OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: March 2019

DFI No. D01224

Figure 1: DFI No. D01224, looking north

Identification

Drainage Facility ID (DFI):	D01224
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 38V-075
Location:	District: 2B
	Highway No.: 171
	Mile Post: 5.49 to 5.51, right

1. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions.

2. Facility Location

The location map below details the facility location. The highway, mile posts, side streets, access location, and stormwater flow directions are noted on the map.

Facility location type: Roadway shoulder

Flow direction: west

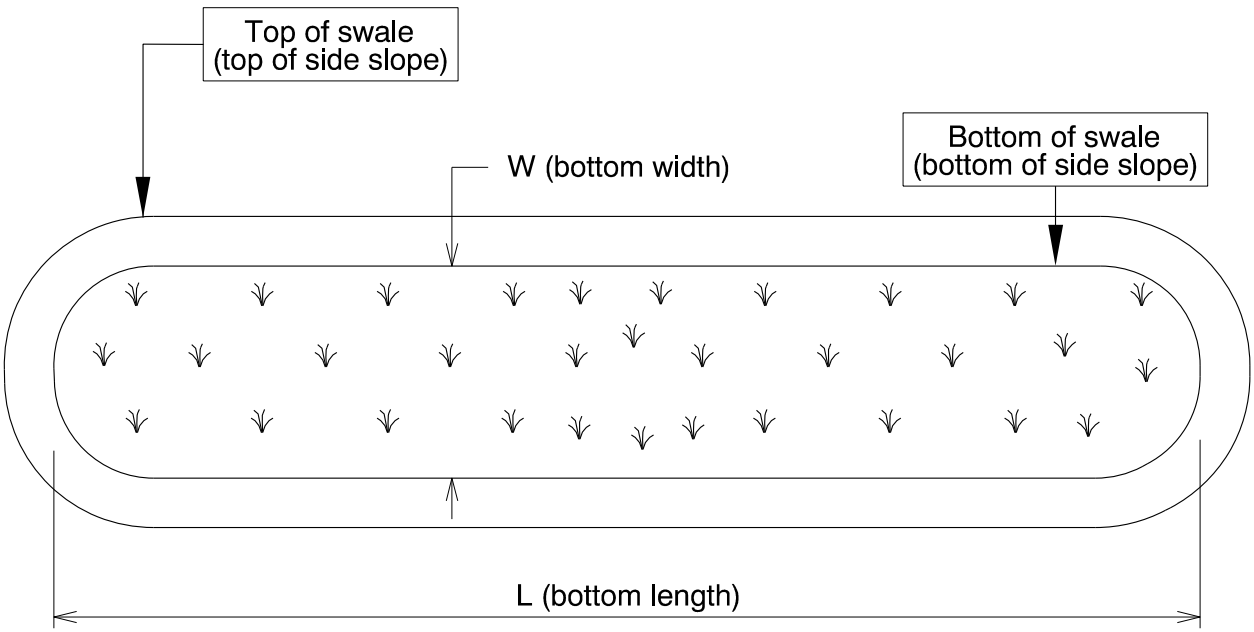
Figure 2: Facility location map

3. Facility Summary

The length and width of a swale is based on the bottom dimensions.

The bottom length and bottom width of the swale is:

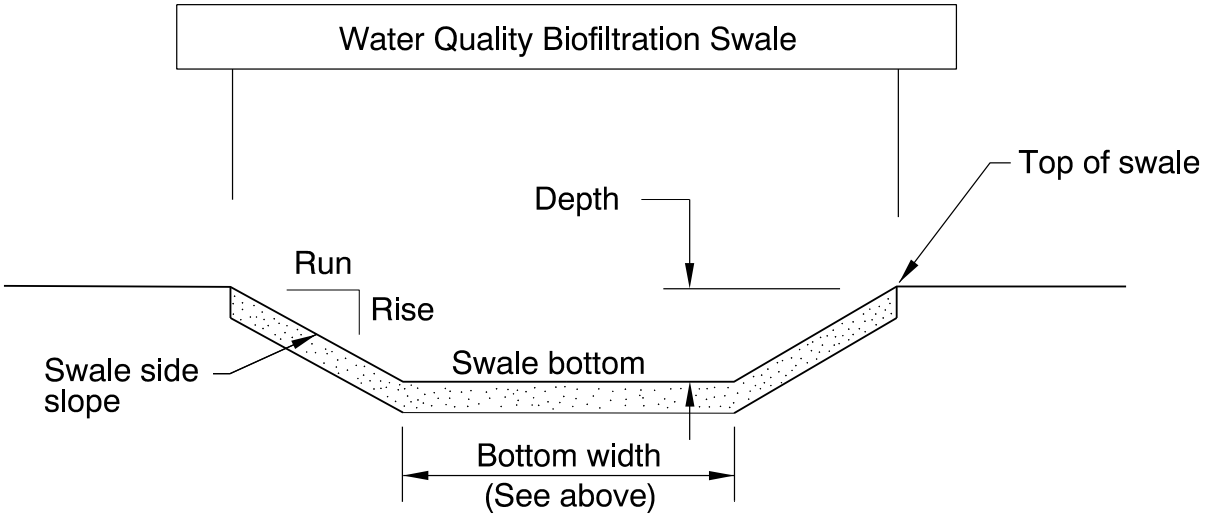
Bottom Length (feet)	Bottom Width (feet)
115	8



The depth of the swale is the vertical distance measured from the bottom of the swale to the top. The slope of the swale sides is presented by a vertical distance (rise) followed by the horizontal distance (run).

Depth and side slopes:

Depth (feet)	Rise (feet)	Run (feet)
2.5	**1**	**4**



Site Specific Information: This facility has a water quality/pollution control manhole and a diversion manhole that will require maintenance. Porous pavers are installed on beginning and sections of the swale bottom, but not throughout.

4. Facility Access

Maintenance access to the facility:

☒Roadside pad	☐Roadside shoulder
☐Access road with Gate	☐Access road without Gate

Figure 3: Maintenance access

5. Operational Components / Maintenance Items

Classification

This facility is classified as an:

☒ On-line Swale	☒ Off-line Swale
A swale that does not include a high flow bypass component; flow drains into and through the facility	**A swale that treats low/small flows and diverts high flows using a bypass component**

Bypass Component

This facility includes a high flow bypass component:

☐ No	☒ Yes
There is no bypass component. High flows drains into and through the facility	There is a bypass component. Only low/small flows drain into the swale. High flows are diverted around the swale using a bypass component

Operational Components

A swale has many components that assist with treatment, conveyance, and reducing flow velocity to minimize erosion. The components in use can vary depending if the facility was designed to operate on-line or off-line. The facility components table (**Table 1**) has been provided to highlight the applicable components for this facility. The component is in use when the box contains an "x" (e.g. ☒).

The Standard Operation Manual for Water Quality Biofiltration Swales (implemented March 2017) outlines facility operation, typical footprint configuration, and component definitions and details. A link to the manual is attached to the feature marker in TransGIS.
https://gis.odot.state.or.us/TransGIS/

Operational Plan

The applicable standard operational plan for this facility is:

☐ Operational Plan A	☐ Operational Plan B	☒ Operational Plan C
An on-line swale with roadside ditches	An on-line swale with piped inlets and outlets	An off-line swale with a piped high flow bypass
A standard operational plan illustrates the general facility footprint configuration and explains the purpose of each facility component. Operational plans (A, B, C) are provided in the Standard Operation Manual.		

See Appendix A for the site specific operational plan.

Maintenance Items

Operational components marked in **Table 1** should be inspected and maintained according to Section 7. Each facility component is defined and detailed in the Standard Operation Manual using the associated ID number indicated below.

Table 1: Swale Components		ID #
Manholes/Structures		
Pre-treatment manhole	☒	**S1**
Weir type flow splitter/flow splitter manhole	☒	**S2**
Orifice type flow splitter/flow splitter manhole	☐	**S3**
Standard manhole	☐	**S4**
Swale Inlet		
Pavement sheet flow	☐	**S5**
Inlet Pipe (s)	☒	**S6**
Open channel inlet	☐	**S7**
Riprap pad	☐	**S8**
Ground Cover		
Grass bottom	☒	**S9**
Grass side slopes	☒	**S10**
Granular drain rock	☐	**S11**
Plantings	☐	**S12**
Underground Components		
Geotextile fabric	☒	**S13**
Water quality mix	☒	**S14**
Perforated pipe	☒	**S15**
Porous pavers (access grid)	☒	**S16**
Flow Spreader		
Rock basin (used at inlet)	☒	**S17**
Anchored board (one is located after water quality manhole)	☒	**S18**
Other:	☐	**S19**
Swale Outlet		
Catch basin with grate	☐	**S20**
Outlet Pipe (s)	☒	**S21**
Open channel outlet	☐	**S22**
Auxiliary Outlet: Outlet Control Structure	☐	**S23**
Outfall Type		
Waterbody (**C**reek/**L**ake/**O**cean)	☐ **C** ☐ **L** ☐**O**	**S24**
Ditch	☐	**S25**
Storm drain system	☒	**S26**
Outfall Components		
Riprap pad	☐	**S27**
Riprap bank protection	☐	**S28**

6. Maintenance

Maintenance Frequency/Maintain Records

a. Inspect annually. Preferably prior to the rainy season.
b. Clean and maintain as necessary. Refer to Activity 125 for conditions when maintenance is needed.
c. Keep a record of inspections, maintenance, and repairs.

Maintenance Guide/Maintenance Actions

The ODOT Routine Road Maintenance Water Quality and Habitat Guide (the *Blue Book*) outlines the standard maintenance actions for water quality facilities under Activity 125.

There are standard maintenance tables for standard ODOT designs. The maintenance tables describe the maintenance component, the defect or problem, the condition when maintenance is needed, and the recommended maintenance to correct the problem. Use the following tables to maintain ODOT swales:

- Table 1 (General Maintenance): Contains general maintenance and inspection guidelines that are applicable to all ODOT water quality facilities
- Table 3 (Maintenance of Water Quality or Biofiltration Swales): Contains maintenance information for swales

The *Blue Book* can be viewed at the following website:
http://www.oregon.gov/ODOT/Maintenance/Documents/blue_book.pdf

7. Limitations

Access grid installed:

☐ No	☒ Yes
There are (medium) duty porous pavers installed in sections of this swale	

Swales are designed to allow equipment access along the bottom. If an access grid is **NOT** installed, vehicles entering the swale can create depressions (tire ruts), damage vegetation, and damage structural components (e.g. flow spreaders). These conditions may result in poor treatment and drainage performance.

Equipment wheels should be kept on the tops and side slopes. Mower arms may be run along the swale bottom.

8. Waste Material Handling

Material removed from the facility is defined as waste by the Department of Environmental Quality (DEQ). Refer to the roadwaste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:

http://www.oregon.gov/ODOT/Maintenance/Documents/ems_manual.pdf

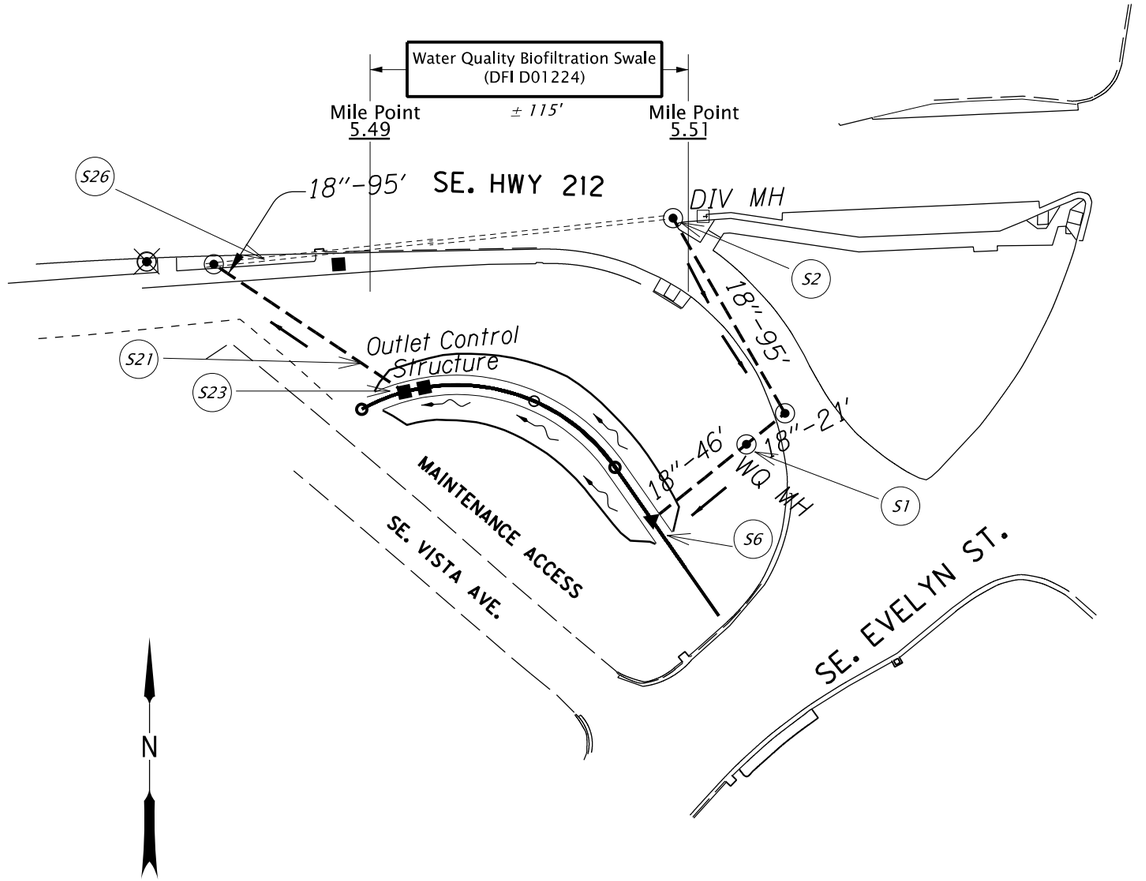
Contact any of the following for more detailed information about management of waste materials found on site:

