

# OPERATION & MAINTENANCE MANUAL

## Water Quality Biofiltration Swale

Manual prepared: September 2017

DFI No. D00485



Figure 1: DFI No. D00485, looking south

## 1. Identification

Drainage Facility ID (DFI): D00485  
Facility Type: Water Quality Biofiltration Swale  
Construction Drawings: (V-File Numbers) 42V-077  
Location: District: 10  
Highway No.: 004  
Mile Post: 103.77 to 103.79, SB [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.

Facility location type: Roadway shoulder

Flow direction: South

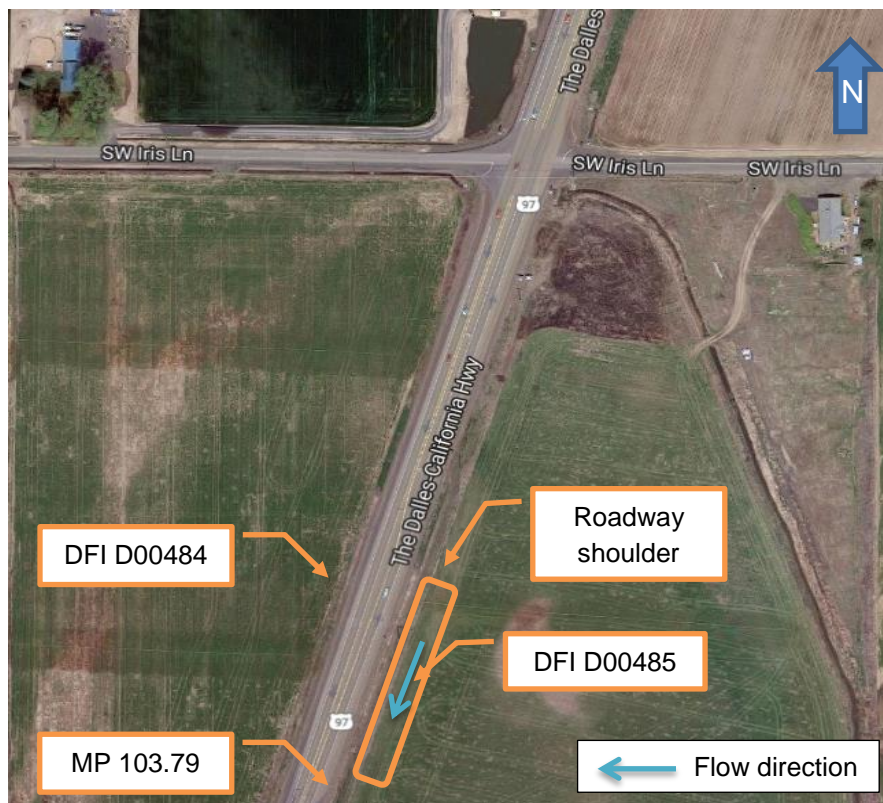


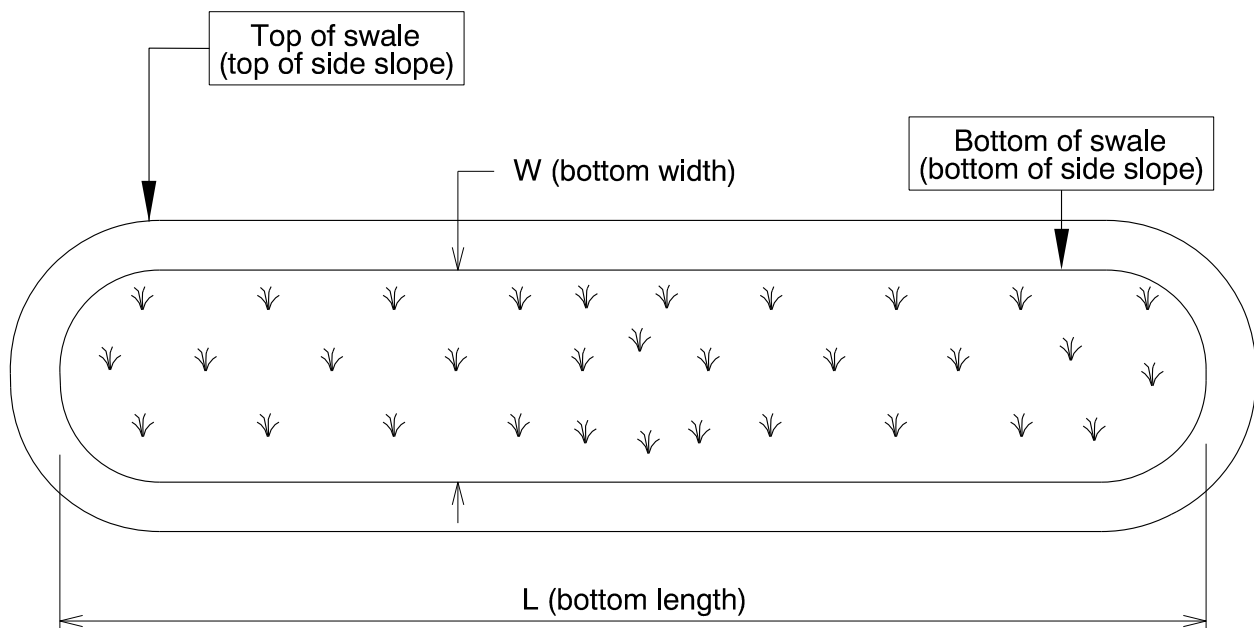
Figure 2: Facility location map

#### 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:

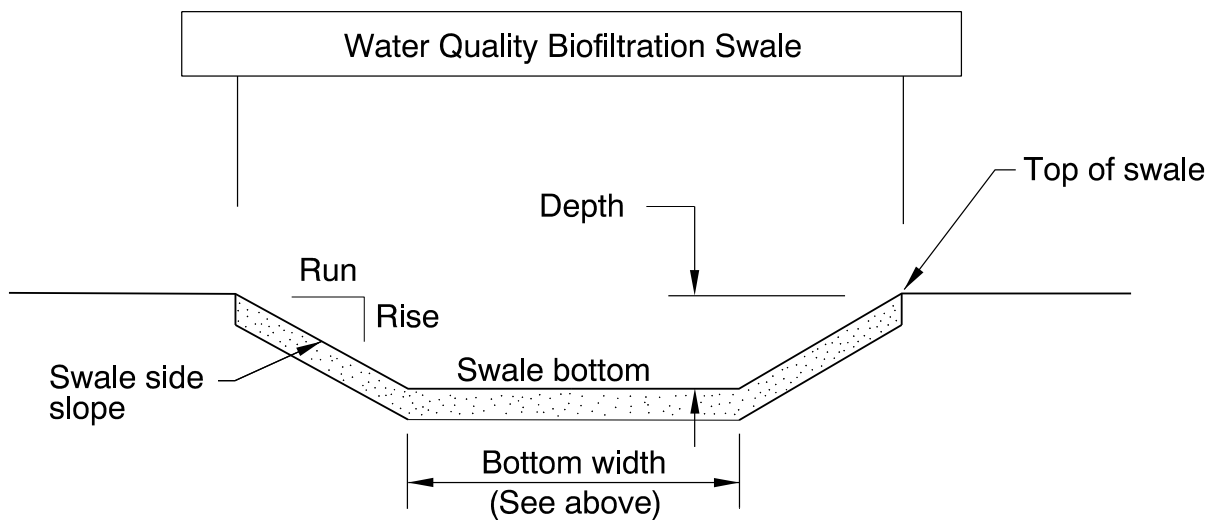
Bottom Length (feet)	Bottom Width (feet)
±150	4



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	1	6



**Site Specific Information:**

## 5. Facility Access

Maintenance access to the facility:

<input type="checkbox"/> Roadside pad	<input checked="" type="checkbox"/> Roadside shoulder
<input type="checkbox"/> Access road with Gate	<input type="checkbox"/> Access road without Gate



Figure 3: Roadside shoulder on The Dalles – California Hwy.

## 6. Operational Components / Maintenance Items

### Classification

This facility is classified as an:

<input checked="" type="checkbox"/> <b>On-line Swale</b>	<input type="checkbox"/> <b>Off-line Swale</b>
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:

<input checked="" type="checkbox"/> <b>No</b>	<input type="checkbox"/> <b>Yes</b>
<b>There is no bypass component. High flows drain into and through the facility</b>	<b>There is a bypass component. Only low/small flows drain into the swale. High flows are diverted around the swale using a bypass component</b>

### 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:

<input checked="" type="checkbox"/> <b>Operational Plan A</b> <input type="checkbox"/> <b>Operational Plan B</b> <input type="checkbox"/> <b>Operational Plan C</b>
<b>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.</b>

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.

<b>Table 1: Swale Components</b>		<b>ID #</b>
<b>Manholes/Structures</b>		
Pre-treatment manhole	<input type="checkbox"/>	<b>S1</b>
