

# OPERATION & MAINTENANCE MANUAL

## Water Quality Biofiltration Swale

Manual prepared: **March 2019**

DFI No. **D00972**



Figure 1: DFI No. D00972, looking south

### Identification

Drainage Facility ID (DFI):	D00972
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) <b>49V-028</b>
Location:	District: <b>4</b>
	Highway No.: <b>33</b>
	Mile Post: <b>20.02 to 20.04, right</b>

## 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: **East to West**



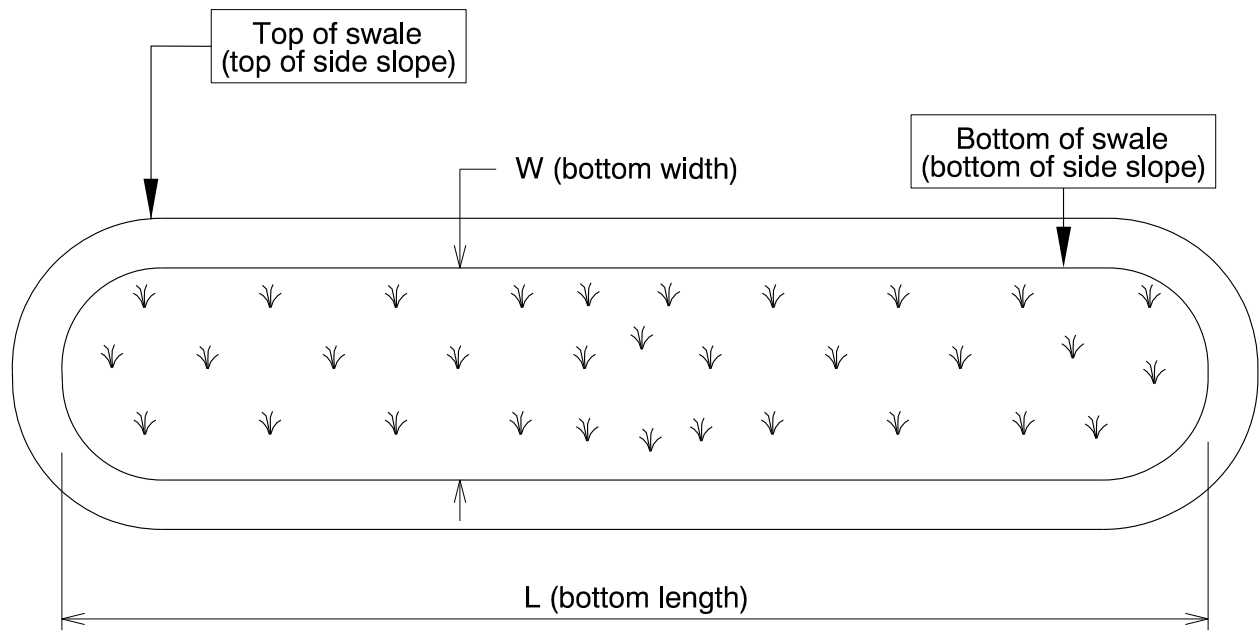
Figure 2: Facility location map

## 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:

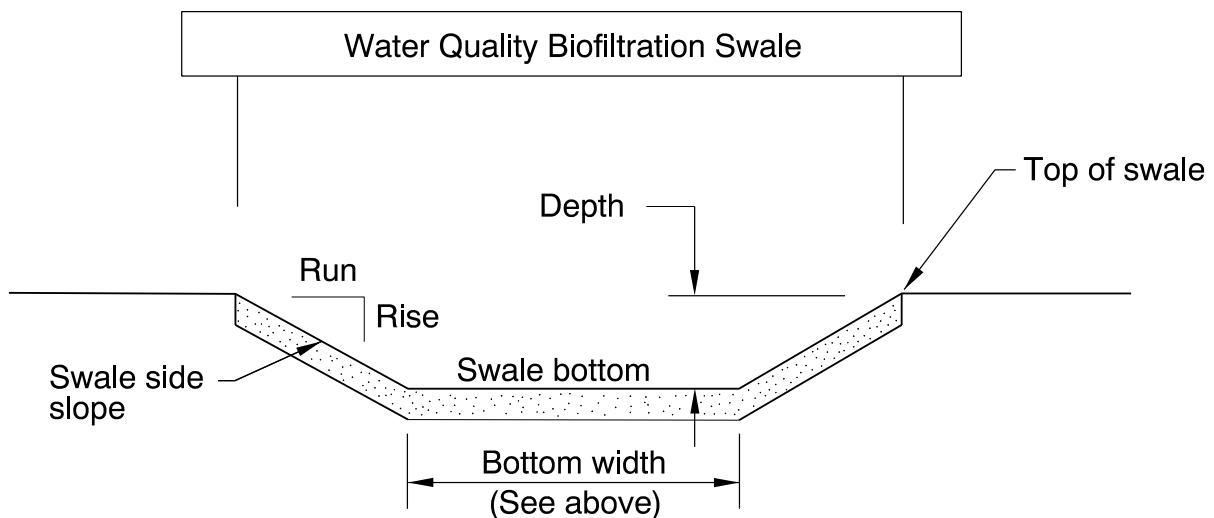
Bottom Length (feet)	Bottom Width (feet)
104	6



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 minimum	1	4



**Site Specific Information:** Water enters the facility from the east and exits on the west end of the swale. Stormwater flowing through the swale discharges to the inlet of a 36-inch diameter culvert and thence flows to the north through the culvert.

## 4. 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: Highway No.: 33, looking south

## 5. 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>
There is no bypass component. High flows drain 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:

<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>An on-line swale with roadside ditches</b>	<b>An on-line swale with piped inlets and outlets</b>	<b>An off-line swale with a piped high flow bypass</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.		

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 checked="" type="checkbox"/>	<b>S9</b>
Grass side slopes	<input checked="" type="checkbox"/>	<b>S10</b>
Granular drain rock	<input 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	<input checked="" type="checkbox"/>	<b>S14</b>
Perforated pipe	<input type="checkbox"/>	<b>S15</b>
Porous pavers (access grid)	<input type="checkbox"/>	<b>S16</b>
<b>Flow Spreader</b>		
Rock basin (used at swale inlet)	<input checked="" type="checkbox"/>	<b>S17</b>
Anchored board (midpoint of swale or every 50 feet along swale bottom)	<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 checked="" type="checkbox"/>	<b>S21</b>
Open channel outlet	<input 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>	<b>S24</b>
	<input type="checkbox"/> <b>L</b>	
	<input type="checkbox"/> <b>O</b>	
Ditch	<input type="checkbox"/>	<b>S25</b>
Storm drain system	<input checked="" type="checkbox"/>	<b>S26</b>
<b>Outfall Components</b>		
Riprap pad	<input type="checkbox"/>	<b>S27</b>
Riprap bank protection	<input type="checkbox"/>	<b>S28</b>

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

## 7. Limitations

Access grid installed:

