OPERATION & MAINTENANCE MANUAL

WATER QUALITY BIOFILTRATION SWALE

Manual prepared: August 2017

DFI No. D00211

Figure 1: DFI No. D00211, looking East

1. Identification

Drainage Facility ID (DFI):	D00211
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 39V-005
Location:	District: 4
	Highway No.: 033
	Mile Post: 47.03 to 47.08, left

2. Manual Purpose

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

3. 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.

Flow direction: East

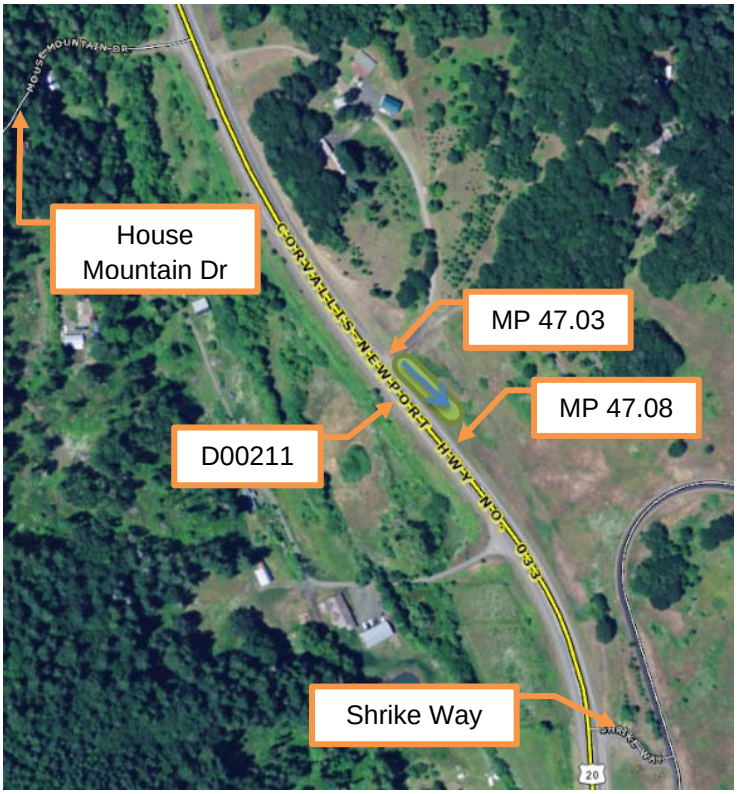


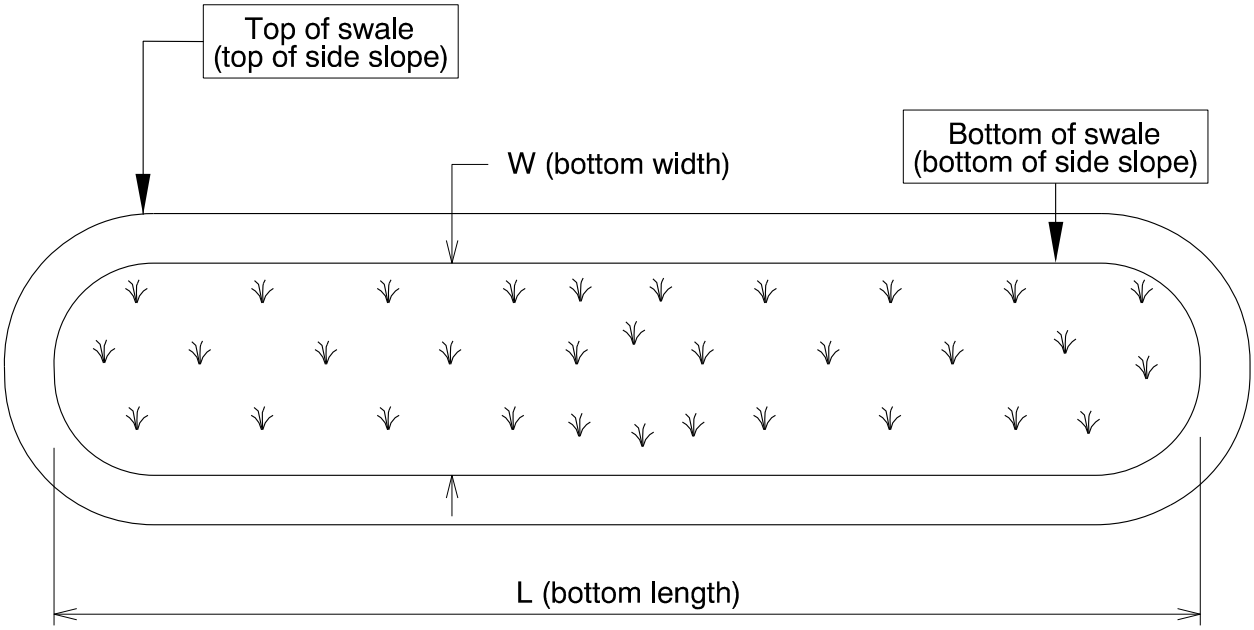
Figure 2: Facility location map

4. 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:

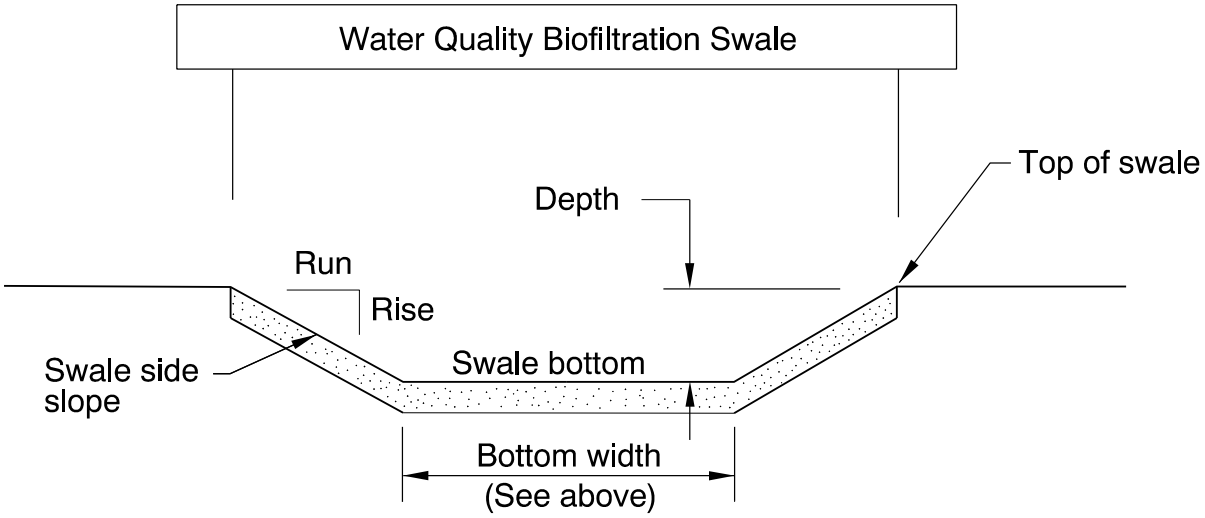
Bottom Length (feet)	Bottom Width (feet)
170	4



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)
1.5	**1**	**4**



Site Specific Information: Facility contains a secondary channel called out as a "conveyance swale" on the construction plans. This secondary channel has three riprap flow spreaders and is used as an auxiliary outlet for the primary swale.

5. Facility Access

Maintenance access to the facility:

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

Figure 3: Facility access via roadside shoulder, looking West

6. 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
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 (midpoint of swale or every 50 feet along swale bottom)	☒	**S18**
Other: Rock basin (midpoint)	☒	**S19**
Swale Outlet		
Catch basin with grate	☐	**S20**
Outlet Pipe (s)	☒	**S21**
Open channel outlet	☒	**S22**
Auxiliary Outlet:	☐	**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**

7. 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

8. Limitations

Access grid installed:

☐ No	☒ Yes
There are (Choose applicable weight: no, light, med., heavy) duty porous pavers installed in 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.

