OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: September 2017

DFI No. D00484

Figure 1: DFI No. D00484, looking south

1. Identification

Drainage Facility ID (DFI):	D00484
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 42V-077
Location:	District: 10
	Highway No.: 004
	Mile Post: 103.74 to 103.77, SB [right]

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

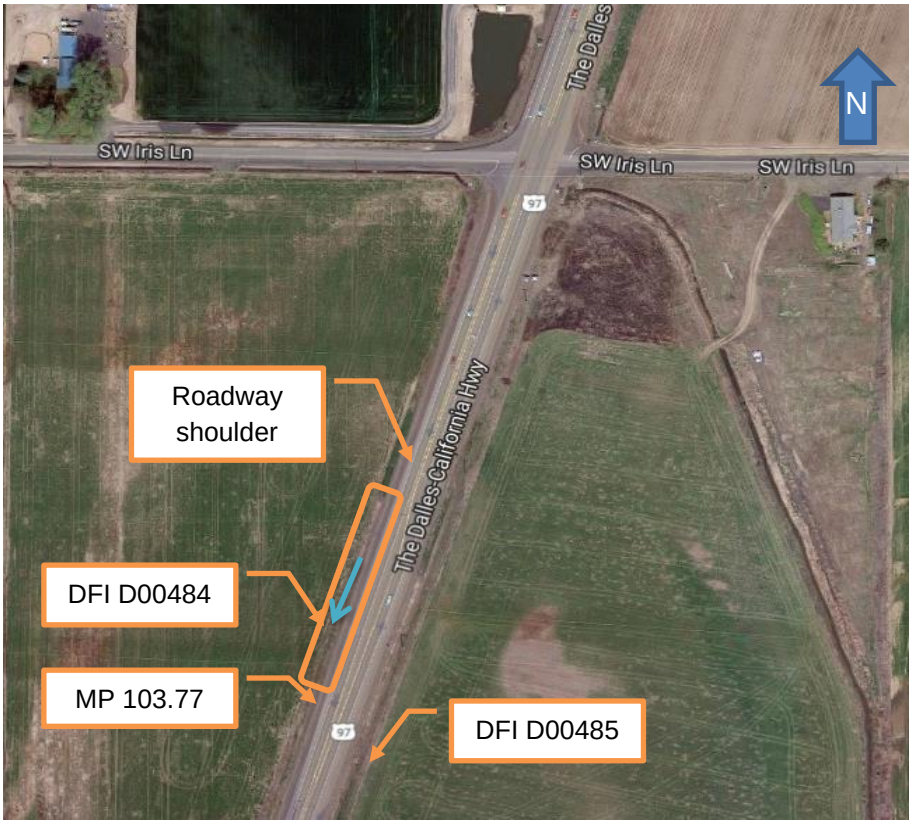


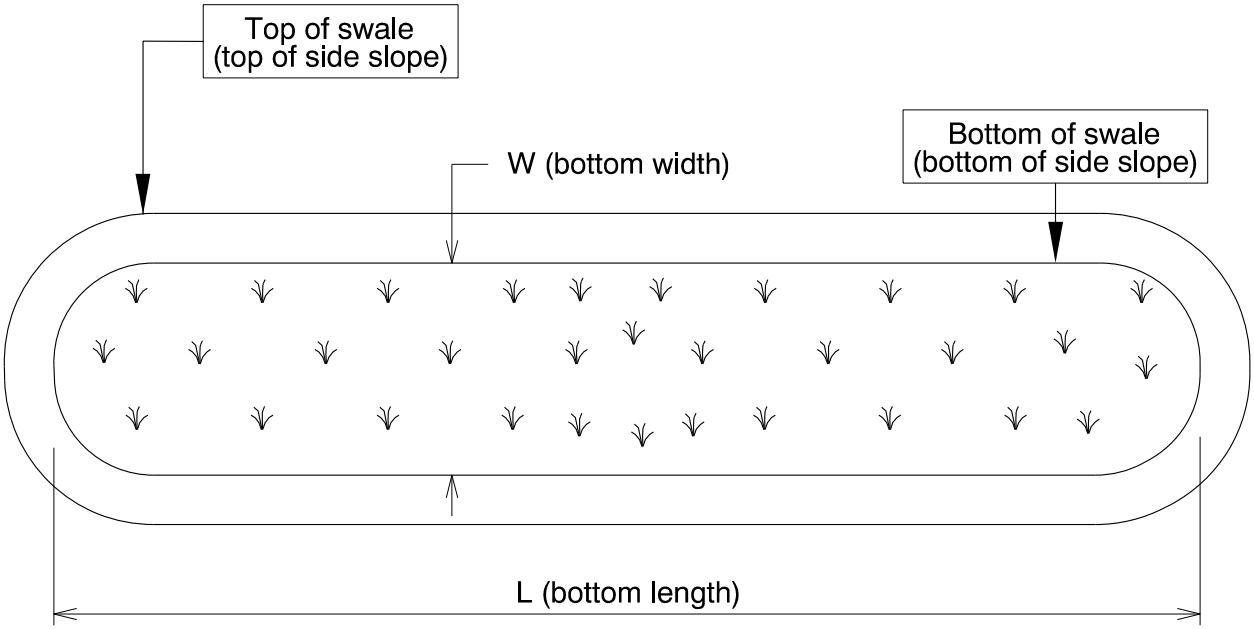
Figure 2: Facility location map

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:

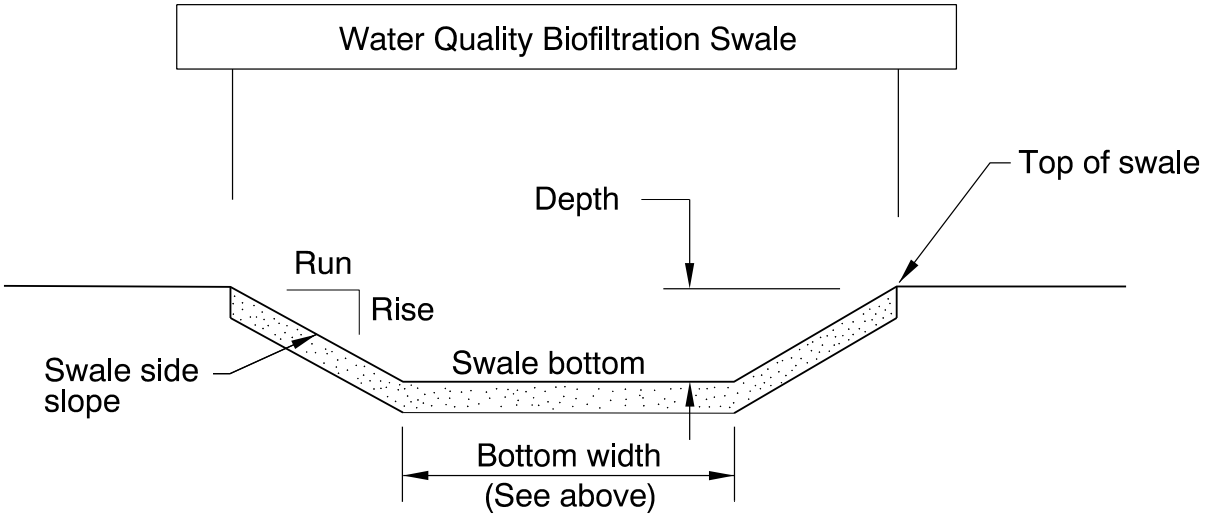
Bottom Length (feet)	Bottom Width (feet)
±150	4



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:

☐Roadside pad	☒Roadside shoulder
☐Access road with Gate	☐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:

☒ 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 (Blended compost and topsoil mixture)	☒	**S14**
Perforated pipe	☒	**S15**
Porous pavers (access grid)	☐	**S16**
Flow Spreader		
Rock basin	☒	**S17**
Anchored board (at inlets)	☒	**S18**
Other:	☐	**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 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

