OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: June, 2019

DFI No. D00614

Figure 1: DFI No. D00614, looking [west]

Identification

Drainage Facility ID (DFI):	D00614
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 45v-073
Location:	District: 03
	Highway No.: 162
	Mile Post: 3.38 to 3.40, [left]

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]

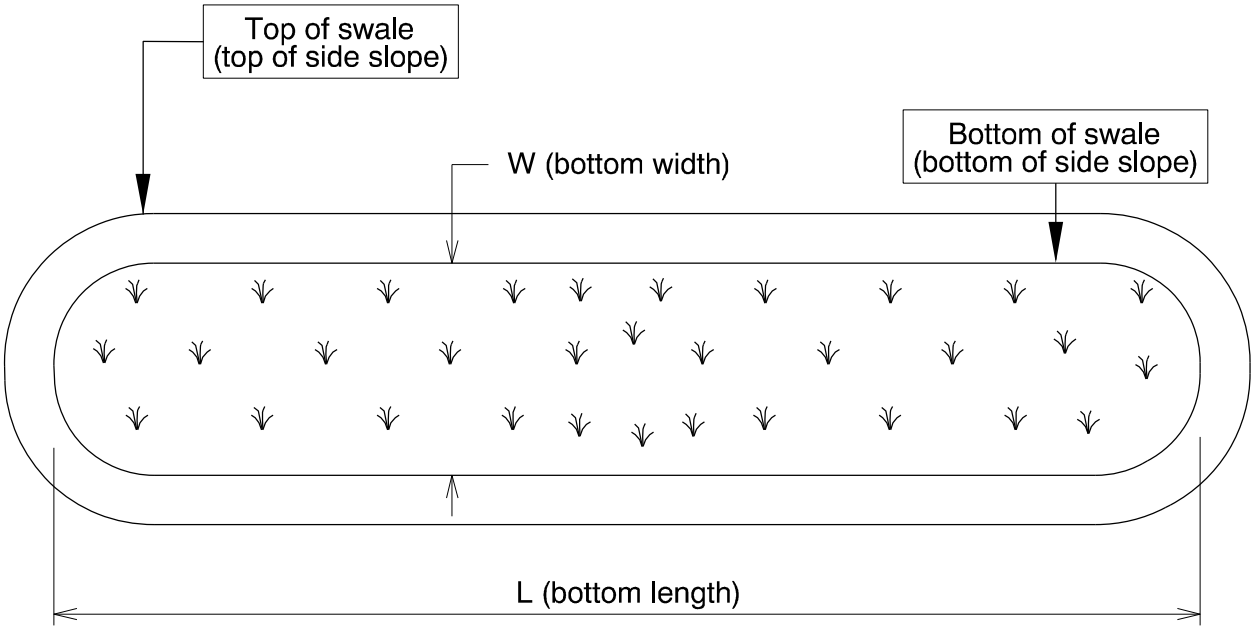
Figure 2: Facility location map

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:

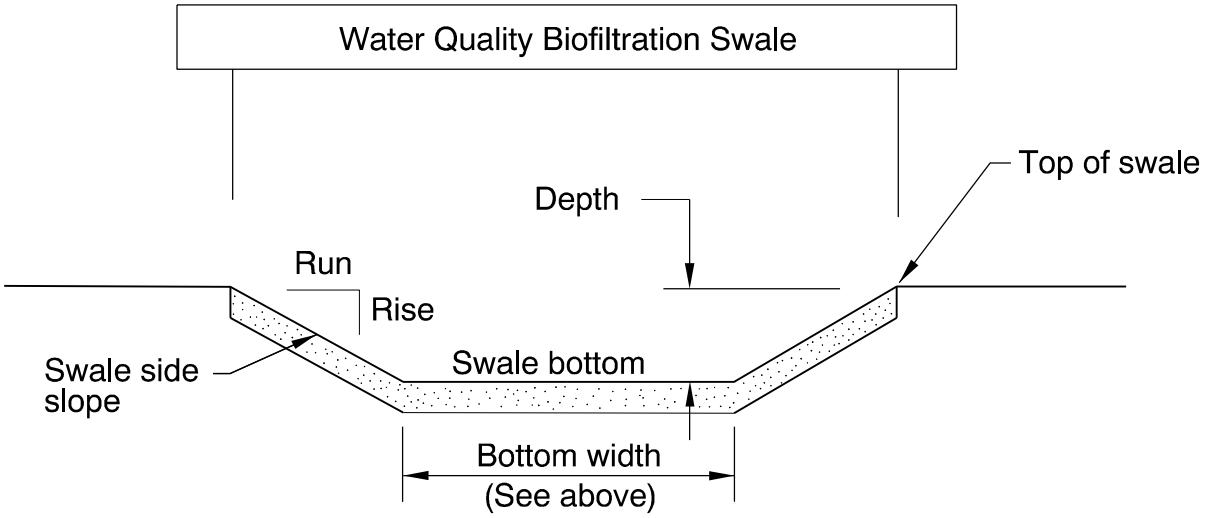
Bottom Length (feet)	Bottom Width (feet)
105	9



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: Water enters from the east in a ditch and flows to the west. Water exits in a ditch also.