Weir type flow splitter/flow splitter manhole	<input type="checkbox"/>	<b>S2</b>
Orifice type flow splitter/flow splitter manhole	<input type="checkbox"/>	<b>S3</b>
Standard manhole	<input type="checkbox"/>	<b>S4</b>
<b>Swale Inlet</b>		
Pavement sheet flow	<input checked="" type="checkbox"/>	<b>S5</b>
Inlet Pipe (s)	<input type="checkbox"/>	<b>S6</b>
Open channel inlet	<input checked="" type="checkbox"/>	<b>S7</b>
Riprap pad	<input checked="" type="checkbox"/>	<b>S8</b>
<b>Ground Cover</b>		
Grass bottom	<input type="checkbox"/>	<b>S9</b>
Grass side slopes	<input type="checkbox"/>	<b>S10</b>
Granular drain rock	<input checked="" type="checkbox"/>	<b>S11</b>
Plantings	<input type="checkbox"/>	<b>S12</b>
<b>Underground Components</b>		
Geotextile fabric	<input checked="" type="checkbox"/>	<b>S13</b>
Water quality mix (Blended compost and topsoil mixture)	<input checked="" type="checkbox"/>	<b>S14</b>
Perforated pipe	<input checked="" type="checkbox"/>	<b>S15</b>
Porous pavers (access grid)	<input type="checkbox"/>	<b>S16</b>
<b>Flow Spreader</b>		
Rock basin	<input checked="" type="checkbox"/>	<b>S17</b>
Anchored board (at inlets)	<input checked="" type="checkbox"/>	<b>S18</b>
Other:	<input type="checkbox"/>	<b>S19</b>
<b>Swale Outlet</b>		
Catch basin with grate	<input type="checkbox"/>	<b>S20</b>
Outlet Pipe (s)	<input type="checkbox"/>	<b>S21</b>
Open channel outlet	<input checked="" type="checkbox"/>	<b>S22</b>
Auxiliary Outlet:	<input type="checkbox"/>	<b>S23</b>
<b>Outfall Type</b>		
Waterbody (Creek/Lake/Ocean)	<input type="checkbox"/> <b>C</b> <input type="checkbox"/> <b>L</b> <input type="checkbox"/> <b>O</b>	<b>S24</b>
Ditch	<input checked="" type="checkbox"/>	<b>S25</b>
Storm drain system	<input type="checkbox"/>	<b>S26</b>
<b>Outfall Components</b>		
Riprap pad	<input checked="" type="checkbox"/>	<b>S27</b>
Riprap bank protection	<input type="checkbox"/>	<b>S28</b>

## 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](http://www.oregon.gov/ODOT/Maintenance/Documents/blue_book.pdf)

## 8. Limitations

Access grid installed:

<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
There are no 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](http://www.oregon.gov/ODOT/Maintenance/Documents/ems_manual.pdf)