9. 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

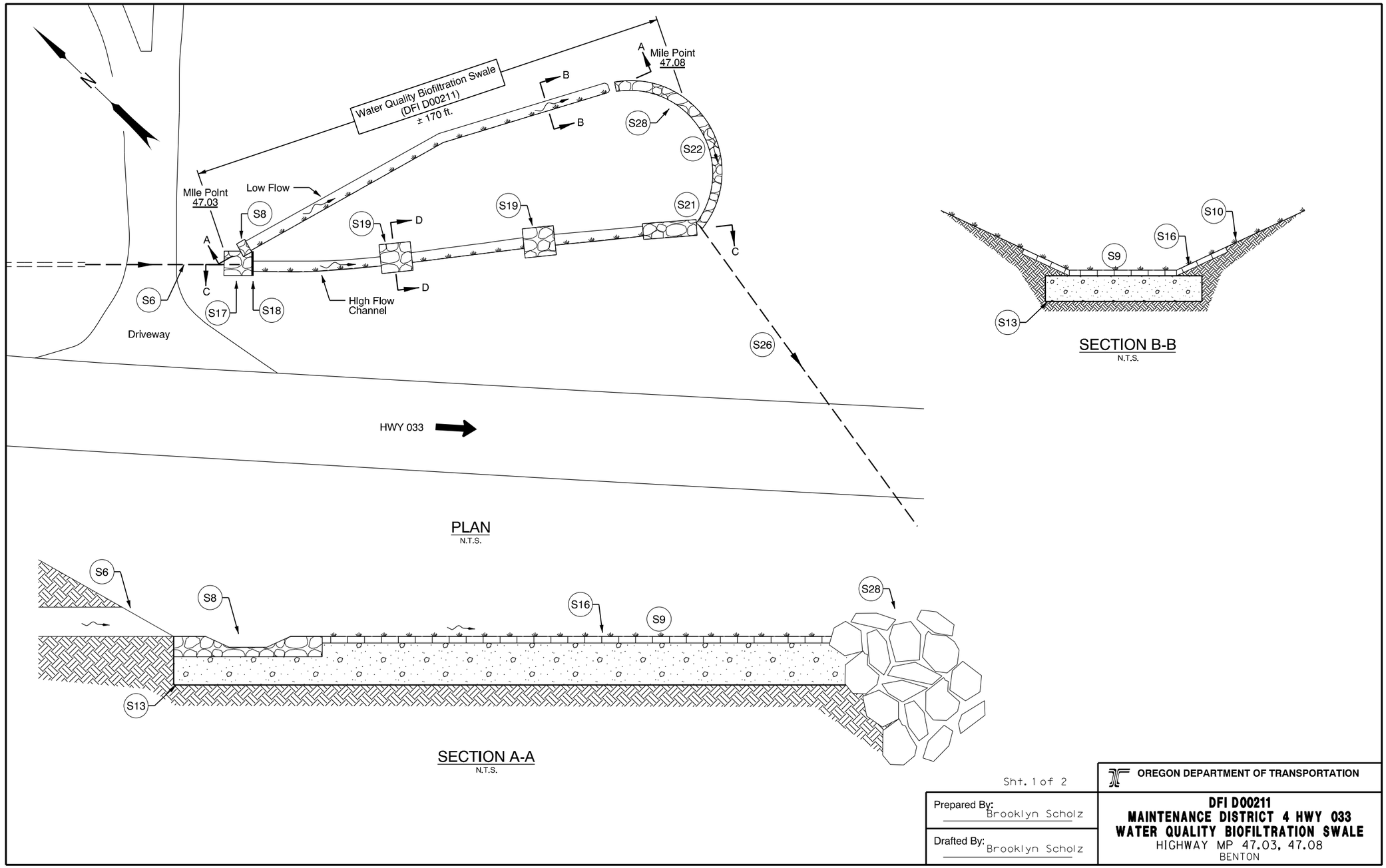
Contact any of the following for more detailed information about management of waste materials found on site:

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 D00211



PLAN
N.T.S.

SECTION B-B
N.T.S.

SECTION A-A
N.T.S.

Sht. 1 of 2

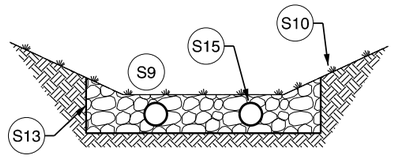
OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Brooklyn Scholz

Drafted By: Brooklyn Scholz

DFI D00211
MAINTENANCE DISTRICT 4 HWY 033
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 47.03, 47.08
BENTON

DFI_D00211.dgn



SECTION B-B
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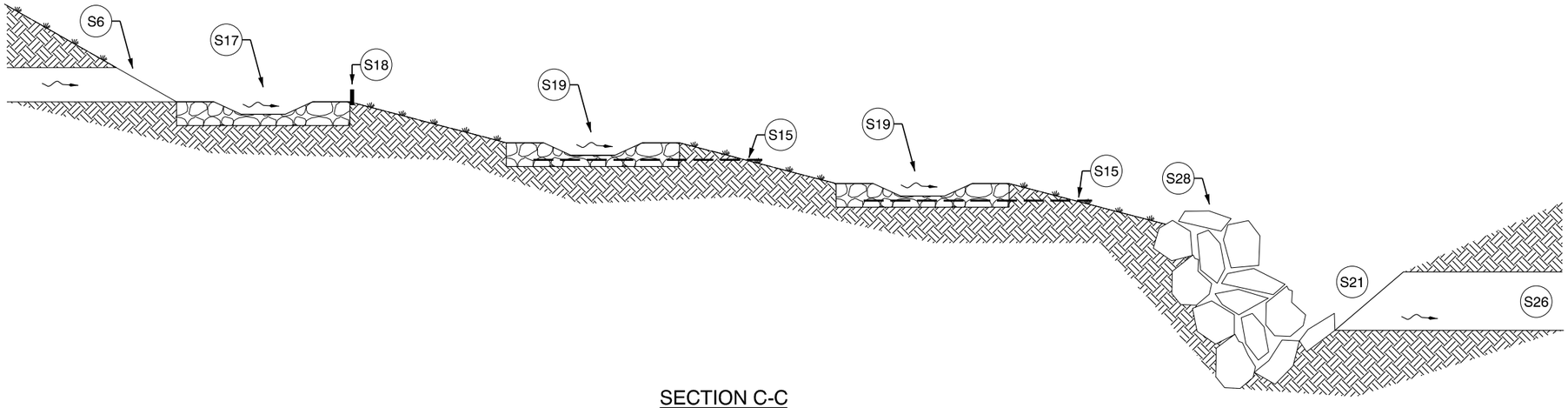


SECTION C-C
N.T.S.