<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes

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



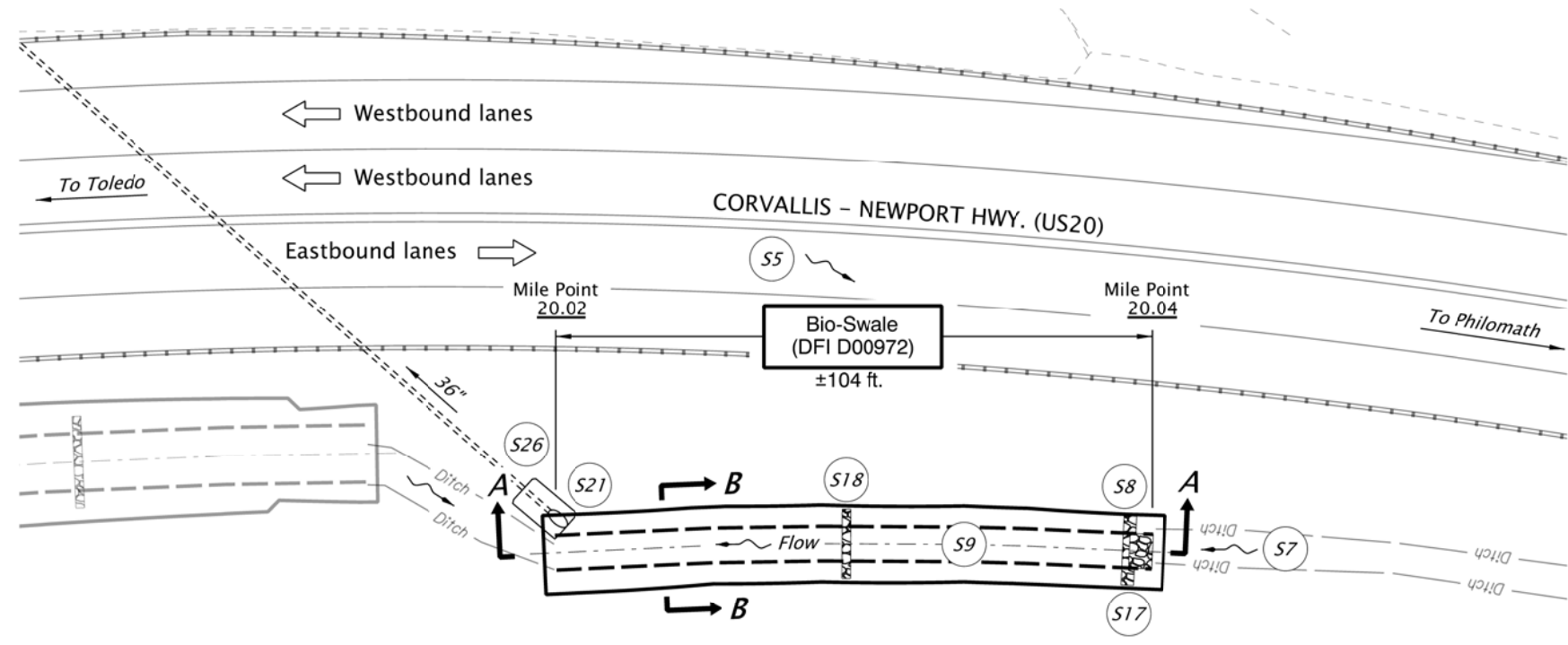
Contact any of the following for more detailed information about management of waste materials found on site:

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**

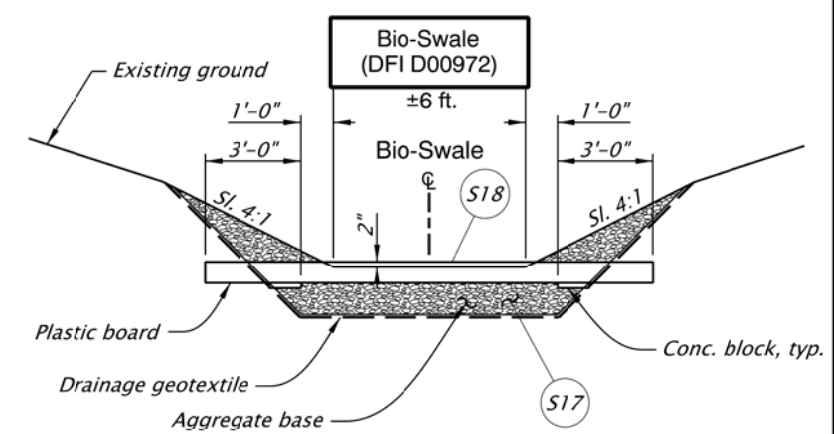
### **Contents:**

**Operational Plan: DFI D00972**

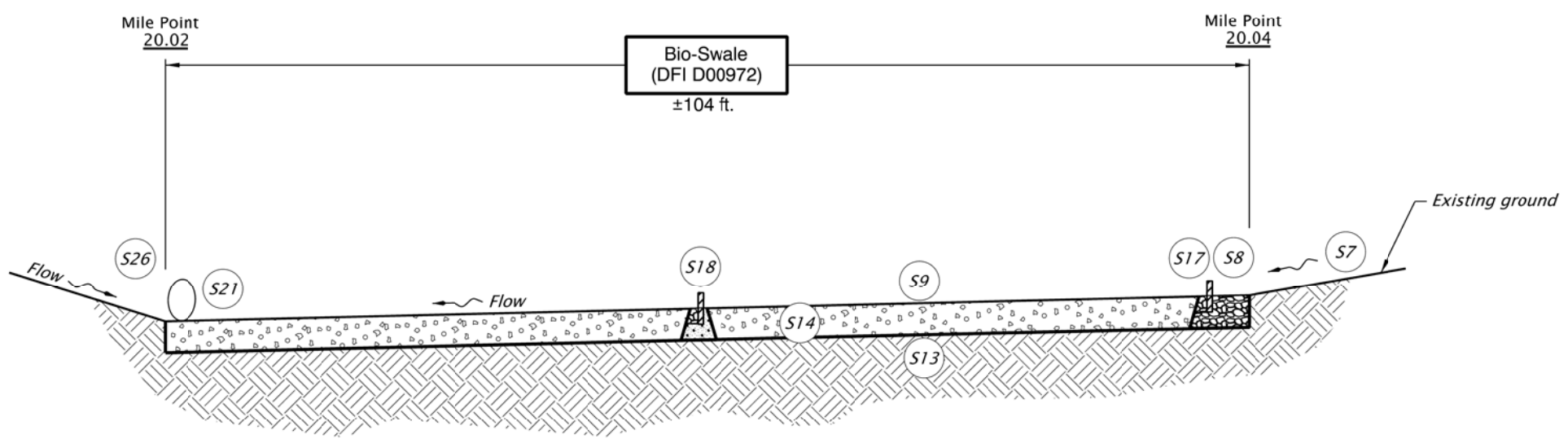


PLAN  
N.T.S.

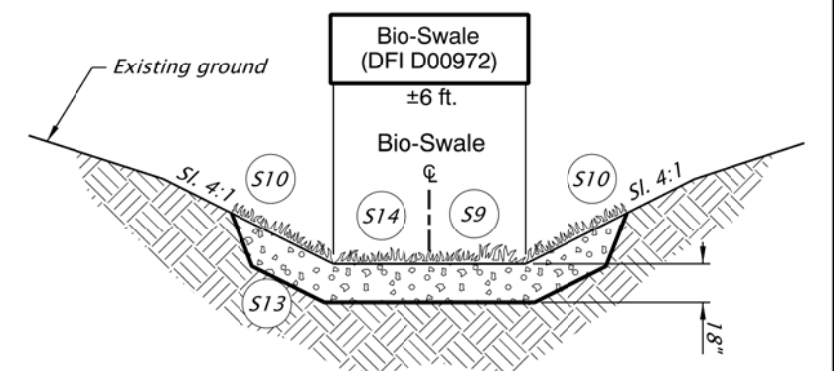
- LEGEND:**
- (X#) Facility Component (see table 1 in O&M Manual)
  - or ⊙ Manhole
  - or □ Inlet
  - Storm Pipe (Facility)
  - - - Storm Pipe
  - - - Ditch Line
  - ▭ Swale Boundary
  - Conveyance Direction
  - Pavement / Facility Flow Path
  - ← Traffic Flow Direction



FLOW SPREADER DETAIL  
N.T.S.



SECTION A-A  
N.T.S.



SECTION B-B  
N.T.S.