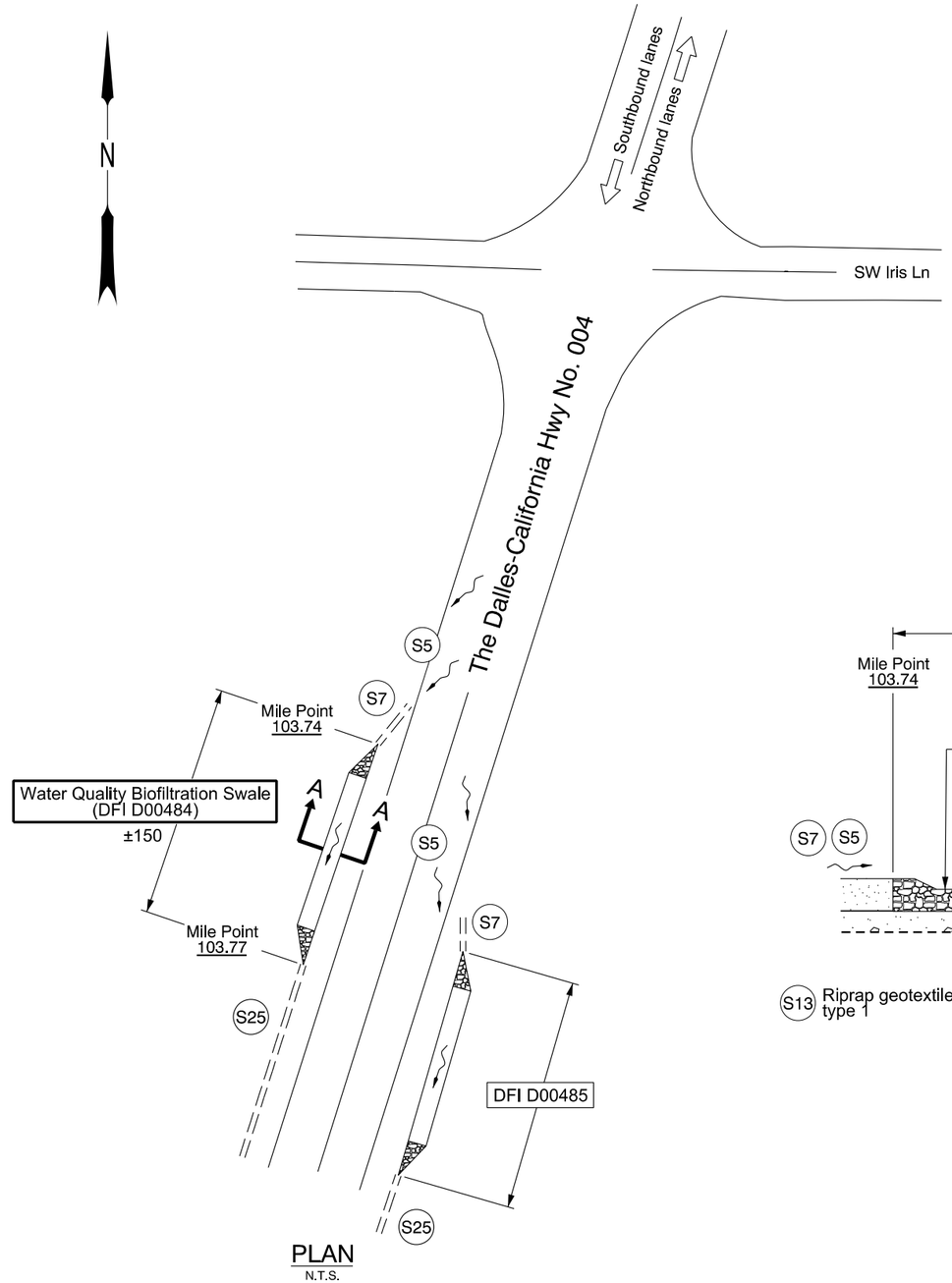
Contact any of the following for more detailed information about management of waste materials found on site:

