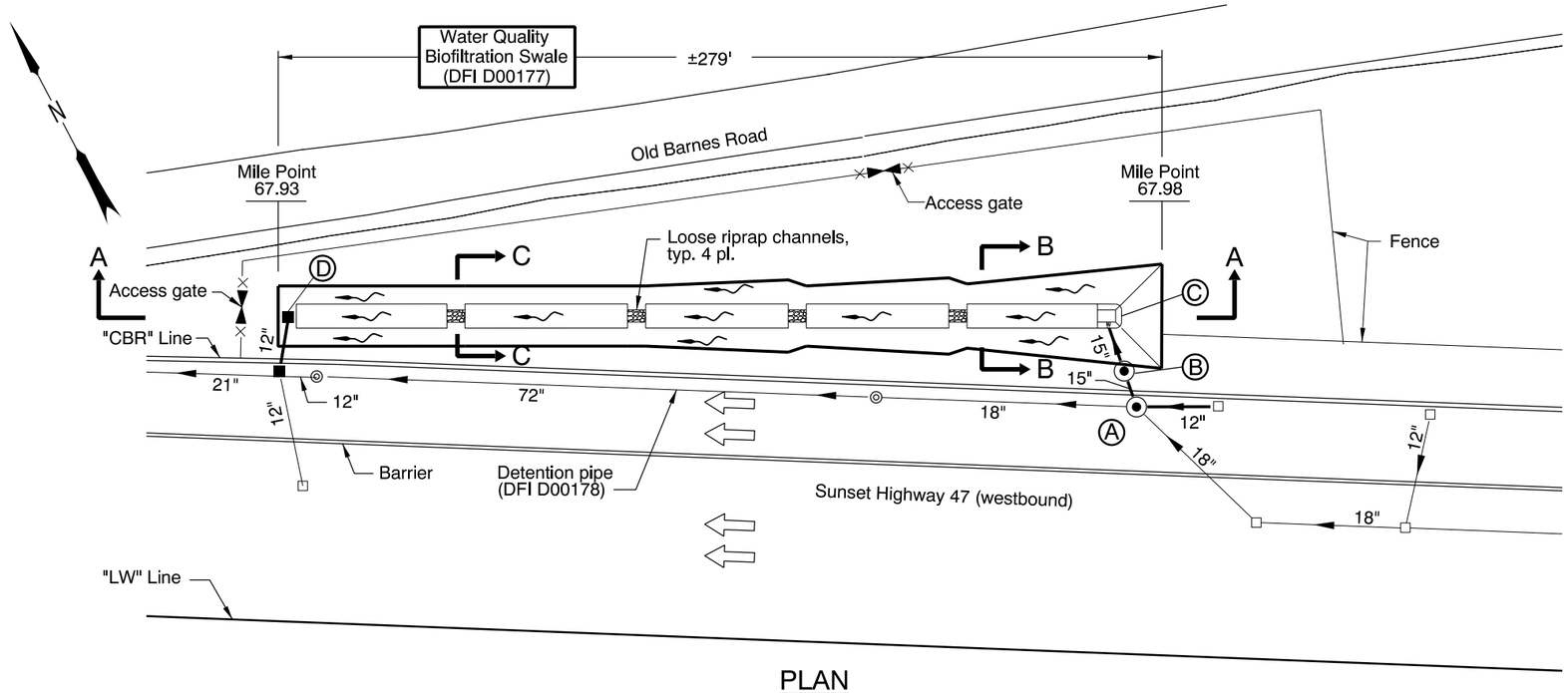
Contact any of the following for more detailed information about management of waste materials found on site:

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

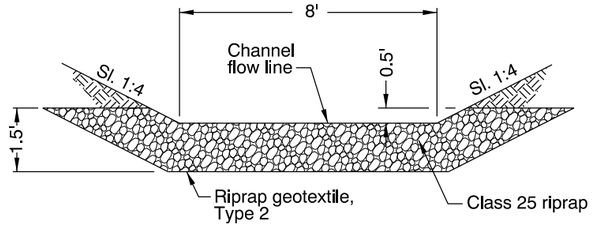
Appendix A

Content:

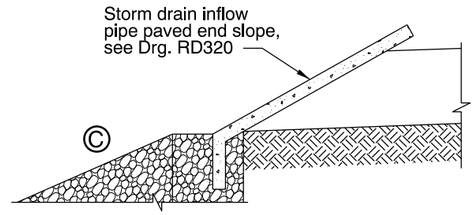
- **Operational Plan and Profile Drawing(s)**



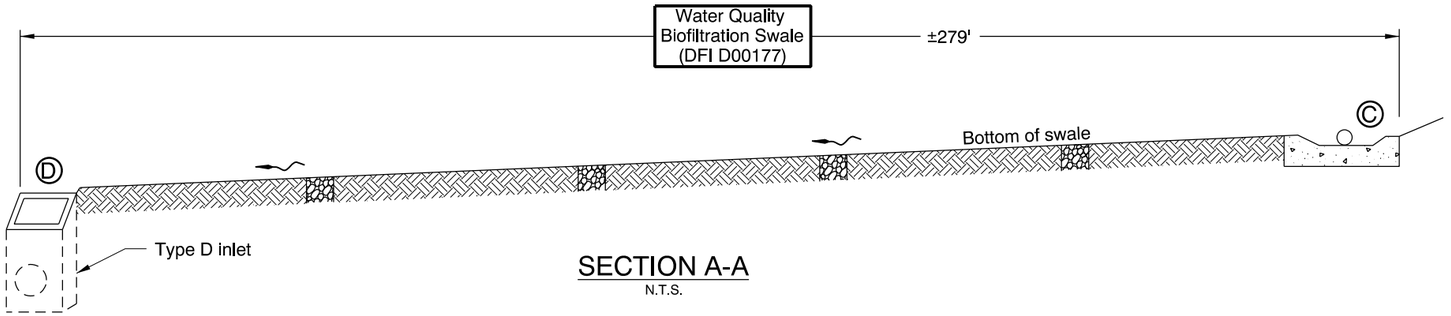
PLAN
N.T.S.



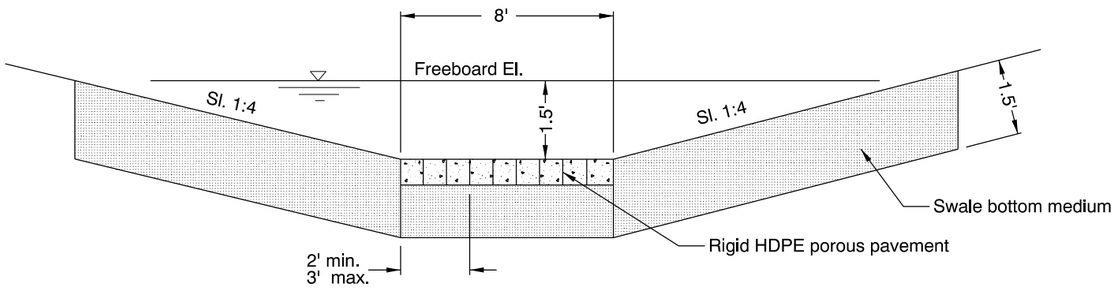
SECTION C-C
N.T.S.



SECTION THROUGH SIDE PIPE OUTLET AT POINT Ⓒ
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

LEGEND:

- Photo Location / Direction
- Ⓐ Diversion manhole, "High-Low"
- Ⓑ Water quality manhole (DFI D00184)
- Ⓒ Flow spreader/inlet
- Ⓓ Swale outlet (Type D inlet)
- Manhole
- Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Traffic flow/direction

Sht. 1 of 2

OREGON DEPARTMENT OF TRANSPORTATION

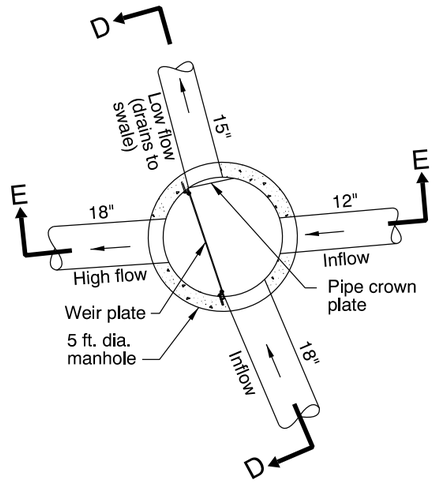
Prepared By: R.E. Knorr

Drafted By: D. Claycomb

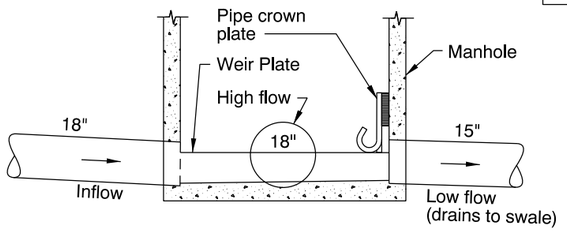
DFI D00177
MAINTENANCE DISTRICT 2B HWY 47
WATER QUALITY BIOFILTRATION SWALE
SUNSET HWY MP 67.93-67.98
WASHINGTON COUNTY