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By:  
Bruce Carmichael

Drafted By:  
Jeff Coon

**DFI D00972**  
**MAINTENANCE DISTRICT 4 HWY 33**  
**WATER QUALITY BIOFILTRATION SWALE**  
CORVALLIS-NEWPORT HIGHWAY MP 20.02  
LINCOLN COUNTY

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

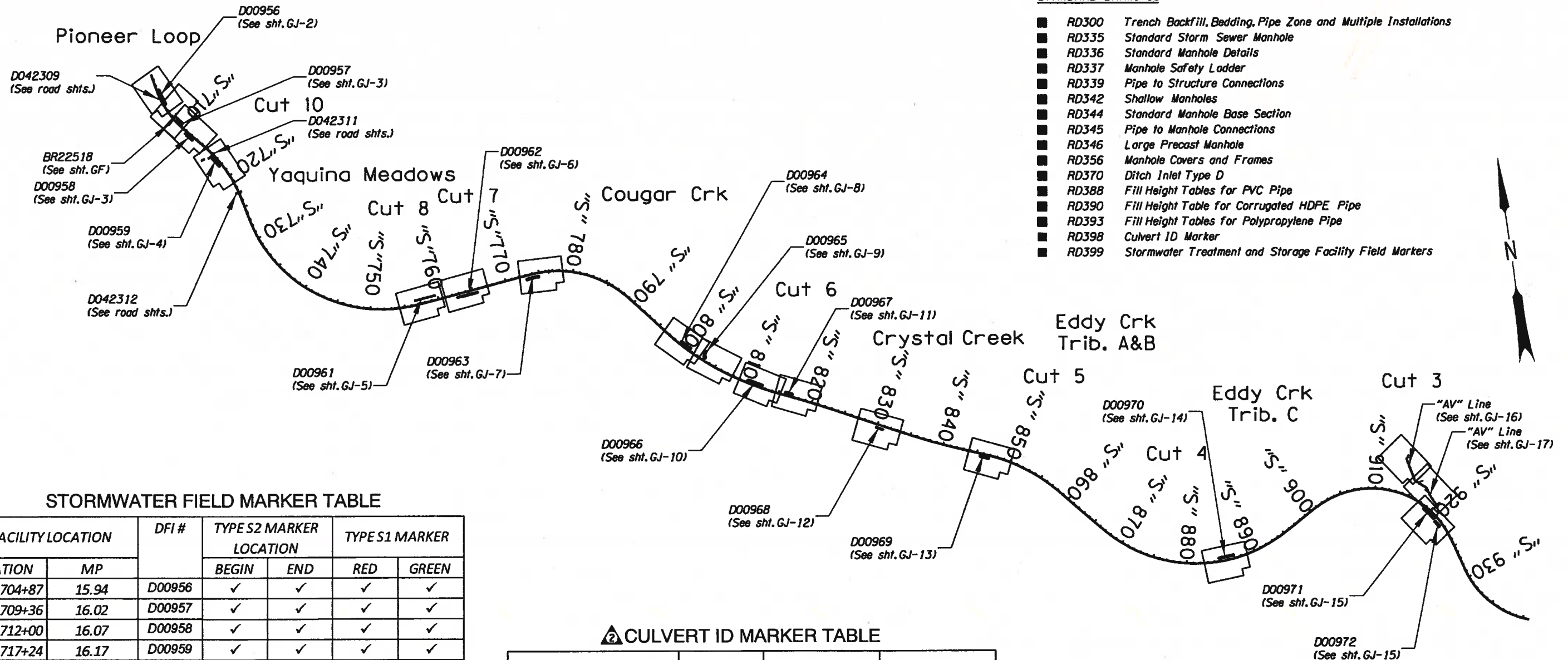
### **Contents:**

**Site Specific Subset of Project Contract Plan 49V-028**

HYDRAULIC FEATURE LOCATION INDEX

STANDARD DRAWINGS

- RD300 Trench Backfill, Bedding, Pipe Zone and Multiple Installations
- RD335 Standard Storm Sewer Manhole
- RD336 Standard Manhole Details
- RD337 Manhole Safety Ladder
- RD339 Pipe to Structure Connections
- RD342 Shallow Manholes
- RD344 Standard Manhole Base Section
- RD345 Pipe to Manhole Connections
- RD346 Large Precast Manhole
- RD356 Manhole Covers and Frames
- RD370 Ditch Inlet Type D
- RD388 Fill Height Tables for PVC Pipe
- RD390 Fill Height Table for Corrugated HDPE Pipe
- RD393 Fill Height Tables for Polypropylene Pipe
- RD398 Culvert ID Marker
- RD399 Stormwater Treatment and Storage Facility Field Markers



STORMWATER FIELD MARKER TABLE

FACILITY LOCATION		DFI #	TYPE S2 MARKER LOCATION		TYPE S1 MARKER	
STATION	MP		BEGIN	END	RED	GREEN
"S" 704+87	15.94	D00956	✓	✓	✓	✓
"S" 709+36	16.02	D00957	✓	✓	✓	✓
"S" 712+00	16.07	D00958	✓	✓	✓	✓
"S" 717+24	16.17	D00959	✓	✓	✓	✓
"S" 760+00	16.98	D00961	✓	✓	✓	✓
"S" 764+19	17.06	D00962	✓	✓	✓	✓
"S" 773+99	17.25	D00963	✓	✓	✓	✓
"S" 799+80	17.74	D00964	✓	✓	✓	✓
"S" 802+93	17.80	D00965	✓	✓	✓	✓
"S" 811+32	17.96	D00966	✓	✓	✓	✓
"S" 816+41	18.05	D00967	✓	✓	✓	✓
"S" 830+46	18.32	D00968	✓	✓	✓	✓
"S" 846+20	18.62	D00969	✓	✓	✓	✓
"S" 885+81	19.37	D00970	✓	✓	✓	✓
"S" 918+99	19.99	D00971	✓	✓	✓	✓
"S" 920+98	20.03	D00972	✓	✓	✓	✓

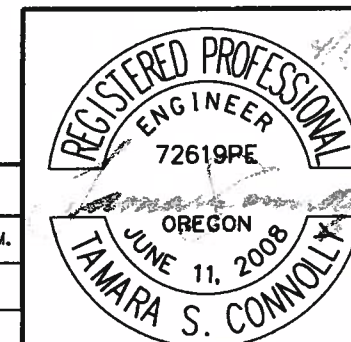
See Drg. No. RD399 for facility marker details.

CULVERT ID MARKER TABLE

FACILITY LOCATION		DFI #	TYPE 1 MARKER		TYPE 2 MARKER	
STATION	MP		INLET	INLET & OUTLET	INLET	INLET & OUTLET
"S" 704+86	15.94	D042309	✓		✓	
"S" 708+40	16.01	BR22518	✓		✓	
"S" 716+20	16.15	D042311	✓		✓	
"S" 722+85	16.28	D042312	✓		✓	

See Drg. No. RD398 for culvert marker details.

No.	DATE	REVISIONS	BY
②	04-04-16	Revised Culvert ID marker table	M.C.M.