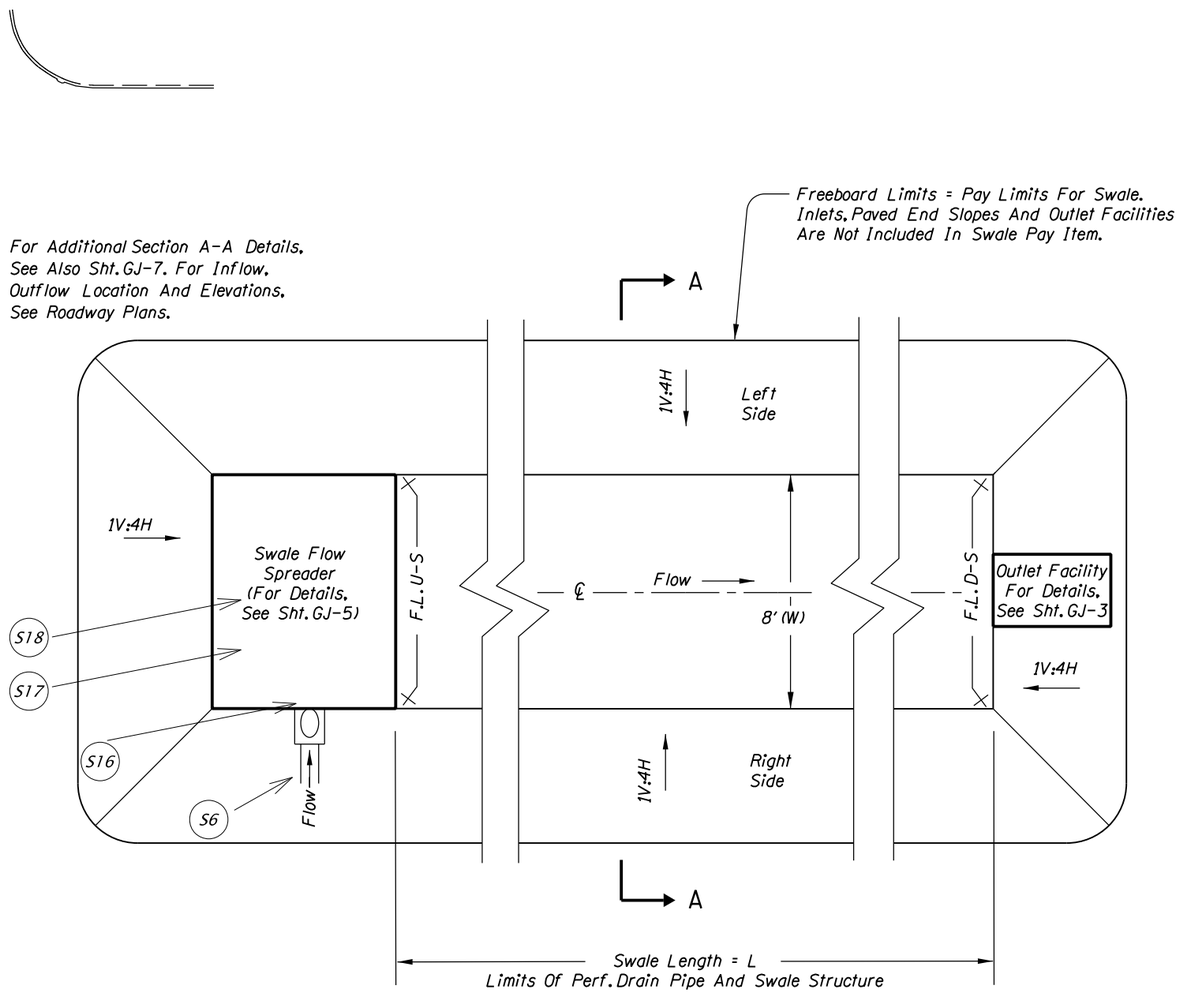
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442
ODOT Region 1 Hazmat Coordinator	(503) 731-8290
ODOT Region 2 Hazmat Coordinator	(503) 986-2647
ODOT Region 3 Hazmat Coordinator	(541) 957-3594
ODOT Region 4 Hazmat Coordinator	(541) 388-6186
ODOT Region 5 Hazmat Coordinator	(541) 963-1590
ODEQ Northwest Region Office	(503) 229-5263

A Appendix A – Site Specific Operational Plan

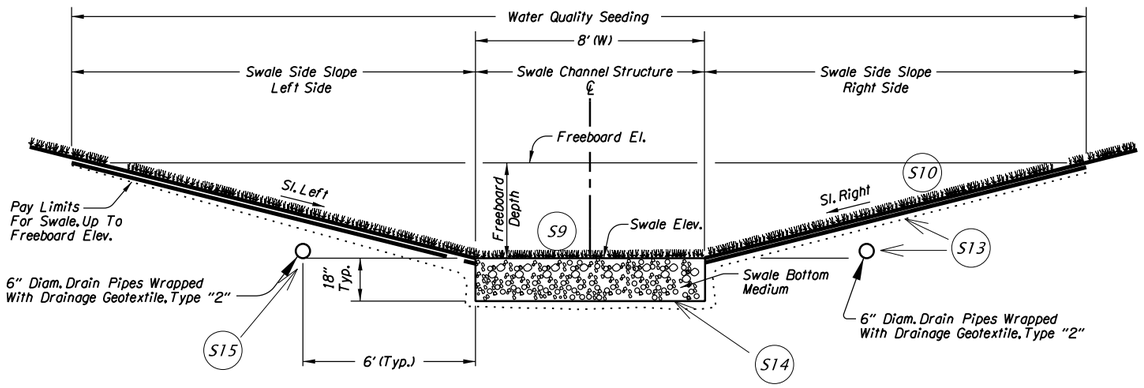
Contents:

Operational Plan: DFI D01224





PLAN



LEGEND:

- (X#) — Facility Component (see table 1 in O&M Manual)
- ◉ and/or ◎ — Manhole
- ■ and/or □ — Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Traffic Flow Direction

OREGON DEPARTMENT OF TRANSPORTATION

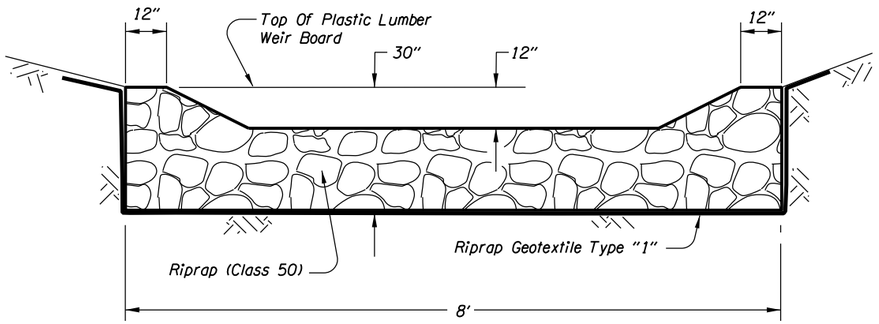
Sht. 01 of 03

Prepared By: Laila Bush

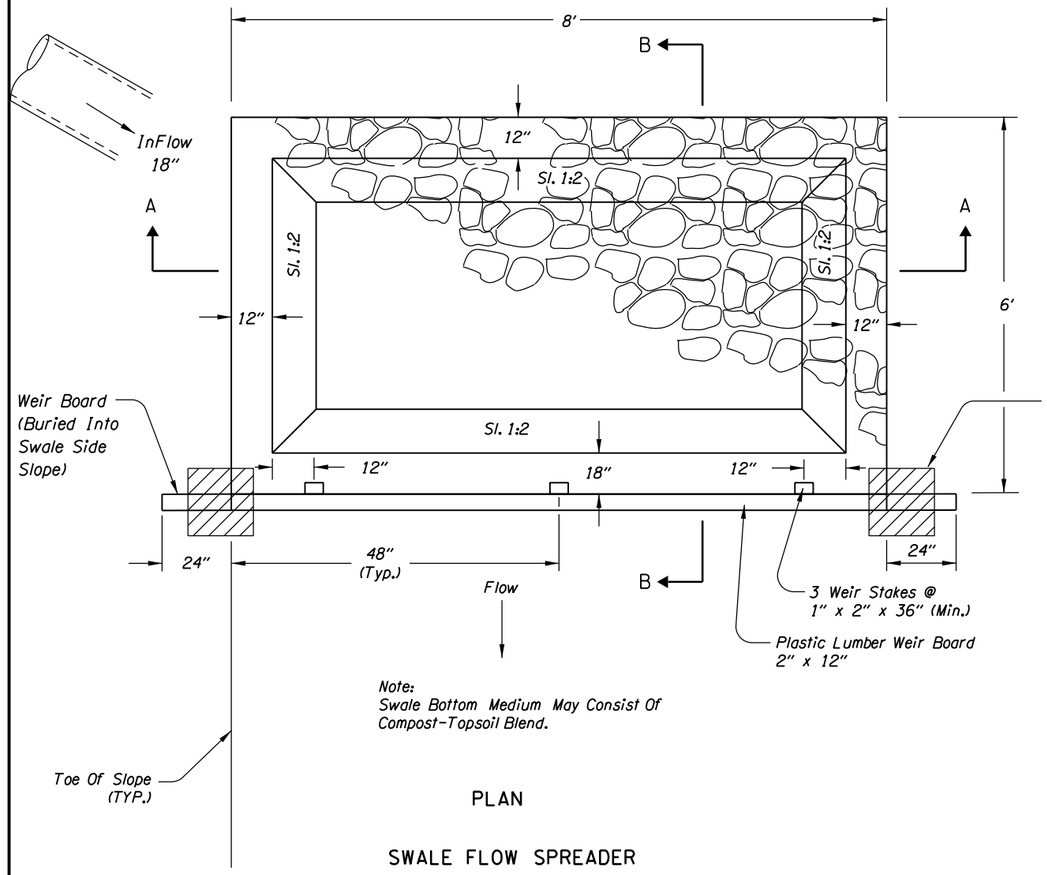
Drafted By: Laila Bush

DFI D01224
MAINTENANCE DISTRICT 2B HWY 171
Biofiltration Swale
HIGHWAY MP 5.49 - 5.51
CLACKAMAS COUNTY

WATER QUALITY SWALE FLOW SPREADER



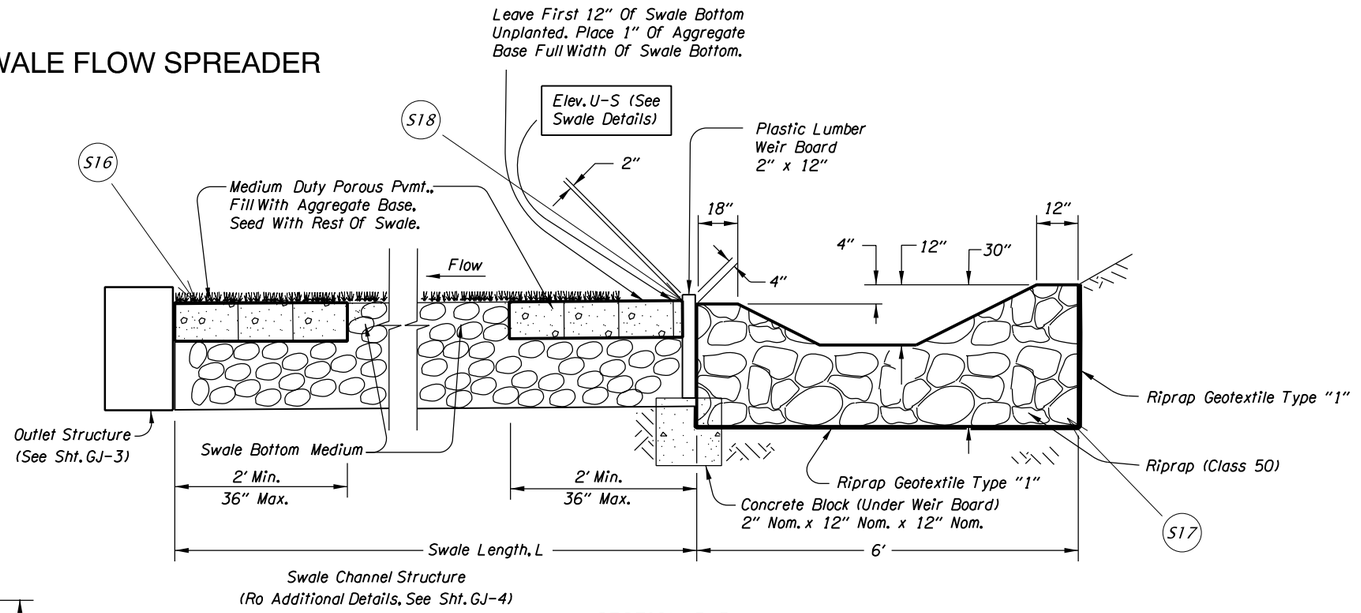
SECTION A-A



Note:
Swale Bottom Medium May Consist Of Compost-Topsoil Blend.