Sht. 2 of 2

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Brooklyn Scholz

Drafted By: Brooklyn Scholz

DFI D00211
MAINTENANCE DISTRICT 4 HWY 033
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 47.03, 47.08
BENTON

DFI_D00211.dgn

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 39V-005

39V-005

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.
1B	Standard Drg. Nos.
1C	Sheet Layout
2, 2A Thru 2A-10 Incl.	Typical Sections
2B, 2B-2, 2B-3	Superelevation Chart
2B-4 Thru 2B-18 Incl.	Details
2C, 2C-2 Thru 2C-26 Incl.	Traffic Control Plans
2D, 2D-2 Thru 2D-4 Incl.	Pipe Data Sheets

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

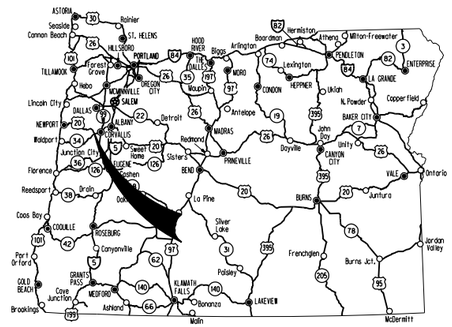
GRADING, DRAINAGE, STRUCTURES, PAVING & SIGNALS

US 20: PHILOMATH COUPLET (PHILOMATH)

CORVALLIS-NEWPORT HIGHWAY

BENTON COUNTY
OCTOBER 2006

REVISED AS CONSTRUCTED
9 JUNE 2008 CONTRACT 13295
PROJ. MGR. RAYMOND S. CRANSTON, PLS

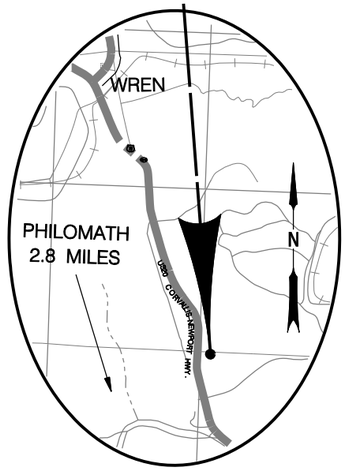


Overall Length Of Project - 8036 ft (1.53 Miles)

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.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

WREN HILL MITIGATION SITE
STA "HWY" 117+63 (M.P. 47.05)



END OF PROJECT
STA. "HWY" 346+36 (M.P. 51.39)

BEGINNING OF PROJECT
STA. "HWY" 263+45 (M.P. 49.81)

RECORD DRAWINGS

THIS DRAWING IS FOR RECORD PURPOSES ONLY, AND HAS BEEN PREPARED BASED IN PART ON INFORMATION PROVIDED BY OTHERS RELATIVE TO REPORTED CONSTRUCTED CONDITIONS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, MURRAY, SMITH & ASSOCIATES, INC. MAKES NO ASSURANCES, STATED OR IMPLIED, AS TO THE ACCURACY OF THIS DRAWING. THOSE RELYING ON THIS RECORD DRAWING FOR ANY PURPOSE ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY. CONTRACT MODIFICATION INFORMATION, FABRICATOR'S SHOP DRAWINGS AND OTHER PROJECT SUBMITTAL INFORMATION PROVIDED BY THE CONTRACTOR WHICH FURTHER CLARIFY DETAILS OF CONSTRUCTION MAY BE ON FILE. SEE ORIGINAL CONTRACT DRAWINGS FOR ENGINEER'S SEAL AND SIGNATURES.

VERSION 4.0 12-9-97

REVISIONS	
1	Revised 11-03-06 Added Sheet 2A-10

OREGON TRANSPORTATION INVESTMENT ACT

T. 12 S., R. 6 W., W.M.

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Pape	COMMISSIONER
Janice Wilson	COMMISSIONER
Matthew Garrett	DIRECTOR OF TRANSPORTATION

PLANS PREPARED FOR
OREGON DEPARTMENT OF TRANSPORTATION
BY:
MURRAY, SMITH & ASSOC., INC.

REGISTERED PROFESSIONAL ENGINEER
16,589
ORIGINAL SIGNED BY
OREGON
JULY 20, 1993
TROY L. BOWERS
Expires Dec. 31, 2009

OREGON DEPARTMENT OF TRANSPORTATION CONCURRENCE

TECHNICAL SERVICES MANAGING ENGINEER _____ DATE _____

US 20: PHILOMATH COUPLET (PHILOMATH)
CORVALLIS-NEWPORT HIGHWAY
BENTON COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	OTIA-SO-S033 (025)	1

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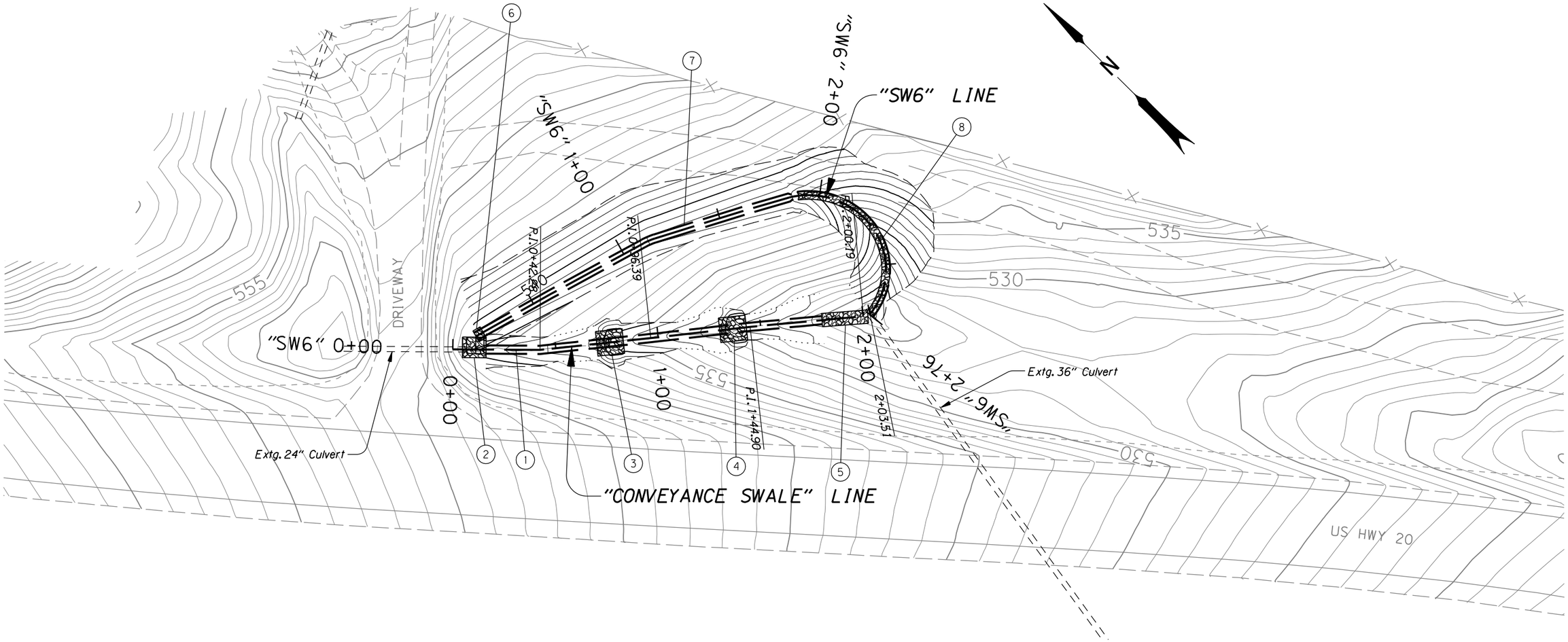
SEC. 33, T.11S., R.6W., W.M.