Z:\Hydraulics\Hydraulics OM\Completed_Facility_Files_READY to QAQC\Dist_2B\Hwy_047\2B_047_D00177\Operational Plan\DFI_D00177.dgn :: Sheet 2/20/2014 11:16:13 AM hwyr33e

DFI_D00177.dgn

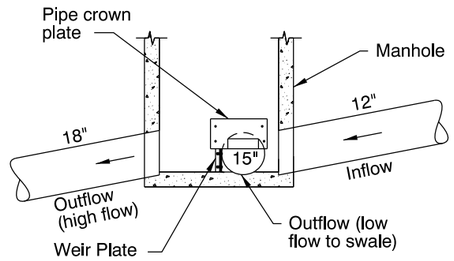


DIVERSION MANHOLE AT POINT Ⓐ
N.T.S.

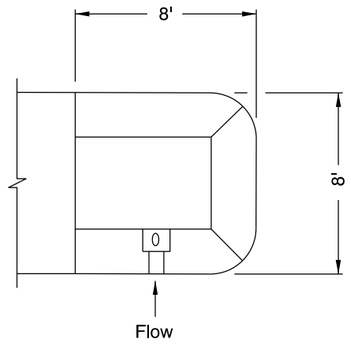


Note:
High flows overtop weir plate.

SECTION D-D
N.T.S.



SECTION E-E
N.T.S.



FLOW SPREADER/INLET DETAIL AT POINT Ⓒ
N.T.S.

Sht. 2 of 2

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: R.E. Knorr

Drafted By: D. Claycomb

DFI D00177
MAINTENANCE DISTRICT 2B HWY 47
WATER QUALITY BIOFILTRATION SWALE
SUNSET HWY MP 67.93-67.98
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

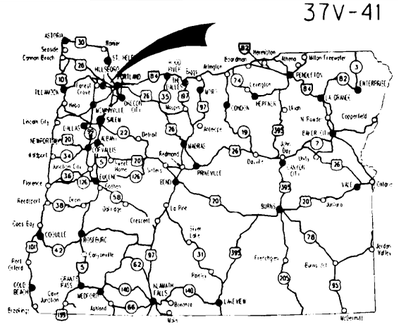
PLANS FOR PROPOSED PROJECT

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

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

SUNSET HIGHWAY

WASHINGTON COUNTY
MARCH 2004

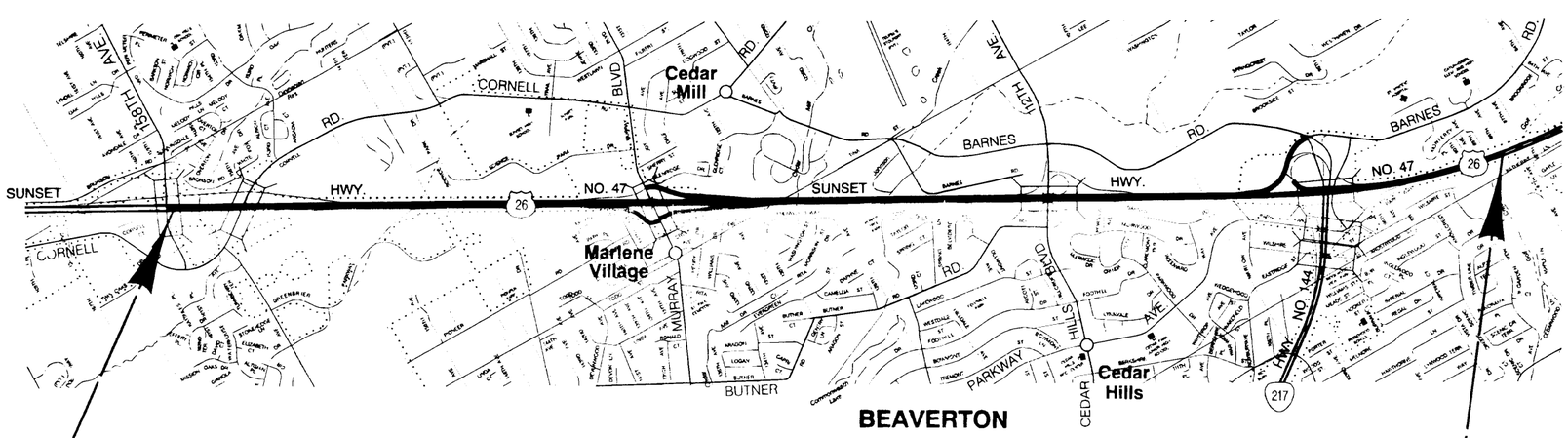


Overall Length Of Project - 6.51 km (4.05 Miles)

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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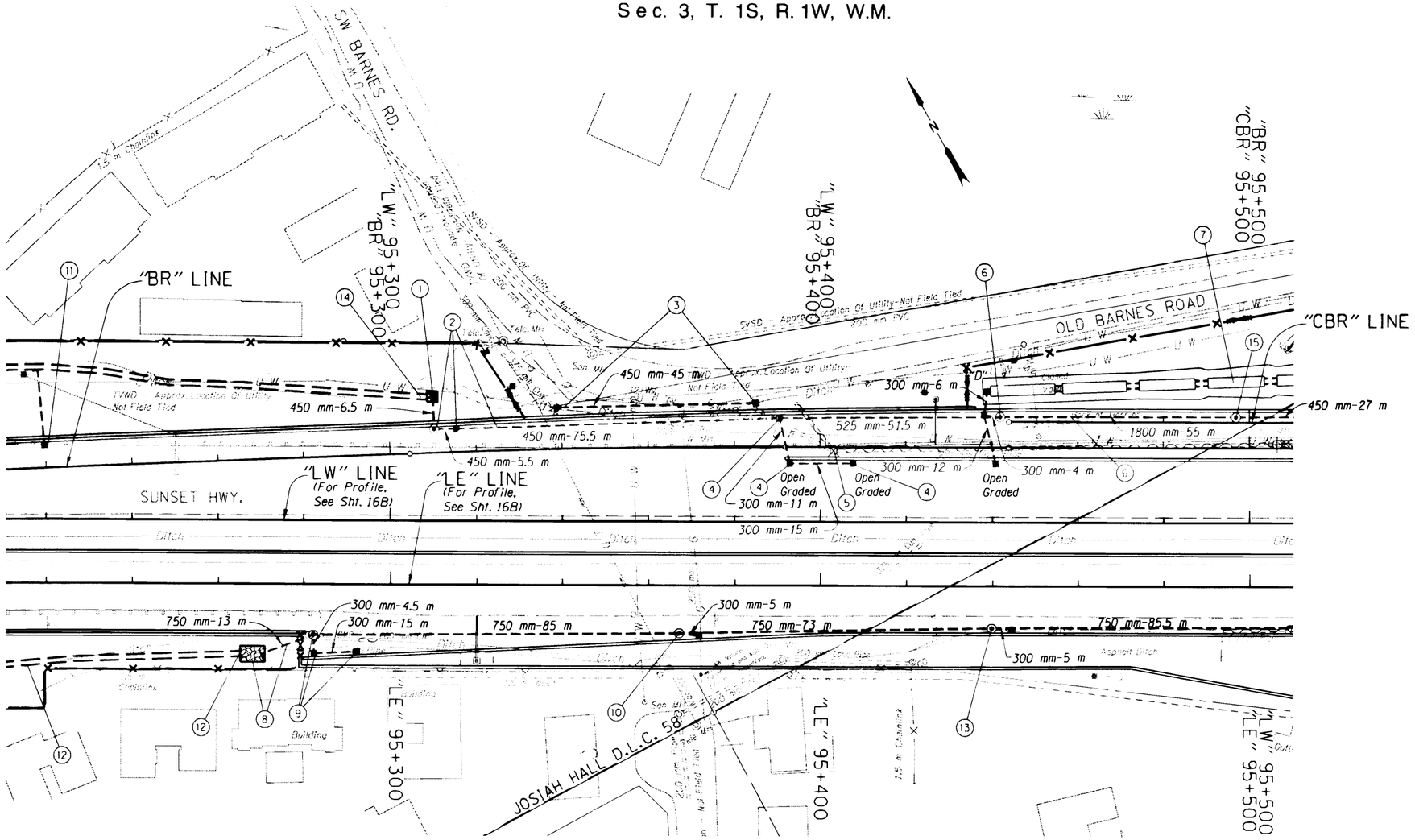
Sec. 3, T. 1S, R. 1W, W.M.