RENEWS: 12/31/2017



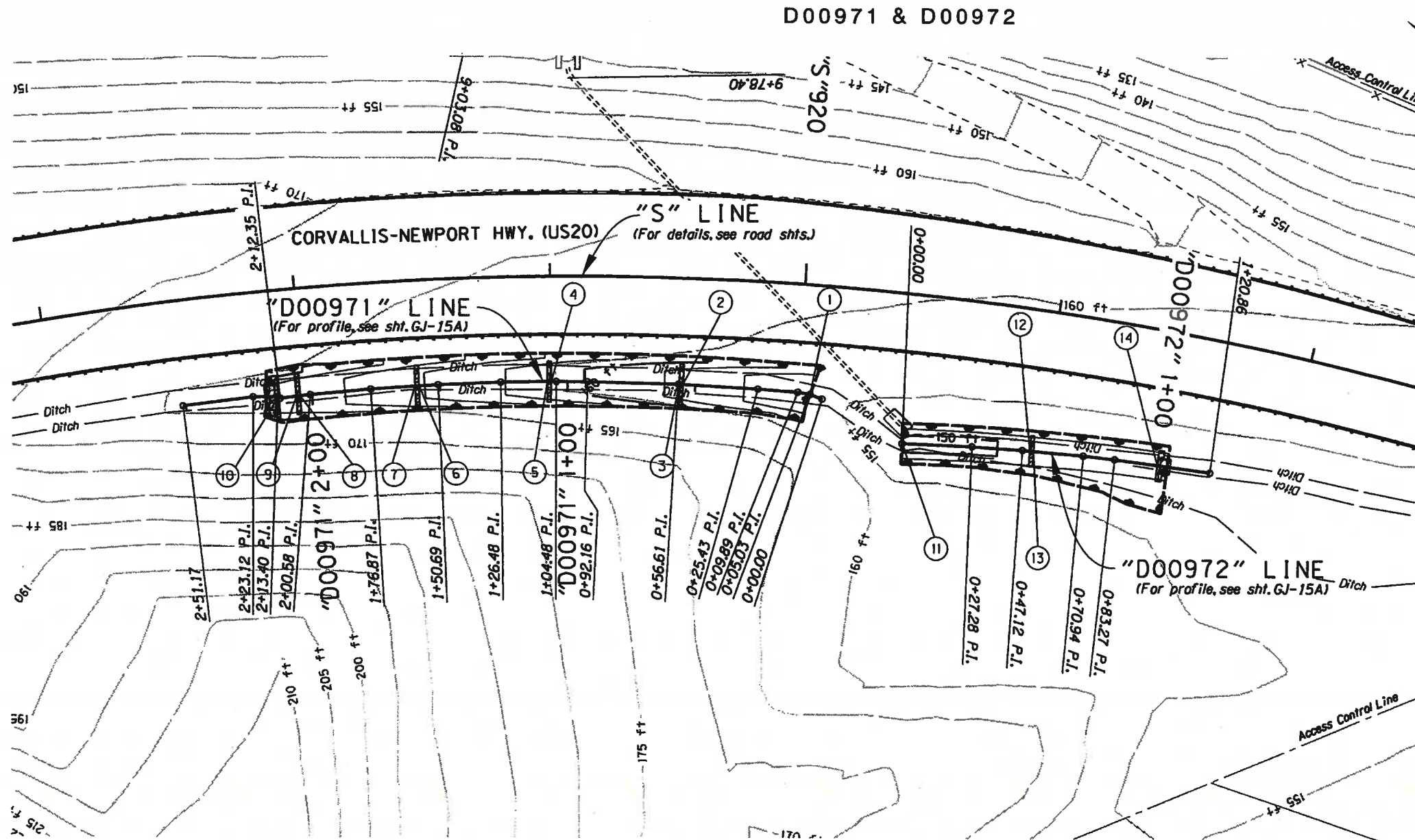
Otak Inc. 808 SW Third Avenue, Suite 300  
Portland, Oregon 97204  
Phone: (503)287-6825 Fax: (503)415-2904

FFO-US20 PME: UPRR - EDDYVILLE  
(PHASE 4) SECTION  
CORVALLIS - NEWPORT HIGHWAY  
LINCOLN COUNTY

Design Team Leader - Melanie McCandless  
Designed By - Jeremy Tamargo  
Drafted By - Sadie Reiter

WATER QUALITY PLAN  
LAYOUT SHEET

SHEET NO.  
GJ



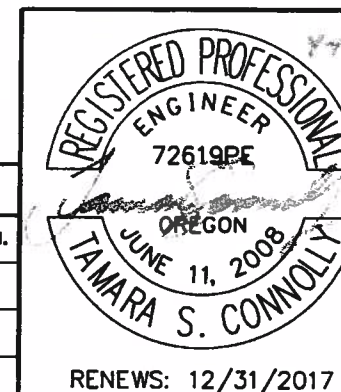
GENERAL NOTES:

1. Sta. "S" 920+10.05, 44.07' Rt.  
Begin Sta. "D00971" 0+00
2. Sta. "D00971" 0+05 to Sta. "D00971" 2+18.0  
Const. water quality swale, see table this sht.
3. Sta. "S" 920+44.08, 58.46' Rt.  
Begin Sta. "D00972" 0+00
4. Sta. "D00972" 0+00 to Sta. "D00972" 1+04.0  
Const. water quality swale, see table this sht.

#	"D00971" Line Sta. begin	"D00971" Line Sta. end	Const. (For details, see shts. GJ-20 thru GJ-22)
①	0+05.0	0+55.0	Water quality section
②	0+55.0	0+56.5	Flow spreader
③	0+56.5	1+06.5	Water quality section
④	1+06.5	1+08.0	Flow spreader
⑤	1+08.0	1+58.0	Water quality section
⑥	1+58.0	1+59.5	Flow spreader
⑦	1+59.5	2+09.5	Water quality section
⑧	2+09.5	2+11.0	Flow spreader
⑨	2+11.0	2+14.0	Water quality section
⑩	2+14.0	2+18.0	Energy dissipator

#	"D00972" Line Sta. begin	"D00972" Line Sta. end	Const. (For details, see shts. GJ-20 thru GJ-22)
⑪	0+00.0	0+50.0	Water quality section
⑫	0+50.0	0+51.5	Flow spreader
⑬	0+51.5	1+00.0	Water quality section
⑭	1+00.0	1+04.0	Energy dissipator

No.	DATE	REVISIONS	BY
②	04-04-16	Swale grading revisions to match ditch line	M.C.M.



**OREGON DEPARTMENT OF TRANSPORTATION**

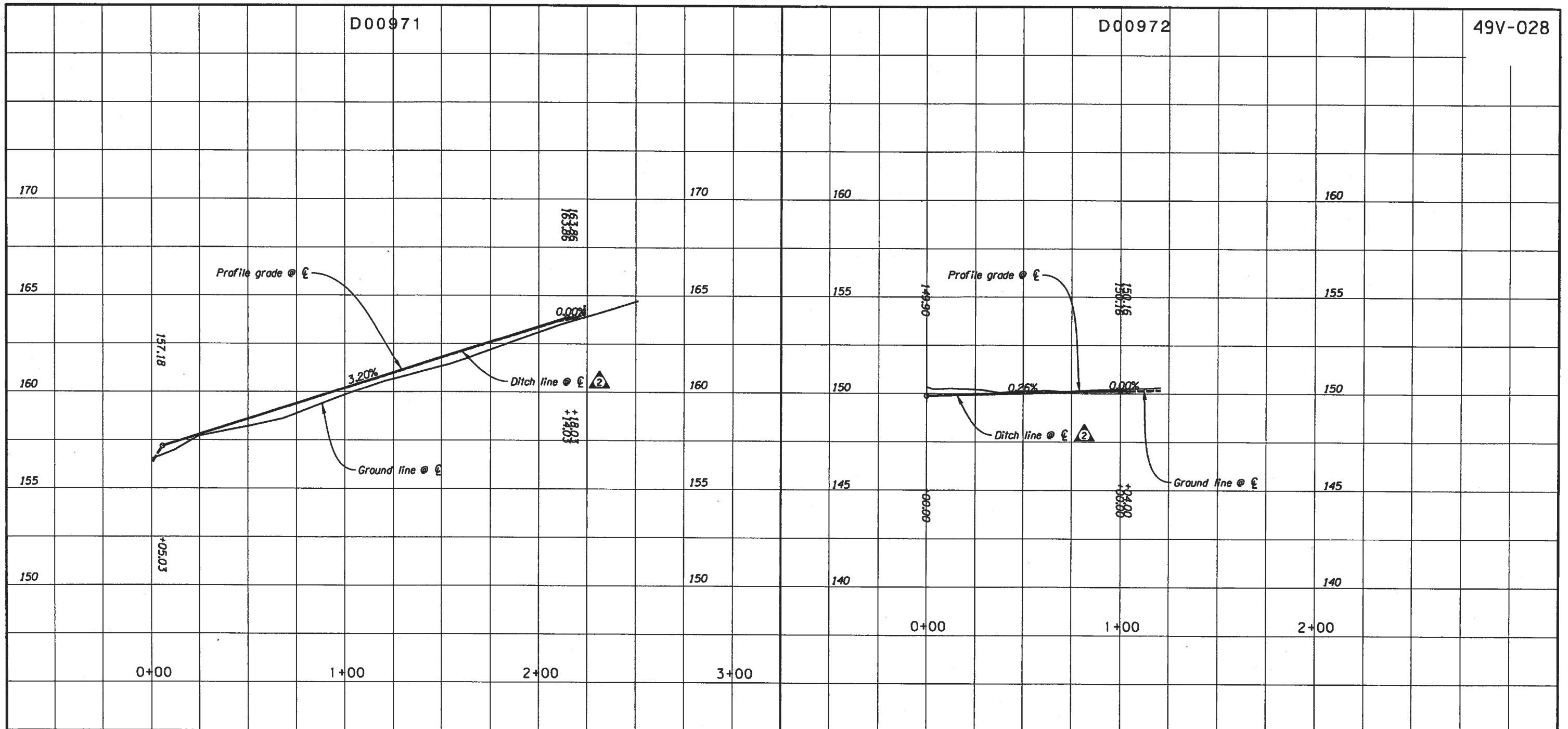
**Otak Inc.**  
808 SW Third Avenue, Suite 300  
Portland, Oregon 97204  
Phone: (503)287-8825 Fax: (503)415-2304