WREN HILL MITIGATION SITE

39V-005

REVISED AS CONSTRUCTED
9 JUNE 2008 CONTRACT 13295



(1) *Sta. 0+16 To Sta. 1+80*
Const. Swale "Conveyance Swale"

(2) *Sta. 0+07 To Sta. 0+16*
Const. Outfall Basin

(3) *Sta. 0+70 To Sta. 0+83*
Const. Swale Basin

(4) *Sta. 1+30 To Sta. 1+43*
Const. Swale Basin

(5) *Sta. 1+80 To Sta. 2+03.51*
Const. Outlet Protection, Type 5

(6) *Sta. "SW6" 0+18*
Const. Swale Flow Spreader
Stone Emb. Material - 18 ft³
Type 1, Riprap Geotextile - 60 ft²
(For Details, See Sht. GJ-15)

(7) *Sta. "SW6" 0+18 To Sta. "SW6" 1+85*
Const. Water Quality Swale "SW6"
Inst. Rigid Porous Pvmt. System - 772 ft²
Exc. 7.5 yd³
(For Details, See Shts. GJ-12, GJ-14, And GJ-16)

(8) *Sta. "SW6" 1+85*
Const. Outlet Protection, Type 5, With Approx. 23% Slope
Loose Riprap, Class 50 - 318 ft³
Drainage Geotextile, Type 2 - 434 ft²
(For Details, See Sht. GJ-13)

MSA
Murray, Smith & Associates, Inc.
Engineers/Planners
Portland, Oregon

REGISTERED PROFESSIONAL ENGINEER
13,265
ORIGINAL SIGNED BY
OREGON
JULY 17, 1986
WILLIAM H. HOLLINGS III
Expires Jun. 30, 2009

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

US 20: PHILOMATH COUPLET (PHILOMATH)
CORVALLIS-NEWPORT HIGHWAY
BENTON COUNTY

Reviewed By - William H. Hollings
Designed By - Brendan V. O'Sullivan
Drafted By - Harry C. Marx

WATER QUALITY PLAN

SHEET NO. GJ-9

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"SW6" LINE PROFILE

39V-005

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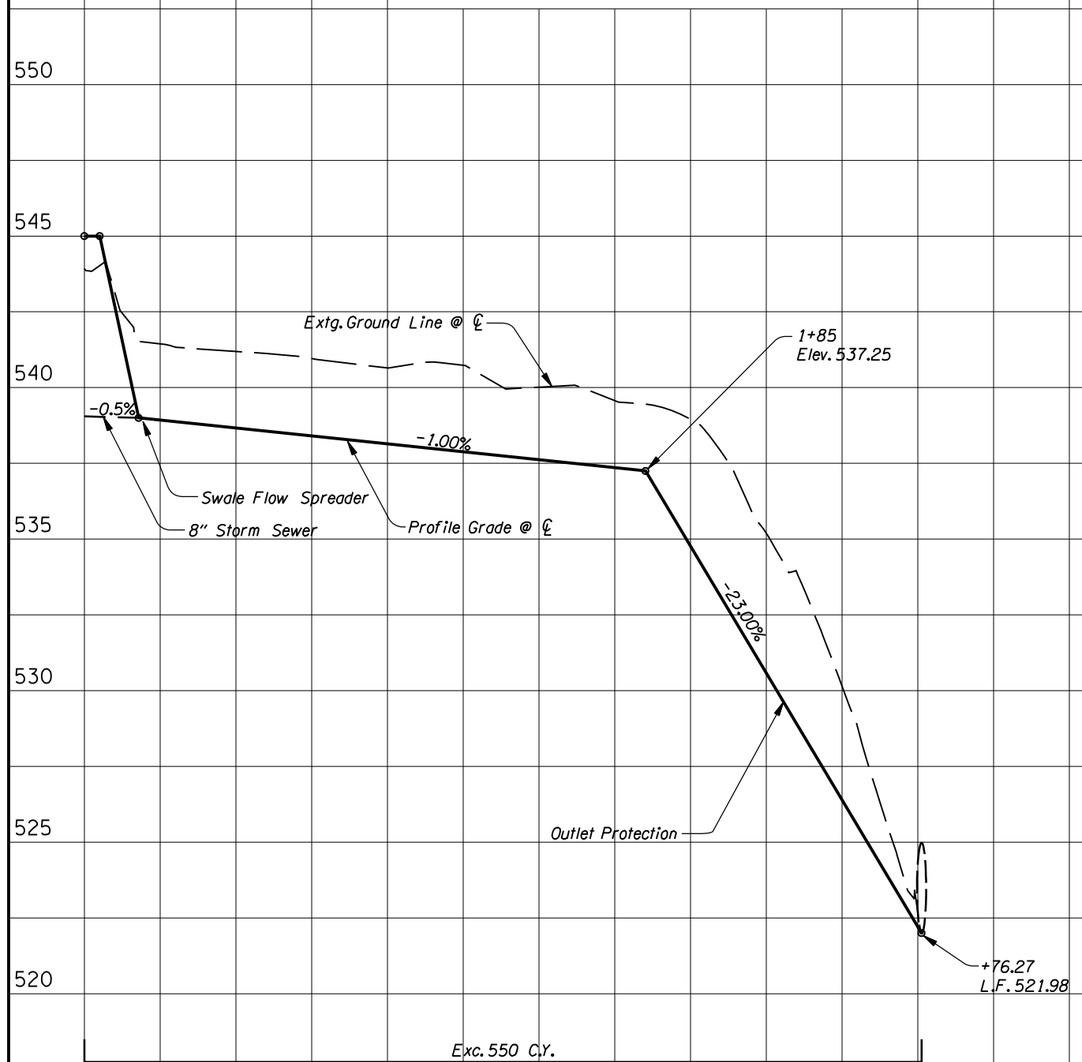
9 JUNE 2008 CONTRACT 13295



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OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

US 20: PHILOMATH COUPLET (PHILOMATH)
CORVALLIS-NEWPORT HIGHWAY
BENTON COUNTY

Reviewed By - William H. Hollings
Designed By - Brendan V. O'Sullivan
Drafted By - Harry C. Marx

PROFILE

SHEET NO.
GJ-10

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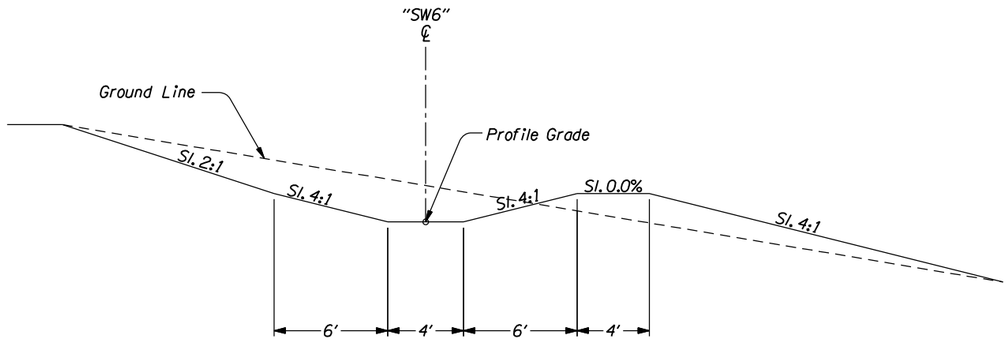
Wren Hill



STA. "SW6" 0+20 TO STA. "SW6" 1+90

WATER QUALITY SWALE
TYPICAL SECTIONS
(For Details, See Sht. GJ-16)

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CORVALLIS-NEWPORT HIGHWAY
BENTON COUNTY

Reviewed By - William H. Hollings
Designed By - Brendan V. O'Sullivan
Drafted By - Harry C. Marx

WATER QUALITY DETAILS

SHEET NO.
GJ-12

39V-005

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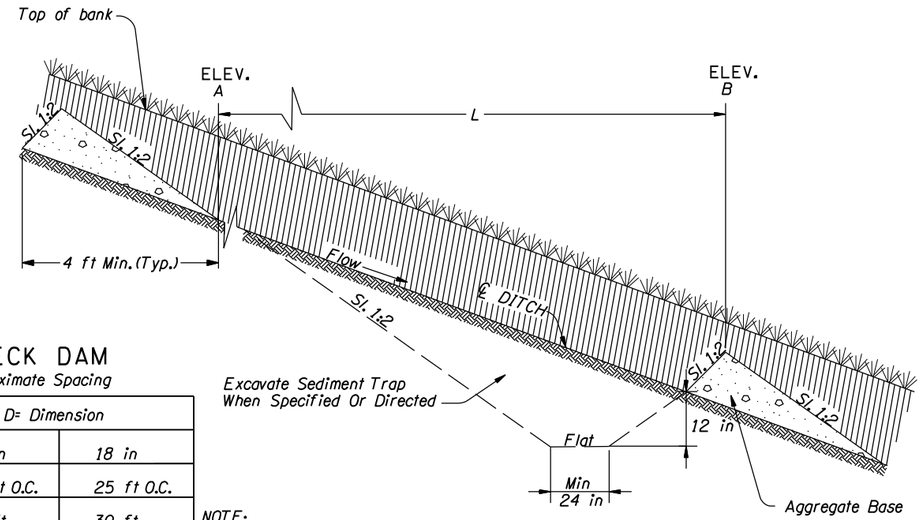
9 JUNE 2008 CONTRACT 13295