37V-41



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 - Henry M. Allen
Drafted By - Tien Nguyen

DRAINAGE & UTILITIES

SHEET NO. 16A

1:1000

(1) *Sta. "LW" 95+309.62, Lt.*
Inst. 450 mm Storm Sew. Pipe - 6.5 m
3 m Depth
Const. Loose Riprap Basin (Class 50) 36 MG
Riprap Geotextile, Type 2 - 39 m²
(For Details, See Sht. GHJ-9)

(2) *Sta. "LW" 95+310.11, Lt.*
Const. Manhole
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 450 mm Storm Sew. Pipe - 81.0 m
3 m Depth

(3) *Sta. "LW" 95+340.17, Lt.*
Const. Type "D" Inlet
Inst. 450 mm Storm Sew. Pipe - 45.0 m
3 m Depth
Const. Paved End Slope - 4.3 m²

(4) *Sta. "LW" 95+390.34, Lt.*
Const. Type "G-2" Inlet
Const. Type "G-2" Open Graded HMAC Inlet - 2
Inst. 300 mm Storm Sew. Pipe - 15.0 m
1.5 m Depth
Inst. 300 mm Storm Sew. Pipe - 11.0 m
3 m Depth
Inst. 525 mm Storm Sew. Pipe - 51.5 m
6 m Depth

(5) *Remove Inlet*

(6) *Sta. "BR" 95+441.83, Lt.*
Const. Manhole, Type Detention
Const. Type "G-2" Inlet
Const. Type "G-2" Open Graded HMAC Inlet
Const. Type "D" Inlet
Inst. 300 mm Storm Sew. Pipe - 18.0 m
1.5 m Depth
Inst. 300 mm Storm Sew. Pipe - 4.0 m
3 m Depth
Inst. 1800 mm Storm Sew. Pipe - 55.0 m
6 m Depth
Detention Storage
(For Details, See Sht. GHJ-12)

(7) *Const. Water-Quality Swale "CBR"*
(For Details, See Sht. GHJ-43)

(8) *Sta. "LE" 95+268.02, Rt.*
Inst. 750 mm Storm Sew. Pipe - 13.0 m
3 m Depth
Const. Loose Riprap Basin (Class 100) - 53 MG
Riprap Geotextile, Type 2 - 54 m²
(For Details, See Sht. GHJ-9)

(9) *Sta. "LE" 95+282.15, Rt.*
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G-2" Open Graded HMAC Inlet - 2
Inst. 300 mm Storm Sew. Pipe - 19.5 m
1.5 m Depth
Inst. 750 mm Storm Sew. Pipe - 85.0 m
6 m Depth

(10) *Sta. "LE" 95+367.07, Rt.*
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 5.0 m
3 m Depth
Inst. 750 mm Storm Sew. Pipe - 73.0 m
6 m Depth

(11) *See Sht. 15A, Note 2*

(12) *Sta. "LE" 95+268.02, Rt.*
Const. Loose Riprap Channel (Class 50) - 673 MG
Riprap Geotextile, Type 2 - 833 m²
Dt. Exc. - 560 m³
(For Details, See Sht. GHJ-8)

(13) *Sta. "LE" 95+439.75, Rt.*
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 5.0 m
3 m Depth
Inst. 750 mm Storm Sew. Pipe - 85.5 m
6 m Depth

(14) *Sta. "LW" 95+308.28, Lt.*
Const. Loose Riprap Channel (Class 25) - 430 MG
Riprap Geotextile, Type 2 - 640 m²
Dt. Exc. - 335 m³
(For Details, See Sht. GHJ-8)

(15) *See Sht. 17B-2, Note 1*

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 - Henry M. Allen
Drafted By - Tien Nguyen

DRAINAGE & UTILITIES NOTES

SHEET NO. 16A-2

"LW" LINE

"LW" EARTHWORK

Exc. 2695 (Excess)

Stone Emb. 169

MEDIAN EARTHWORK

Exc. 1141 (Excess)

Stone Emb. 181

Profile Grade @ ℄

Ground Line @ ℄

Subgrade

875 mm

50 mm Overlay/ 50 mm Inlay

100 mm Overlay/ 50 mm Inlay

72.953

250 m V.C.

+287.874

+315.20 Inlet F.L. 72.915

450 mm-75.5 m +4.10%

450 mm-45 m +7.06%

+384.77 Inlet F.L. 75.05

450 mm-5.5 m +12.32%

+340.17 Pipe Outfall F.L. 71.90

450 mm-6.5 m +5.62%

+309.62 Pipe Outfall F.L. 69.800

+310.11 M.H. F.L. {72.284 (In) 70.165 (Out)

"LW"95+300

"LW"95+400

+438.77 Inlet F.L. 78.900

+438.07 Inlet F.L. 78.581

+4.992%

100 mm Overlay/ 50 mm Inlay

875 mm

Subgrade

450 mm-27 m +7.10%

+440.65 Inlet F.L. 78.942

300 mm-12 m +3.09%

300 mm-4 m -10.40%

300 mm-6 m +5.70%

+407.65 Inlet F.L. 77.446

1800 mm-55 m +1.00%

525 mm-51.5 m +0.78%

+496.83 M.H. F.L. {76.950 (1800 mm) 80.600 (450mm)

300 mm-15 m +4.84%

+441.83 M.H. F.L. {76.400 (1800 mm) 76.400 (525 mm) 78.193 (300 mm)

+392.71 Inlet F.L. 76.723

300 mm-11 m +7.05%

+390.34 Inlet F.L. 76.000

"LW"95+500

50 mm Overlay

875 mm

Subgrade

+4.992%

+444.45 Inlet F.L. 79.067

300 mm-5 m +17.32%

750 mm-85 m +5.0%

+439.75 M.H. F.L. {77.053 (750 mm) F.L. 78.253 (300 mm)

"LE"95+500

"LE" LINE

"LE" EARTHWORK

Exc. 705 (Excess)

Stone Emb. 842

Profile Grade @ ℄

72.948

250 m V.C.

+282.44 Inlet F.L. 71.951

300 mm-4.5 m +4.55%

875 mm

50 mm Overlay

Subgrade

750 mm-13 m +0.50%

+287.496

+270.02 Pipe Outfall F.L. 71.350

300 mm-15 m +3.77%

+282.15 M.H. F.L. {71.415 (750 mm) 71.753 (300 mm)

"LE"95+300

"LE"95+400

300 mm-5 m +17.10%

+371.75 Inlet F.L. 75.501

750 mm-73 m +4.87%

Extg. Pvmt. @ ℄

+297.37 Inlet F.L. 72.516

750 mm-85 m +2.47%

+367.07 M.H. F.L. {73.516 (750 mm) 74.716 (300 mm)