**FFO-US20 PME: UPRR - EDDYVILLE (PHASE 4) SECTION**  
CORVALLIS - NEWPORT HIGHWAY  
LINCOLN COUNTY

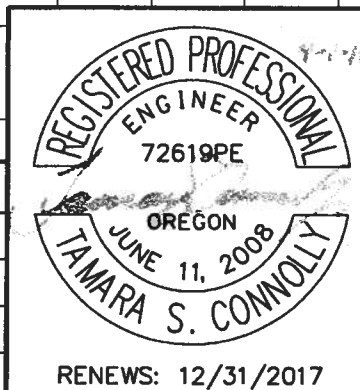
Design Team Leader - Melanie McCandless  
Designed By - Jeremy Tamargo  
Drafted By - Sodie Reiter

**WATER QUALITY SWALE PLAN**

SHEET NO. **GJ-15**



No.	DATE	REVISIONS	BY
2	04-04-16	Swale grading revisions to match ditch line	M.C.M.



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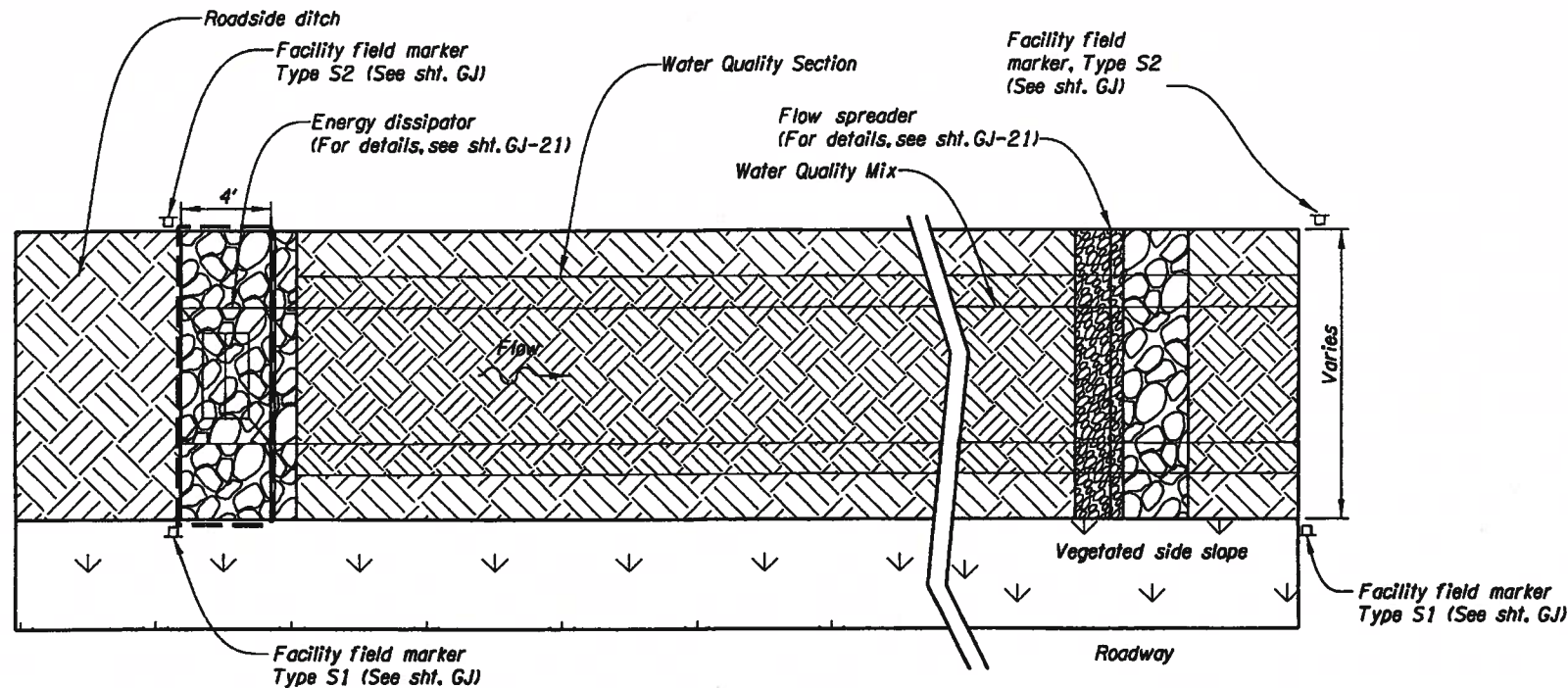
**Otak Inc.** 808 SW Third Avenue, Suite 300  
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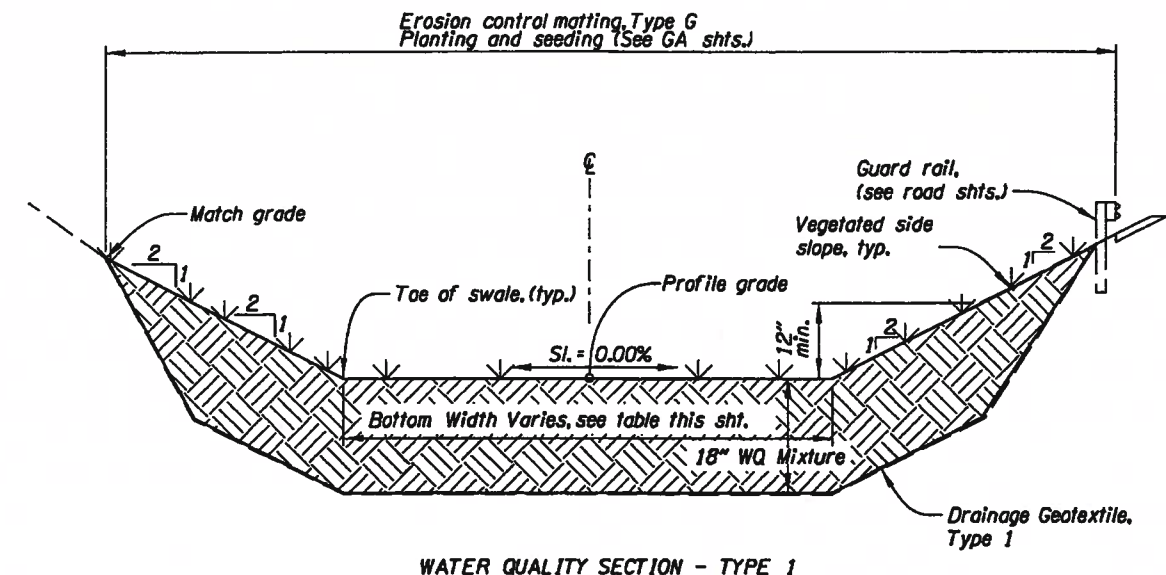
Design Team Leader - Melanie McCandless  
 Designed By - Jeremy Tamargo  
 Drafted By - Sadie Reiter