CHECK DAM

Approximate Spacing

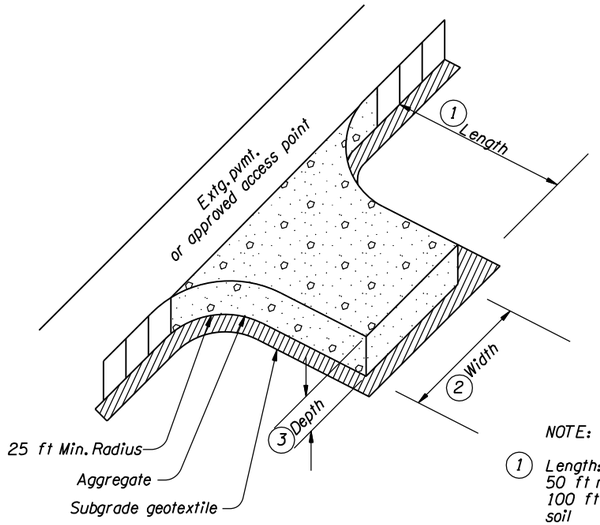
Ditch Grade	D= Dimension	
	12 in	18 in
6%	15 ft O.C.	25 ft O.C.
5%	20 ft	30 ft
4%	25 ft	40 ft
3%	30 ft	50 ft
2%	55 ft	80 ft
1%	82 ft	131 ft
0.5%	164 ft	262 ft

NOTE:

When bid item is "Check Dams" the following materials may be used, as appropriate to meet the functional requirements of the control.

Type 1. aggregate
Type 2. straw bales with aggregate weir
Type 3. biofilter bags
Type 4. sand bags
Type 5. prefab. check dam system

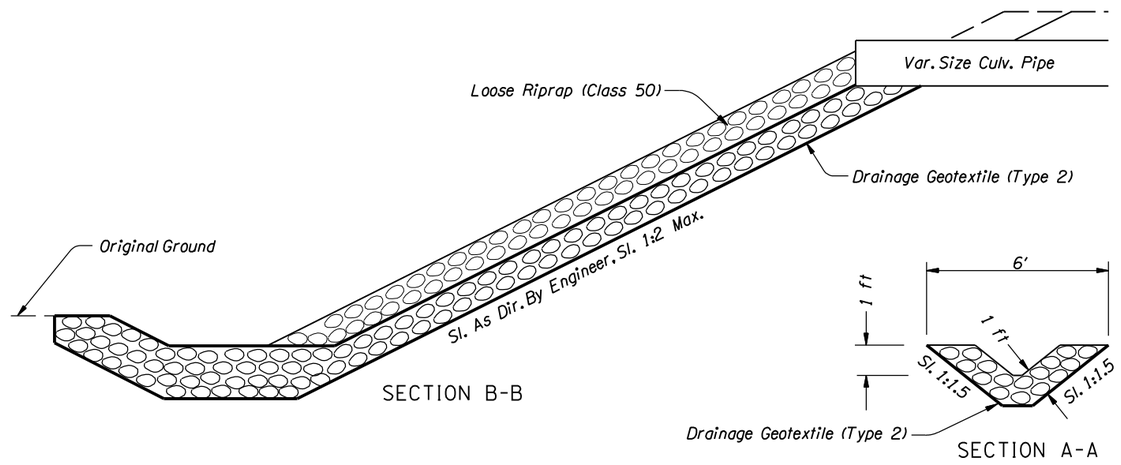
DITCH PROFILE SECTION
TYPE 1 CHECK DAMS

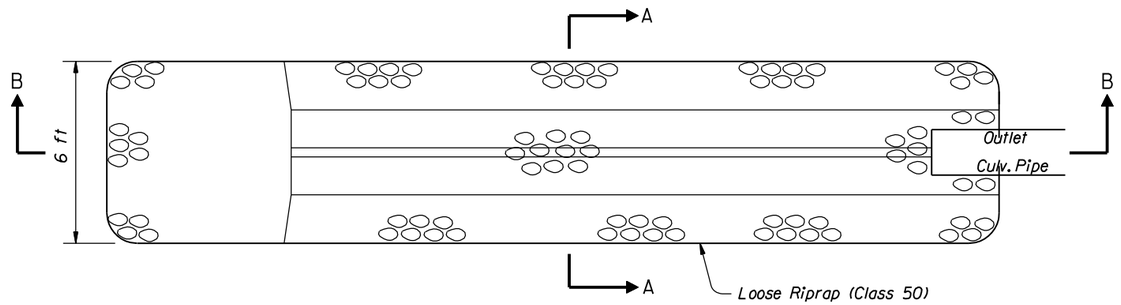


CONSTRUCTION ENTRANCE

NOTE:

1. Length:
   50 ft min. - for less than 1 acre exposed soil
   100 ft min. - for greater than 1 acre exposed soil
2. Width:
   20 ft - or width of extg. approach, whichever is greater.
3. Depth:
   8 in. min





PLAN

OUTLET PROTECTION
Type 5

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Engineers/Planners
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OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

US 20: PHILOMATH COUPLET (PHILOMATH)
CORVALLIS-NEWPORT HIGHWAY
BENTON COUNTY

Reviewed By - William H. Hollings
Designed By - Brendan V. O'Sullivan
Drafted By - Harry C. Marx