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

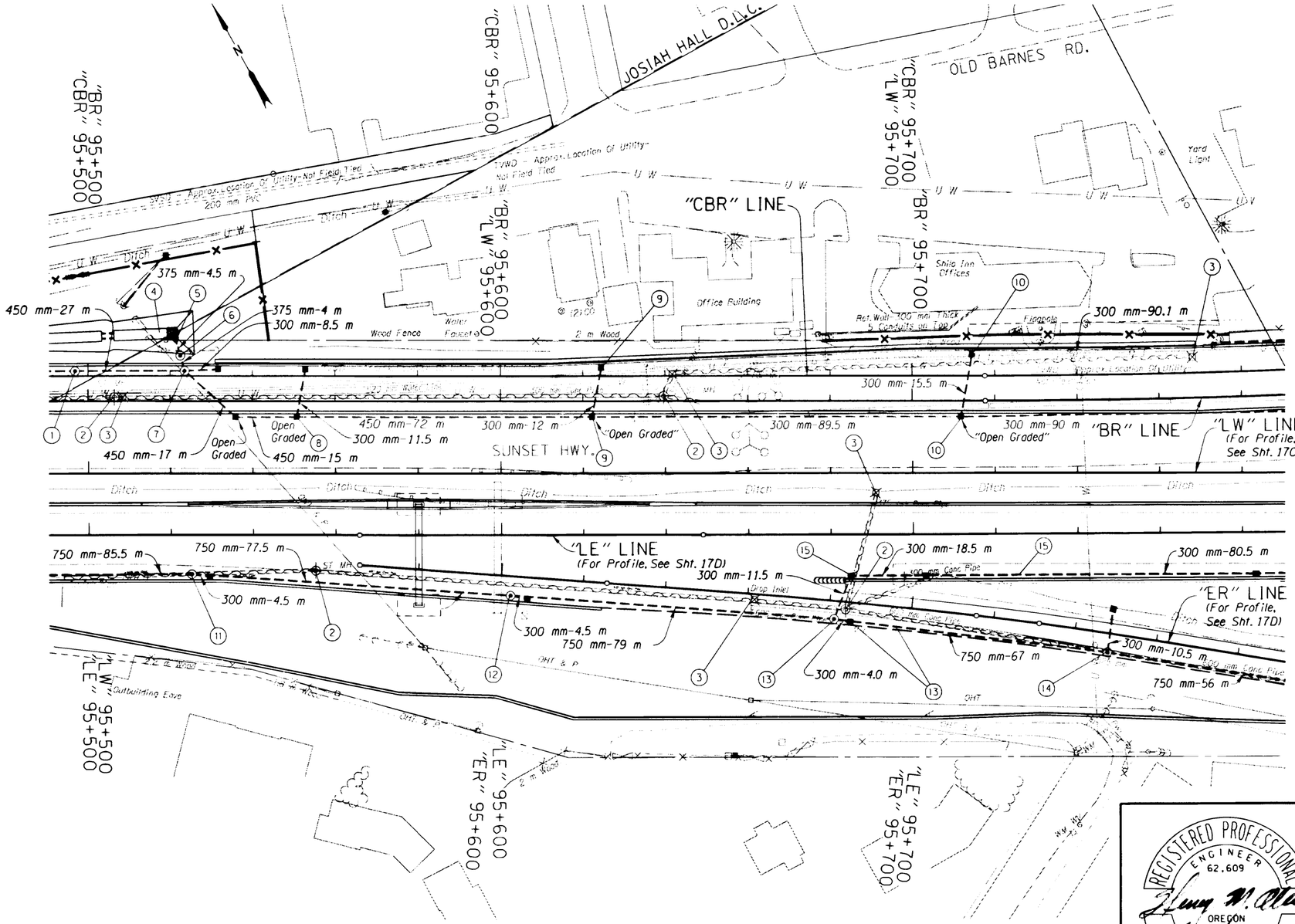
PROFILE

SHEET NO. 16B

F: \GIS_DATA projects \hwy\cornell\217-hwy26crl.dgn 19-JUL-2004 10:08:13 PM dwj\c0m

Sec. 3, T. 1S, R. 1W, W.M.

37V-41



Abandon Pipes, Shown Thus: ⊢ᴖᴖᴖᴖᴖᴖ⊣

62,609
Henry M. Allen
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 - Henry M. Allen
Drafted By - Tien Nguyen

DRAINAGE & UTILITIES

SHEET NO.
17B

(1) Sta. "CBR" 95+496.83, Lt.
Const. Manhole, Large, 2700 mm Dia.
Inst. 450 mm Storm Sew. Pipe - 27.0 m
3 m Depth

(2) Remove Manhole - 4

(3) Remove Inlet - 5

(4) See Sht. 16A-2, Note 7

(5) Sta. "CBR" 95+521.24, Lt.
Inst. 375 mm Storm Sew. Pipe - 4.5 m
1.5 m Depth
Const. Paved End Slope - 3 m^2

(6) Sta. "CBR" 95+522.48, Lt.
Const. Manhole, Type Pollution Control
Inst. 375 mm Storm Sew. Pipe - 4.0 m
3 m Depth
(For Details, See Sht. GHJ-29)

(7) Sta. "CBR" 95+523.54, Lt.
Const. Manhole, Type Diversion, "High-Low"
Const. Type "G-2" Inlet
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 8.5 m
3 m Depth
Inst. 450 mm Storm Sew. Pipe - 32.0 m
3 m Depth
(For Details, See Sht. GHJ-18)

(8) Sta. "LW" 95+550.63, Lt.
Const. Type "G-2" Inlet
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 11.5 m
3 m Depth
Inst. 450 mm Storm Sew. Pipe - 72.0 m
3 m Depth
Rock Exc. - 12 m^3

(9) Sta. "LW" 95+622.17, Lt.
Const. Type "G-2" Inlet
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 101.5 m
3 m Depth
Rock Exc. - 12 m^3

(10) Sta. "LW" 95+711.65, Lt.
Const. Type "G-2" Inlet
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 105.5 m
3 m Depth
Rock Exc. - 12 m^3

(11) Sta. "LE" 95+524.99, Rt.
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 4.5 m
3 m Depth
Inst. 750 mm Storm Sew. Pipe - 77.5 m
6 m Depth

(12) Sta. "ER" 95+602.54, Rt.
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G-2" Open Graded HMAC Inlet
Inst. 300 mm Storm Sew. Pipe - 4.5 m
3 m Depth
Inst. 750 mm Storm Sew. Pipe - 79.0 m
6 m Depth

(13) Sta. "ER" 95+681.37, Rt.
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G-2" Inlet
Inst. 300 mm Storm Sew. Pipe - 15.5 m
3 m Depth
Inst. 750 mm Storm Sew. Pipe - 67.0 m
6 m Depth

(14) Sta. "ER" 95+748.54, Rt.
Const. Manhole, Large, 1500 mm Dia.
Const. Type "G2-MA" Inlet
Remove Extg. Pipe - 56.0 m
Inst. 300 mm Storm Sew. Pipe - 10.5 m
3 m Depth
Inst. 750 mm Storm Sew. Pipe - 56.0 m
6 m Depth

(15) Sta. "LE" 95+684.81, Rt.
Const. Type "G-2" Open Graded HMAC Inlet - 2
Inst. 300 mm Storm Sew. Pipe - 99.0 m
1.5 m Depth

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 - Henry M. Allen
Drafted By - Tien Nguyen

DRAINAGE & UTILITIES NOTES

SHEET NO. 17B-2

"LW" LINE

200 mm Overlay
50 mm Inlay
875 mm
97.112o
Subgrade
272 m V.C.
+771.800
Profile Grade ℄
Ground Line ℄
300 mm-90 m
+3.88%
+714.38 Inlet F.L. 92.057
300 mm-15.5 m +1.00%
+711.65 Inlet F.L. 91.905
200 mm Overlay
50 mm Inlay
100 mm Overlay
50 mm Inlay
300 mm-89.5 m
+4.64%
+4.992%
+624.31 Inlet F.L. 87.873
300 mm-12 m +1.00%
+622.17 Inlet F.L. { 87.603 (450 mm)
87.753 (300 mm)
450 mm-72 m
+4.98%
100 mm Overlay
50 mm Inlay
875 mm
300 mm-8.5 m
+7.37%
300 mm-11.5 m
+1.00%
+552.80 Inlet F.L. 84.307
+550.63 Inlet { F.L. 84.042 (450 mm)
F.L. 84.192 (300 mm)
450 mm-15 m +4.92%
+535.70 Inlet F.L. 83.311
450 mm-17 m +4.92%
+531.66 Inlet F.L. 83.100
Subgrade
+523.54 Diversion M.H. F.L. 82.496
375 mm-4.0 m +1.00%
+522.48 Pollution Control M.H. F.L. 82.460
450 mm-27 m
+7.10%
375 mm-4.5 m +1.00%
+521.24 Pipe F.L. 82.415
+542.00 Outfall F.L. 83.80