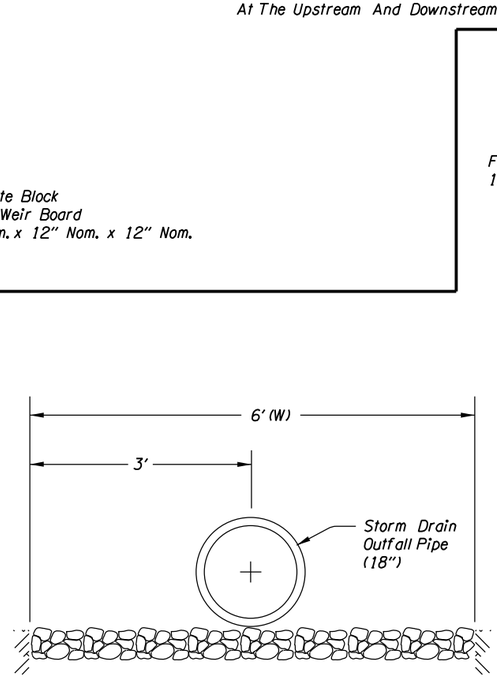
PLAN

SWALE FLOW SPREADER

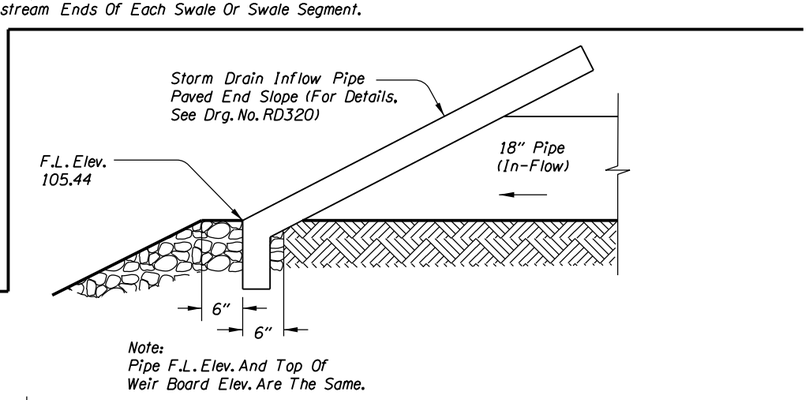


SECTION B-B

Note:
Place A Section Of Medium Duty Porous Pavement, Full Width Of Swale Bottom At The Upstream And Downstream Ends Of Each Swale Or Swale Segment.



LOOKING AT A SIDE



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

SECTION THROUGH SIDE
PIPE OUTLET

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 03 of 03

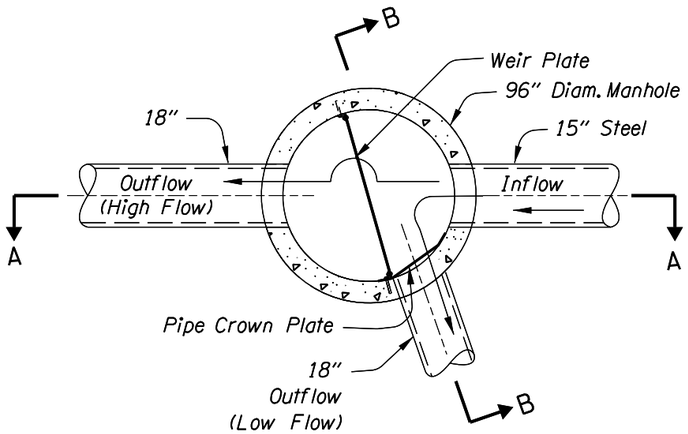
Prepared By: Laila Bush

Drafted By: Laila Bush

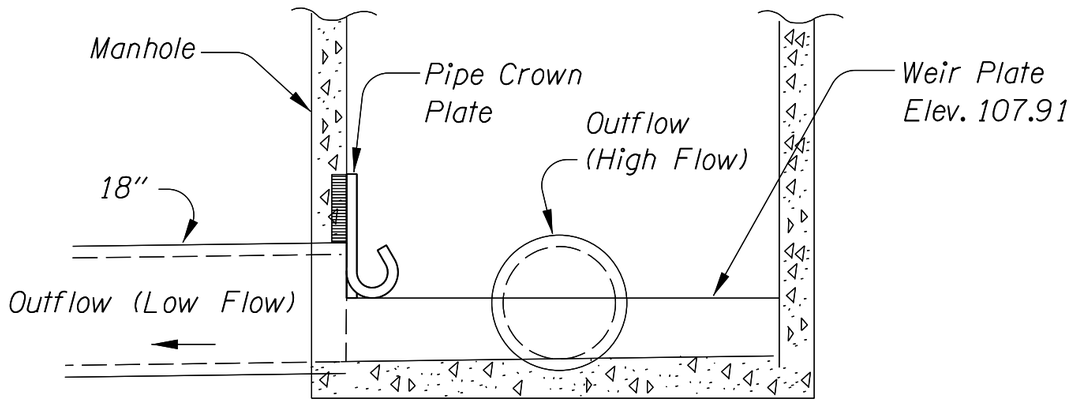
DFI_D01224
MAINTENANCE DISTRICT 2B HWY 171
BIOFILTRATION SWALE
HIGHWAY MP 5.49 - 5.51
CLACKAMAS COUNTY

For Details Not Shown, See Sht. GJ-2

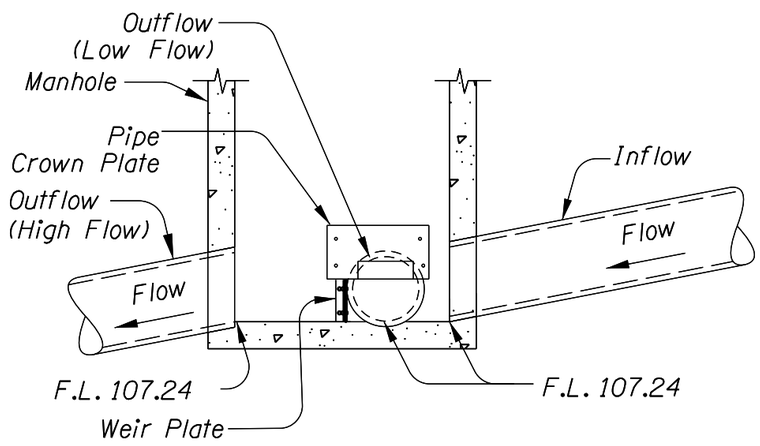
DIVERSION MANHOLE "HIGH-LOW", LOW FLOW TO SIDE



PLAN



SECTION B-B



SECTION A-A

LEGEND:

- X# — *Facility Component (see table 1 in O&M Manual)*
- and/or — *Manhole*
- and/or — *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 02 of 03

Prepared By: Laila Bush

Drafted By: Laila Bush

DFI D01224
MAINTENANCE DISTRICT 2B HWY 171
BIOFILTRATION SWALE
HIGHWAY MP 5.49 - 5.51
CLACKAMAS COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 38V-075

Partial Plan Set

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.& Std. Drg. Nos.

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

GRADING, PAVING, SIGNING, ILLUMINATION & SIGNALS

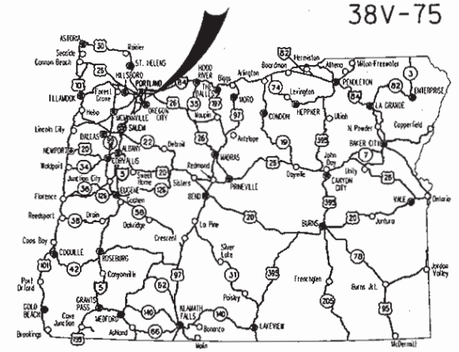
OR224: EAST PORTLAND FWY. - S.E. EVELYN ST. SEC.

CLACKAMAS HIGHWAY

CLACKAMAS COUNTY

MAY 2005

38V-75



Overall Length Of Project - 0.46 Miles

BEGINNING OF PROJECT

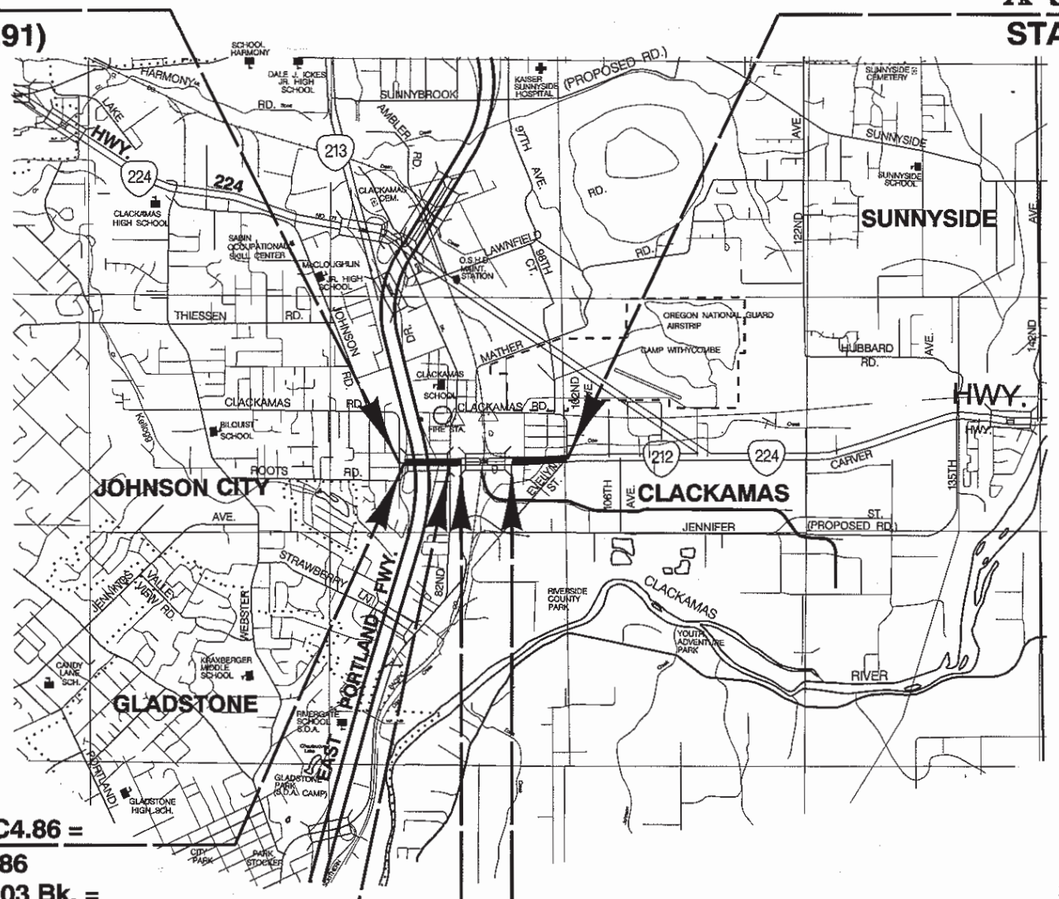
X-STP-S171(011)

STA. 253+31.00 (M.P. 1C4.91)

END OF PROJECT

X-STP-S171(011)

STA. 290+22.30 (M.P. 5.54)



M.P. 1C4.86 = M.P. 4.86

M.P. 5.03 Bk. = M.P. 5.05 Ah.