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

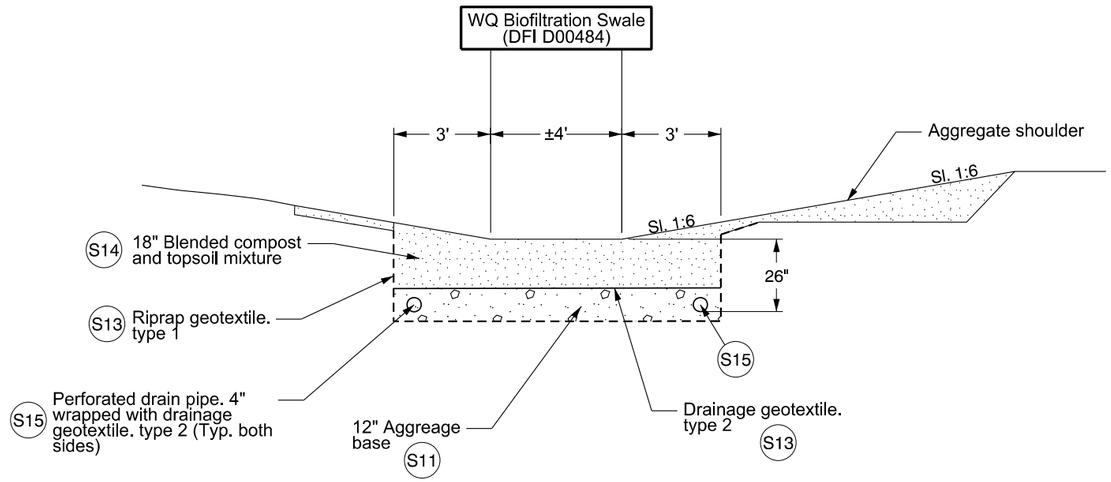
A Appendix A – Site Specific Operational Plan

Contents:

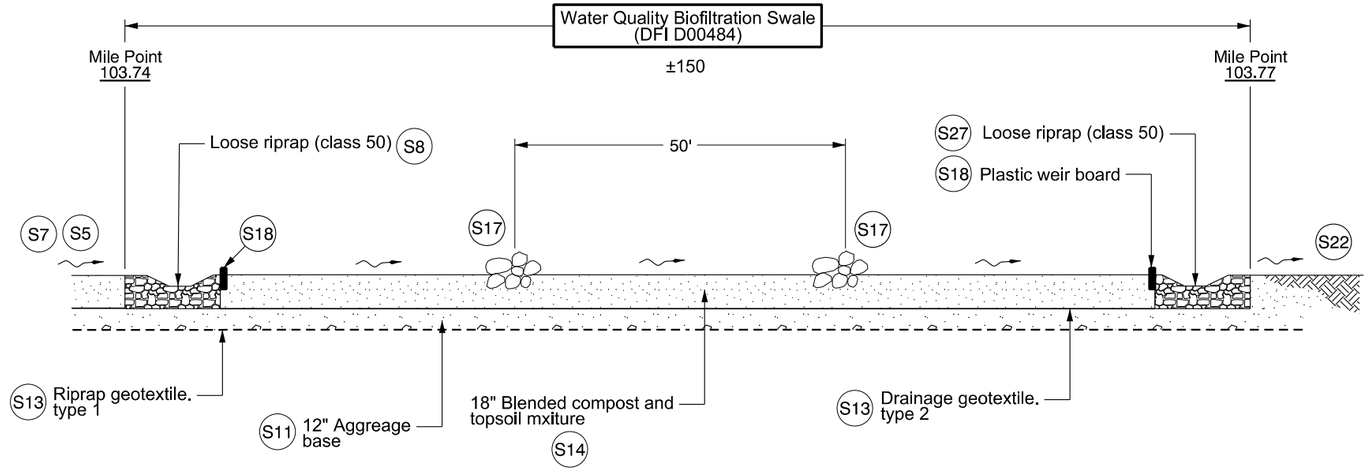
Operational Plan: DFI D00484



PLAN
N.T.S.



SECTION A-A
N.T.S.



PROFILE
N.T.S.