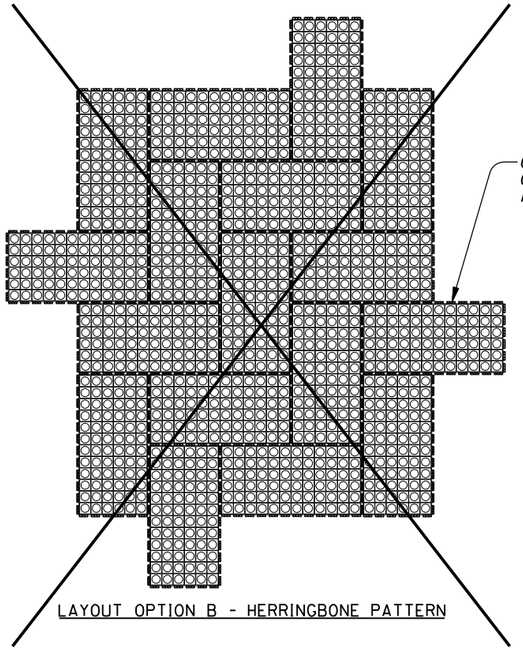
WATER QUALITY DETAILS

SHEET NO. GJ-13

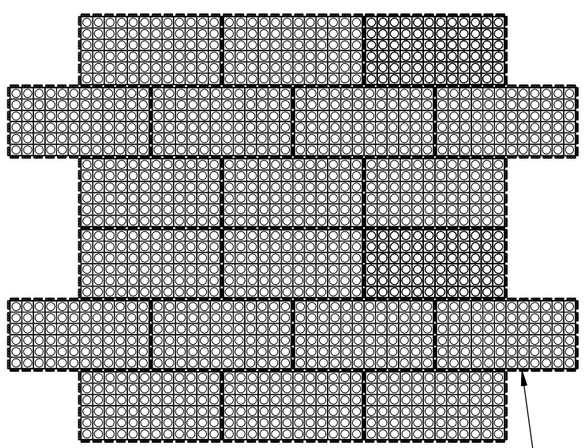
POROUS PAVEMENT DETAILS

39V-005

REVISED AS CONSTRUCTED
9 JUNE 2008 CONTRACT 13295

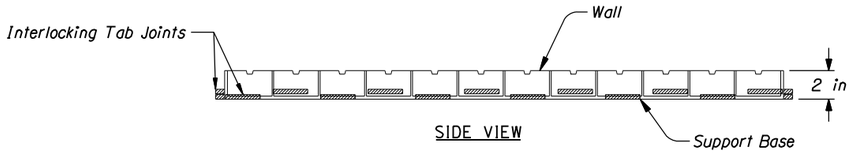


LAYOUT OPTION B - HERRINGBONE PATTERN

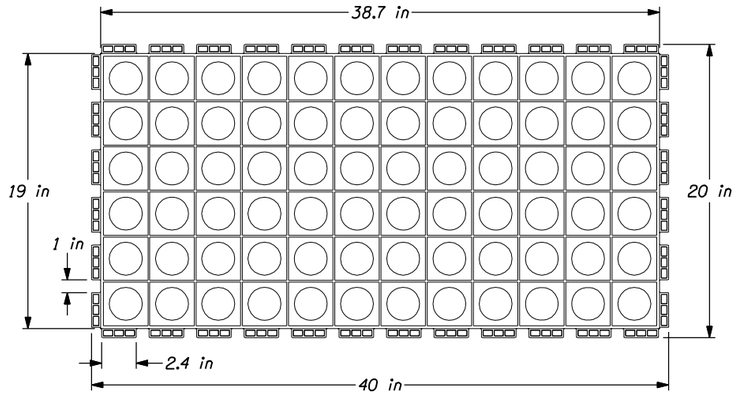


LAYOUT OPTION A- BRICKLAYER PATTERN

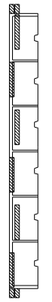
Cut Sections In Half Along Outer Edges Of Porous Pavement System



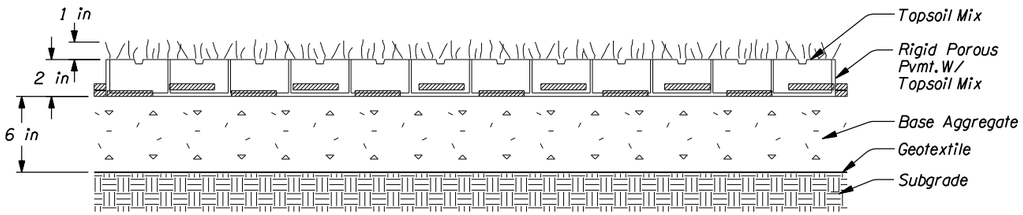
SIDE VIEW



TOP VIEW



END VIEW



TYPICAL CROSS SECTION

Murray, Smith & Associates, Inc.
Engineers/Planners
Portland, Oregon

REGISTERED PROFESSIONAL ENGINEER
13,265
ORIGINAL SIGNED BY
OREGON
JULY 17, 1986
WILLIAM H. HOLLINGS III
Expires Jun. 30, 2009

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

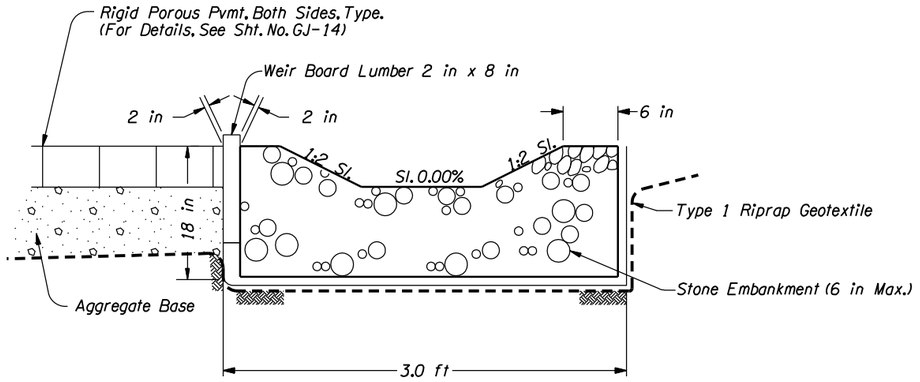
US 20: PHILOMATH COUPLET (PHILOMATH)
CORVALLIS-NEWPORT HIGHWAY
BENTON COUNTY

Reviewed By - William H. Hollings
Designed By - Brendan V. O'Sullivan
Drafted By - Harry C. Marx

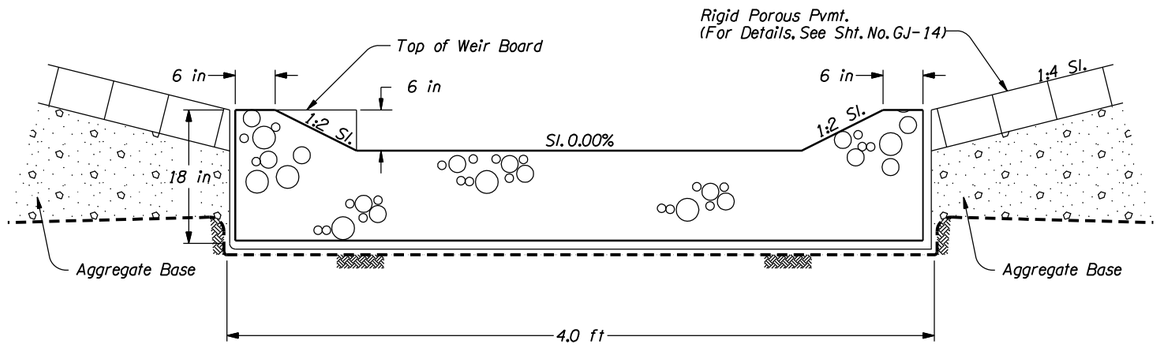
WATER QUALITY DETAILS

SHEET NO.
GJ-14

REVISED AS CONSTRUCTED
9 JUNE 2008 CONTRACT 13295

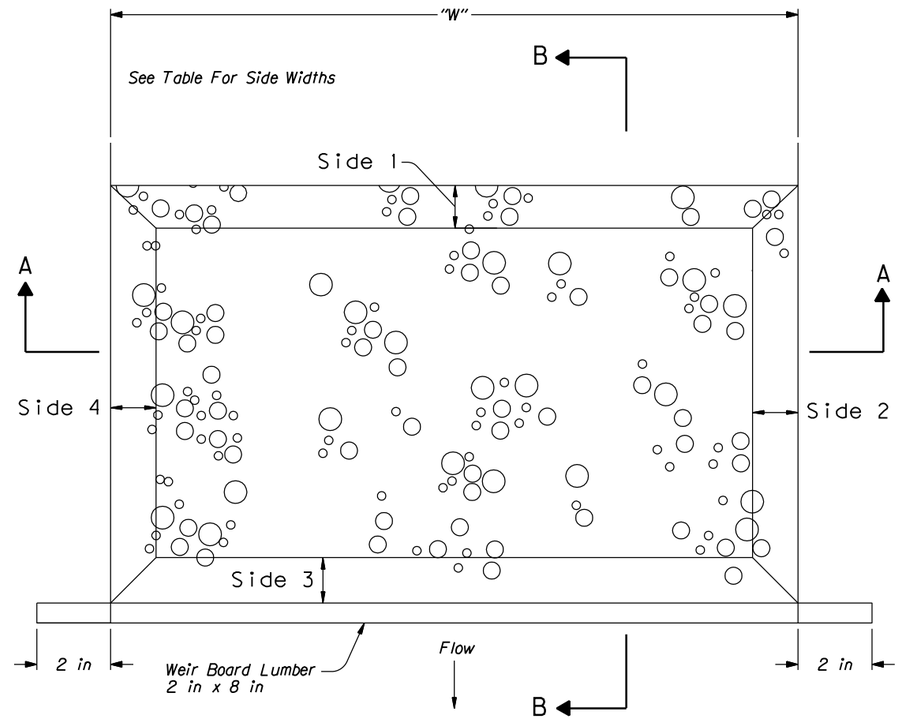


SECTION B-B



SECTION A-A

	Side Widths (in)					"W"	Top of Weir Board Elev.
Swale	1	2	3	4	Pipe Outfall Side		
SW	6	6	6	6	1	4.0 ft	-