STA. 268+50 (M.P. 5.12)

OTIA PROJECT

STA. 276+40 (M.P. 5.27)

N

T. 2 S., R. 2 E., W.M.

Wayne L Statler

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
PROJ. MGR. WAYNE STATLER
1 Mar 2007

ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Papé	COMMISSIONER
Janice J. Wilson	COMMISSIONER
Bruce A. Warner	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER 13,704

OREGON JULY 16, 1987 CATHERINE M. NELSON Expires Dec. 31, 2006

Catherine M. Nelson

TECHNICAL SERVICES MANAGING ENGINEER

OR224: EAST PORTLAND FWY. - S.E. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-STP-S171(011)	1

CHARGE NUMBER

THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

i:i00 - i

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2D, 2D-2 Thru 2D-3 Incl.	Pipe Data
3	Alignment
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6	Alignment
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I-1147	Illumination Plans
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13794	Signal Plan
13795	Interconnect And Detector Plan
CLACKAMAS HWY. AT S.E. 82ND DR.	
13796, 13797	Signal Plans
13798	Detector Legend And Diagrams
13799	Interconnect And Detector Plan
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RD316	- Sloped Ends For Pipe
RD320	- Paved End Slope For Culverts
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RD336, RD340	- Concrete Inlets
RD356	- Manhole Covers And Frames
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RD907, RD915, RD945	
RD950	- Barricades
RD1010	- Inlet Protection Type 1,2,3
RD1035	- Sediment barrier Type 3
RD1040	- Sediment Fence Supported/Unsupported

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BR705	- Retaining Walls Front Face Battered 2:1
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TM206, TM207	- Sign Mounting Details
TM211, TM212	- Signing Details
TM216	- Sign Installation Br. Mount Details
TM217	- Route Markers & Secondary Assemblies
TM218	- Secondary Signing Mounting Details
TM219	- Steel Pole Mounted Sign Details
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TM239	- Square Tube Sign Support
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TM426, TM427	- Service Cabinets
TM428	- Terminal Cabinets
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TM500, TM501, TM502	- Pavement Markings
TM510, TM511	- Bike Lane Pavement Markings
TM520	- Durable Pavement Markings
TM525	- Pavement Marking Details
TM526	- Freeway Pavement Markings
TM527	- Intersection Pavement Markings
TM530	- Urban Pavement Markings
TM535	- Crosswalk Markings
TM537	- Channelized Intersection Pavement Markings
TM545	- Left Turn lane Pavement Markings
TM556	- Bus Pavement Markings
TM631, TM632	- Traffic Signal Supports

NOT REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne A Statler
1 Mar 2007

OR224: EAST PORTLAND FWY. - S.E. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

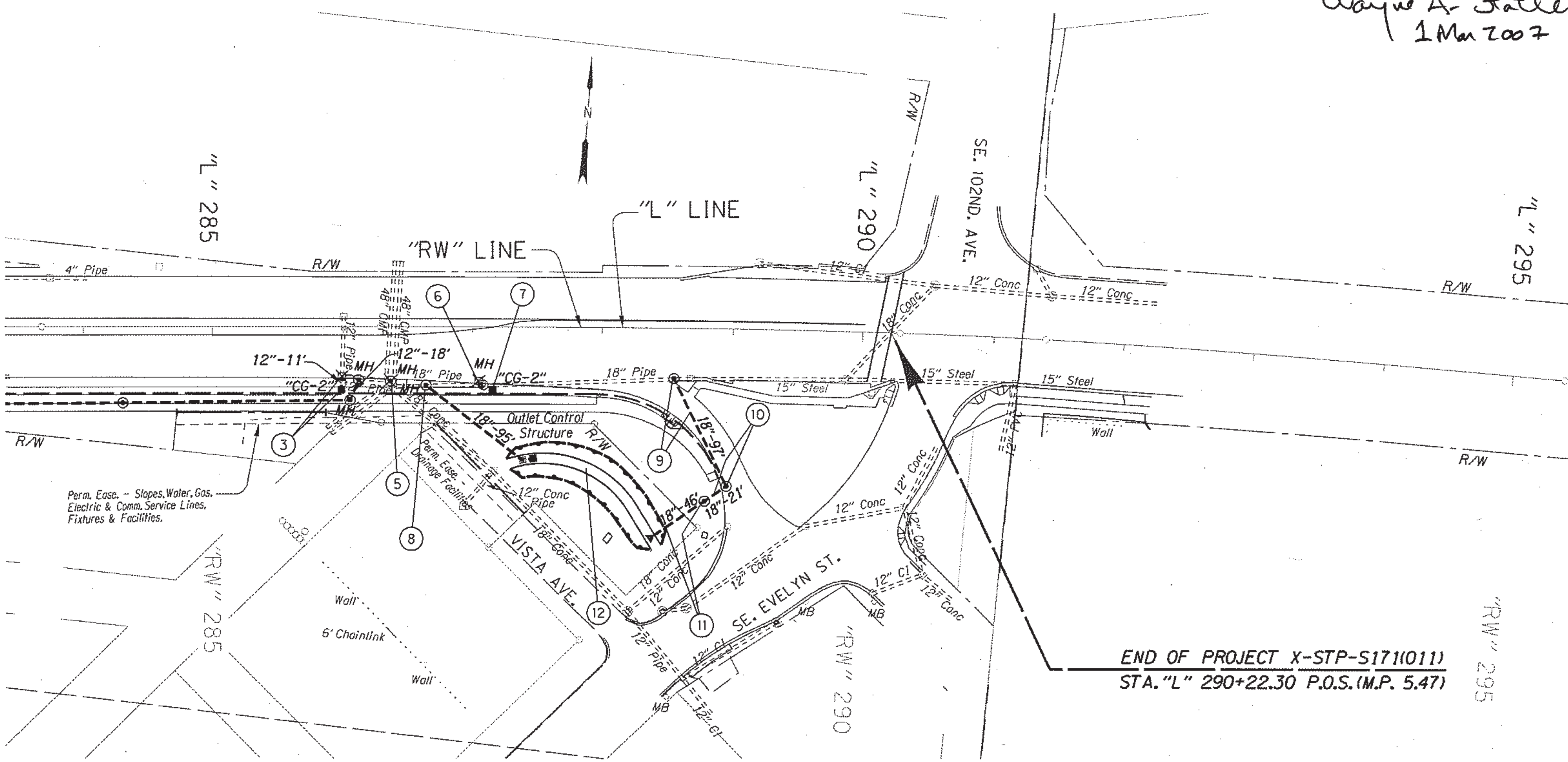
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-STP-S171(011)	1A

Partial Plan Set

T. 2 S., R. 2 E., W.M.

38V-75

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne A. Statler
1 Mar 2007



(1) Sta. "L" 286+06.12, 57.14' Rt.
Const. Manhole
Top Elev. 111.30'
Inst. 12" Sew. Pipe - 12'
5' Depth
F.L. 107.51'

(2) Sta. "L" 285+99.34, 48.98' Rt.
Remove Extg. Inlet
Remove Pipe - 36'
Const. Type "CG-2" Inlet
Top Elev. 110.71'
Inst. 12" Sew. Pipe - 12'
5' Depth
F.L. 108.62'

(3) Sta. "L" 285+99.34, 49.98' Rt.
Remove Extg. Inlet
Remove Pipe - 36'
Const. Type "CG-2" Inlet
Top Elev. 110.71'
Inst. 12" Sew. Pipe - 11'
5' Depth
F.L. 108.90'
Conn. Extg.
F.L. 108.85

(4) Sta. "L" 286+36.79, 42.25' Rt.
Minor Adj. Manhole
Top Elev. 110.97'
(Note: This Manhole Is A Concrete Vault For 4-48" Culvert Pipes. For Cow Creek; 2-18" Pipes; And 1-12" Pipe)

(5) Sta. "L" 286+36.79, 42.25' Rt.
Special Manhole Retro Fit
Details, See Sheet 2B-9
Top Elev. 110.97'
(Note: This Manhole Is A Concrete Vault For 4-48" Culvert Pipes. For Cow Creek; 2-18" Pipes; and 1-12" Pipe)
Inst. 12" Sew. Pipe - 9'
5' Depth
F.L. 107.64'

(6) Sta. "L" 287+08.24, 45.16'
Remove Extg. Inlet
Major Adj. Manhole
Top Elev. 111.21'
Inst. 12" Sew. Pipe - 9'
5' Depth
F.L. 107.68'

(7) Sta. "L" 287+15.75, 49.03' Rt.
Const. Type "CG-2" Inlet
Top Elev. 107.68'

(8) Sta. "L" 286+64.35, 45.32' Rt.
Const. Manhole
Over Extg. Storm Sew. Pipe
Top Elev. 111.03'
F.L. 105.28'
Inst. 18" Storm Sew. Pipe - 95'
10' Depth

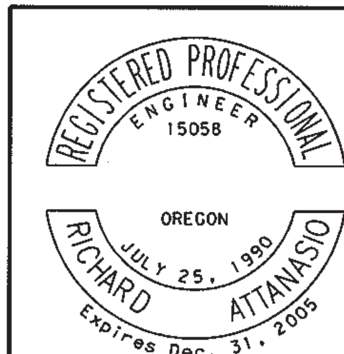
(9) Sta. "L" 288+55.12, 39.17' Rt.
Const. Manhole
Top Elev. 112.13"
Inst. 18" Sew. Pipe - 97'
5' Depth
F.L. 107.24'

(10) Sta. "L" 288+98.72, 125.84' Rt.
Const. Manhole
Top Elev. 111.21'
Inst. 18" Sew. Pipe - 21'
5' Depth
F.L. 106.42'

(11) Sta. "L" 288+80.02, 134.09' Rt.
Const. Water Quality Manhole -
Top Elev. 111.11'
Inst. 18" Sew. Pipe - 46'
5' Depth
F.L. 106.24'
Const. Paved End Slope - 31 Sq. Ft.
F.L. 105.66'
(For Details, See Shts. GJ-1 & GJ-2)

(12) Sta. "L" 287+28.72, 106.56' Rt. To
Sta. "L" 288+44.30, 171.65' Rt.
Const. Water Quality Swale
(For Details, See Shts. GJ-3, GJ-4, GJ-5, GH-6, & GJ-7)

Notes:
1. Station/Offset Call-outs For Typ "G-2", "CG-2", And "CG-3 Inlets Are To The Face Of Curb. Station/Offset Call-outs For Extg. Manholes Are To The Center Of The Manhole Lid. Station/Offset Call-outs For Extg. Manholes Are To The Center Of The Structure.
2. Field Verify Top And Invert Elevations.
3. Remove Extg. Pipe, Shown Thus:



OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

OR224: EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Design Team Leader - David Joe Polly
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

DRAINAGE

SHEET NO. 6B

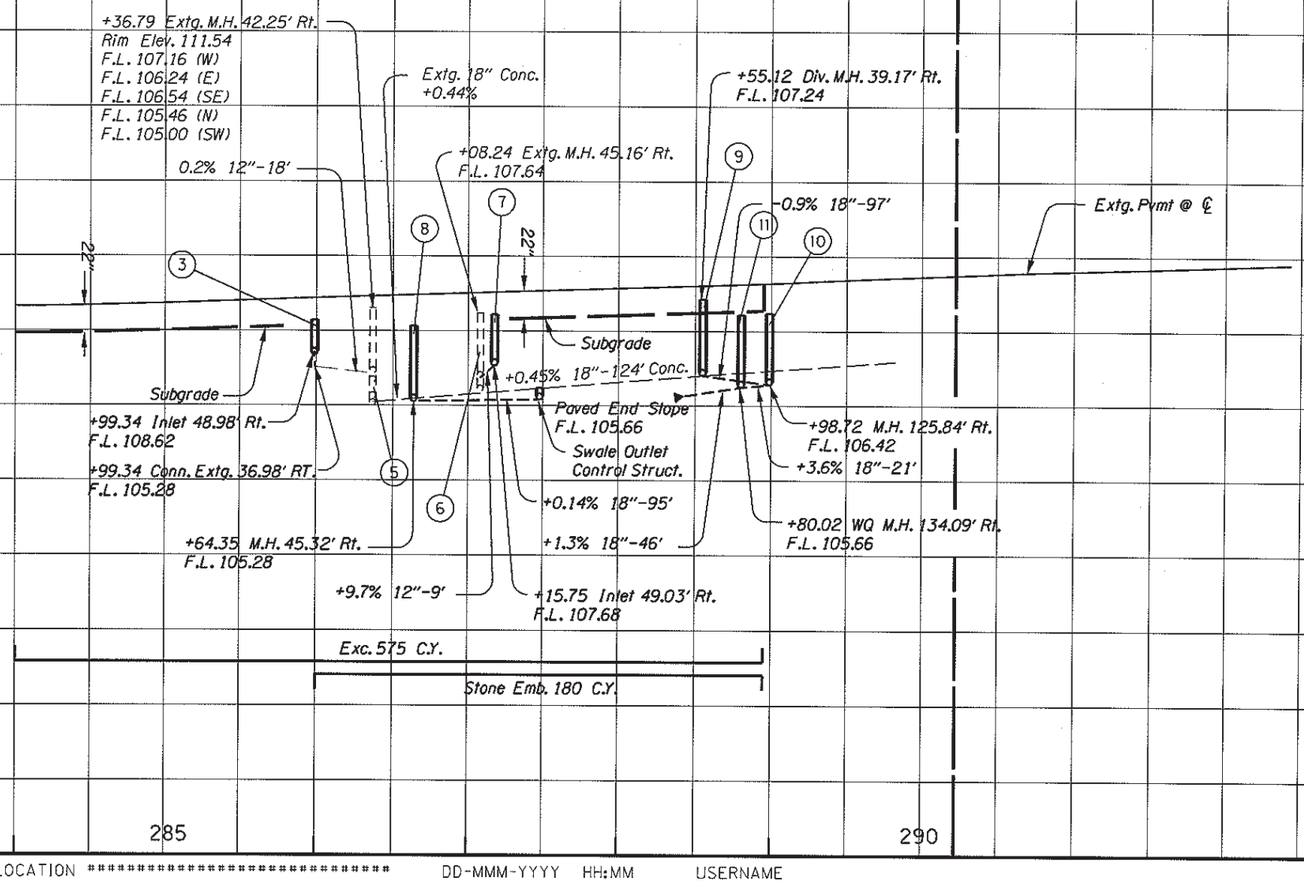
THIS IS THE FILENAME LOCATION ******************************** DD-MMM-YYYY HH:MM USERNAME