LEGEND

- Stormwater Flow Path
- Traffic Flow Direction
- S# Facility Component (Table 1)

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Chabeli Arreola

Drafted By: Chabeli Arreola

DFI D00484
MAINTENANCE DISTRICT 10 HWY 004
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 103.74 - 103.77
JEFFERSON COUNTY

DFI_D00484.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

Revised Plan
Sheets Incorporated

STATE OF OREGON
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

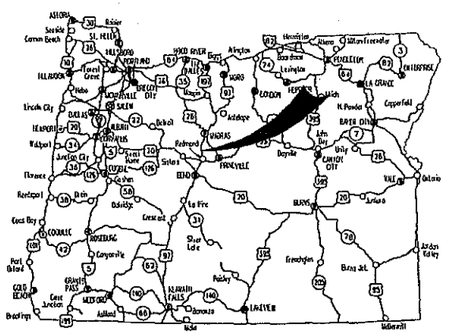
GRADING, DRAINAGE & PAVING

US 97 AT IRIS LANE

THE DALLES - CALIFORNIA HIGHWAY

JEFFERSON COUNTY

APRIL 2009



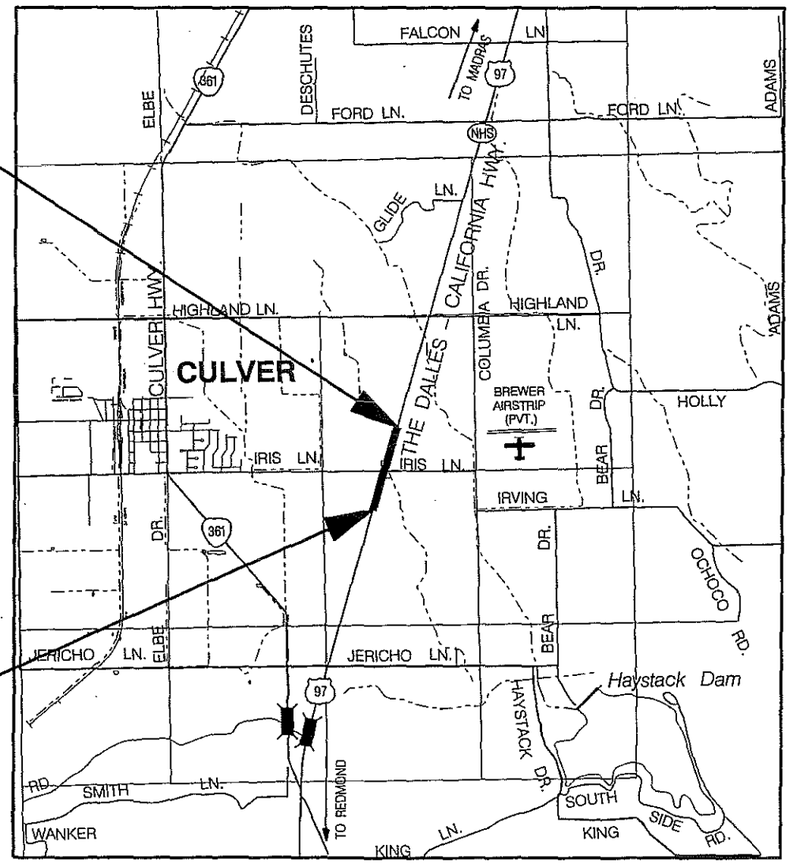
Overall Length Of Project - 0.60 Miles (0.95 KM)

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 Vespa 12/21/09
Project Manager Date