**WATER QUALITY SWALE PROFILE**

SHEET NO. **GJ-15A**

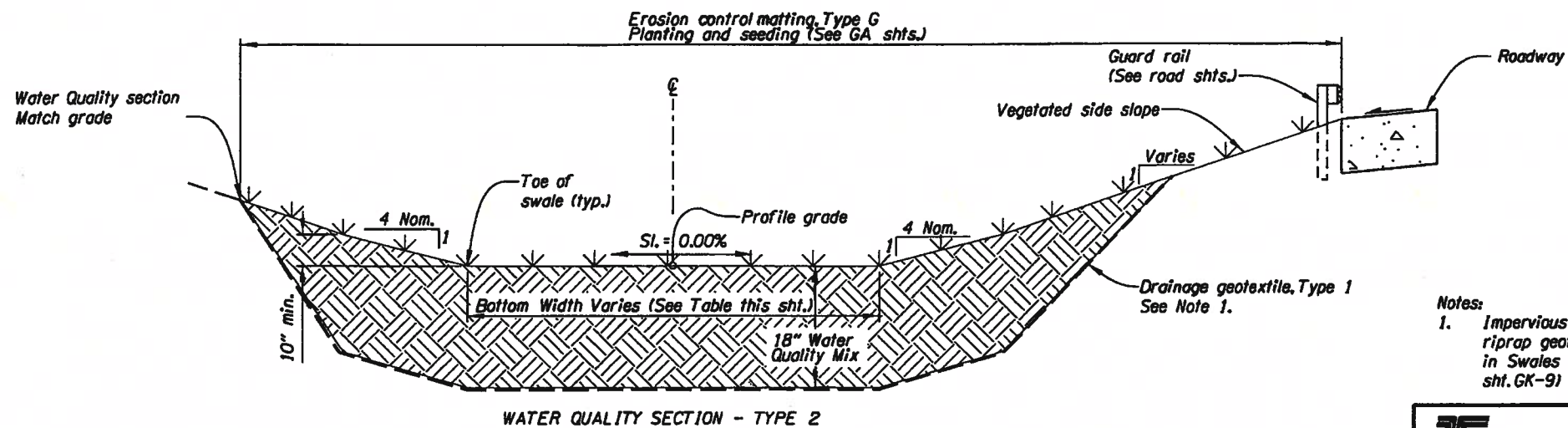


PLAN



WATER QUALITY SECTION - TYPE 1

SWALE DATA TABLE		
SWALE	BOTTOM WIDTH (FT)	TYPE
D00955	6.0	1
D00956	6.0	1
D00957	6.0	1
D00958	6.0	1
D00959	8.0	1
D00962	6.0	2
D00963	6.0	2
D00964	6.0	2
D00965	6.0	2
D00966	8.0	2
D00967	6.0	2
D00968	4.0	2
D00969	6.0	2
D00970	8.0	2
D00971	10.0	2
D00972	6.0	2

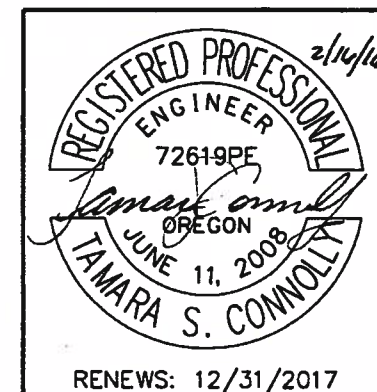


WATER QUALITY SECTION - TYPE 2

WATER QUALITY SWALE DETAIL

Not to Scale

- Notes:
- Impervious liner shall replace riprap geotextile and drainage geotextile in Swales D00965 and D00970. (For details, see sht. GK-9)



RENEWS: 12/31/2017

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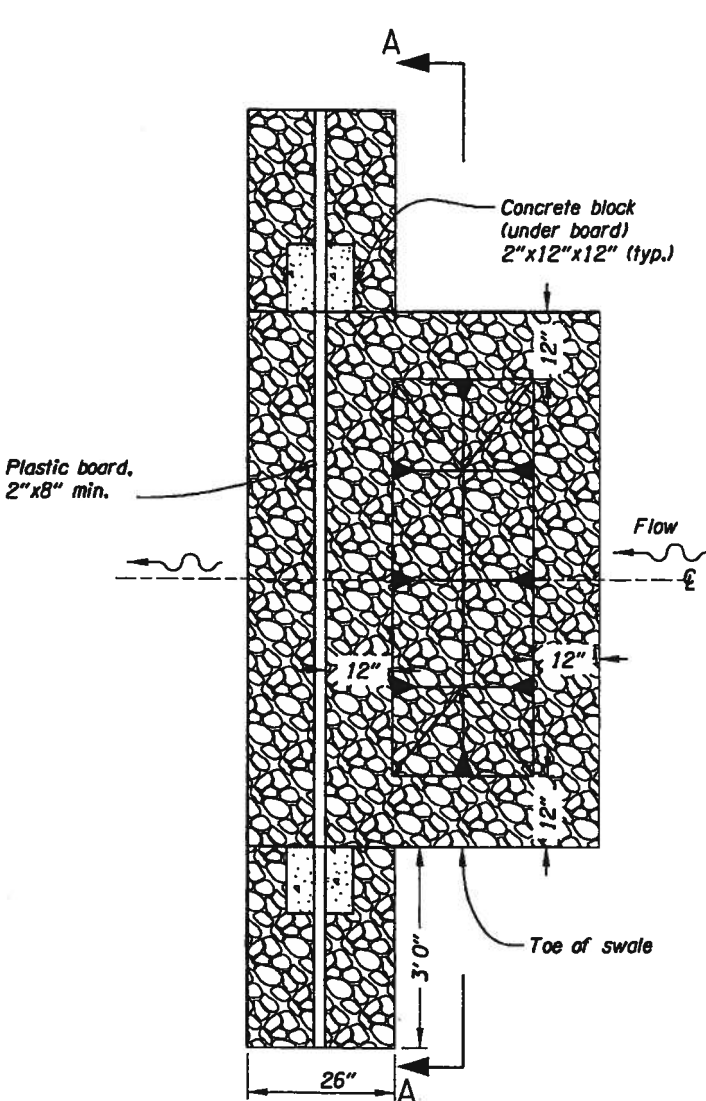
**FFO-US20 PME: UPRR - EDDYVILLE (PHASE 4) SECTION**  
 CORVALLIS - NEWPORT HIGHWAY  
 LINCOLN COUNTY

Design Team Leader - Melanie McCandless  
 Designed By - Tammi Connolly  
 Drafted By - Sadie Reiter

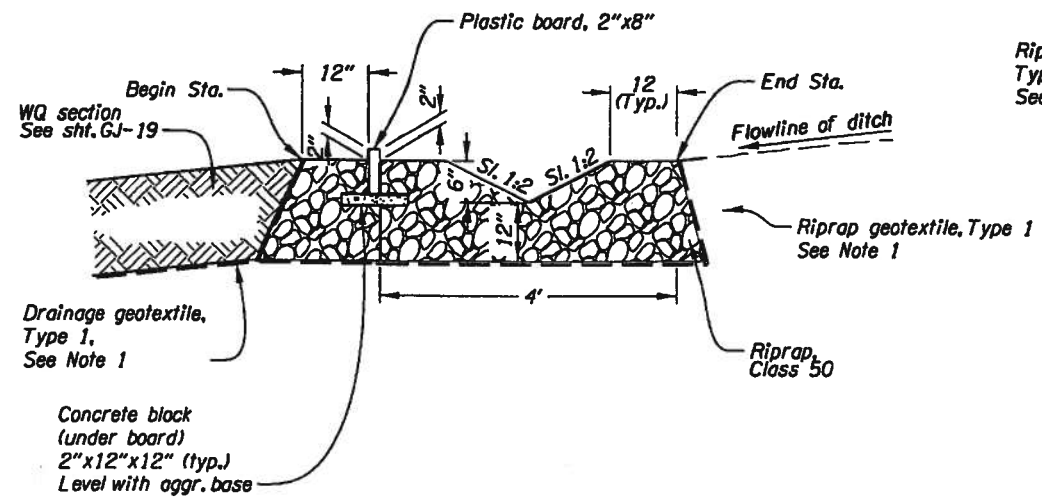
**WATER QUALITY SWALE DETAILS**

SHEET NO. GJ-20

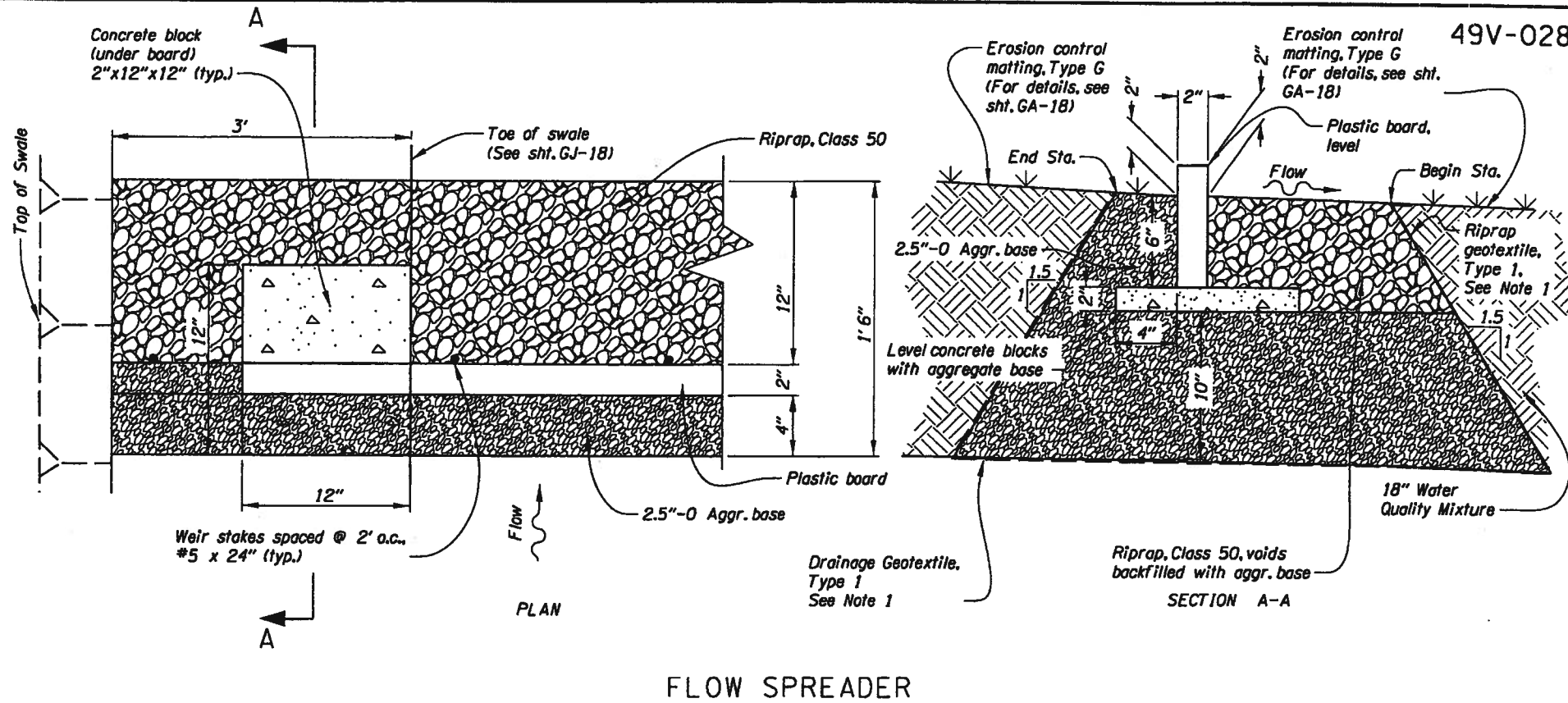




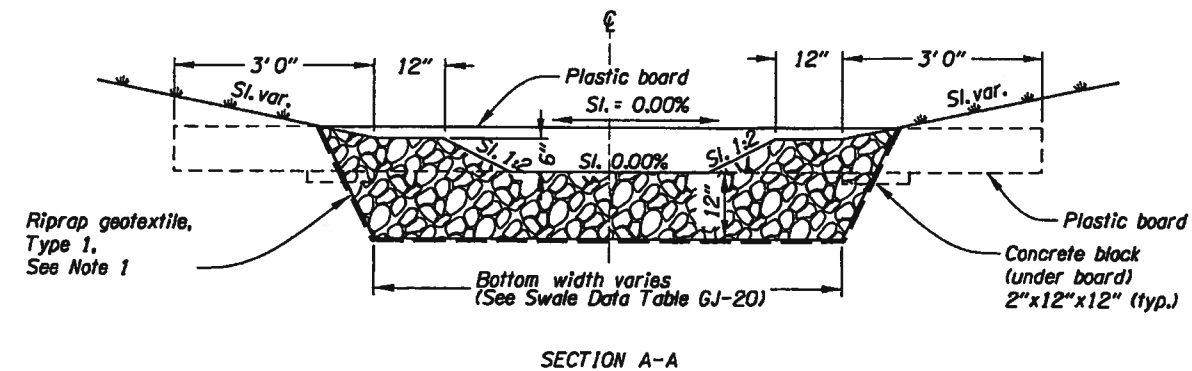
PLAN



PROFILE

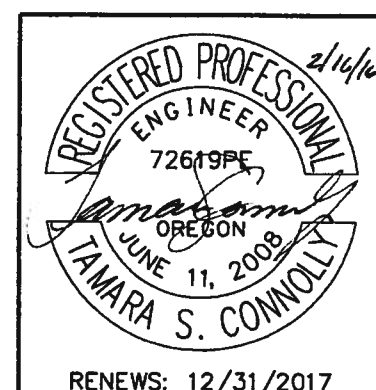


Notes:  
1. Impervious liner shall replace riprap geotextile and drainage geotextile in Swales D00965 and D00970. See sht. GK-9.

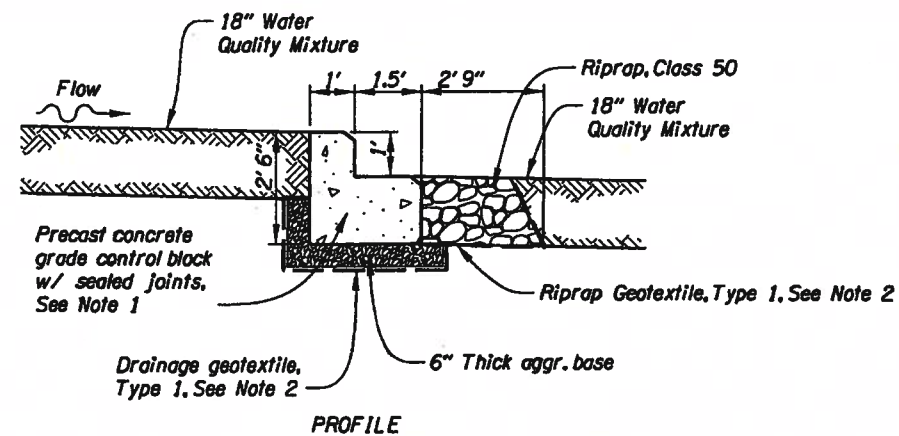
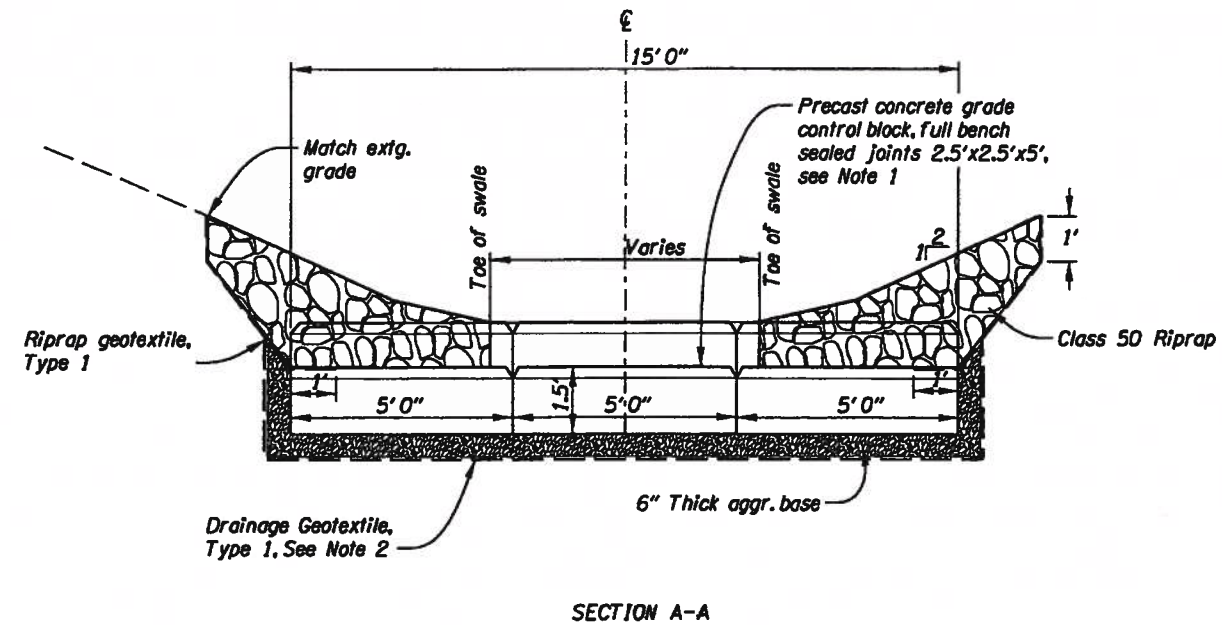
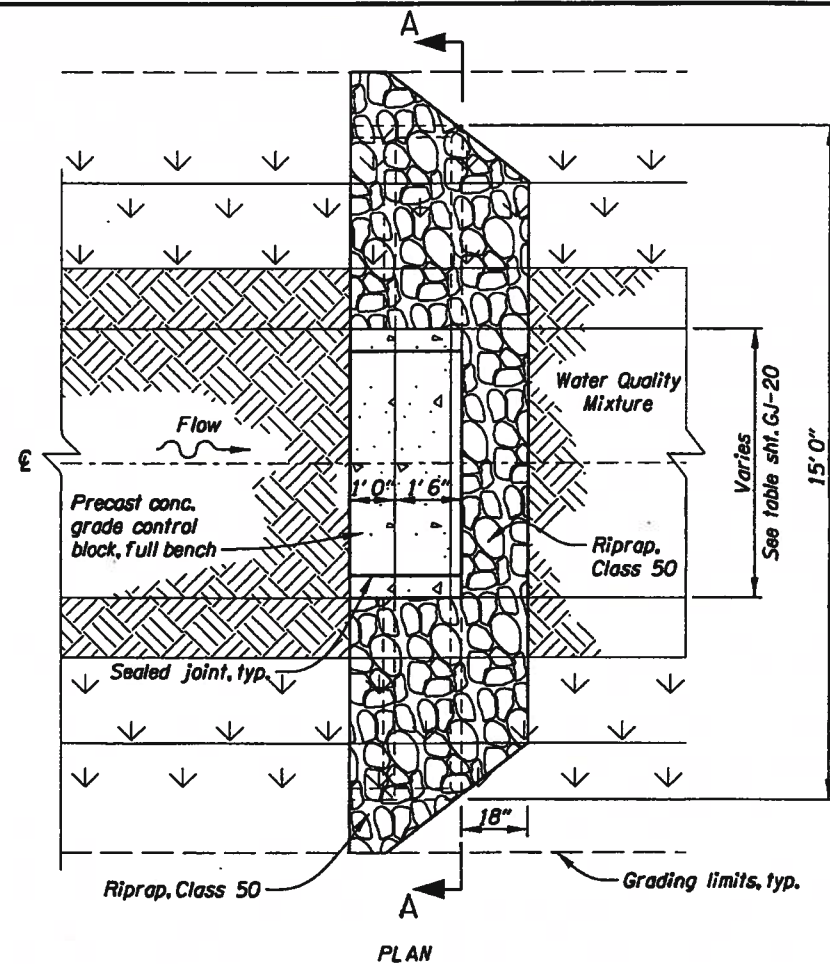


Notes:  
1. Impervious liner shall replace riprap geotextile and drainage geotextile in Swales D00965 and D00970. See sht. GK-9.

ENERGY DISSIPATOR  
Not to Scale



<p>OREGON DEPARTMENT OF TRANSPORTATION</p>	
<p>808 SW Third Avenue, Suite 300 Portland, Oregon 97204 Phone: (503)287-6825 Fax: (503)415-2304</p>	
<p><b>FFO-US20 PME: UPRR - EDDYVILLE (PHASE 4) SECTION</b> CORVALLIS - NEWPORT HIGHWAY LINCOLN COUNTY</p>	
<p>Design Team Leader - Melanie McCandless Designed By - Tammi Connolly Drafted By - Sadie Reiter</p>	
<p><b>WATER QUALITY SWALE DETAILS</b></p>	<p>SHEET NO. <b>GJ-21</b></p>



PRECAST CONCRETE GRADE CONTROL  
Not to Scale

- Notes:
1. Seal joints between precast concrete grade control blocks with Non-Shrink Grout meeting the requirements of Standard Specification Section 02440.
  2. Impervious liner shall replace riprap geotextile and drainage geotextile in Swales D00965 and D00970. See sht. GK-9.

<p>OREGON DEPARTMENT OF TRANSPORTATION</p>	
<p>Otak Inc. ManmGlobal Partner</p>	<p>808 SW Third Avenue, Suite 300 Portland, Oregon 97204 Phone: (503)287-8825 Fax: (503)415-2304</p>
<p>FFO-US20 PME: UPRR - EDDYVILLE (PHASE 4) SECTION CORVALLIS - NEWPORT HIGHWAY LINCOLN COUNTY</p>	
<p>Design Team Leader - Melanie McCandless Designed By - Tammi Connolly Drafted By - Sadie Reiter</p>	
<p>WATER QUALITY SWALE DETAILS</p>	<p>SHEET NO. GJ-22</p>