Partial Plan Set

38V-75

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne L. Stallen
1 Mar 2007

END OF PROJECT X-STP-S171(011)
STA. "L" 290+22.30



REGISTERED PROFESSIONAL ENGINEER
15058
OREGON
JULY 25, 1990
RICHARD ATTANASIO
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

OR224: EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Design Team Leader - David Joe Polly
Designed By - Lily N. Nguyen
Drafted By - Tien Nguyen

PROFILE

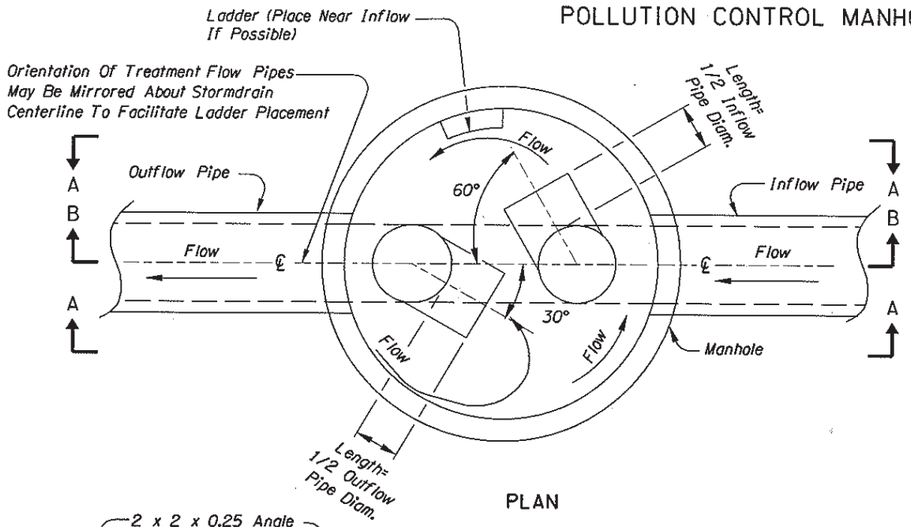
SHEET NO. 6D

THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

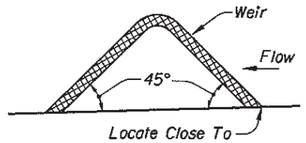
POLLUTION CONTROL MANHOLE GENERAL DETAILS

Wayne L. Stalter
REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
1 May 2007

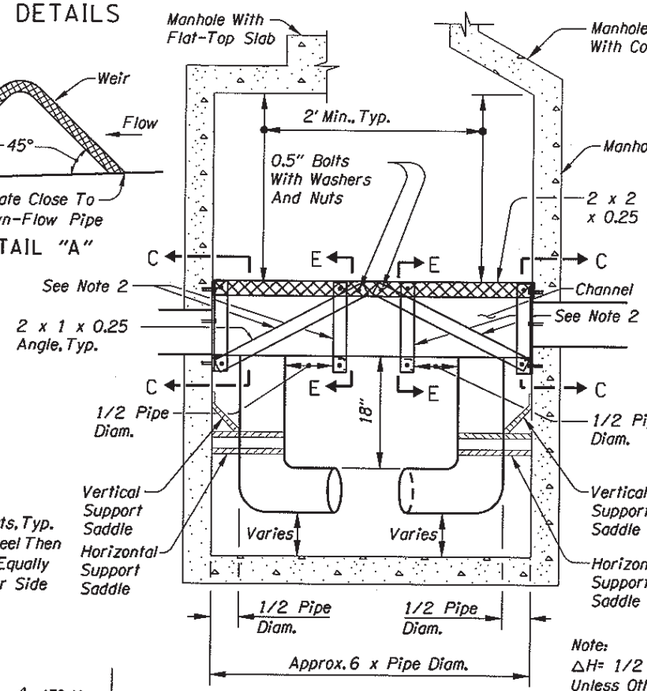
38V-75



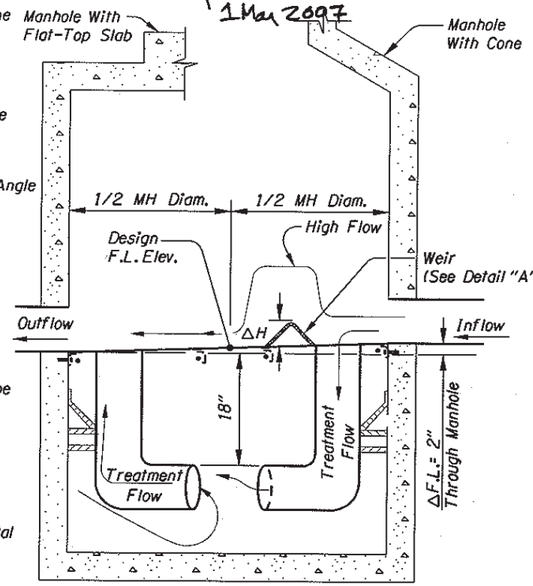
PLAN



DETAIL "A"

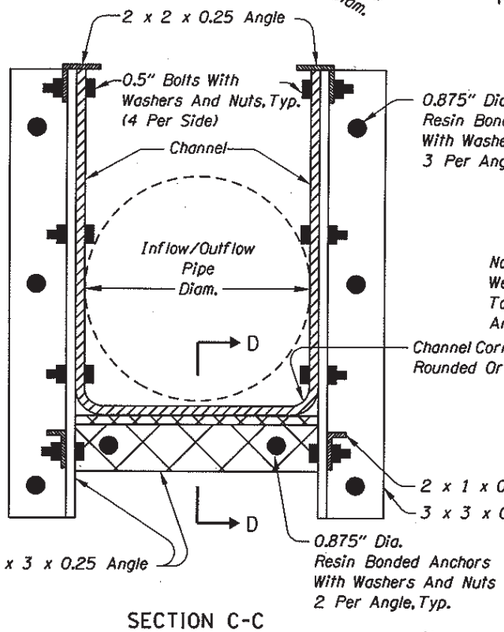


SECTION A-A

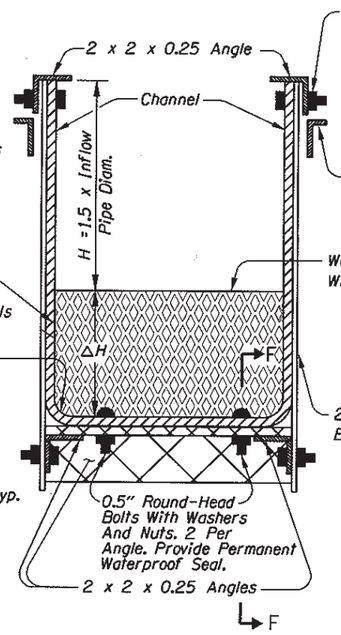


Note:
ΔH= 1/2 Inflow Pipe Diam.
Unless Otherwise Specified

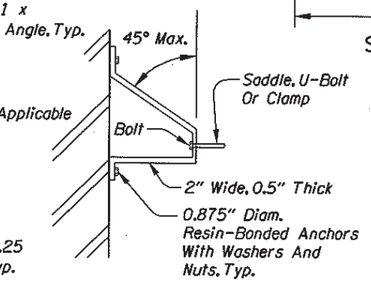
INSIDE SECTION B-B



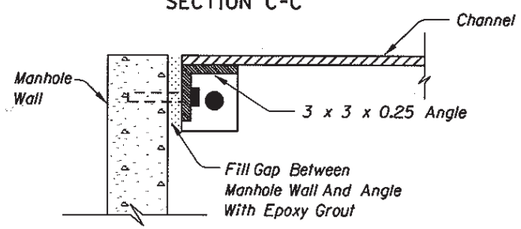
SECTION C-C



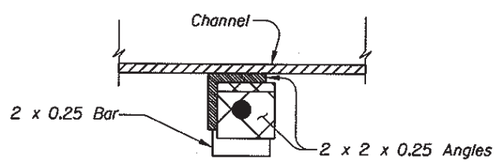
SECTION E-E



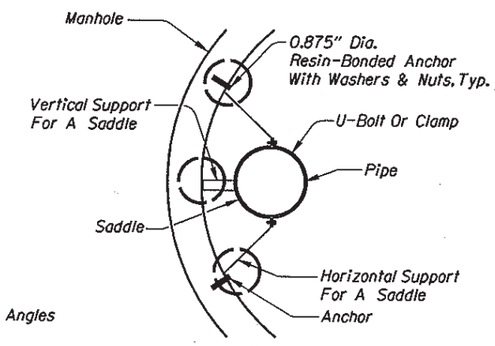
ELEVATION
VERTICAL PIPE SUPPORT



SECTION D-D
(Typ. Both Sides)



SECTION F-F
(Typ. Both Sides - Round-Head Bolts Eliminated For Clarity)



PLAN
HORIZONTAL PIPE SUPPORT

Notes:
1. Channel And Weir To Be Made Of 0.5" Thick HDPE Or 0.188" (3/16") Thick. Min., Stainless Steel. Any Joints In Channel To Be Permanent, Strong And Watertight.
2. Angles And Bars Shall Be A36 Steel Or Stronger. Vertical And Diagonal Supports For Channel Span Not Necessary If Channel Is Steel.
3. Pipes Within Manhole To Be Corrugated HDPE, HDPE SDR26, PVC Sch. 40 Or 0.125" Min. Thick Stainless Steel. Flanges (12 Bolts) To Be Of These Materials.
4. Pipes And Channel Must Have Water Tight Joints And Smooth Interior Walls With Manning's "n" ≤ 0.013
5. Fasten Pipes To Wall Using 2" Wide By 0.188" (3/16") Thick Straps With 0.875" (7/8") Diameter U-Bolts Or Clamps.
6. Vertical Pipes To Be Set Away From Wall So That There Is A Clear Space Between The Manhole Wall And The Outside Pipe Wall Equal To At Least , But Not Much More Than $\frac{1}{2}$ Pipe Diameter.
7. Provide Permanent Watertight Seals Between Channel End And Manhole Wall, Between Channel Floor And Pipes Within The Manhole And Between The Weir And Channel.
8. All Hardware Shall Be Stainless Steel Or Hot-Dipped Galvanized.
9. For Resin-Bonded Anchors, Use Steel Threaded Rods.
10. Embed Resin-Bonded Anchors 4", Min. Into Concrete. Use High Or Low Strength Resin From ODOT's Qualified Products List, Suitable For Wet Or Submerged Locations.
11. Dimensional Relationships, Ratios, And Pipe Rotation Angles Shown Are Typical For All Pollution Control Manholes Except Where Otherwise Noted At Specific Location(s).
12. For Other Details Not Shown, See Sht. GJ-2 And Drawing No. RD340.
13. All Dimensions Are In Inches (") Unless Otherwise Noted.