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

N

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

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

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

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

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

REVISED AS CONSTRUCTED

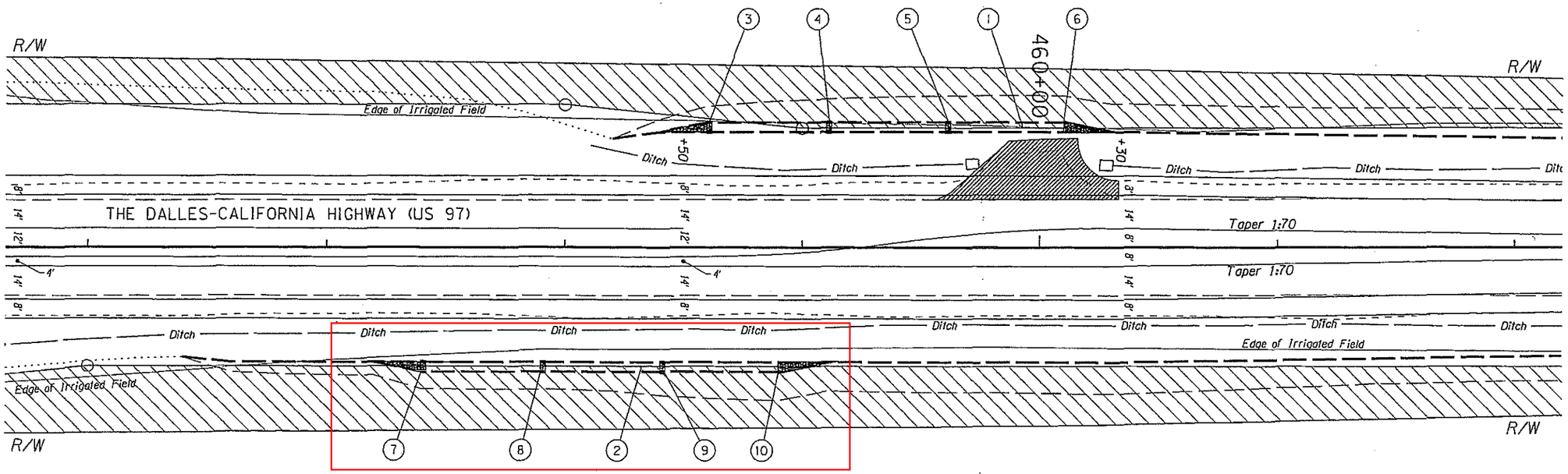
Stephanie Jerpus 12/21/09
Project Manager Date

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 Stepien 12/21/09
Project Manager 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)

(9) Sta. 458+40, 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 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