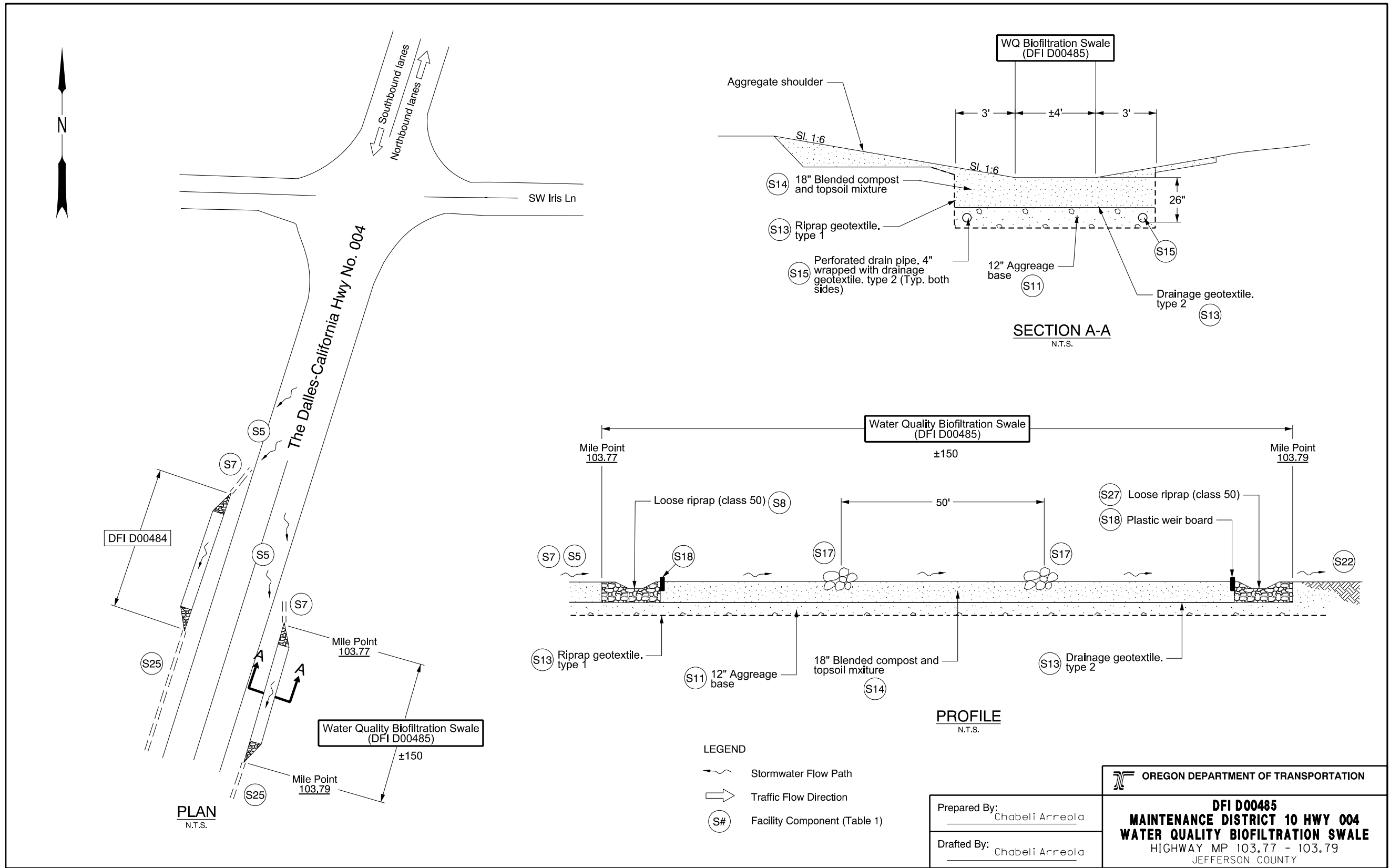
Contact any of the following for more detailed information about management of waste materials found on site:

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 D00485**



THIS IS THE FILENAME LOCATION \*\*\*\*\* DD-MMM-YYYY HH:MM USERNAME DFI.D00485.dgn

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## **B Appendix B – Project Contract Plans**

### **Contents:**

**Site Specific Subset of Project Contract Plan 42V-077**

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AS BUILTS

Revised Plan  
Sheets Incorporated

42V-77

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.
1B	Sheet Layout

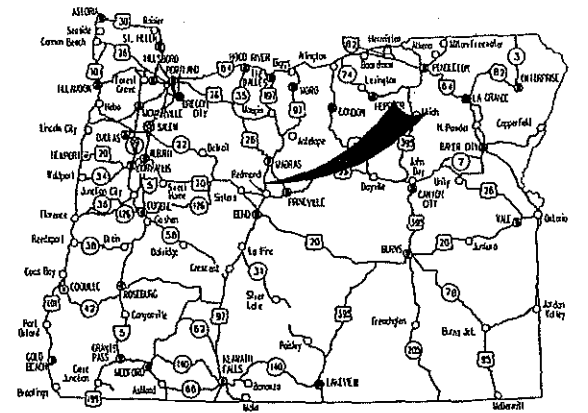
STATE OF OREGON  
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT  
GRADING, DRAINAGE & PAVING