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

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Project Leader - Rick K. Keene
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

WATER QUALITY DETAILS

SHEET NO. GJ-1

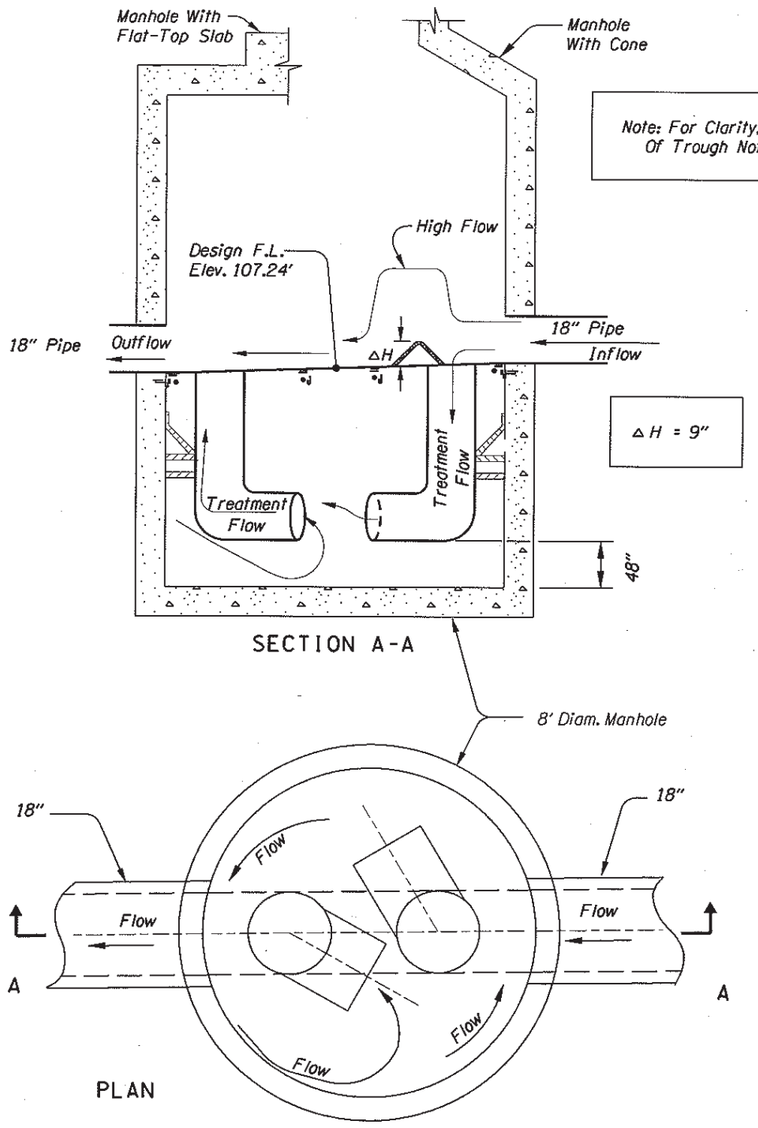
THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

Partial Plan Set

POLLUTION CONTROL MANHOLE

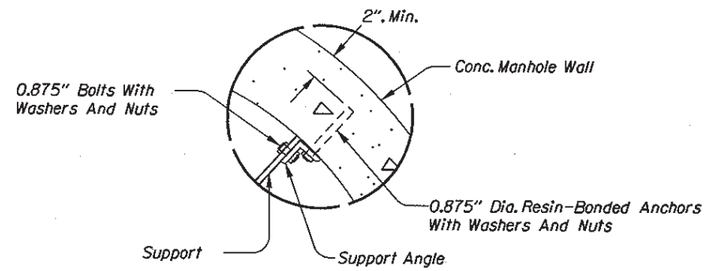
38V-75

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne A. Stalter
1 Mar 2007

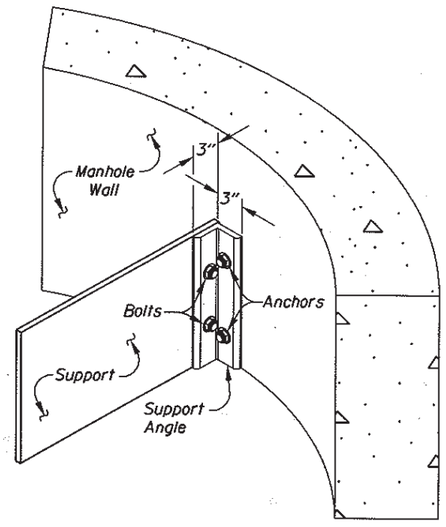


For Details Not Shown, See Sht. GJ-1

POLLUTION CONTROL MANHOLE
Sta. "L" 288+82.13, 143.98 Rt..



DETAIL "A"



DETAIL "B"
(Typ. Vertical & Horizontal Supports)

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

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Project Leader - Rick K. Keene
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

WATER QUALITY DETAILS

SHEET NO. GJ-2

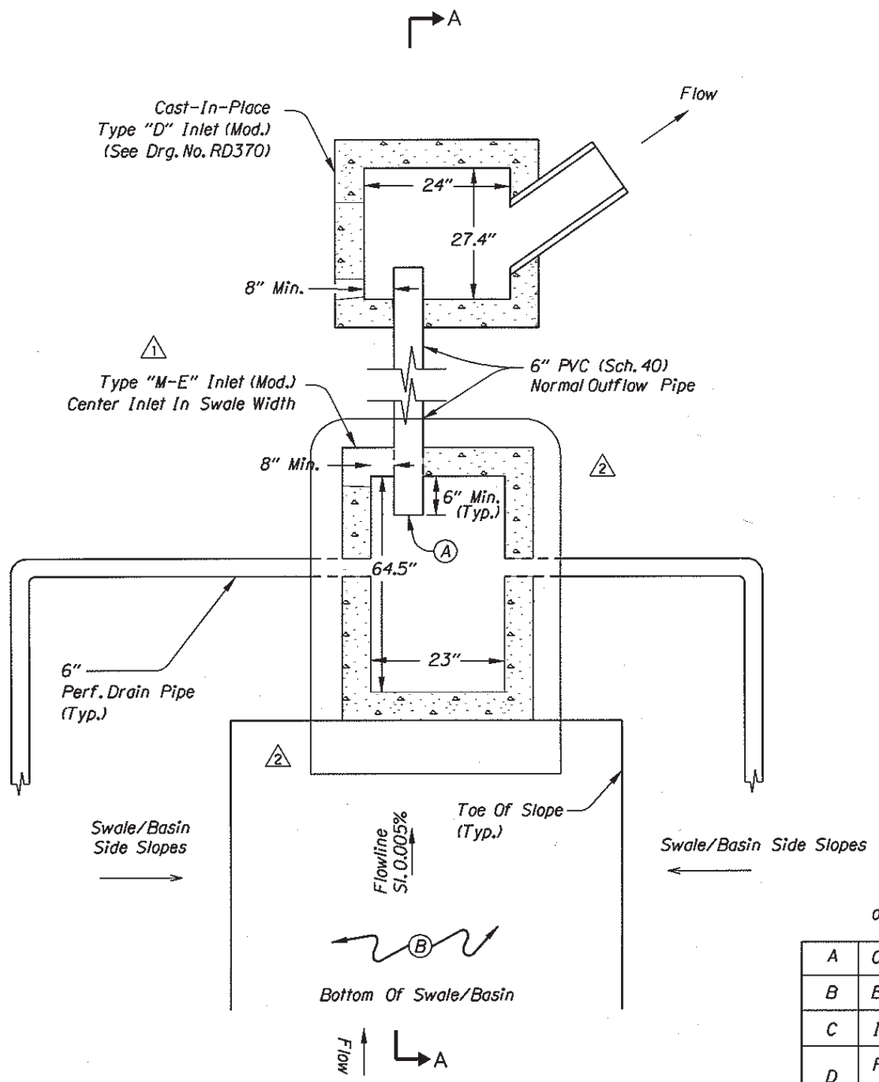
THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

Partial Plan Set

38V-75

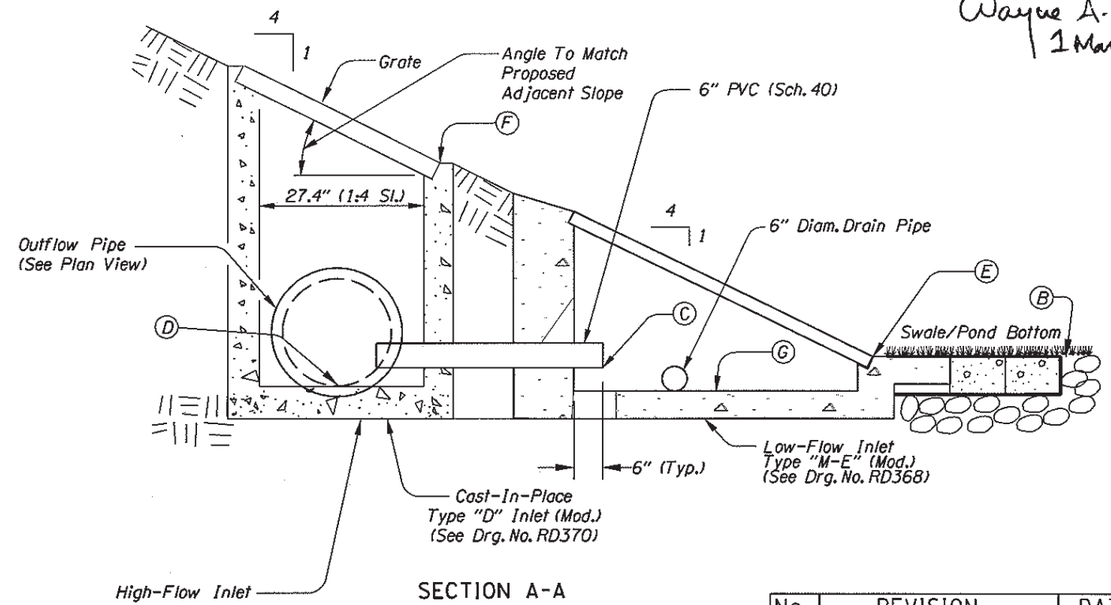
WATER QUALITY OUTLET STRUCTURE
FOR WATER QUALITY SWALE

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne A. Staffler
1 Mar 2007



PLAN

For Additional Drain Pipe Details, See Sht. GJ-4



SECTION A-A

No.	REVISION	DATE	BY
1	Edited Inlet Type	04/07/05	BSC
2	Deleted Extraneous Text	04/07/05	BSC

Orifice Diameter

A	Orifice Diameter	Not Req'd.
B	Elev. Of Swale/Pond Bottom.	105.44'
C	Invert Elevation Of 6" PVC Pipes.	105.44'
D	FL Elev. Of Outfall Pipe. Wall Location For Outfall Pipe	105.41'
E	Elev. Of Lip Of Low-Flow Inlet	105.44'
F	Elev. Of Lip Of High-Flow Inlet	106.0'
G	F.L. Of Type "M-E" (Mod.) Inlet	105.41'
	Outfall Pipe Diameter	18"

Notes:
1) Locate Center Of Low -Flow Type "M-E" Mod. Inlet At Center Of Swale Width.
2) For Plan View Of Water Quality Outlet Structure, See Sht. GJ-6.
3) All Fasteners, Bands, And Wire Mesh Screens Shall Be Stainless Steel Or Shall Have A Protective Coating To Prevent Corrosion.
4) The Orifice Opening Is The 6" Dia. PVC Pipe.
5) All Dimensions Are Inches ("), Unless Otherwise Noted.

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

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Project Leader - Rick K. Keene
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