90 89 88 87 86 85 84 83 82 81

98 97 96 95 94 93 92 91 90 89 88

"LW" EARTHWORK
Exc. 4344 (Excess)
Stone Emb. 3

MEDIAN EARTHWORK
(See Sht. 17D "LE" Line)
Exc. 1298 (Excess)
Stone Emb. 151

"LW"95+500 "LW"95+600 "LW"95+700

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. 17C

1:1000 - 3

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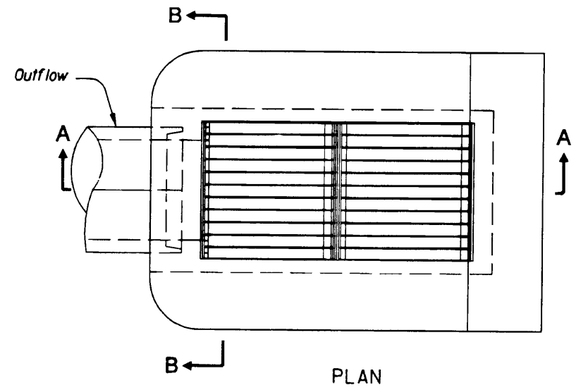
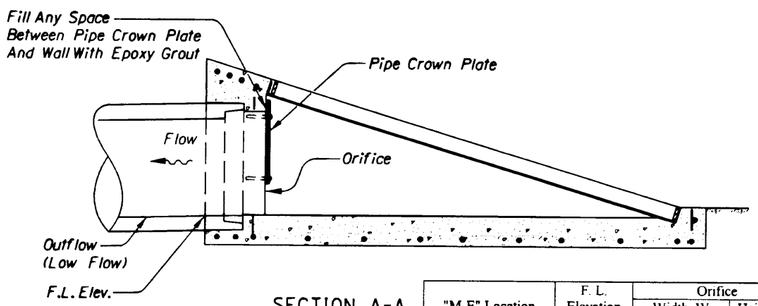
TYPE "M-E" DETENTION MODIFIED INLET



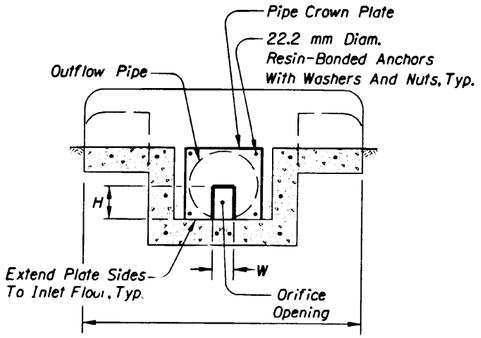
PLAN

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



SECTION A-A

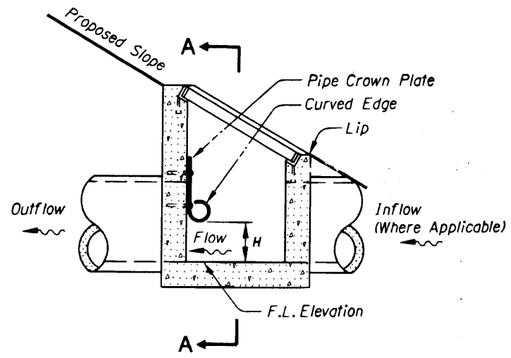
"M-E" Location	F. L. Elevation (m)	Orifice Width, W (mm)	Orifice Height, H (mm)
Sta. "CB" 92+305	66.540	25	150
Sta. "LE" 93+452	69.961	25	150
Sta. "MC" 93+920	74.158	25	150
Sta. "LW"94+062	72.000	62	75
Sta. "D"95+942	90.800	100	100



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.

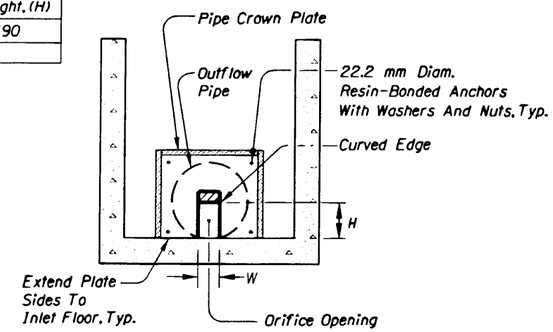
TYPE "D" DETENTION MODIFIED INLET



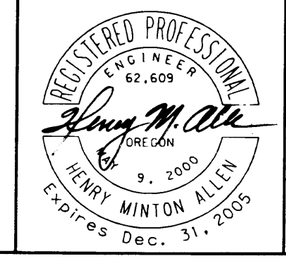
ELEVATION

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



OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

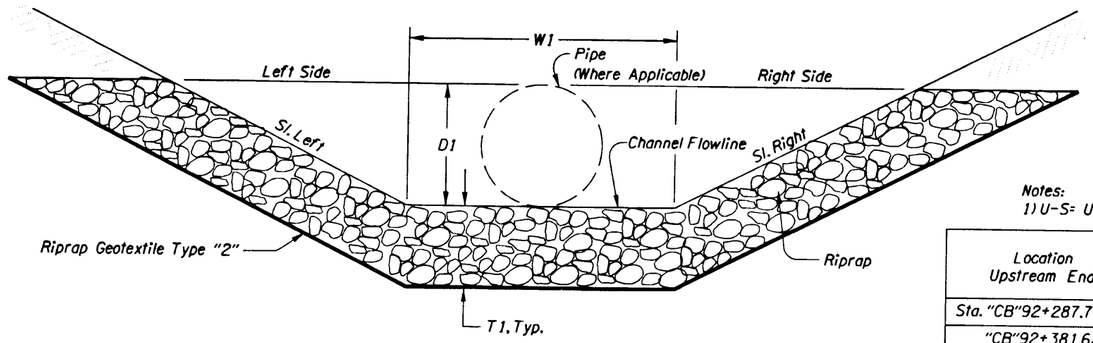
US26: CORNELL RD. -
OR217 (BEAVERTON) SEC.
SUNSET HIGHWAY
WASHINGTON COUNTY

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

WATER QUALITY DETAILS

SHEET NO. GHJ-5

RIPRAP CHANNEL

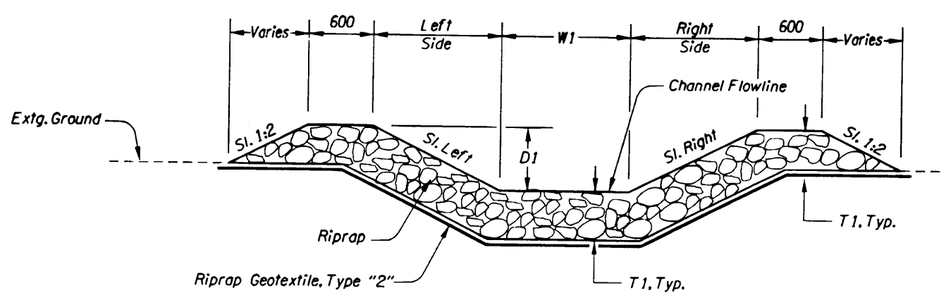


LOOKING DOWNSTREAM

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

VIEW 2

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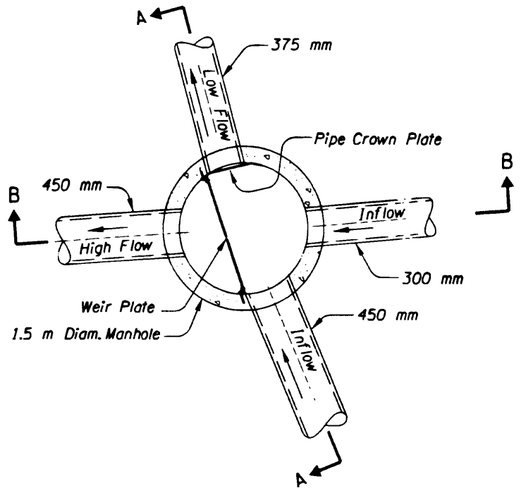
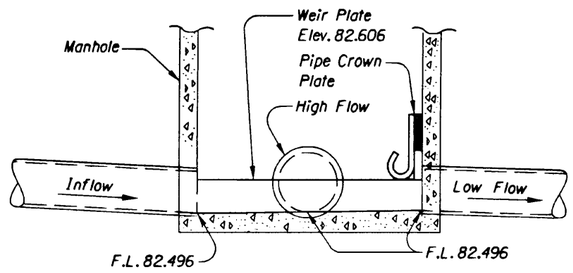
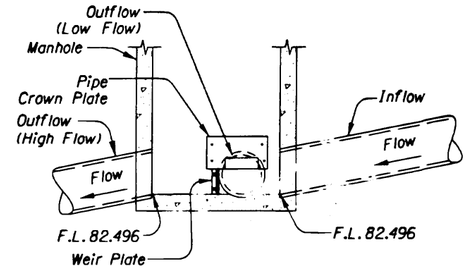
VIEW 2



PLAN



SECTION A-A

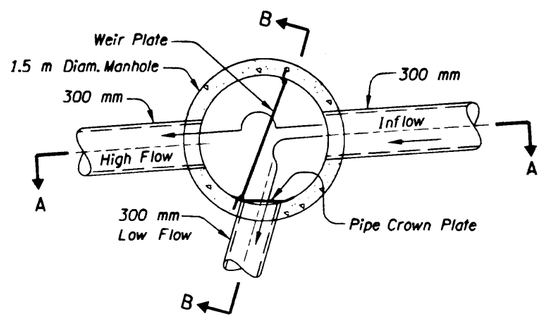


SECTION B-B

For Details Not Shown, See Sht. GHJ-20

DIVERSION MANHOLE "HIGH-LOW" LOW FLOW STRAIGHT THROUGH

Sta. "CBR" 95+523, Lt.