**US 97 AT IRIS LANE**  
**THE DALLES - CALIFORNIA HIGHWAY**  
JEFFERSON COUNTY

APRIL 2009

Revised Plan  
Sheets Incorporated

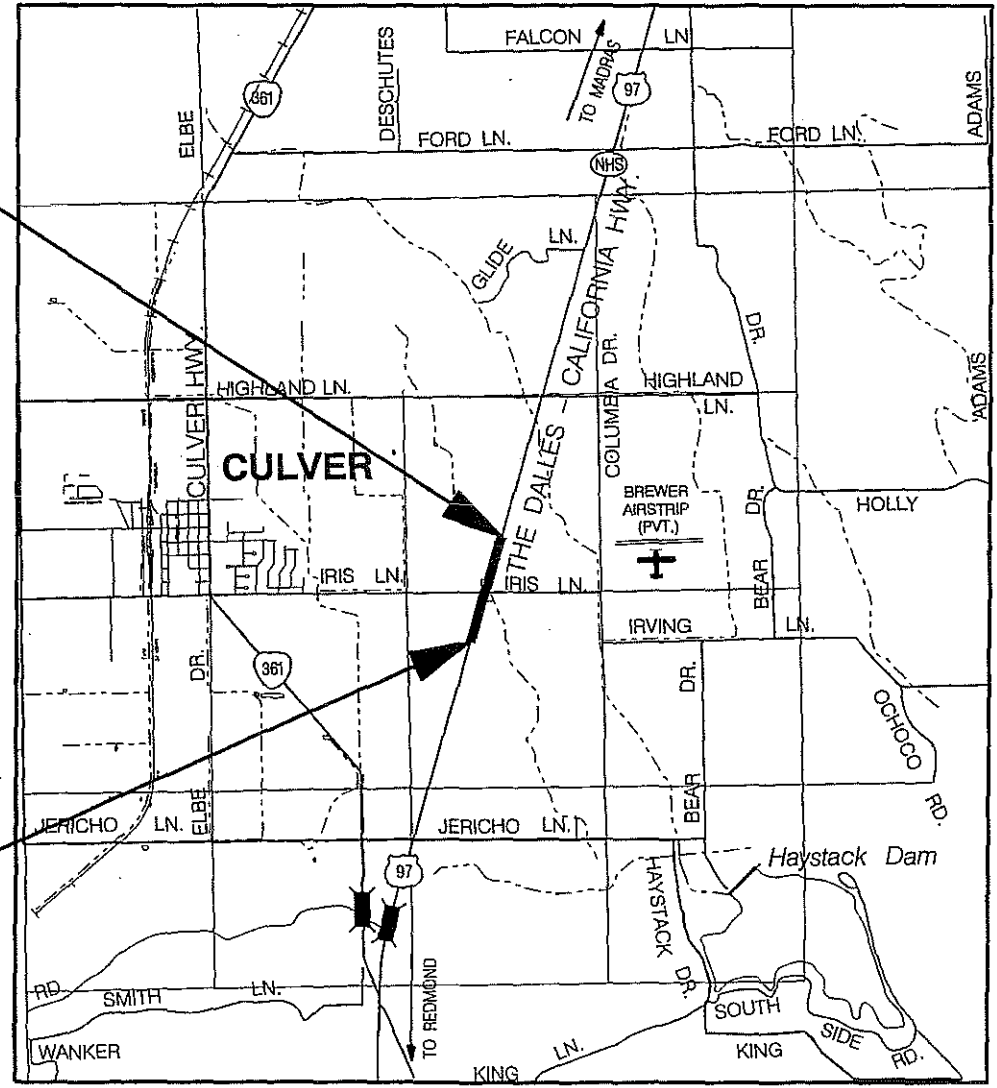


Overall Length Of Project - 0.60 Miles (0.95 KM)

**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.)



**BEGINNING OF PROJECT**  
**SO-NTSA-S004 (129)**  
**STA. 436+95 (M.P. 103.35)**



REVISED AS CONSTRUCTED

*Stephanie Lopez* 12/21/09  
Project Manager Date

**END OF PROJECT**  
**SO-NTSA-S004 (129)**  
**STA. 468+30 (M.P. 103.95)**

OREGON TRANSPORTATION COMMISSION

Gail Achterman	CHAIR
Michael Nelson	VICE-CHAIR
Janice Wilson	COMMISSIONER
Alan Brown	COMMISSIONER
David Lohman	COMMISSIONER
Matthew L. Garrett	DIRECTOR OF TRANSPORTATION

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

These plans were developed using ODOT design standards. Exceptions to these standards, if any, have been submitted and approved by the ODOT Chief Engineer or their delegated authority.

Approving Authority: *W. Hollings III* 3-7-09  
Signature & date  
*W. Hollings III* PM  
Print name and title  
*W. Hollings III*  
Concurrence by ODOT Chief Engineer

**US 97 AT IRIS LANE**  
**THE DALLES - CALIFORNIA HIGHWAY**  
JEFFERSON COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	SO-NTSA-S004 (129)	1

T. 12 S., R. 13 E., W.M.



INDEX OF SHEETS, CONT'D.	
SHEET NO.	DESCRIPTION
2, 2A Thru 2A-5 Incl.	Typical Sections
2B Thru 2B-6 Incl.	Details
2C Thru 2C-8 Incl.	Traffic Control Plan
2D	Pipe Data Sheet
2E	Survey Control Data
3	Alignment & General Construction
3A	Drainage & Utilities
3B	Profile
4	Alignment & General Construction
4A	Drainage & Utilities
4B	Profile
5	Alignment & General Construction
5A	Drainage & Utilities
5B	Profile
6	Alignment & General Construction
6A	Drainage & Utilities
6B	Profile
7	Alignment & General Construction
7A	Drainage & Utilities
7B	Profile
PERMANENT PAVEMENT MARKINGS	
ST-1 Thru ST-5 Incl.	Striping Plans
GEO/HYDRO	
GA Thru GA-6 Incl.	Erosion Control Plans
GJ Thru GJ-2 Incl.	Water Quality Details
DRAWING NO. DESCRIPTION	
PERMANENT SIGNING	
S-11122 Thru S-11126 Incl.	Signing Plan
S-11127	Sign Details
S-11128 Thru S-11129 Incl.	Sign And Post Data Tables

Standard Drg. Nos.

- RD200 - Roadway Cross Slopes Superelevated Sections
- RD230 - Slope Rounding
- RD300 - Trench Backfill, Bedding, Pipe Zone And Multiple Installations
- RD302 - Street Cut
- RD316 - Sloped Ends For Metal Pipe
- RD317 - Culvert Embankment Protection
- RD318 - Sloped Ends For Concrete Pipe
- RD320 - Paved End Slope for Culverts 60" Maximum Pipe Size
- RD326 - Coupling Bands For Corrugated Metal Pipe
- RD380 - Aluminum and Steel Corrugated Pipe Fill Height Tables
- RD386 - Circular Concrete Pipe Fill Height Tables
- RD400 - Guardrail and Metal Median Barrier
- RD405 - Guardrail and Metal Median Barrier Parts
- RD415 - Guardrail and Metal Median Barrier Parts
- RD420 - Energy Absorbing Terminal
- RD610 - Asphalt Pavement Details
- RD715 - Approaches And Driveways
- RD1005 - Check Dams
- RD1040 - Sediment Fence (Supported And Unsupported)
- RD1055 - Matting

- TM200 - Sign Installation Details
- TM201 - Miscellaneous Sign Placement Details
- TM204 - Flag Board Mounting Details
- TM206 - Sign Bracing Details
- TM211 - Signing Details Us and Interstate Route Shields
- TM223 - Conventional Roads Directional Sign Layout Street Name Signs
- TM224 - Signing Details Directional Sign Layout
- TM230 - Mounting Details For Removable Legend (5" 4.C., 6" & 8" UC & LC Letters/Numbers)
- TM231 - Mounting Details For Removable Legend (10 2/3" UC, 12" & 10" UC & LC Letters/Numbers)
- TM233 - Mounting Details For Removable Legend (Various Arrow Sizes)
- TM500 - Pavement Marking Standard Detail Blocks
- TM501 - Pavement Marking Standard Detail Blocks
- TM503 - Pavement Marking Standard Detail Block
- TM525 - Turn Arrow Marking Details
- TM530 - Intersection Pavement Markings
- TM539 - Left Turn Lane Pavement Markings for New Construction
- TM570 - Traffic Delineators
- TM571 - Traffic Delineators Steel Post Details
- TM576 - Traffic Delineator Installation For Non-Freeways
- TM602 - Triangular Base Breakaway Sign Support (Multi-directional Slip Base Design)
- TM635 - Breakaway Sign and Luminaire Supports (Location Guidelines)
- TM670 - Permanent Signing Wood Post Supports Sizing Charts
- TM671 - 3 Second Gust Wind Speed Isotach
- TM675 - Extruded Aluminum Panels
- TM676 - Sign Attachments
- TM678 - Secondary Sign Mounting Details
- TM700 - Traffic Control Plans Details
- TM705 - Intersection Details
- TM710 - 2-Lane, 2-Way Roadways
- TM747 - Temporary Reflective Pavement Markers
- TM750 - Temporary Barricades
- TM775 - Temporary Sign Supports
- TM780 - Closure Details

REVISED AS CONSTRUCTED

*Stephanie Lewis* 12/21/09  
Project Manager Date

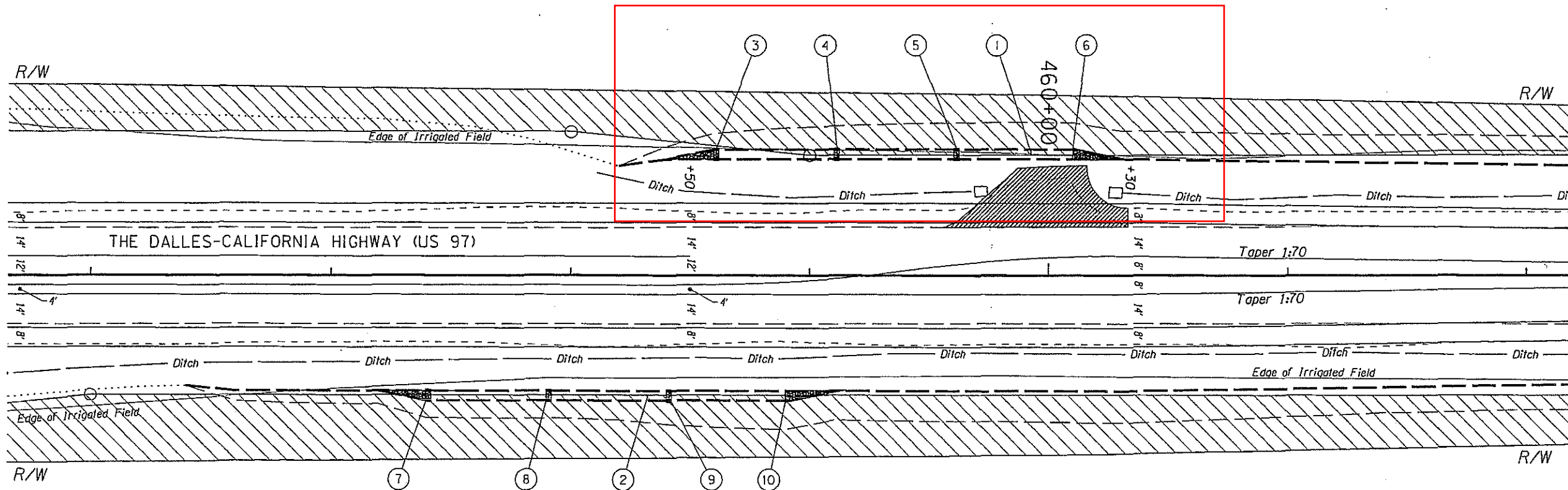
R/W Map No. 11B-2-21

US 97 AT IRIS LANE		
THE DALLES - CALIFORNIA HIGHWAY		
JEFFERSON COUNTY		
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	SO-NTSA-S004 (129)	1A



REVISED AS CONSTRUCTED

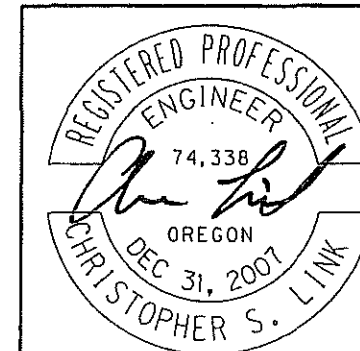
*Stephanie Sepe* 12/21/09  
Project No. 3707 Date



- ① Sta. 458+60 to Sta. 460+10, Lt.  
Const. water quality swale "SW1" - 150'  
Blended compost & topsoil mixture - 92 cu. yd.  
Drainage geotextile, type 2 - 262 sq. yd.  
Riprap geotextile, type 1 - 317 sq. yd.  
4 inch drain pipe - 410 ft.  
Aggregate base - 94 tons  
Topsoil - 5 cu. yd.  
(For details, see shts. GJ thru GJ-3)
- ② Sta. 457+40 to Sta. 458+90, Rt.  
Const. water quality swale "SW2" - 150'  
Blended compost & topsoil mixture - 92 cu. yd.  
Drainage geotextile, type 2 - 262 sq. yd.  
Riprap geotextile, type 1 - 317 sq. yd.  
4 inch drain pipe - 410 ft.  
Aggregate base - 94 tons  
Topsoil - 5 cu. yd.  
(For details, see shts. GJ thru GJ-3)
- ③ Sta. 458+60, 50.3' Lt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 5 cu. yd.  
Plastic weir board not required  
Daylight drain pipe in flow spreader  
(For details, see sht. GJ-2)
- ④ Sta. 459+10, 50.3' Lt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 1 cu. yd.  
Plastic weir board - 8 ft.  
(For details, see sht. GJ-2)
- ⑤ Sta. 459+60, 50.3' Lt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 1 cu. yd.  
Plastic weir board - 8 ft.  
(For details, see sht. GJ-2)

- ⑥ Sta. 460+10, 50.3' Lt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 2 cu. yd.  
Plastic weir board - 8 ft.  
(For details, see shts GJ-2 and GJ-3)
- ⑦ Sta. 457+40, 50.3' Rt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 5 cu. yd.  
Plastic weir board not required  
Daylight drain pipe in flow spreader  
(For details, see sht. GJ-2)
- ⑧ Sta. 457+90, 50.3' Rt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 1 cu. yd.  
Plastic weir board - 8 ft.  
(For details, see shts GJ-2)
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Plastic weir board - 8 ft.  
(For details, see shts GJ-2 and GJ-3)
- ⑩ Sta. 458+90, 50.3' Rt.  
Const. rock basin flow spreader with riprap  
Loose riprap (Class 50) - 2 cu. yd.  
Plastic weir board - 8 ft.  
(For details, see shts. GJ-2)

Remove Extg. Surfacing Shown Thus:   
Contractor may not occupy area shown thus:   
prior to 6-1-09 or otherwise specified by the engineer



RENEWAL DATE: 12-31-2010

**OREGON DEPARTMENT OF TRANSPORTATION**

Murray, Smith & Associates, Inc.  
121 S.W. Salmon, Suite 900, Portland, Oregon 97204-2919  
503.225.9010

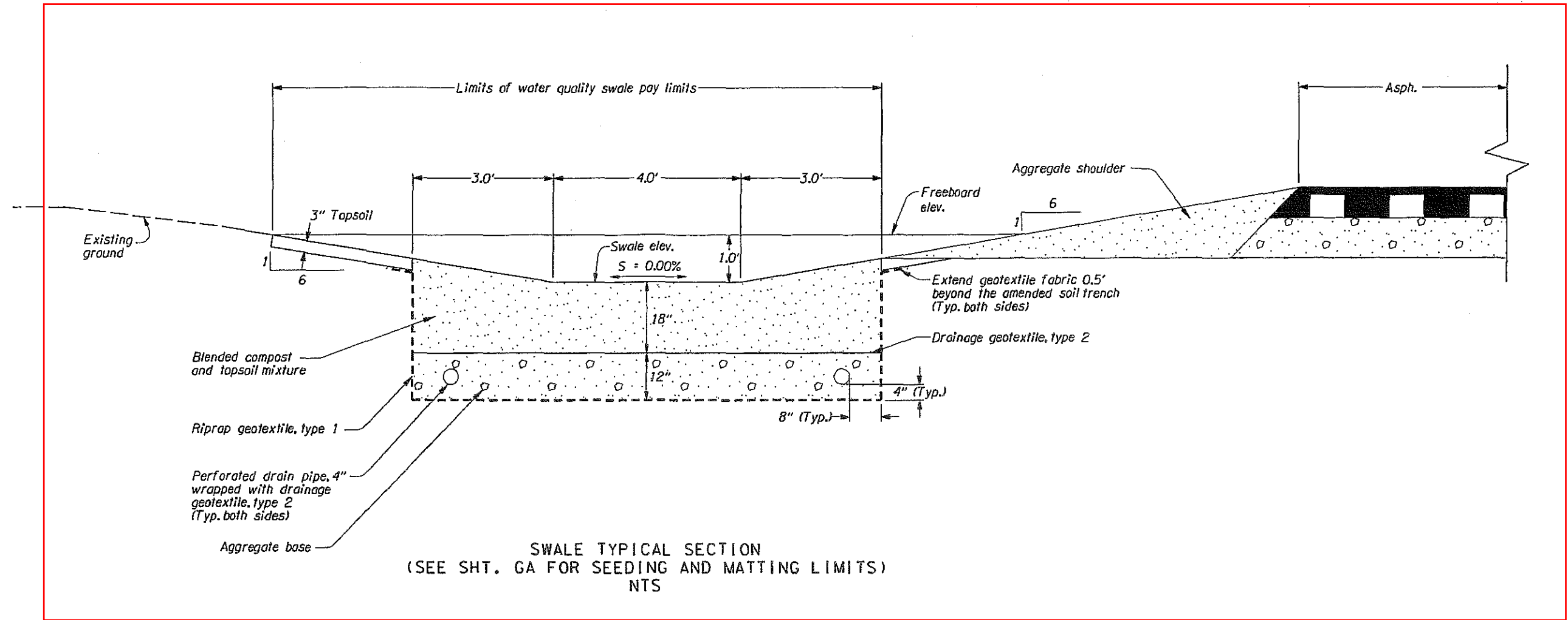


**US 97 AT IRIS LANE**  
THE DALLES - CALIFORNIA HIGHWAY  
JEFFERSON COUNTY

Reviewed By - Christopher S. Link  
Designed By - Andrew H. Giesy  
Drafted By - Susan K. Wentz

**ALIGNMENT & GENERAL CONSTRUCTION**

SHEET NO. 6



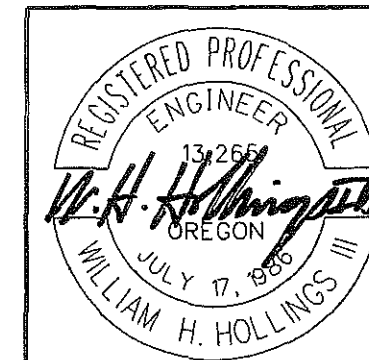
SWALE TYPICAL SECTION  
(SEE SHT. GA FOR SEEDING AND MATTING LIMITS)  
NTS

Notes:

1. For blended compost and topsoil mixture, mix composted yard debris approx. 50%/50% by volume with topsoil before placing.
2. For seeding and matting limits, see sht. GA-5.

REVISED AS CONSTRUCTED

*Stephanie Serpio* 12/21/09  
Project Engineer Date



RENEWAL DATE: 06-30-2009

Murray, Smith & Associates, Inc. 121 S.W. Salmon, Suite 900, Portland, Oregon 97204-2919 503.225.9010	
US 97 AT IRIS LANE THE DALLES - CALIFORNIA HIGHWAY JEFFERSON COUNTY	
Reviewed By - Christopher S. Link Designed By - Gwenyth N. Linscheid Drafted By - Susan K. Wentz	
WATER QUALITY DETAILS	SHEET NO. GJ

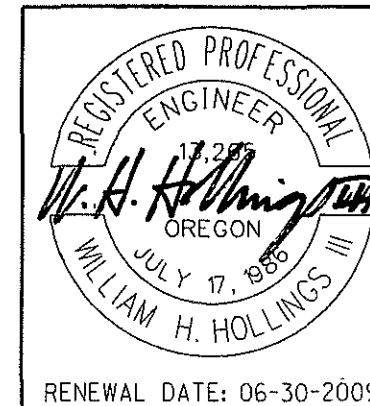
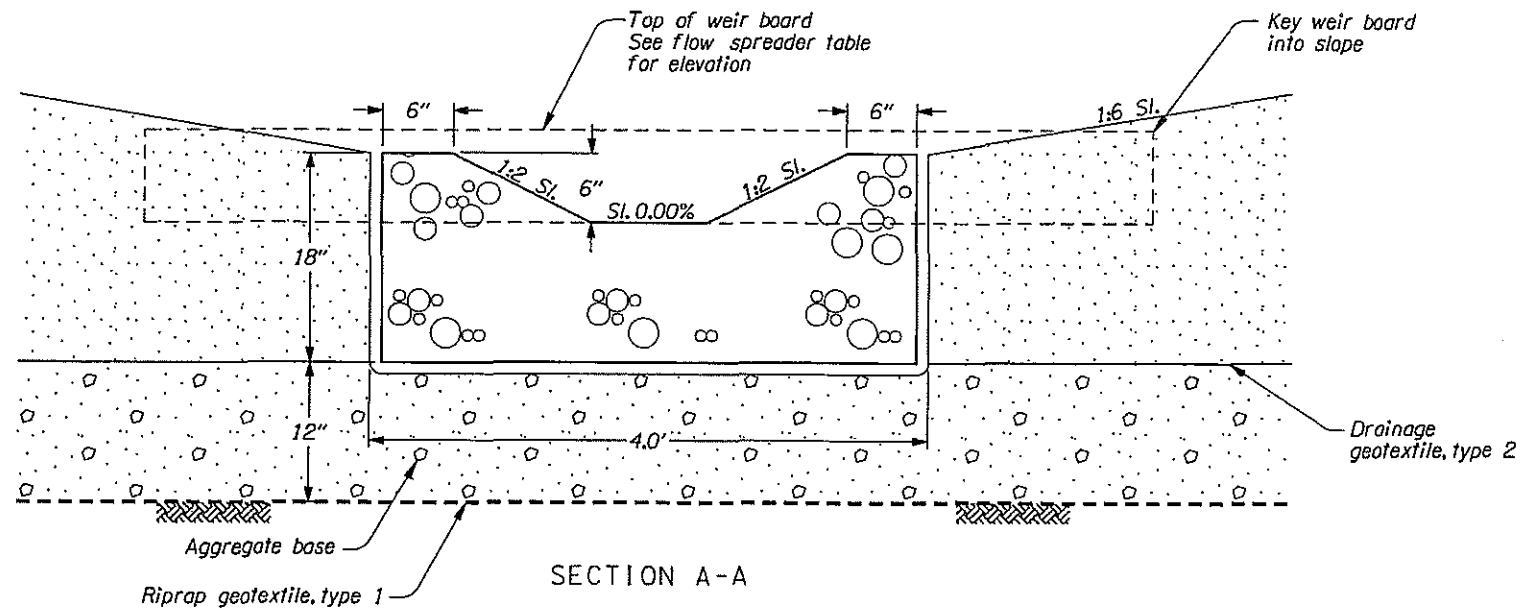
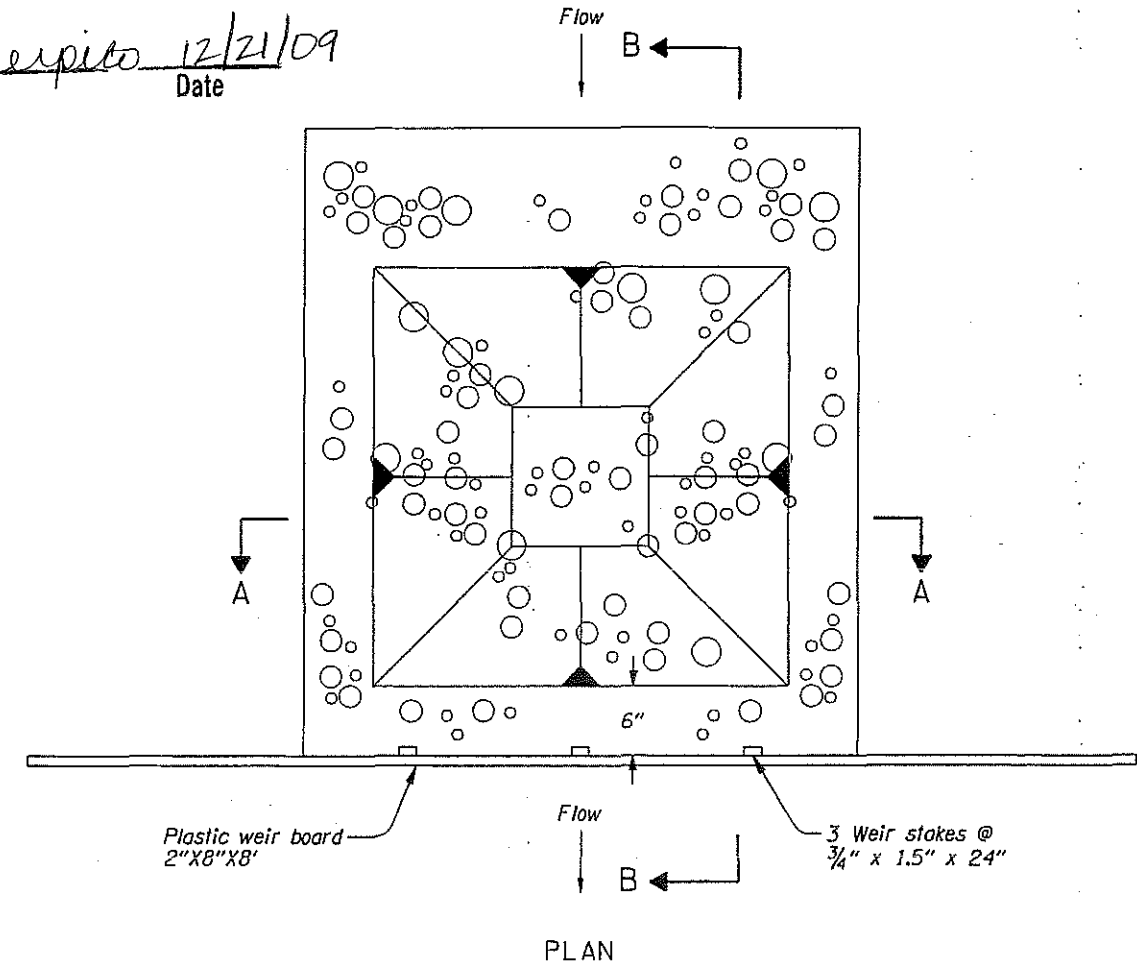
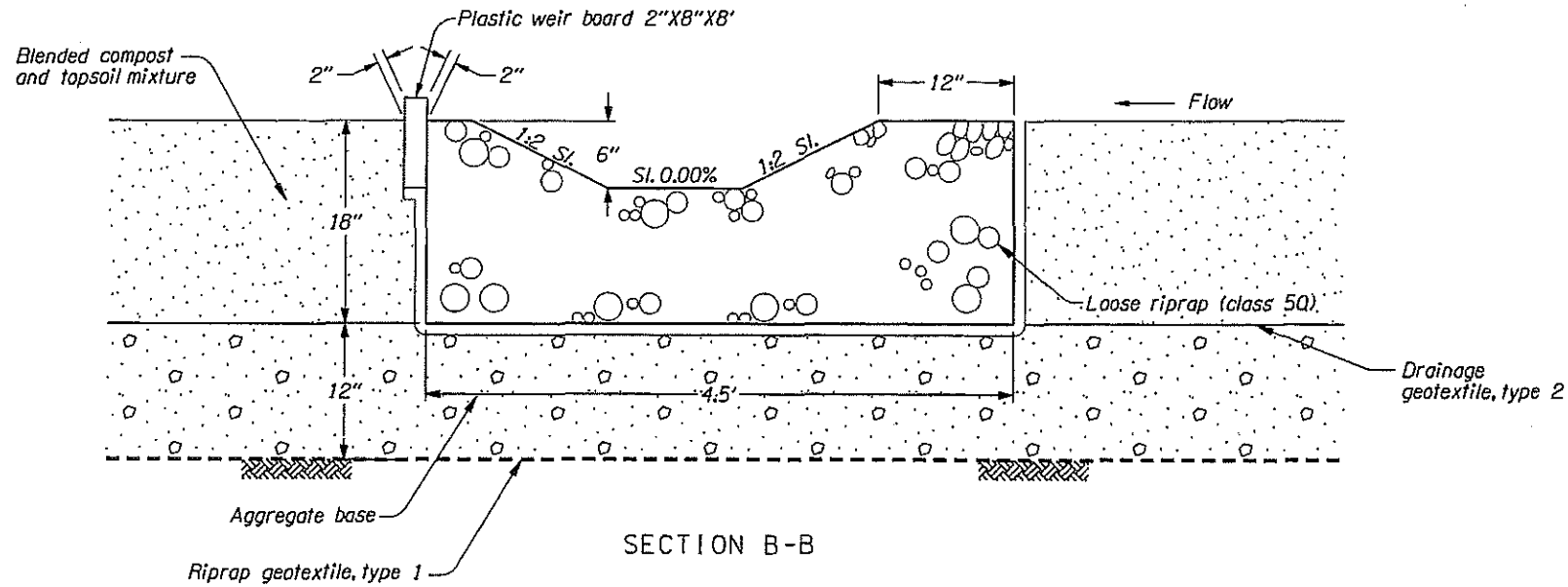
ROCK BASIN SWALE FLOW SPREADER WITH RIPRAP  
NTS

REVISED AS CONSTRUCTED

*Stephanie Depina* 12/21/09  
Project Manager Date

Flow Spreader Table

Station	Top Of Weir Board Elev.
459+10, Lt.	2691.77
459+60, Lt.	2692.57
460+10, Lt.	2693.31
457+90, Rt.	2689.91
458+40, Rt.	2690.65
458+90, Rt.	2691.45



**OREGON DEPARTMENT OF TRANSPORTATION**

Murray, Smith & Associates, Inc.  
121 S.W. Salmon, Suite 900, Portland, Oregon 97204-2919  
503.225.9010



**US 97 AT IRIS LANE**  
THE DALLES - CALIFORNIA HIGHWAY  
JEFFERSON COUNTY

Reviewed By - Christopher S. Link  
Designed By - Gwennyth N. Linscheid  
Drafted By - Susan K. Wentz

**WATER QUALITY DETAILS**

SHEET NO.  
GJ-2