PLAN
SWALE FLOW SPREADER

MSA
Murray, Smith & Associates, Inc.
Engineers/Planners
Portland, Oregon

REGISTERED PROFESSIONAL ENGINEER
13,265
ORIGINAL SIGNED BY
OREGON
JULY 17, 1986
WILLIAM H. HOLLINGS III
Expires Jun. 30, 2009

OREGON DEPARTMENT OF TRANSPORTATION
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SHEET NO. GJ-15

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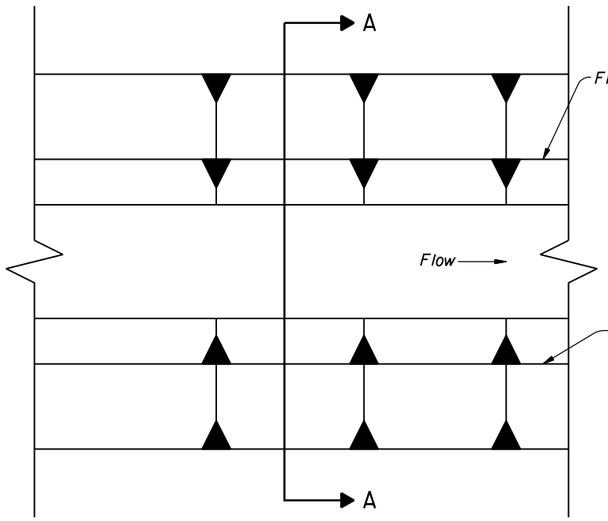
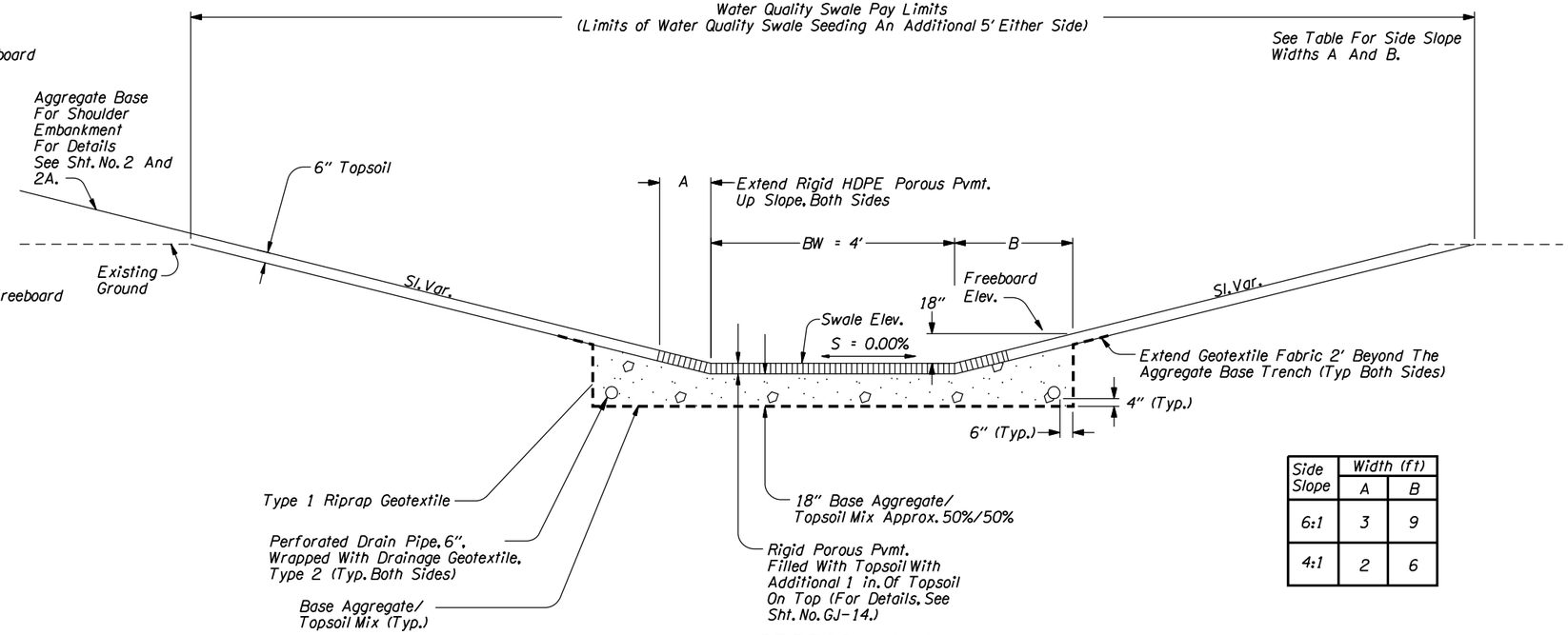


PLAN
GENERAL SWALE LAYOUT

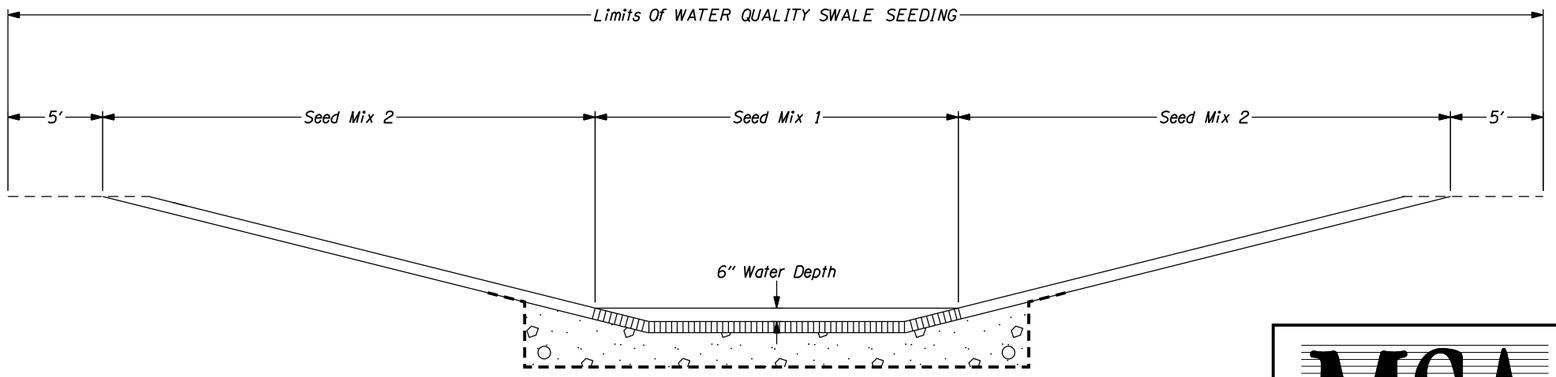


Side Slope	Width (ft)	
	A	B
6:1	3	9
4:1	2	6

SECTION A-A
SWALE SOIL STRUCTURE
NTS

Notes:

1. Base Aggregate, 1" - 0 Per Sec 00641 Mix Approx. 50/50 with Topsoil Before Placing.
2. Swale Elevation Called Out On Plans Is At Top Of Rigid HDPE Porous Pvmt.
3. Swale Side Slopes To Be Constructed As Specified On Typical Sections. See Shts. No. GJ-11 And GJ-12.