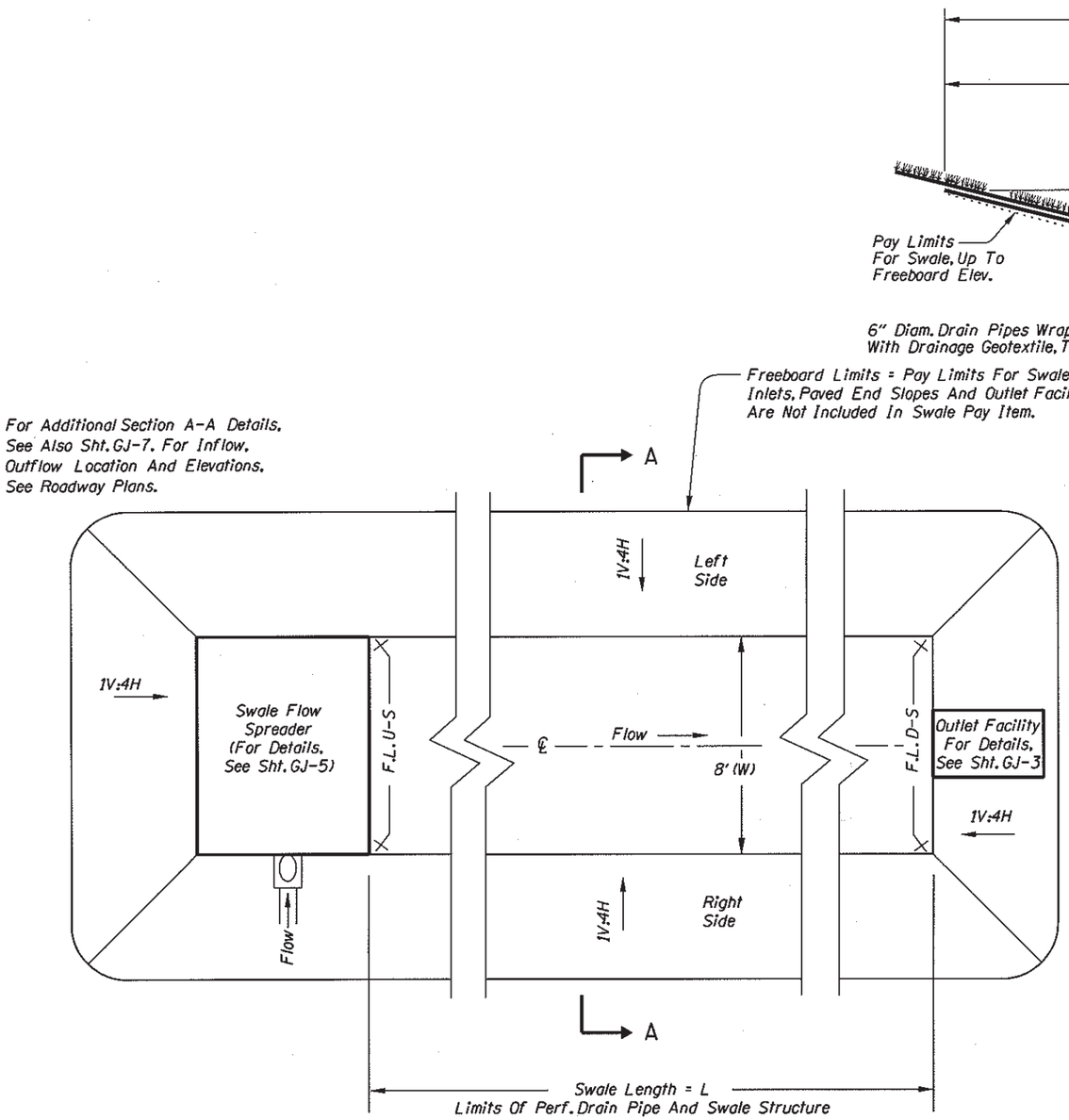
WATER QUALITY DETAILS

SHEET NO. GJ-3

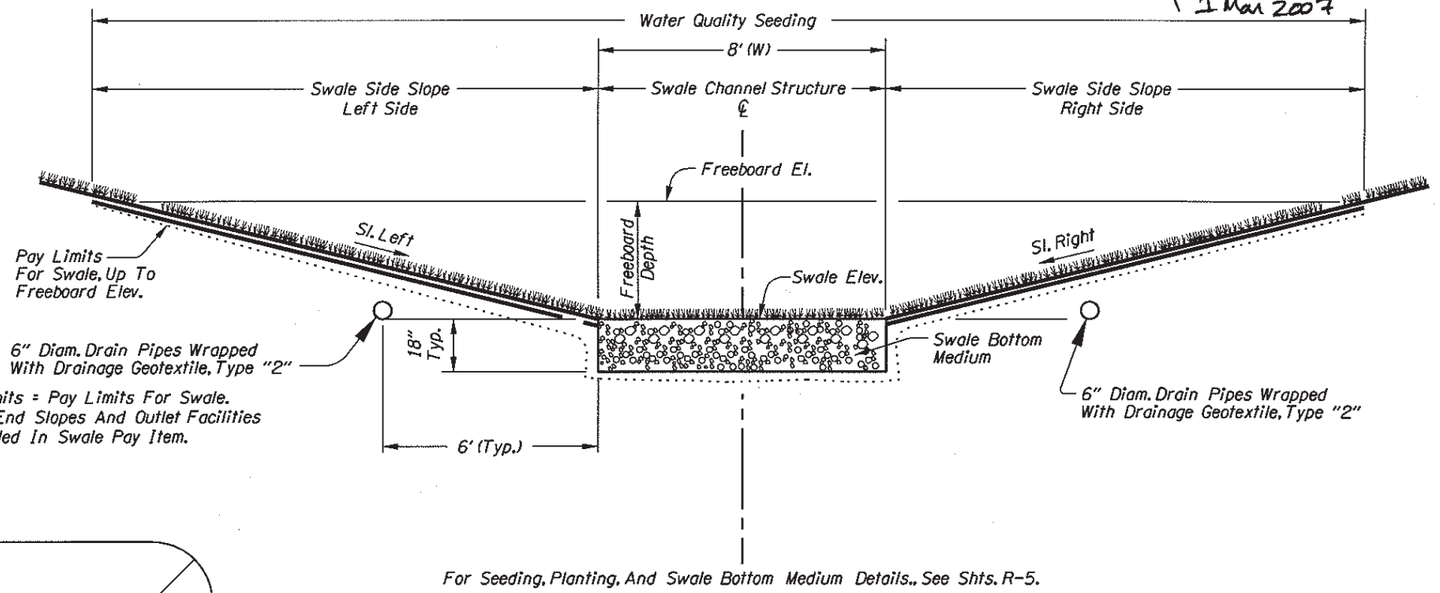
THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

WATER QUALITY SWALE GENERAL DETAILS
PLAN AND TYPICAL CROSS-SECTION

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne A. Staffler
1 Mar 2007



PLAN



For Seeding, Planting, And Swale Bottom Medium Details., See Shts. R-5.

SECTION A-A, AND UNDER DRAIN

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

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Project Leader Herrick M. Adene
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

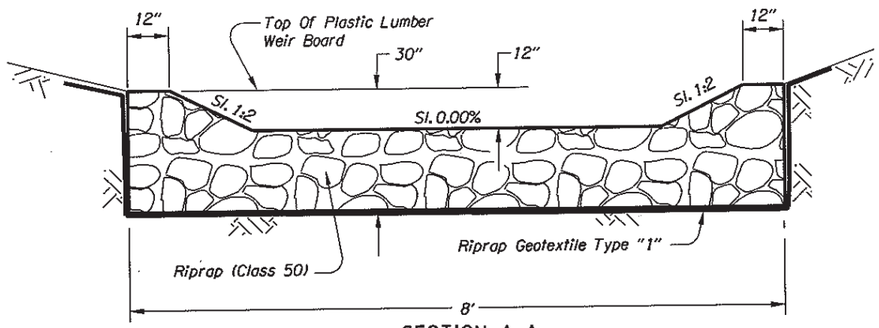
WATER QUALITY DETAILS

SHEET NO. GJ-4

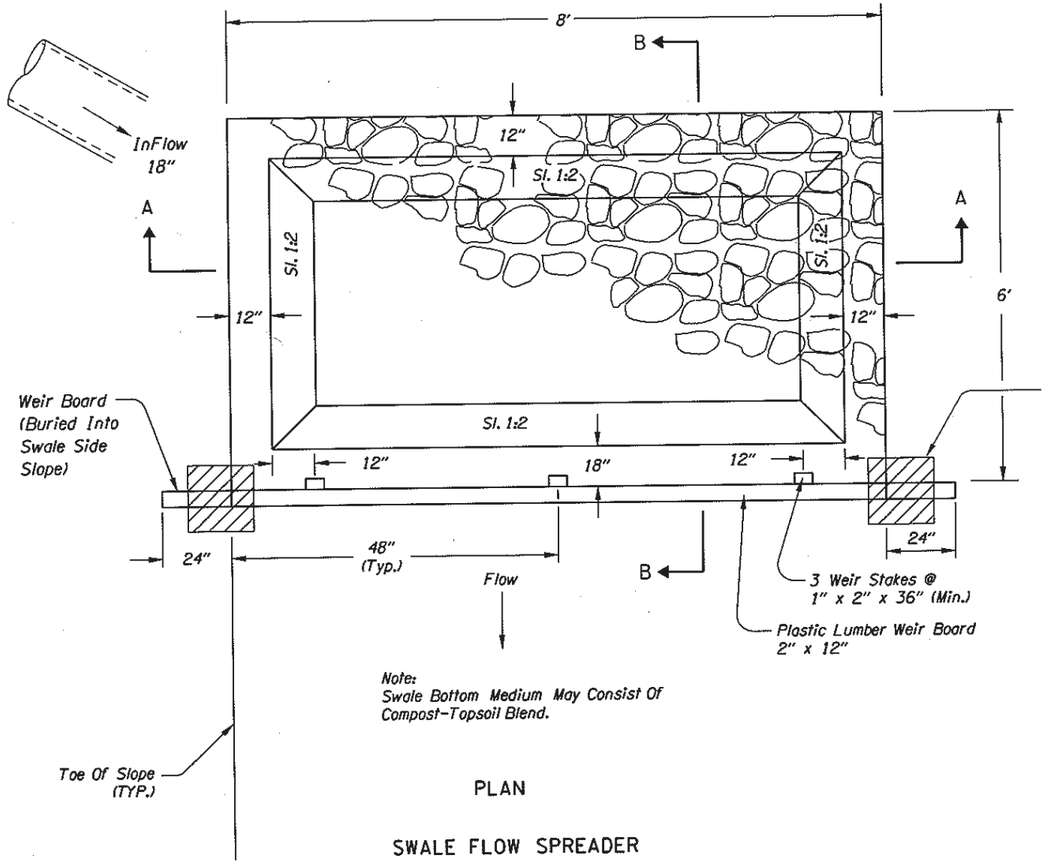
THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

WATER QUALITY SWALE FLOW SPREADER

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
Wayne A Statler
1 Mar 2007



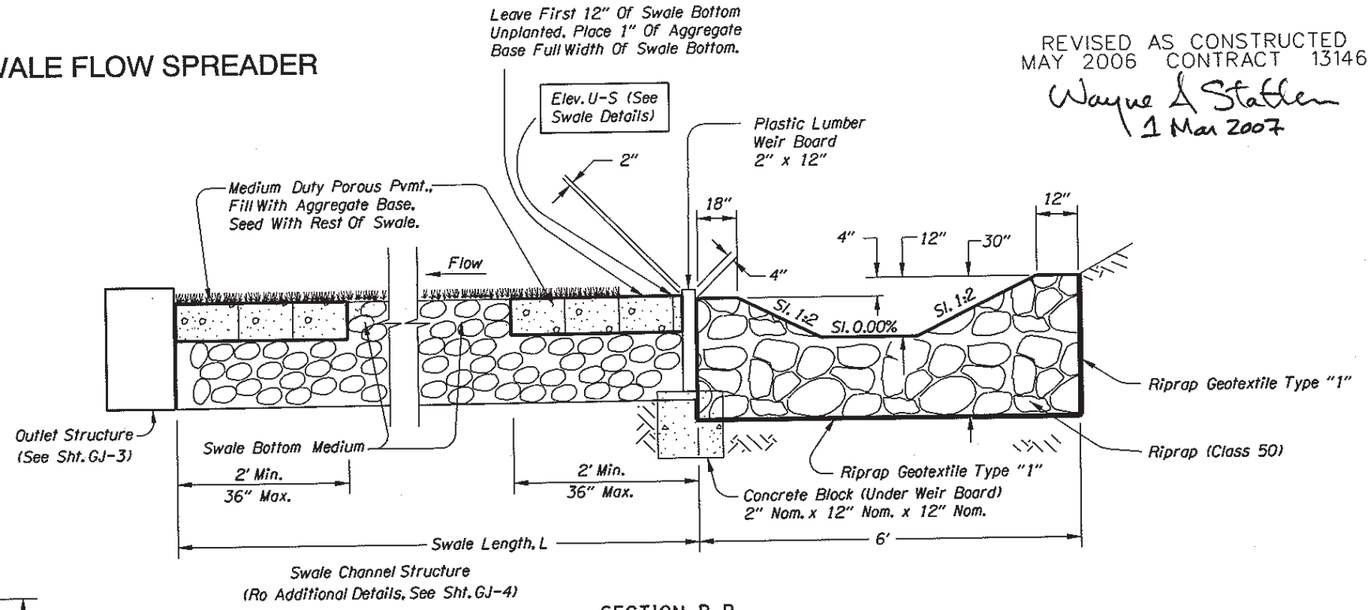
SECTION A-A



Note:
Swale Bottom Medium May Consist Of Compost-Topsoil Blend.

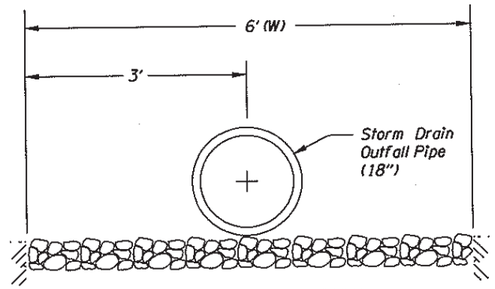
PLAN

SWALE FLOW SPREADER

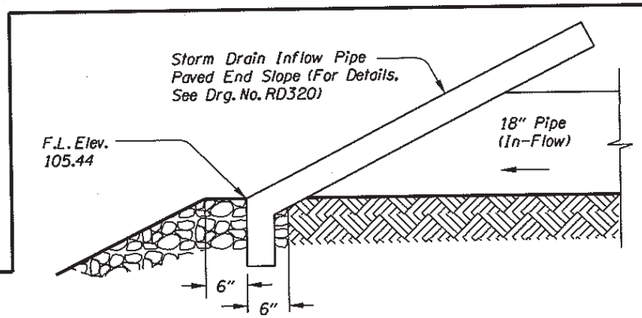


SECTION B-B

Note:
Place A Section Of Medium Duty Porous Pavement, Full Width Of Swale Bottom At The Upstream And Downstream Ends Of Each Swale Or Swale Segment.