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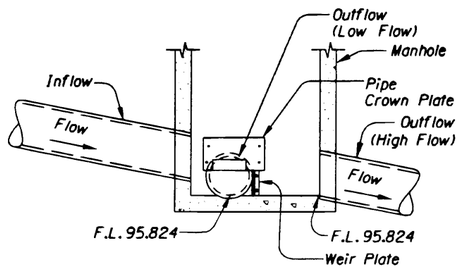
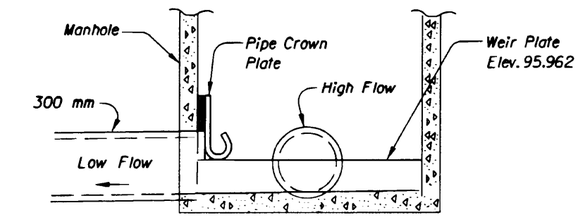


SECTION A-A



SECTION B-B

For Details Not Shown, See Sht. GHJ-20

DIVERSION MANHOLE "HIGH-LOW", LOW FLOW TO SIDE

Sta. "D" 96+042, Rt.

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

REGISTERED PROFESSIONAL ENGINEER
62.609
Henry M. Allen
OREGON
BY 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-18

VIEW 6

VIEW 6

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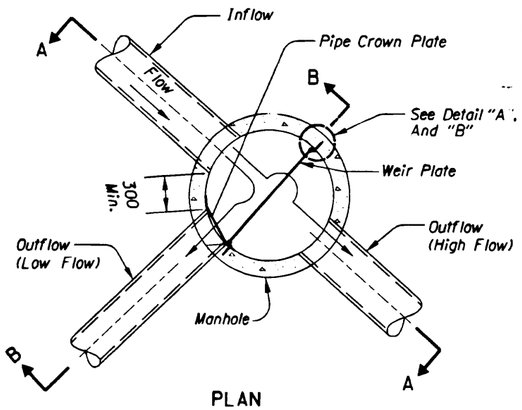
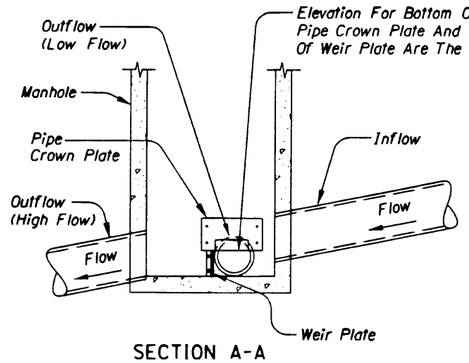
DIVERSION MANHOLE HIGH-LOW, PIPE CROWN PLATE, AND WEIR PLATE GENERAL DETAILS

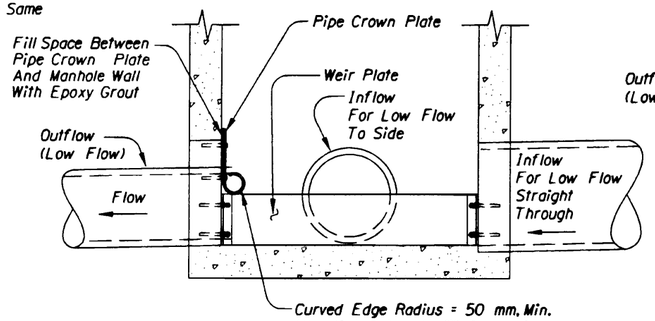


PLAN

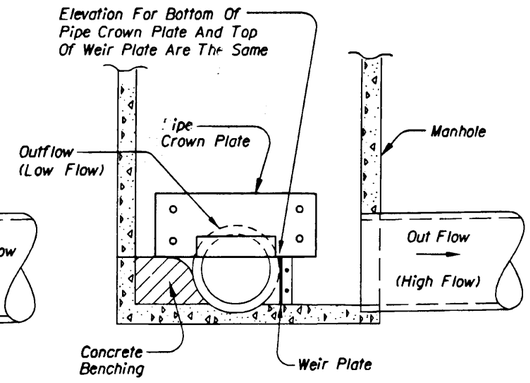
GENERAL-LOW FLOW TO SIDE



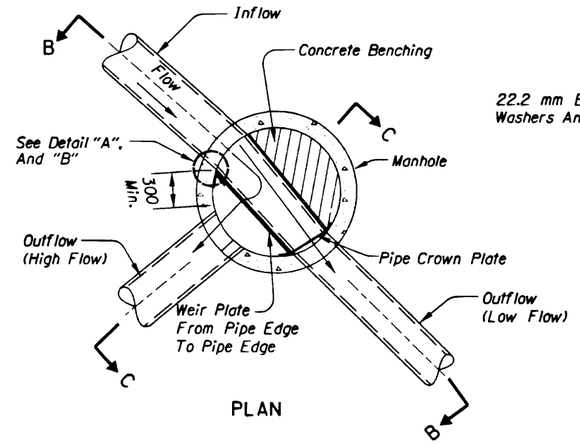
SECTION A-A



SECTION B-B

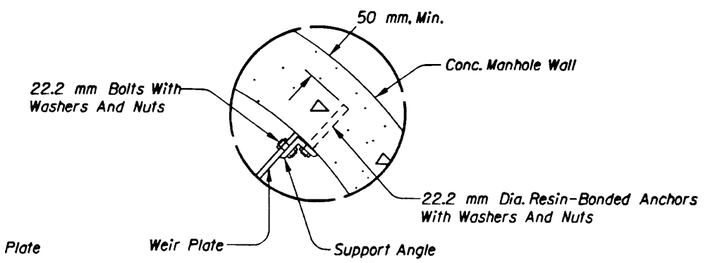


SECTION C-C

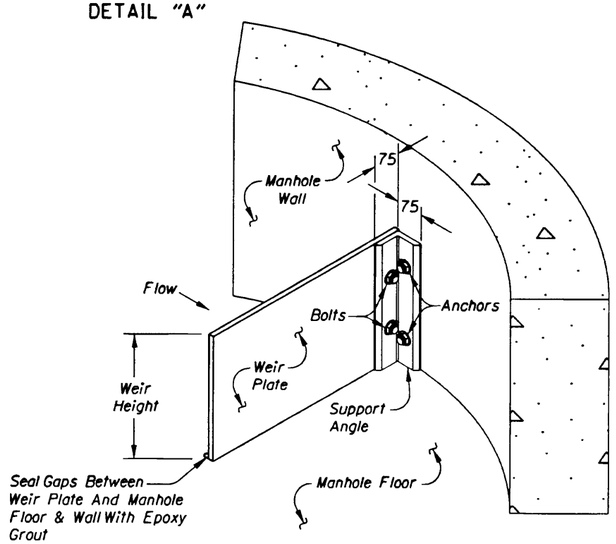


PLAN

GENERAL-LOW FLOW STRAIGHT THROUGH

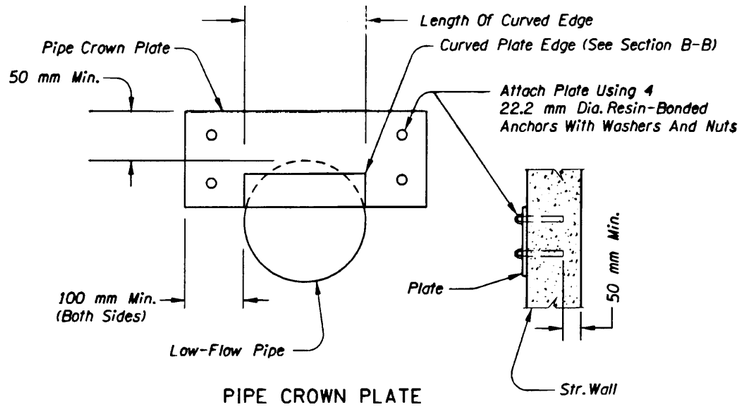


DETAIL "A"



DETAIL "B"

(Typ. Both Ends Of Weir)



PIPE CROWN PLATE

Notes:

1. When Connecting To Extg. Pipes Their 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, Weir Plate, And Support Angle 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.