REGISTERED PROFESSIONAL ENGINEER
74,338
OREGON
DEC 31, 2007
CHRISTOPHER S. LINK

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

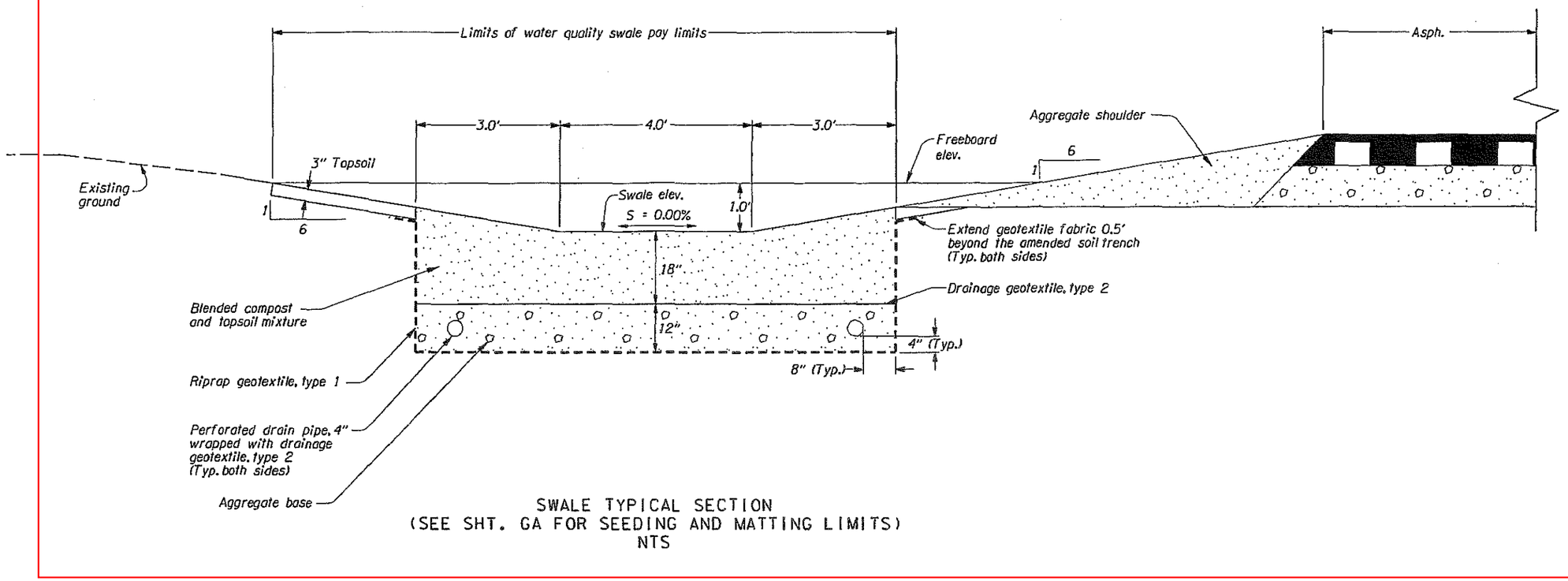
MSA

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 Serpico 12/21/09
Project Engineer Date

REGISTERED PROFESSIONAL ENGINEER
13266
OREGON
JULY 17, 1986
WILLIAM H. HOLLINGS III
RENEWAL DATE: 06-30-2009

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 - Gwenyth N. Linscheid
Drafted By - Susan K. Wentz

WATER QUALITY DETAILS

SHEET NO. GJ

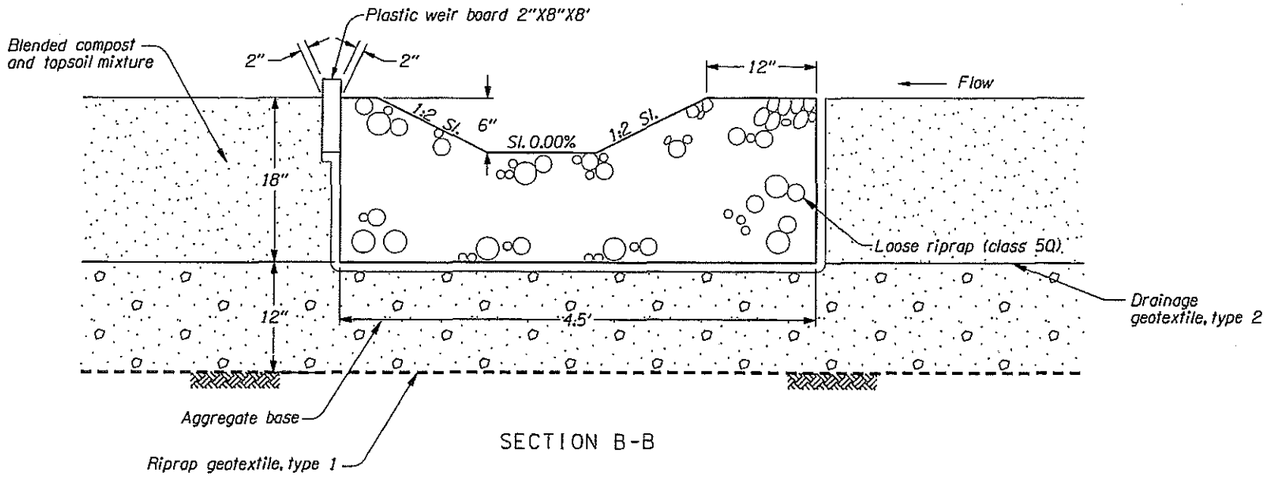
ROCK BASIN SWALE FLOW SPREADER WITH RIPRAP
NTS