LOOKING AT A SIDE



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

SECTION THROUGH SIDE PIPE OUTLET

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

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKAMAS HIGHWAY
CLACKAMAS COUNTY

Project Leader - Rick K. Keene
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

WATER QUALITY DETAILS

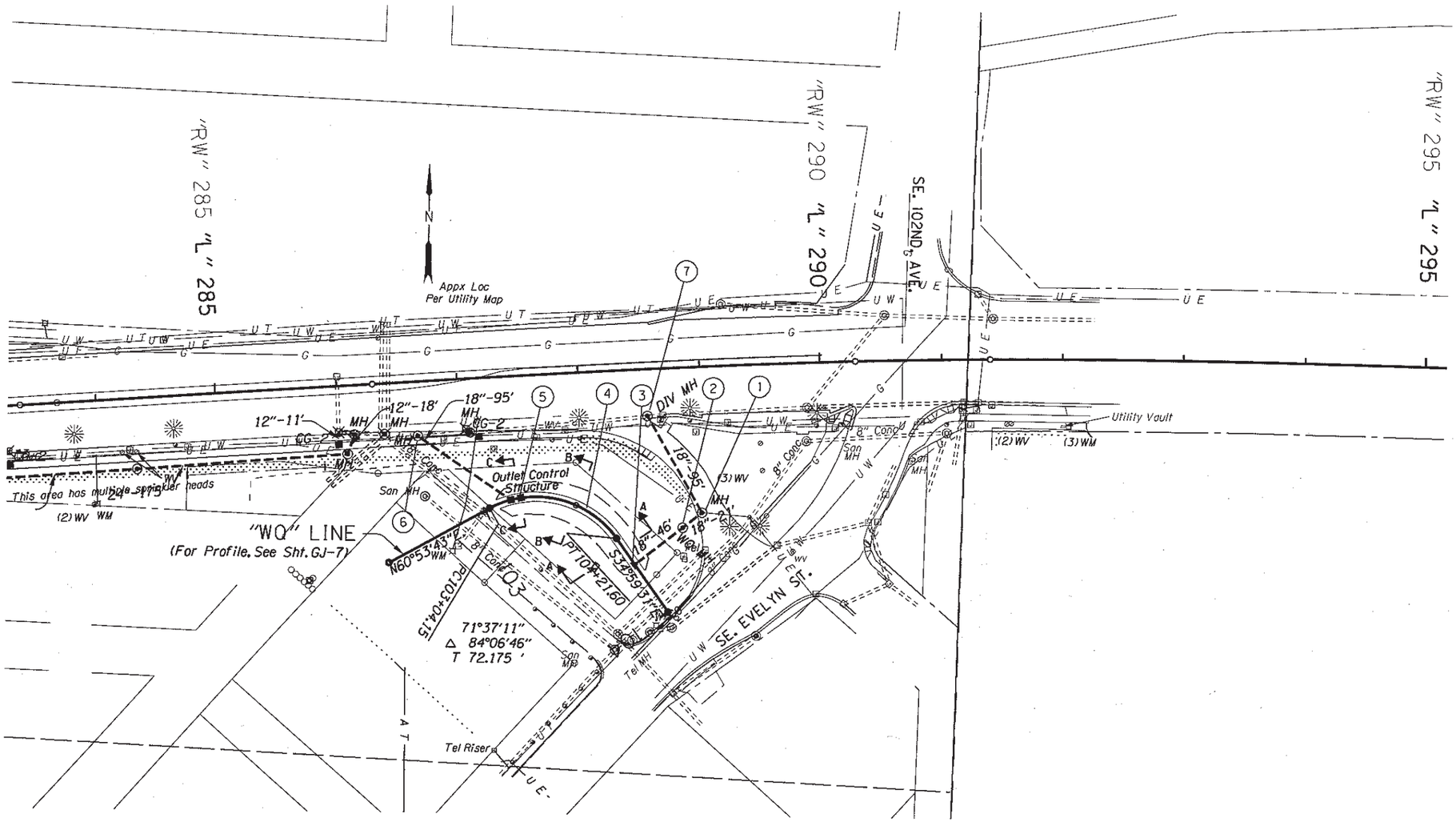
SHEET NO. GJ-5

Partial Plan Set

T. 2S., R. 2 E., W.M.

Wayne L. Stalter 34V-75

REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
1 Mar 2007



1 See Sht. 6B, Note 10

2 See Sht. 6B, Note 11

3 See Sht. 6B, Note 11

4 Sta. "L" 288+44.30, 171.65 Rt.
To Sta. "L" 287+28.72, 106.56 Rt.
Const. Water Quality Swale
(For Details, See Shts. GJ-6, & GJ-7)

5 Sta. "L" 287+47.93, 102.14 Rt.
Const. Outlet Control Struct.
(For Details, See Sht. GJ-3)

6 See Sht. 6B, Note 7

7 See Sht. 6B, Note 8

8 See Sht. 5B, Note 18

9 See Sht. 6B, Note 2

10 See Sht. 6B, Note 4

11 See Sht. 6B, Note 3

Note: For Sections, See Sht. GJ-7.

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

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

EAST PORTLAND FWY. -
SE. EVELYN ST. SEC.
CLACKMAS HIGHWAY
CLACKMAS COUNTY

Reviewed By - Henry M. Allen
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

WATER QUALITY DETAILS

SHEET NO. GJ-6

THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

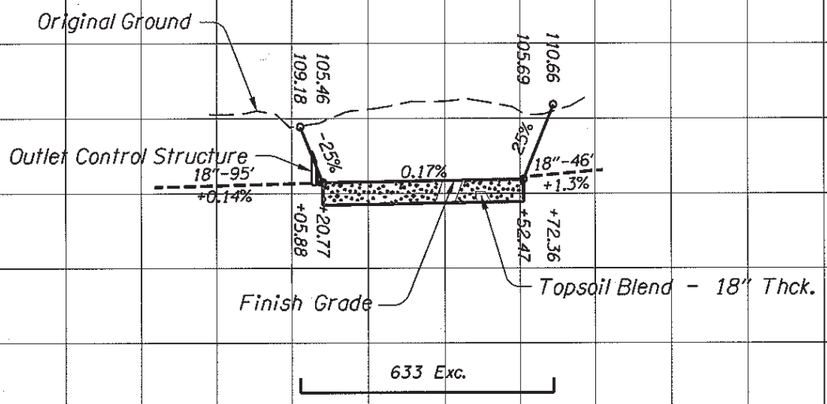
Partial Plan Set

WATER QUALITY SWALE PROFILE & SECTIONS

Wayne A Statler
REVISED AS CONSTRUCTED
MAY 2006 CONTRACT 13146
1 Mar 2007

34V-75

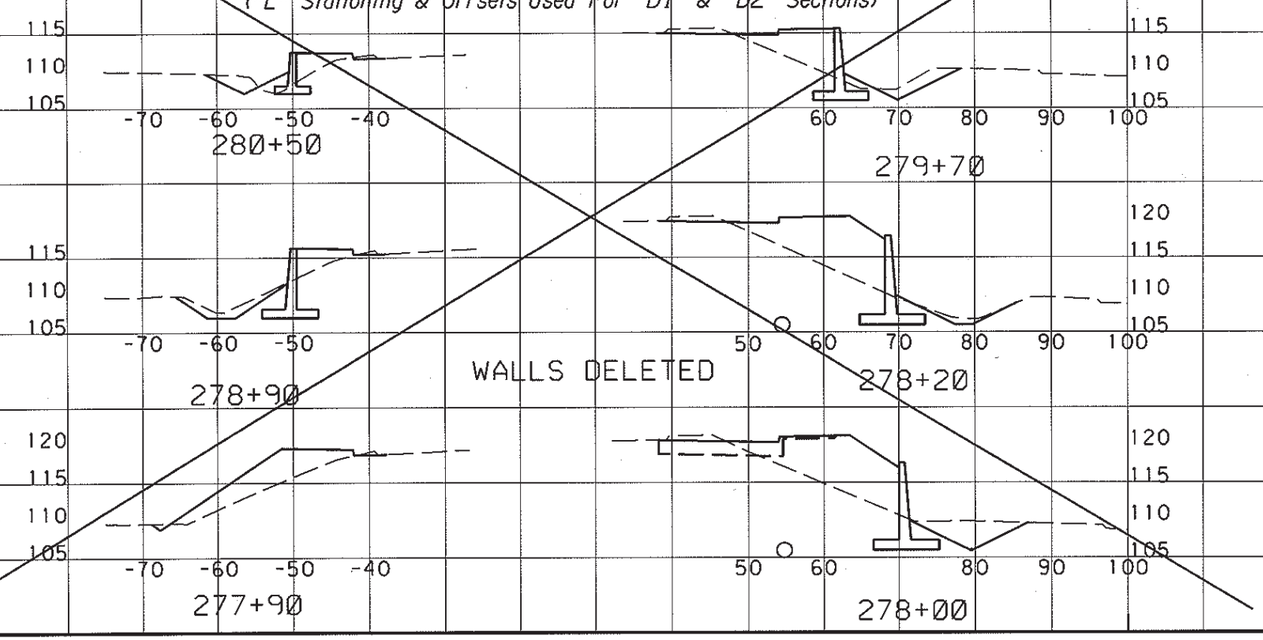
"WQ" LINE

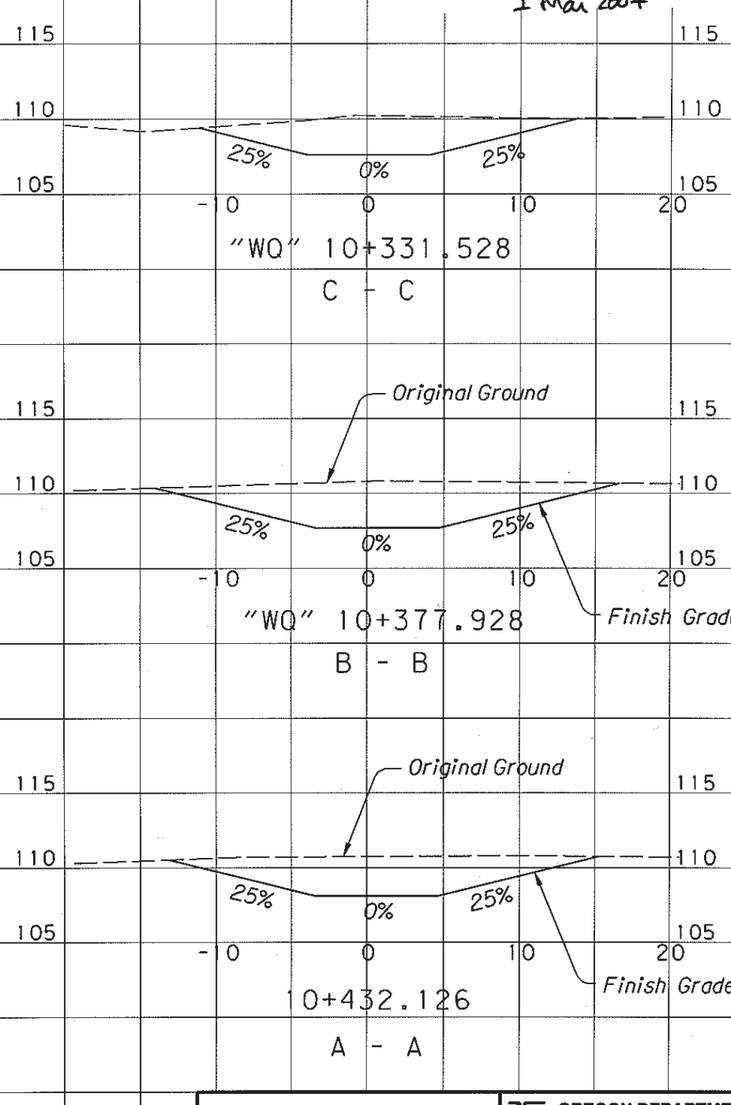


"D1" & "D2" DITCH LINE SECTIONS

(For Wall Information, See Appropriate Roadway & Structure Sheets)

("L" Stationing & Offsets Used For "D1" & "D2" Sections)





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

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

EAST PORTLAND FWY. - SE. EVELYN ST. SEC.
CLACKMAS HIGHWAY
CLACKMAS COUNTY

Reviewed By - Henry M. Allen
Designed By - Bruce S. Council
Drafted By - Bruce S. Council

WATER QUALITY DETAILS

SHEET NO. GJ-7

THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME