

# OPERATION & MAINTENANCE MANUAL

## Water Quality Biofiltration Swale

Manual prepared: June, 2019

DFI No. D00611



Figure 1: DFI No. D00611, looking [southwest]

### Identification

Drainage Facility ID (DFI):	D00611
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 45v-073
Location:	District: 03
	Highway No.: 162
	Mile Post: 1.58 to 1.60, [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



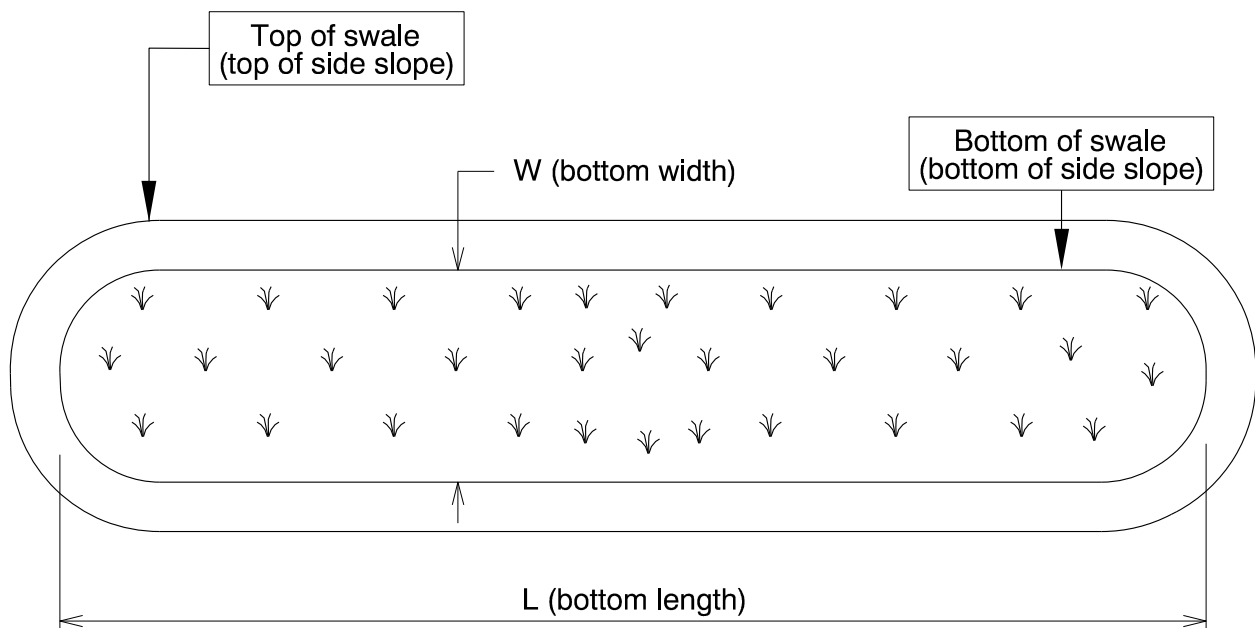
Figure 2: Facility location map

### 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:

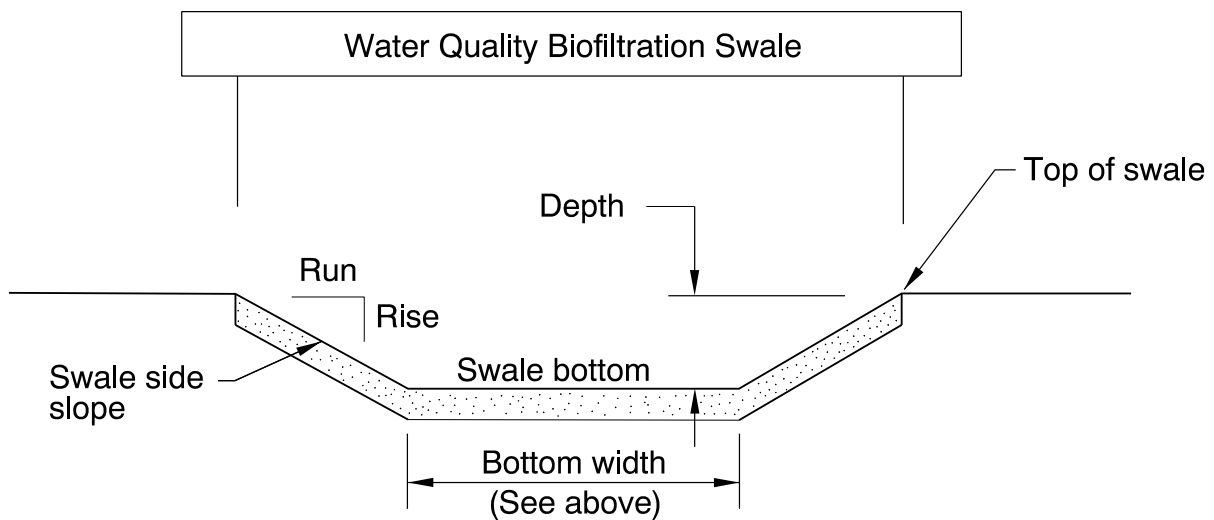
Bottom Length (feet)	Bottom Width (feet)
116	24



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)
Varies	1	4



**Site Specific Information:** Water enters the swale from a pipe on the east side and exits in a ditch on the west side. Rock check dams spread flow within the swale.

## 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: [Access from roadside shoulder]

## 5. Operational Components / Maintenance Items

### Classification

This facility is classified as an:

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

<input type="checkbox"/> No	<input checked="" type="checkbox"/> 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 #
<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 checked="" 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 checked="" type="checkbox"/>	<b>S6</b>
Open channel inlet	<input 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 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 (rock weir @ 55.5')	<input checked="" type="checkbox"/>	<b>S17</b>
Anchored board (midpoint of swale or every 50 feet along swale bottom)	<input type="checkbox"/>	<b>S18</b>
Other: concrete weir @ inlet	<input checked="" 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: N/A	<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 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
There are <b>(no)</b> 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.



## 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:

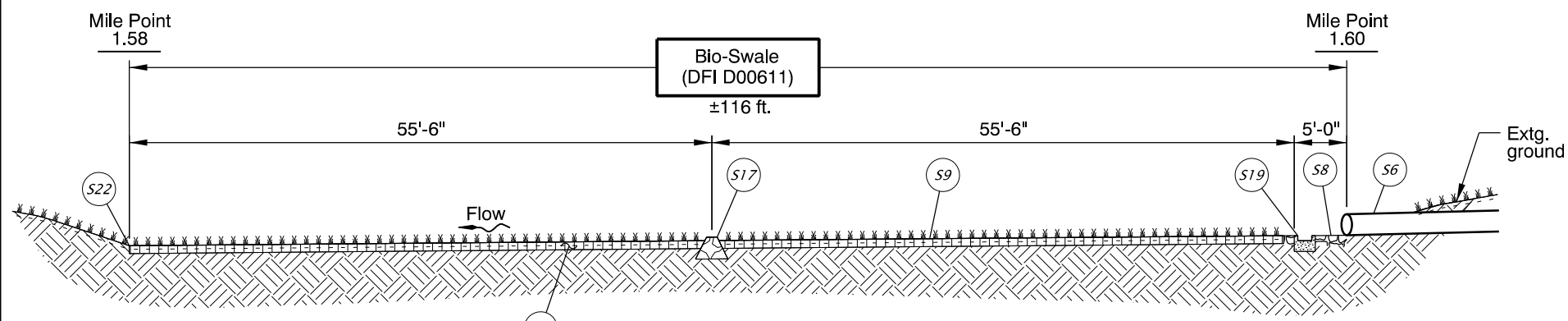
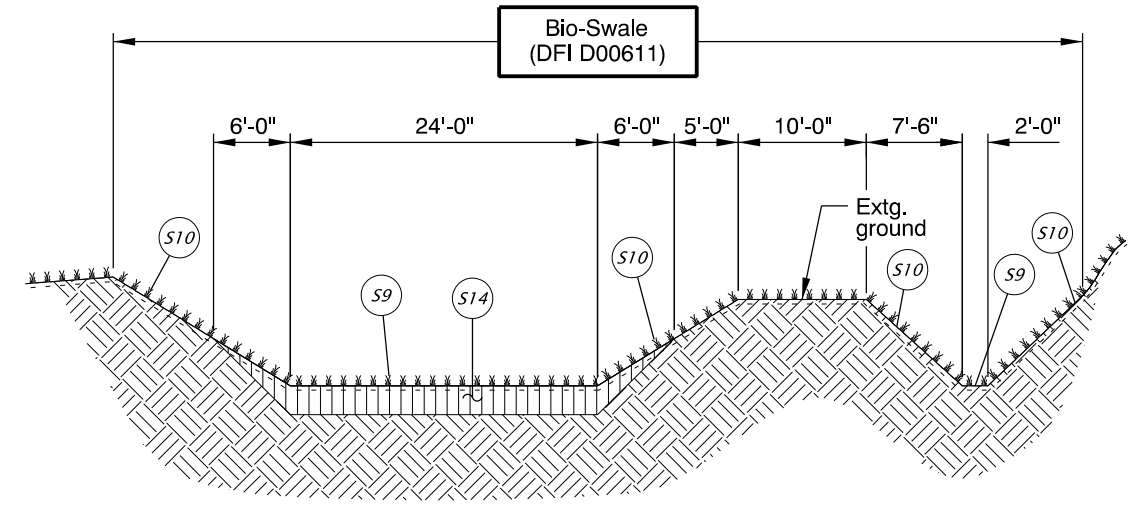
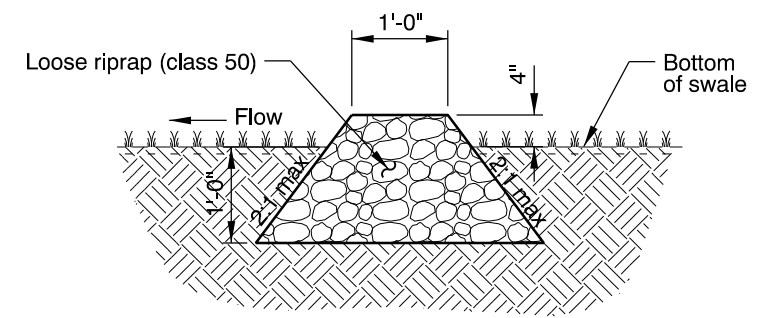
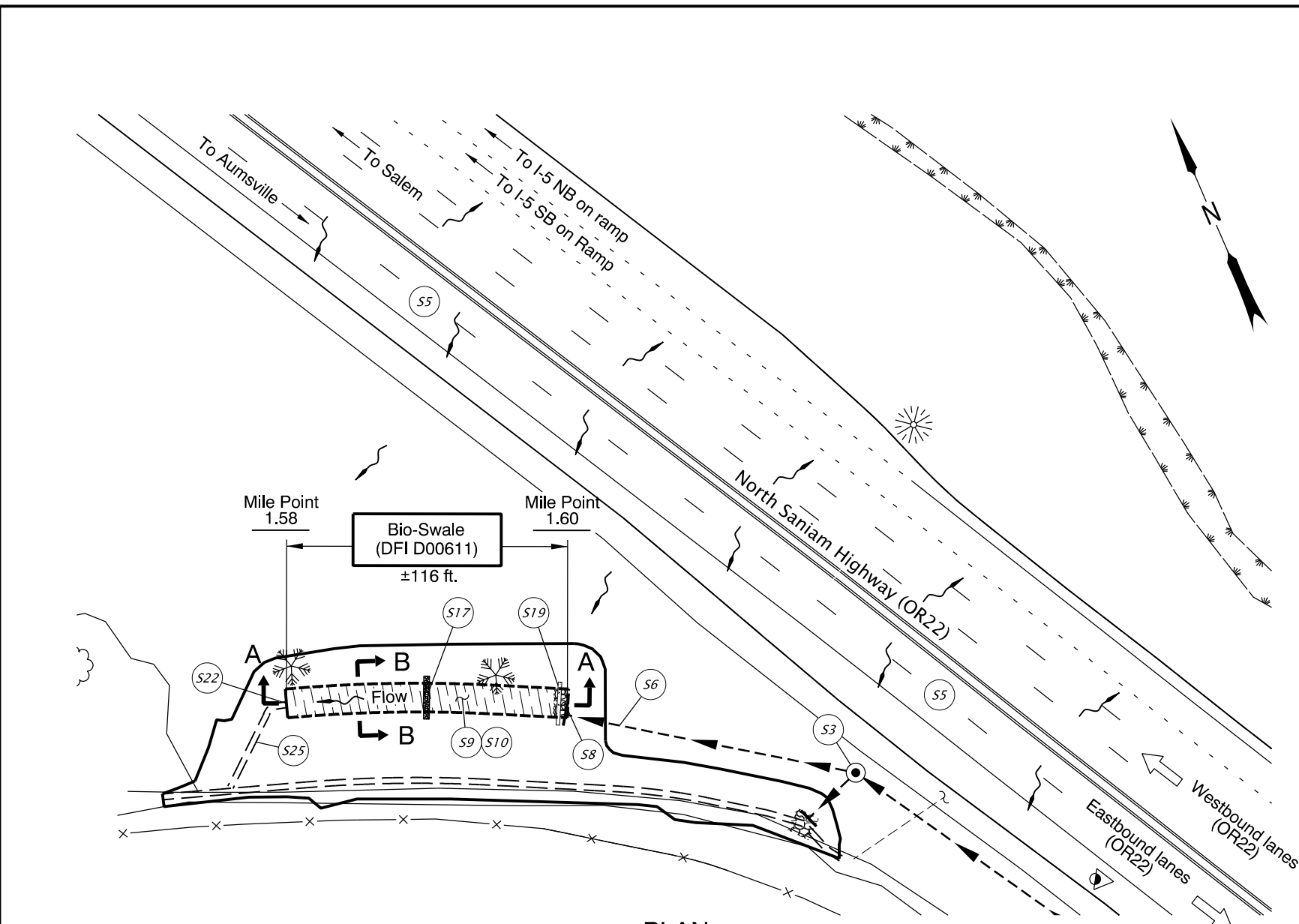
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442
ODOT Region 1 Hazmat Coordinator	(503) 731-8290
ODOT Region 2 Hazmat Coordinator	(503) 986-2647
ODOT Region 3 Hazmat Coordinator	(541) 957-3594
ODOT Region 4 Hazmat Coordinator	(541) 388-6186
ODOT Region 5 Hazmat Coordinator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

## **A Appendix A – Site Specific Operational Plan**

### **Contents:**

**Operational Plan: DFI D00611**

- LEGEND:**
- Photo Location / Direction
  - Facility Component (see table 1 in O&M Manual)
  - Manhole
  - Ditch Line
  - Swale Bottom
  - Swale Boundary
  - Storm Pipe (Facility)
  - Conveyance Direction
  - Pavement / Facility Flow Path



Prepared By:  
Chris Carman

Drafted By:  
Michael Skelton

**DFI D00611**  
**MAINTENANCE DISTRICT 3 OR22**  
**WATER QUALITY BIOFILTRATION SWALE**  
**NORTH SANTIAM HIGHWAY MP 1.58 RT.**  
**MARION COUNTY**

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

### **Contents:**

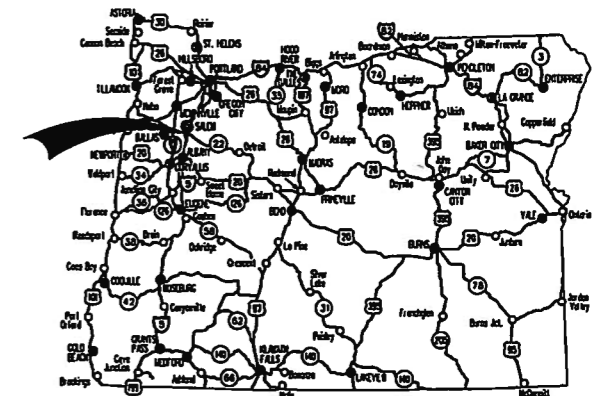
**Site Specific Subset of Project Contract Plan 45v-073**

STATE OF OREGON  
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING,  
ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

OR 22 BRIDGE VERTICAL CLEARANCE  
BRIDGE PROJECTS



Overall Length Of Project - 8.37 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.)

PLANS PREPARED FOR  
OREGON DEPARTMENT OF TRANSPORTATION  
BY:

**WHPacific**

3470 Pipeband Place  
Suite 170  
Salem, OR 97301  
t: 503.362.4675 f: 503.362.5078

OREGON TRANSPORTATION COMMISSION  
Pat Egan CHAIR  
Mary F. Olson COMMISSIONER  
David Lahman COMMISSIONER  
Mark Frohnmayer COMMISSIONER  
Tammy Baney COMMISSIONER  
Matthew L. Garrett DIRECTOR OF TRANSPORTATION

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: *Ed Chamberland* 5/14/12  
Signature & date

**Ed Chamberland, Sr. P.M.**  
Print name and title

*Ed Chamberland*  
Concurrence by ODOT Chief Engineer

OR22 BRIDGE VERTICAL CLEARANCE  
BRIDGE PROJECTS

NORTH SANTIAM HIGHWAY MARION COUNTY		
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	NH-S162(050)	1

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets
1A-2	Std. Drg. Nos.

BEGINNING OF CONTRACT

NH-S162(050)  
STA. "NS" 174+44 (M.P. 1.67)

NORTH SANTIAM HIGHWAY  
MARION COUNTY  
JULY 2012

CORDON ROAD O'XING  
BRIDGE NO. 08473 (M.P. 2.82)

END OF CONTRACT

NH-S162(050)  
STA. "NS" 626+50 (M.P. 10.04)

LANCASTER  
DRIVE O'XING  
BRIDGE NO. 07770  
(M.P. 1.91)

END OF PRESERVATION

STA. "NS" 358+76 (M.P. 5.16)

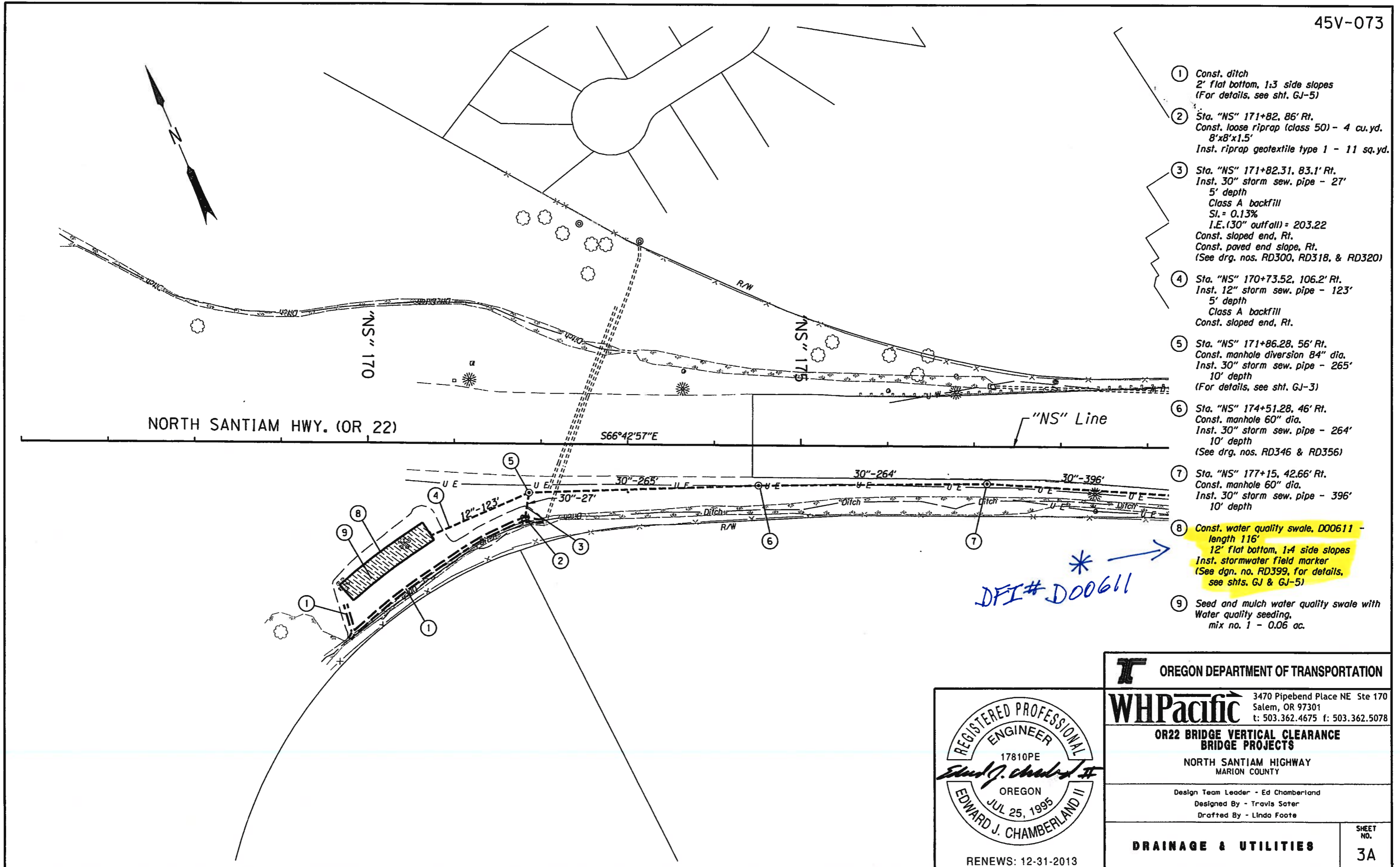
72ND AVENUE O'XING  
BRIDGE NO. 08074 (M.P. 5.92)

ALBUS ROAD O'XING  
BRIDGE NO. 08077 (M.P. 10.04)



T. 7 S., R. 2 W., W.M.  
T. 8 S., R. 2 W., W.M.  
T. 8 S., R. 1 W., W.M.



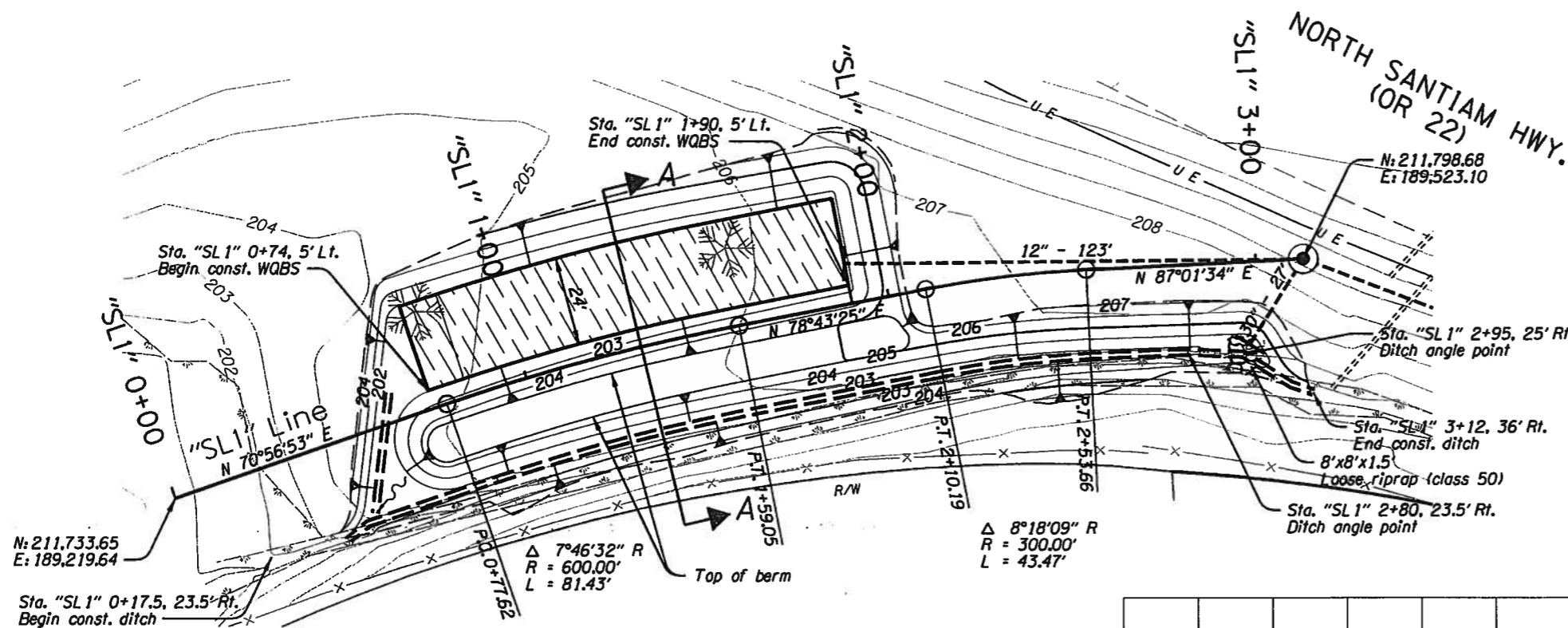


- ① Const. ditch  
2' flat bottom, 1:3 side slopes  
(For details, see sht. GJ-5)
- ② Sta. "NS" 171+82, 86' Rt.  
Const. loose riprap (class 50) - 4 cu.yd.  
8'x8'x1.5'  
Inst. riprap geotextile type 1 - 11 sq.yd.
- ③ Sta. "NS" 171+82.31, 83.1' Rt.  
Inst. 30" storm sew. pipe - 27'  
5' depth  
Class A backfill  
St. = 0.13%  
I.E. (30" outfall) = 203.22  
Const. sloped end, Rt.  
Const. paved end slope, Rt.  
(See drg. nos. RD300, RD318, & RD320)
- ④ Sta. "NS" 170+73.52, 106.2' Rt.  
Inst. 12" storm sew. pipe - 123'  
5' depth  
Class A backfill  
Const. sloped end, Rt.
- ⑤ Sta. "NS" 171+86.28, 56' Rt.  
Const. manhole diversion 84" dia.  
Inst. 30" storm sew. pipe - 265'  
10' depth  
(For details, see sht. GJ-3)
- ⑥ Sta. "NS" 174+51.28, 46' Rt.  
Const. manhole 60" dia.  
Inst. 30" storm sew. pipe - 264'  
10' depth  
(See drg. nos. RD346 & RD356)
- ⑦ Sta. "NS" 177+15, 42.66' Rt.  
Const. manhole 60" dia.  
Inst. 30" storm sew. pipe - 396'  
10' depth
- ⑧ Const. water quality swale, D00611 -  
length 116'  
12' flat bottom, 1:4 side slopes  
Inst. stormwater field marker  
(See dgn. no. RD399, for details,  
see shts. GJ & GJ-5)
- ⑨ Seed and mulch water quality swale with  
Water quality seeding,  
mix no. 1 - 0.06 ac.

\* →  
DFI# D00611

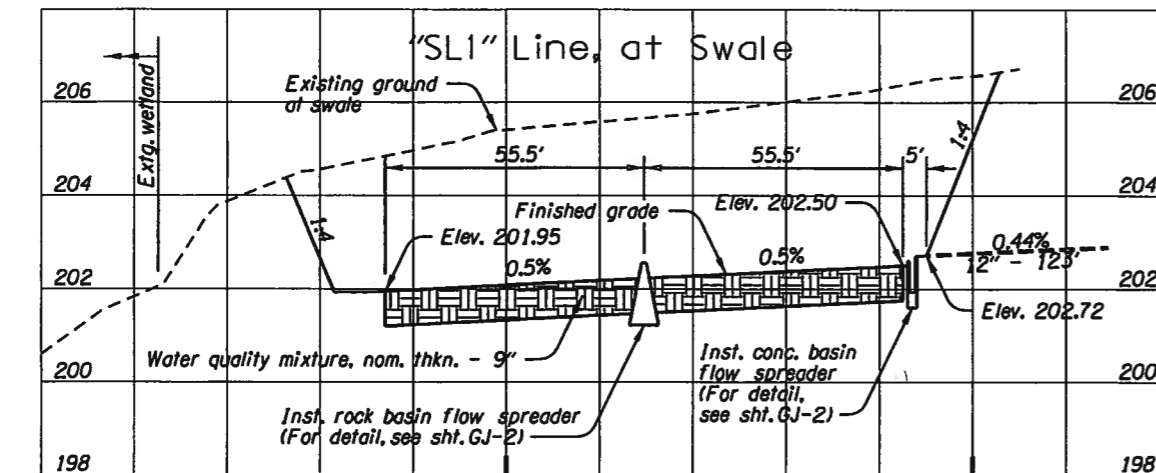


<b>OREGON DEPARTMENT OF TRANSPORTATION</b>	
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3470 Pipebend Place NE Ste 170 Salem, OR 97301 t: 503.362.4675 f: 503.362.5078	
<b>OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS</b>	
NORTH SANTIAM HIGHWAY MARION COUNTY	
Design Team Leader - Ed Chamberland Designed By - Travis Soter Drafted By - Linda Foote	
<b>DRAINAGE &amp; UTILITIES</b>	SHEET NO. <b>3A</b>

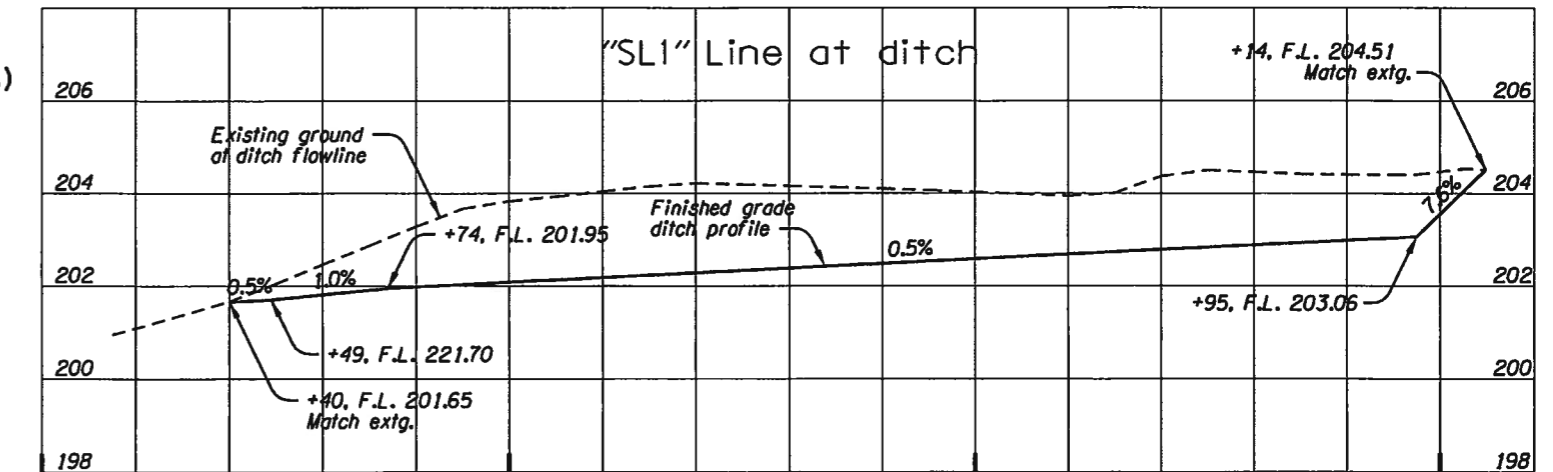


WATER QUALITY BIOFILTRATION SWALE (WQBS)  
SCALE: 1"=40'

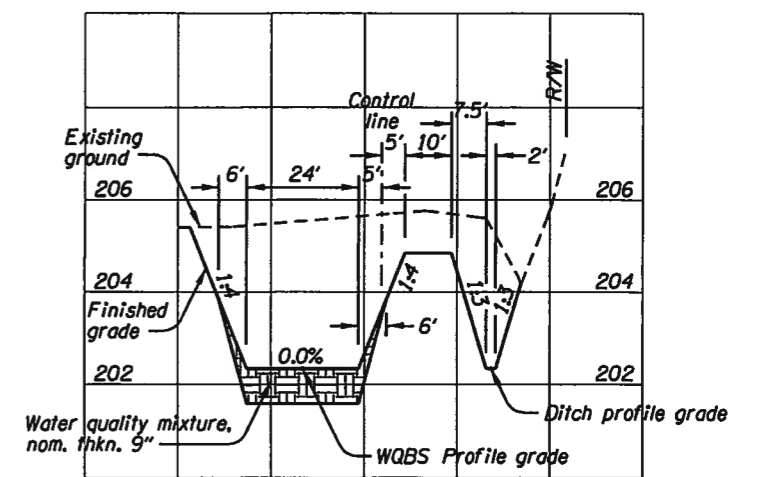
LEGEND  
Up Down  
Slope direction indicator



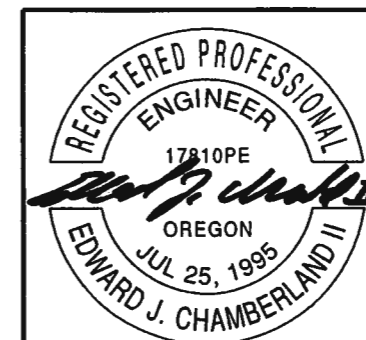
(WQBS) PROFILE  
SCALE: 1"=40'



DITCH PROFILE  
SCALE: 1"=40'



SECTION A-A  
SCALE: 1"=40'



RENEWS: 12-31-2013

OREGON DEPARTMENT OF TRANSPORTATION

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OR22 BRIDGE VERTICAL CLEARANCE  
BRIDGE PROJECTS

NORTH SANTIAM HIGHWAY  
MARION COUNTY

Design Team Leader - Ed Chamberland  
Designed By - Travis Sater  
Drafted By - Linda Foote

STORMWATER DETAILS

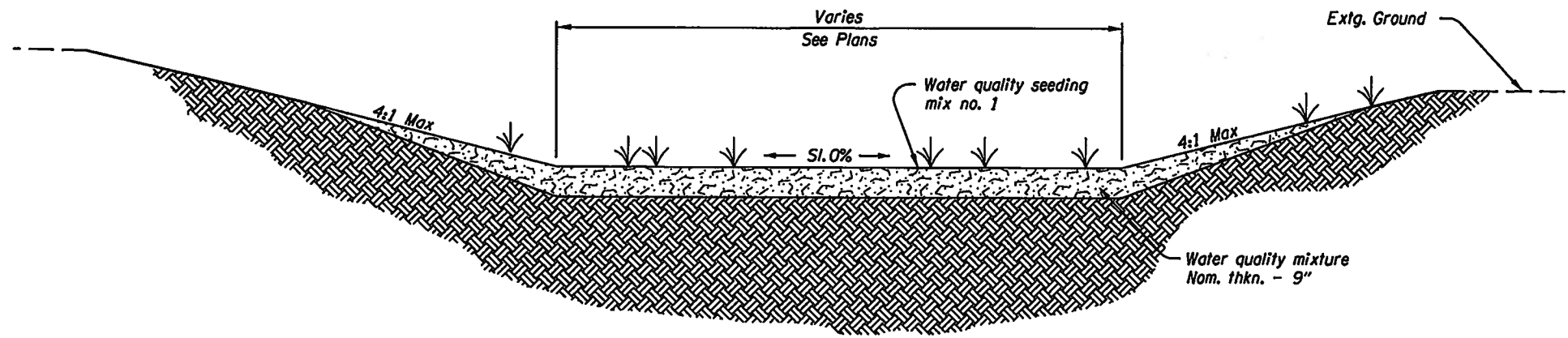
SHEET NO.  
GJ-5

STORMWATER CONTROL FIELD FACILITY MARKER TABLE

FACILITY LOCATION		DF1 #	TYPE S2 MARKER LOCATION		TYPE S1 MARKER	
STATION	MP		BEGIN	END	RED	GREEN
"NS" 170+65, Rt.	1.60	D 00611	✓			
"NS" 236+40, Rt.	2.85	D 00612	✓		✓	
"NS" 236+40, Lt.	2.85	D 00613		✓		✓
"NS" 239+20, Rt.	2.90	D 00612		✓		✓
"NS" 239+50, Lt.	2.90	D 00613	✓		✓	
"NS" 264+67, Lt.	3.38	D 00614		✓		✓
"NS" 265+72, Lt.	3.40	D 00614	✓		✓	
"NS" 288+20, Lt.	3.83	D 00615	✓			
"NS" 400+60, Rt.	5.95	D 00616	✓			
"NS" 395+60, Lt.	5.86	D 00617	✓			
"NS" 605+10, Rt.	9.63	D 00618	✓		✓	
"NS" 612+80, Rt.	9.78	D 00618		✓		✓
"NS" 621+20, Rt.	9.94	D 00619	✓		✓	
"NS" 626+50, Rt.	10.04	D 00619		✓		✓

See drg. no. RD399

✓ Check where appropriate  
 Red = Beginning of facility  
 Green = End of facility



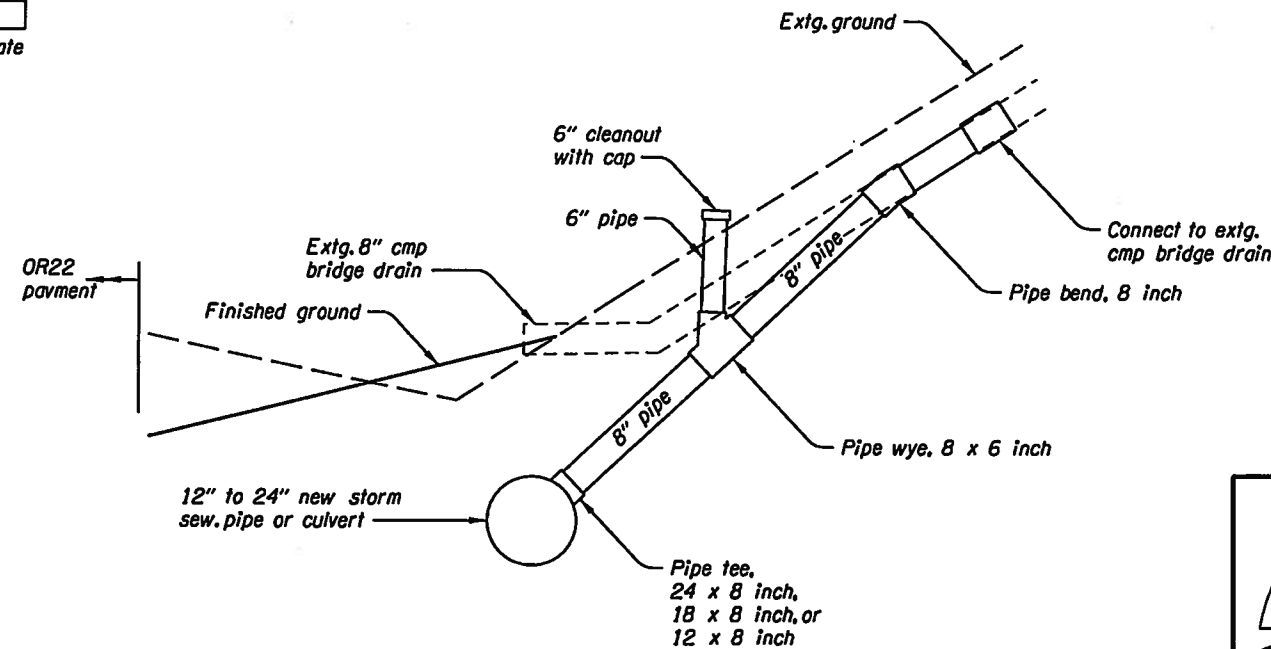
WATER QUALITY BIOFILTRATION SWALE  
 N.T.S.

CULVERT DRAINAGE FACILITY MARKER TABLE

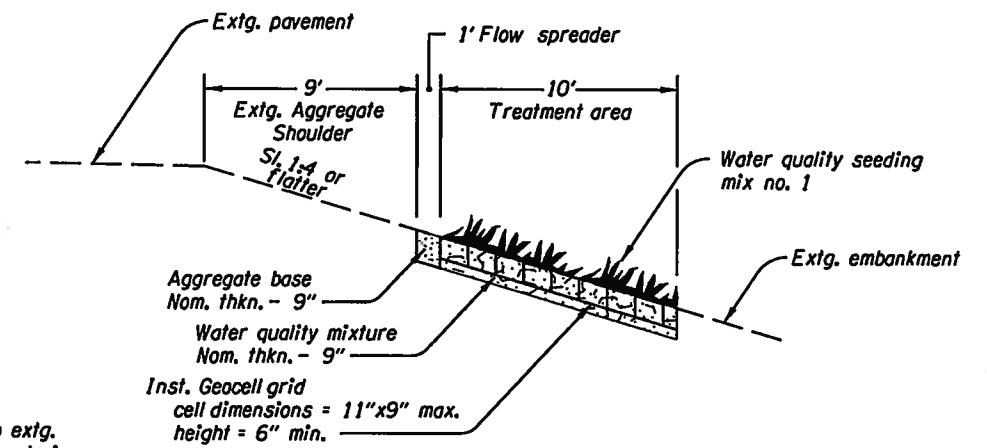
FACILITY LOCATION		TYPE 1 MARKER	
STATION	MP	INLET	INLET & OUTLET
"NS" 183+80	1.85	✓	
"B" 189+20	1.96	✓	
"D" 192+20	2.01	✓	
"NS" 237+60	2.87		✓
"NS" 266+50	3.40	✓	
"NS" 288+20	3.82	✓	

See drg. no. RD398

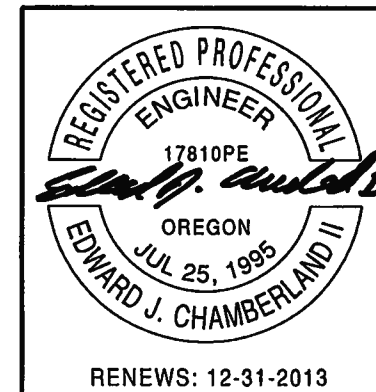
✓ Check where appropriate



TYPICAL BRIDGE DRAIN CONNECTION  
 N.T.S.

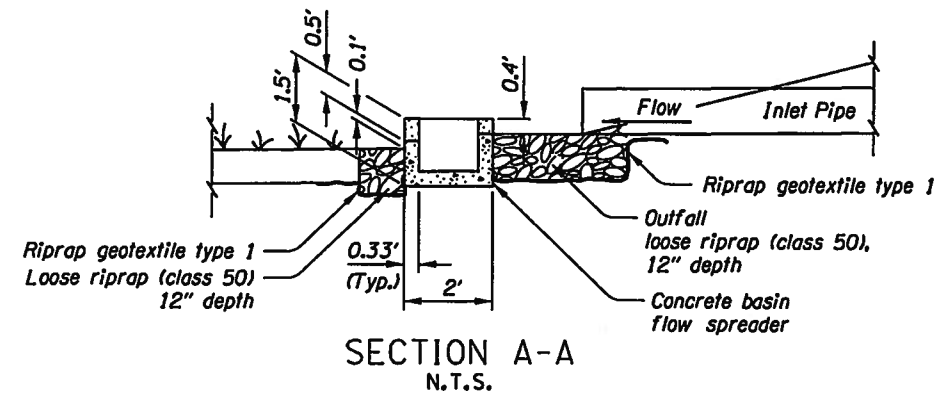


WATER QUALITY FILTER STRIP  
 N.T.S.

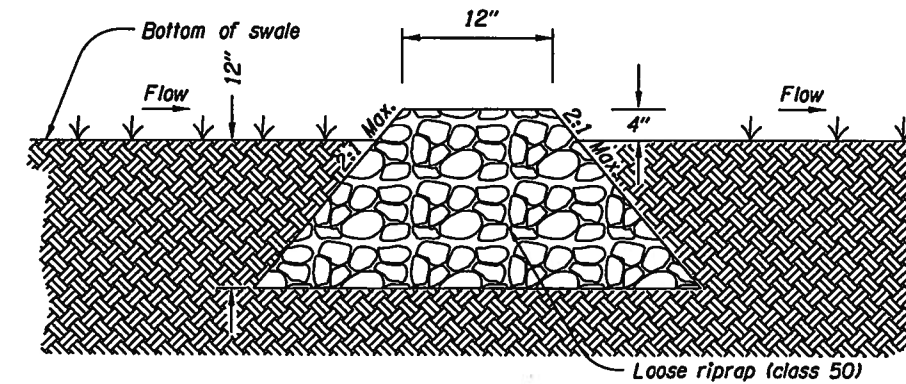
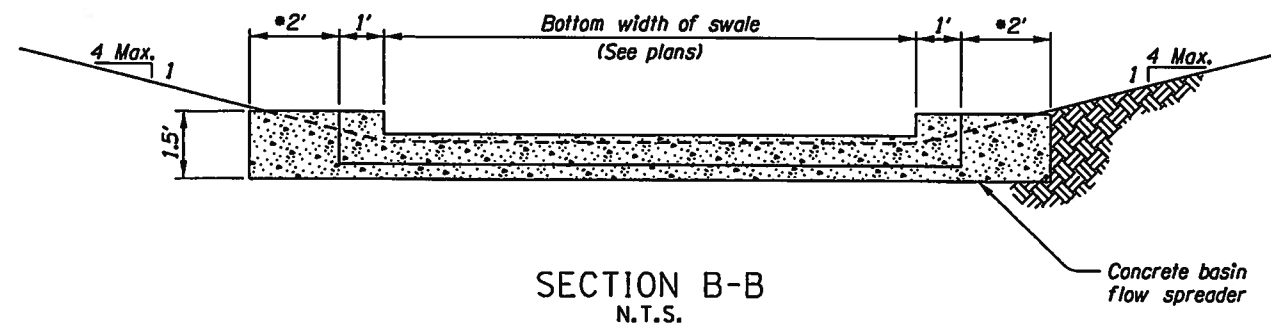


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NORTH SANTIAM HIGHWAY MARION COUNTY	
Design Team Leader - Ed Chamberland Designed By - Travis Sater Drafted By - Linda Foote	
<b>STORMWATER DETAILS</b>	SHEET NO. <b>GJ</b>



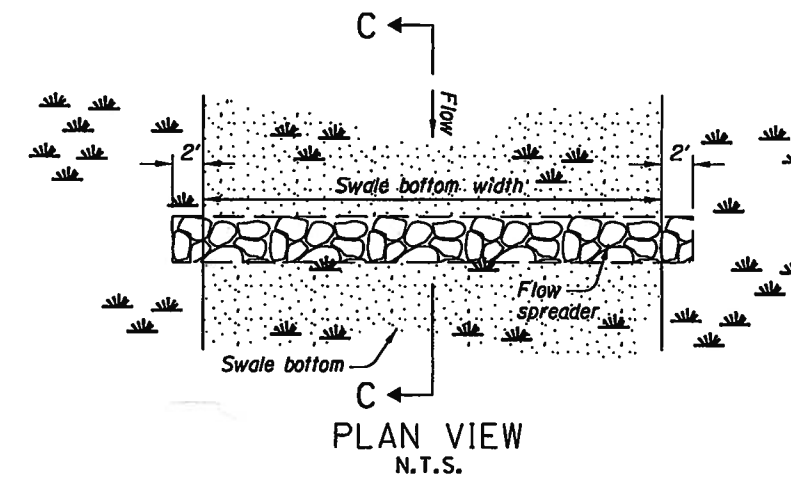


• 3' at 1:6 side slope

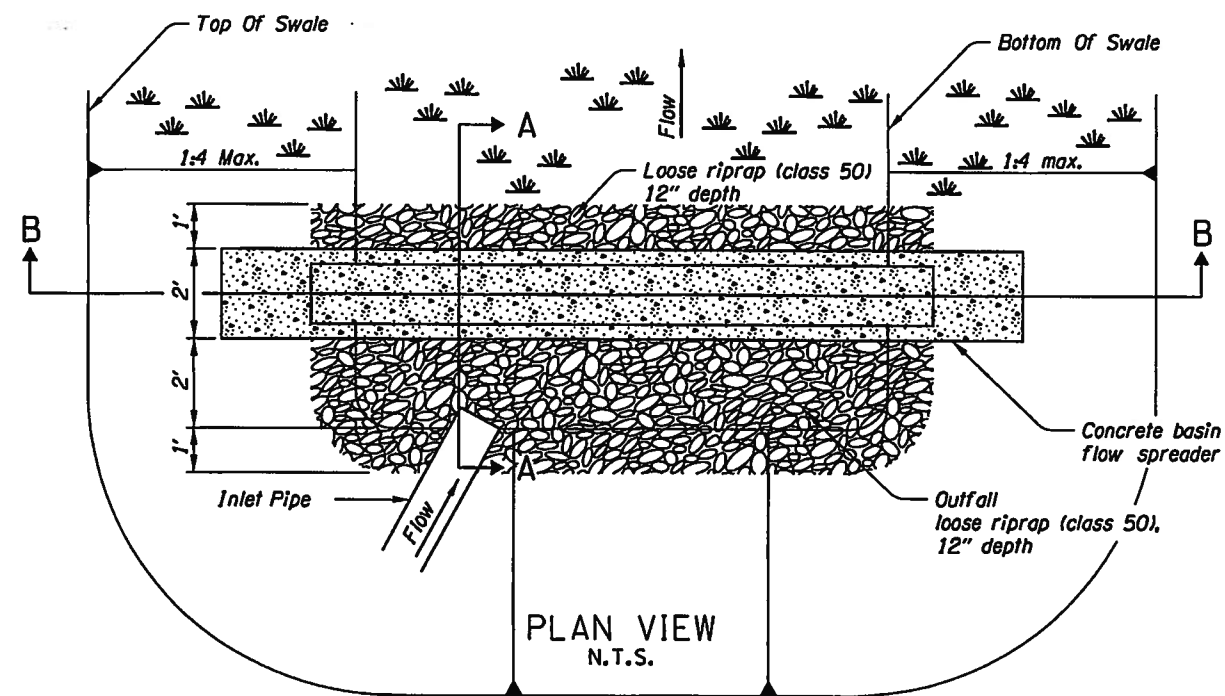


Note: Place 0-15 lb rock gradation as the top layer of the flow spreader.

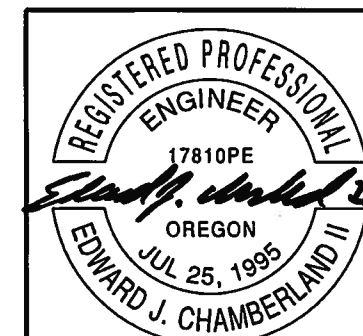
SECTION C-C  
N.T.S.



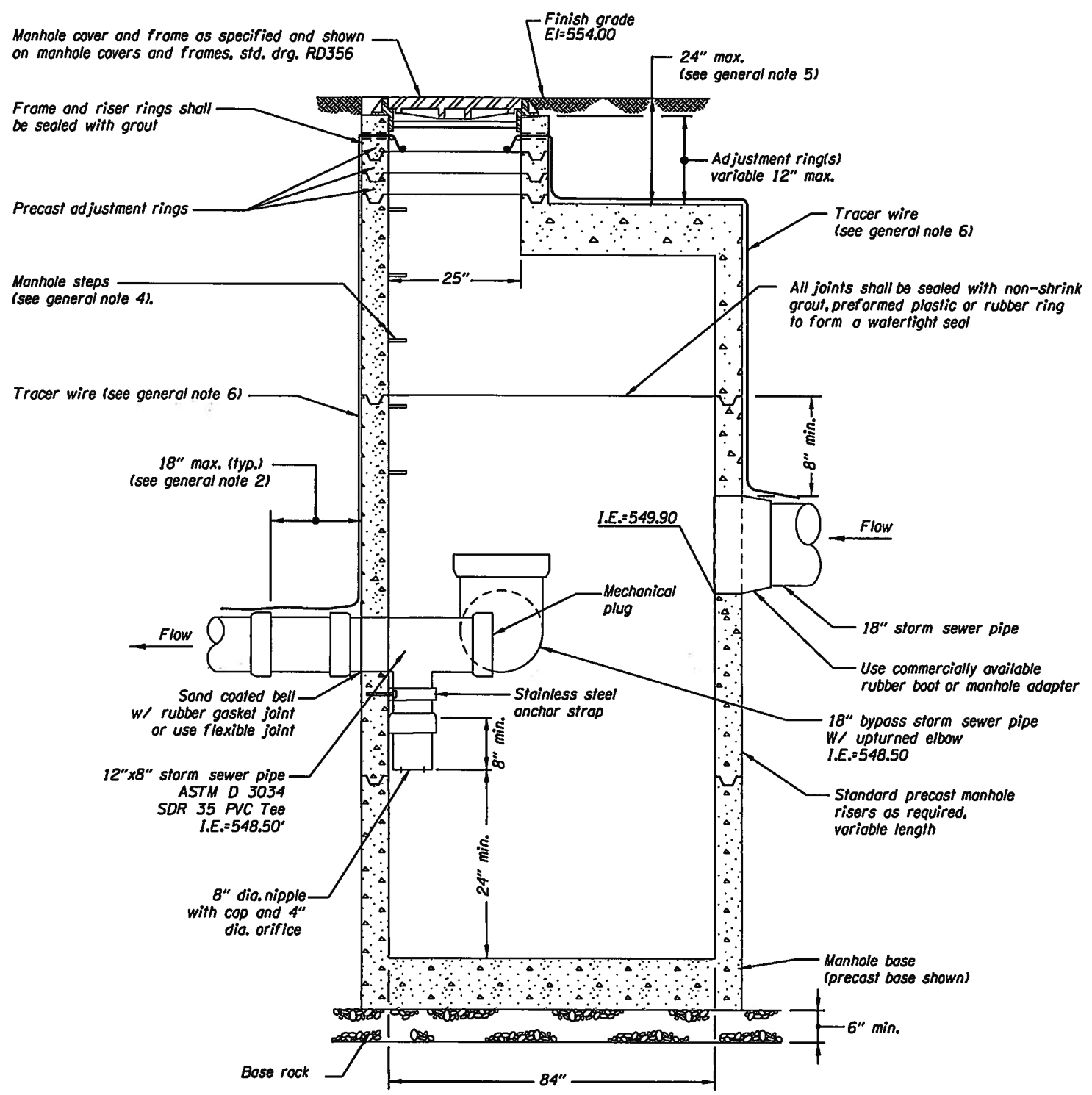
ROCK BASIN FLOW SPREADER



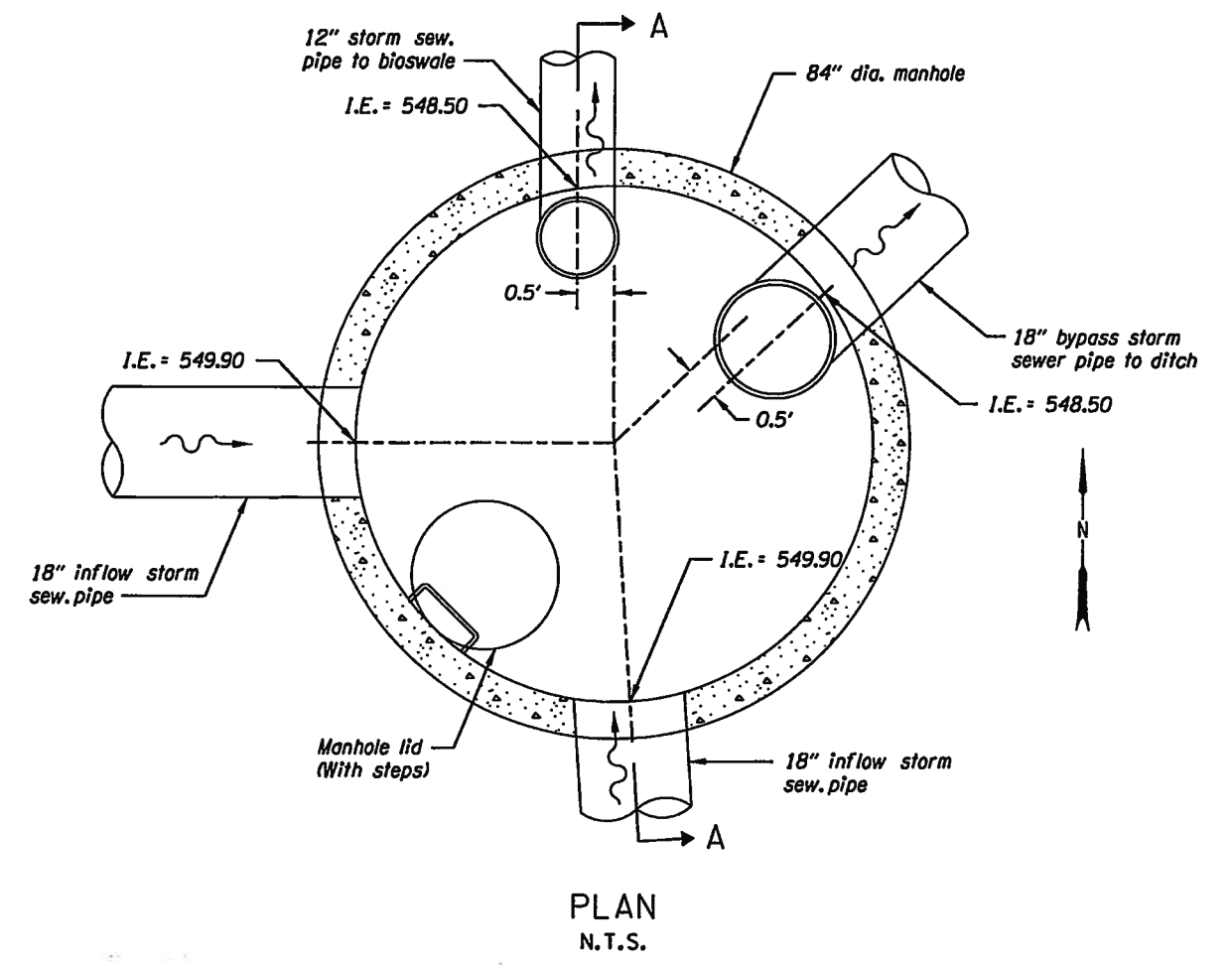
CONCRETE BASIN FLOW SPREADER



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<b>OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS</b>	
NORTH SANTIAM HIGHWAY MARION COUNTY	
Design Team Leader - Ed Chamberland Designed By - Travis Sater Drafted By - Linda Foote	
<b>STORMWATER DETAILS</b>	SHEET NO. <b>GJ-2</b>

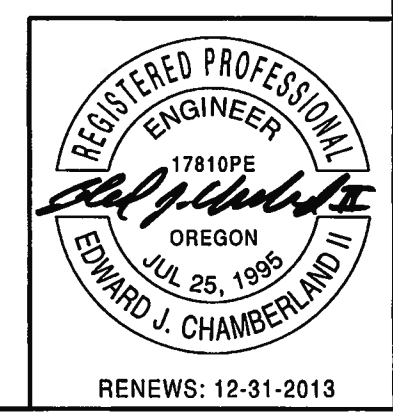


SECTION A-A  
N.T.S.  
MANHOLE DIVERSION 84" DIA.  
AT 72nd AVE  
N.T.S.  
Sta. "72" 6+80, 48' Rt.  
See sht. 18, note 5



GENERAL NOTES FOR ALL DETAILS:

1. All precast sections shall conform to requirements of ASTM C478.
2. All connecting pipes shall have a flexible, gasketed, and unrestrained joint within 18" of manhole wall.
3. See std. drg. RD344 for manhole base section.
4. See std. drg. RD336 for manhole steps details and flat-top slab orientation.
5. Adjust 24" max.
6. See std. drg. RD336 for tracer wire details.



OREGON DEPARTMENT OF TRANSPORTATION	
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<b>OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS</b> NORTH SANTIAM HIGHWAY MARION COUNTY	
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<b>STORMWATER DETAILS</b>	SHEET NO. <b>GJ-4</b>