REVISED AS CONSTRUCTED

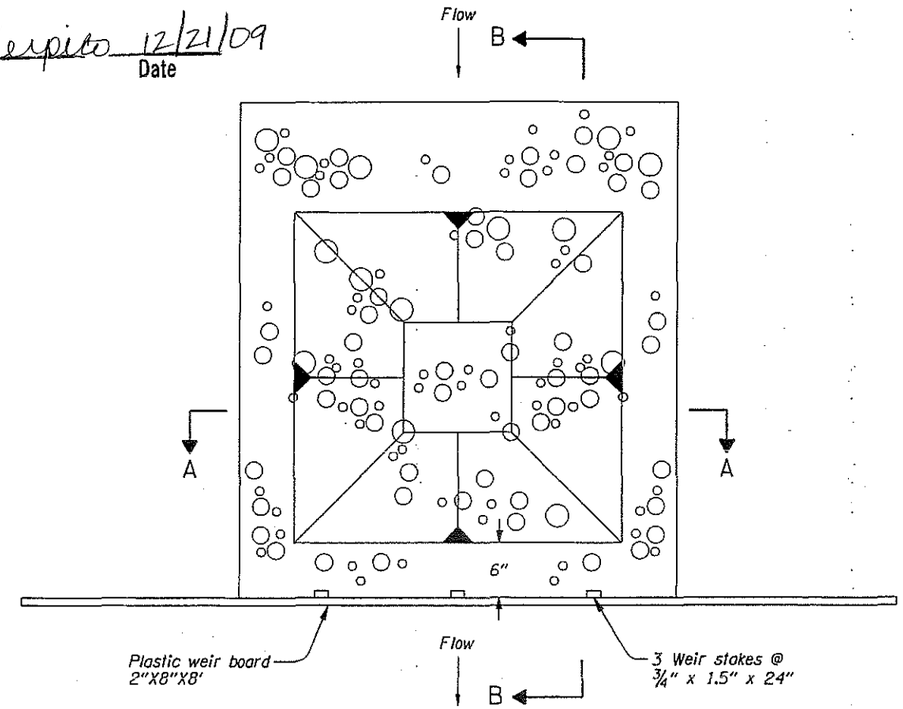
Stephanie Leipito 12/21/09
Project Manager Date

Flow Spreader Table

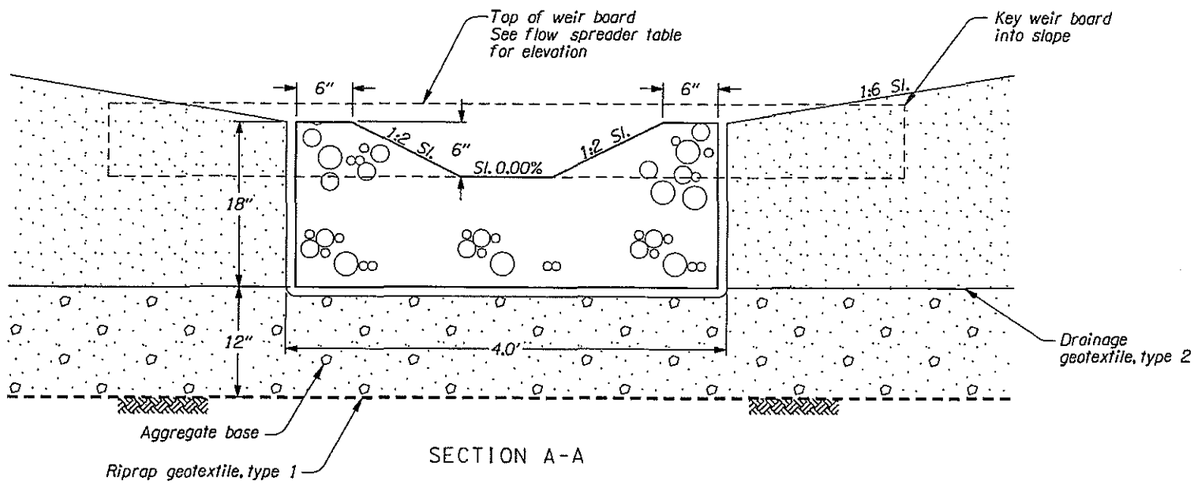
Station	Top Of Weir Board Elev.
459+10, Lt	2691.77
459+60, Lt.	2692.57
460+10, Lt.	2693.31
457+90, Rt.	2689.91
458+40, Rt.	2690.65
458+90, Rt.	2691.45



SECTION B-B



PLAN



SECTION A-A

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 17, 1985
WILLIAM H. HOLLINGS III
12.20.09
RENEWAL DATE: 06-30-2009

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 - Gwenyth N. Linscheid
Drafted By - Susan K. Wentz

WATER QUALITY DETAILS

SHEET NO. GJ-2