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

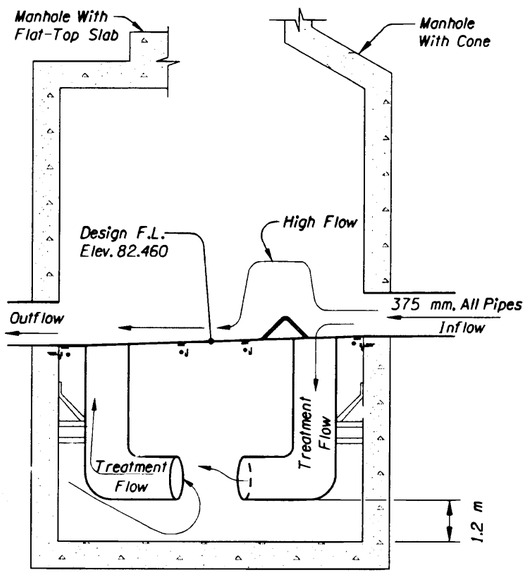
OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

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

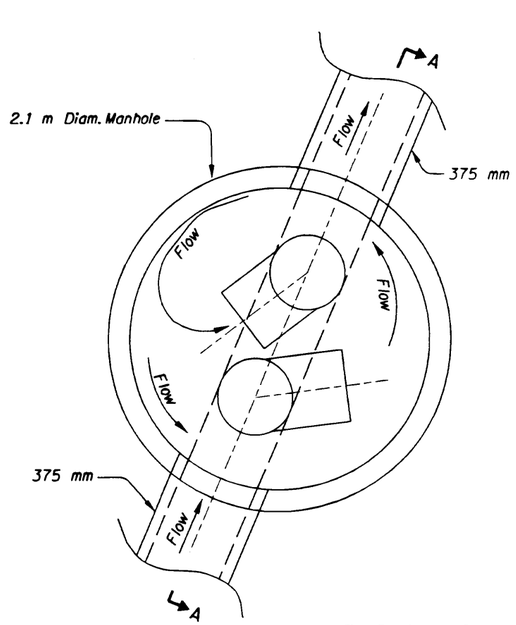
Project Leader - Naveen Chandra
Designed By - Henry M. Allen
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. GHJ-20



SECTION A-A

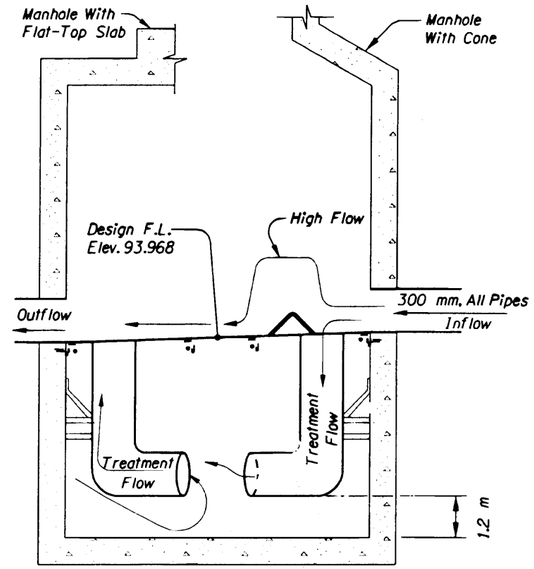


PLAN

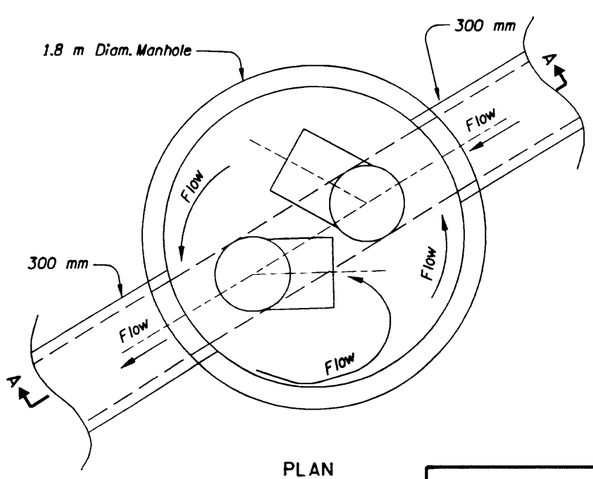
For Details Not Shown, See Sht. GHJ-31

POLLUTION CONTROL MANHOLE

Sta. "CBR"95+522, Lt.



SECTION A-A



PLAN

For Details Not Shown, See Sht. GHJ-31

POLLUTION CONTROL MANHOLE

Sta. "D"96+028, Rt.

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

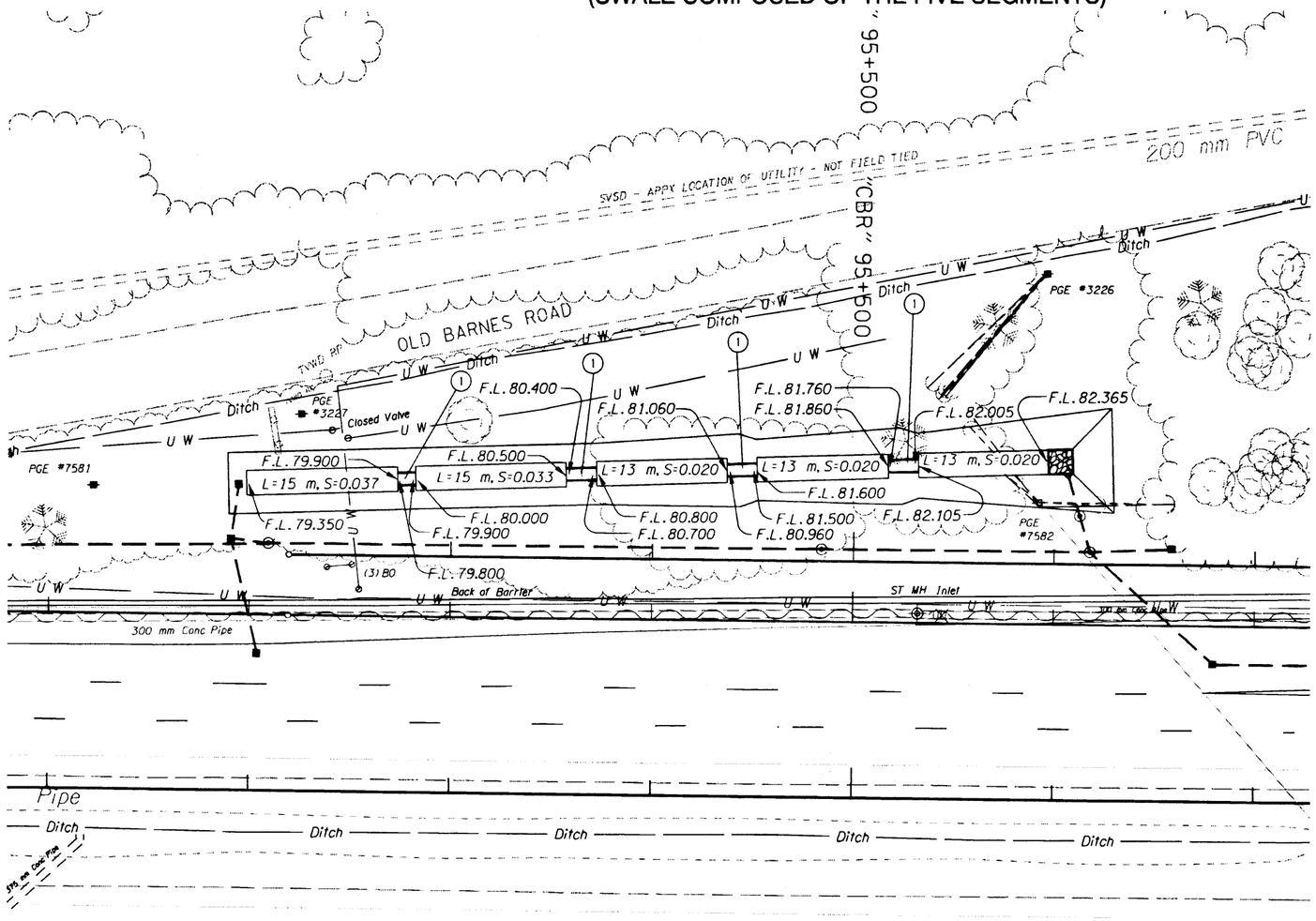
Project Leader - Naveen Chandra
Designed By - Henry M. Allen
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. GHJ-29

VIEW 5

WATER QUALITY SWALE "CBR"
(SWALE COMPOSED OF THE FIVE SEGMENTS)



① Const. Loose Riprap Channel, (4) - 60 MG, Total Riprap Geotextile, Type 2 - 88 m², Total (For Details, See Sht. GHJ-8 & GHJ-49)

Notes:
1. For Details Not Shown, See Sht. GHJ-48.
2. All Dimensions Are In Meters (m) Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER
62,609
OREGON
MAY 9, 2000
HENRY MINTON ALLEN
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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 PLAN

SHEET NO. GHJ-43

VIEW S

THIS IS THE FILE NAME LOCATION \\serisp\wyp66c\ODOT_DATA\projects\06021_wr\Sweets\06021wrq.dt9 1/16/2004 8:02:32 AM

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	Swale Sideslopes 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

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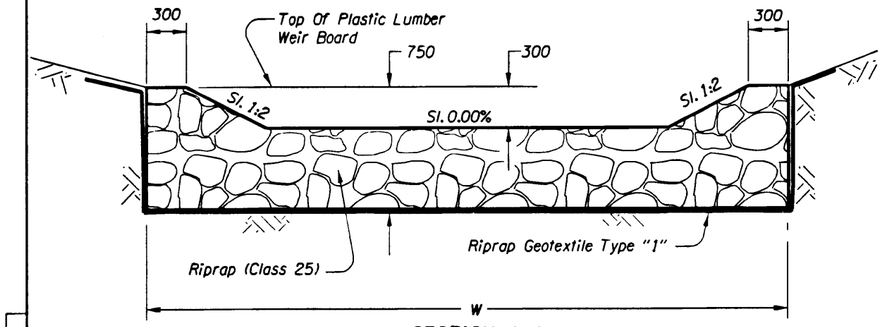
Drafted By - Martin G. Casillas

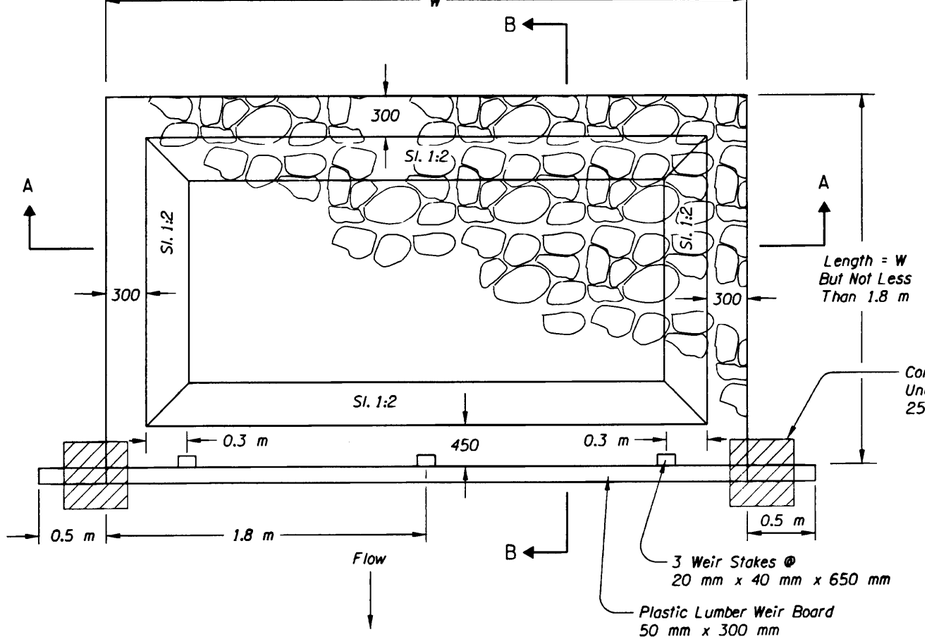
WATER QUALITY DETAILS

SHEET NO. GHJ-49

WATER QUALITY SWALE FLOW SPREADER



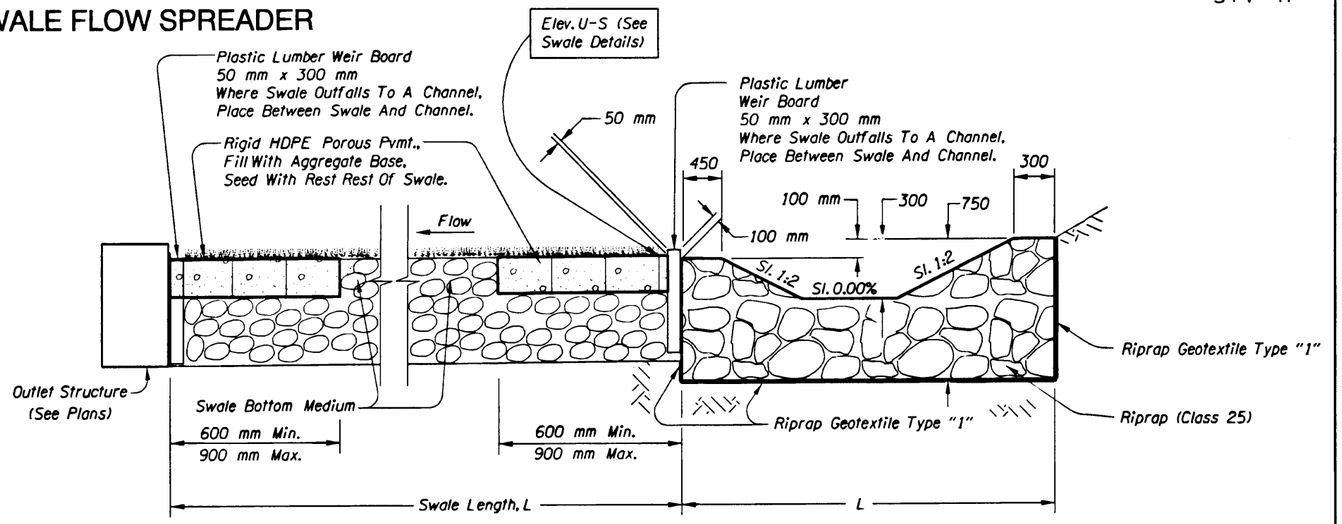
SECTION A-A



Note:
Swale Bottom Medium May Consist Of Compost-Topsoil Blend Or Drain Rock With Compost-Topsdoil Blend.

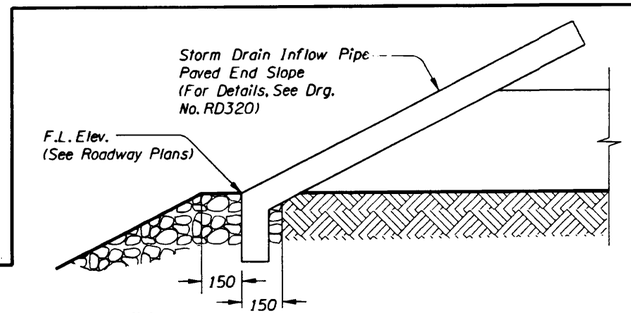
PLAN

SWALE FLOW SPREADER



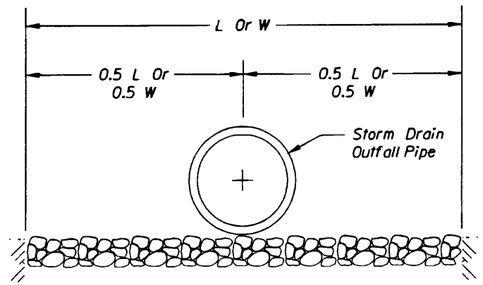
SECTION B-B

Note:
Place A Section Of Rigid HDPE Porous Pavement At The Upstream And Downstream Ends Of Each Swale Or Swale Segment.



Note:
Pipe F.I. Elev. And Top Of Weir Board Elev. Are The Same.

SECTION THROUGH SIDE PIPE OUTLET



LOOKING AT A SIDE

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

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WATER QUALITY DETAILS

SHEET NO. GHJ-50