SECTION A-A
SWALE SEEDING LIMITS

(For Seed Mix Details, See Sht. GN-1)

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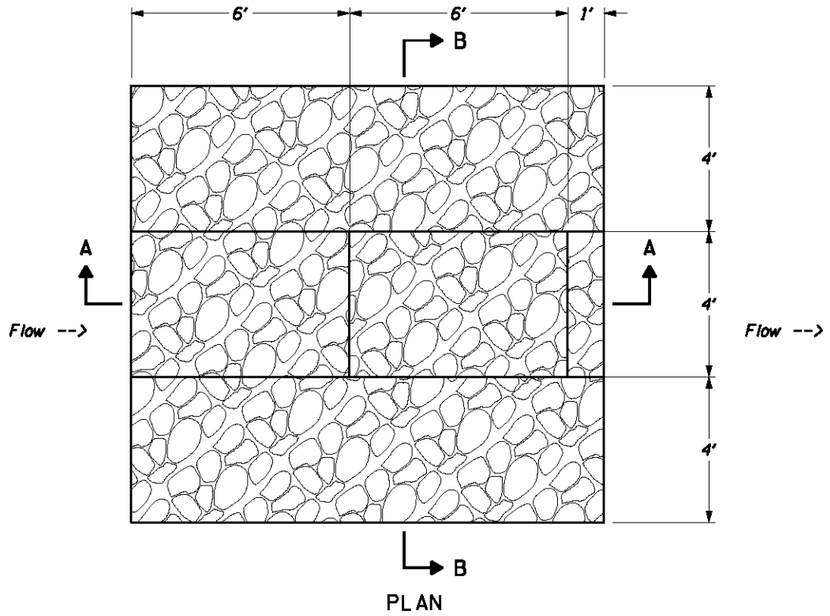
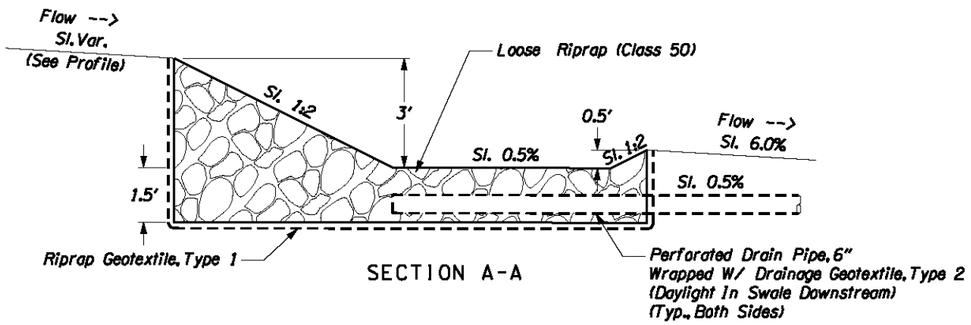
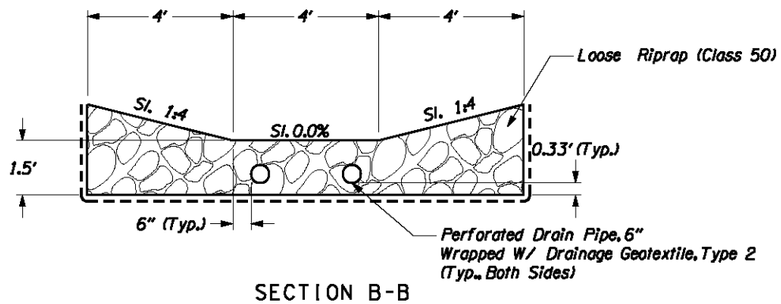
WATER QUALITY DETAILS

SHEET NO.
GJ-16







SWALE BASIN DETAIL

"CONVEYANCE SWALE" PROFILE

39V-005

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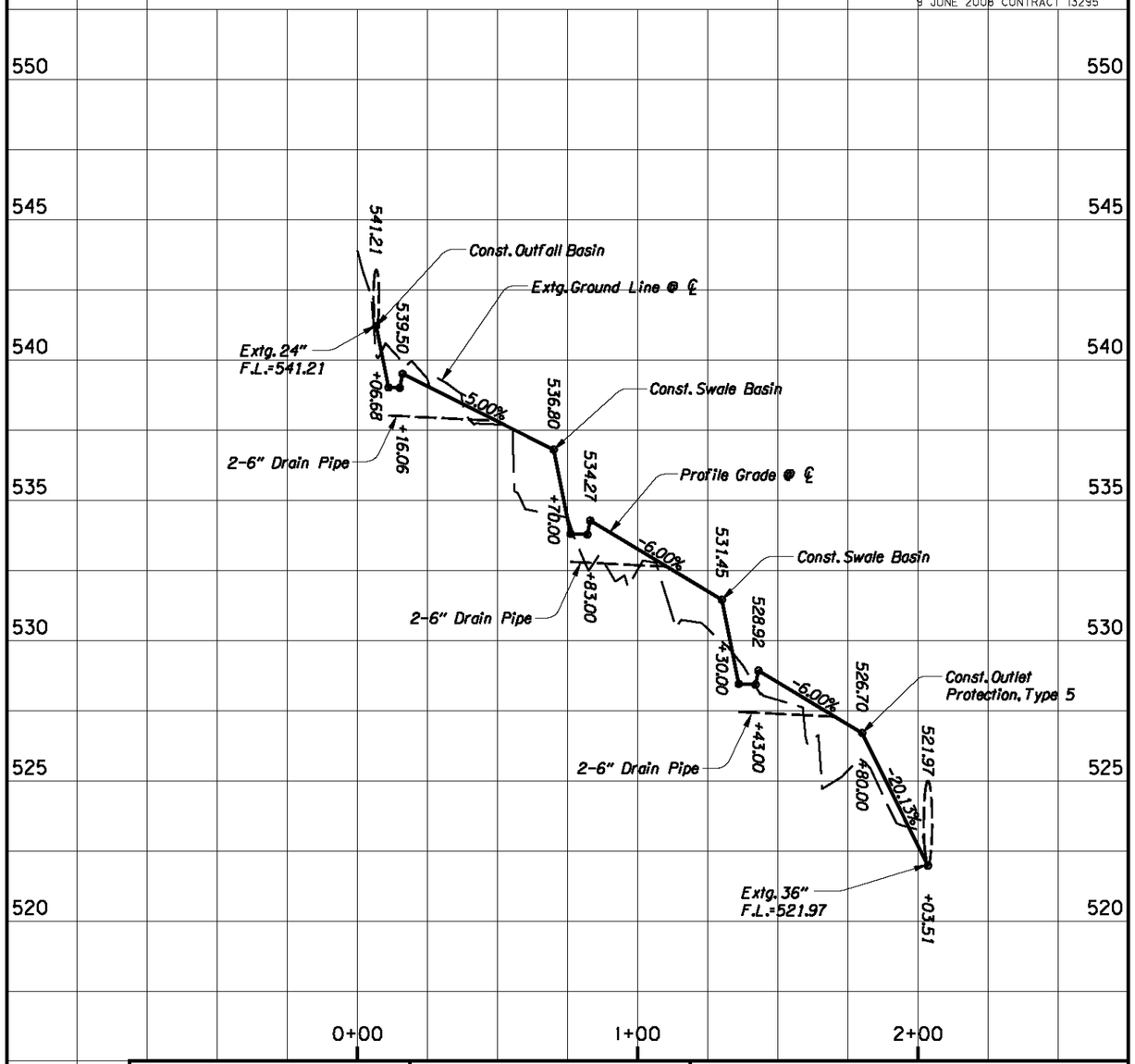

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WATER QUALITY DETAILS

SHEET NO. GJ-18