4. Facility Access

Maintenance access to the facility:

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

Figure 3: Maintenance Access, looking west

5. 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 (rock @ 50')	☒	**S17**
Anchored board (midpoint of swale or every 50 feet along swale bottom)	☐	**S18**
Other: concrete weir @ inlet	☒	**S19**
Swale Outlet		
Catch basin with grate	☐	**S20**
Outlet Pipe (s)	☐	**S21**
Open channel outlet	☐	**S22**
Auxiliary Outlet: describe type	☐	**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**

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

7. Limitations

Access grid installed:

☒ No	☐ Yes
There are (no) 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

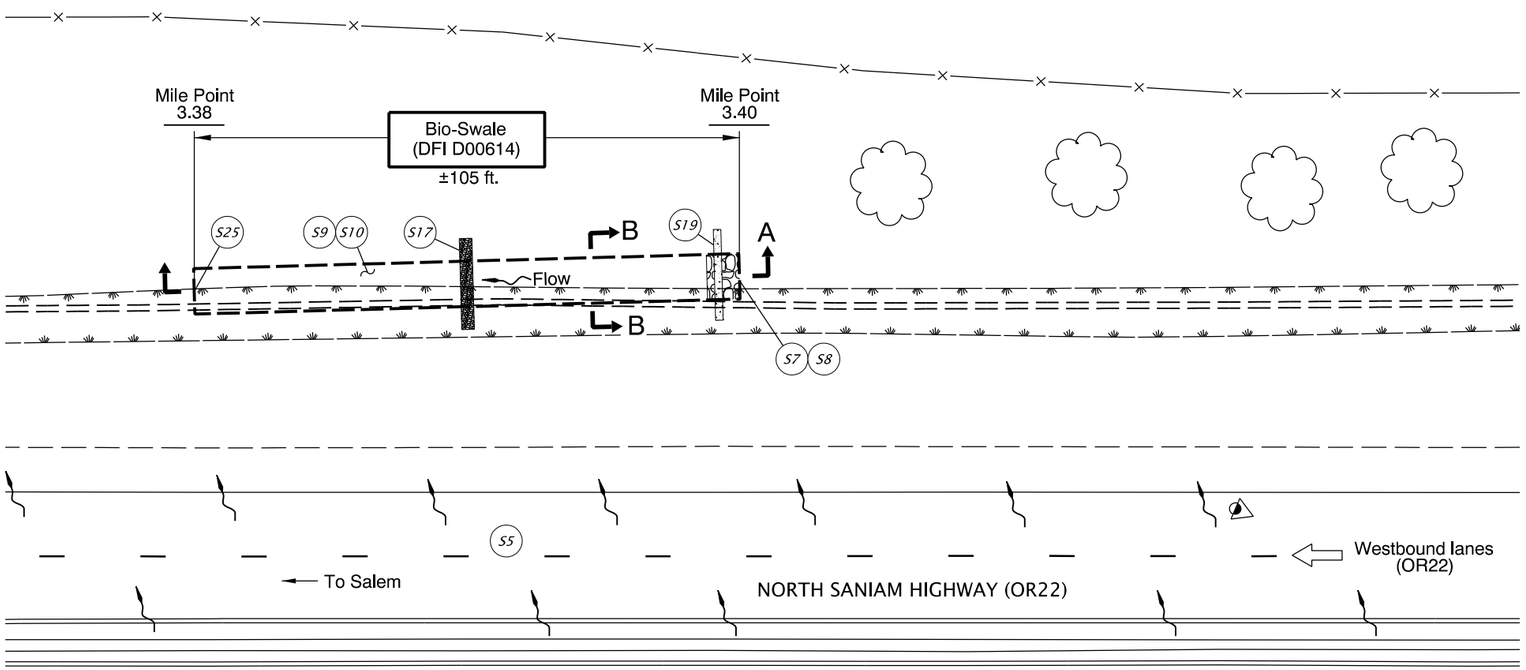
Contact any of the following for more detailed information about management of waste materials found on site:

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

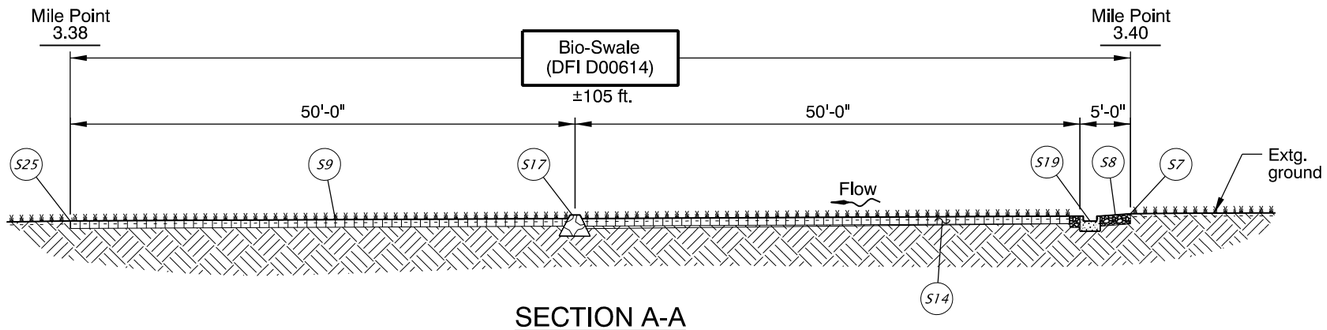
A Appendix A – Site Specific Operational Plan

Contents:

Operational Plan: DFI D00614



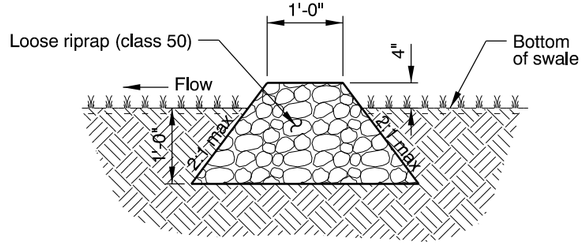
PLAN
N.T.S.



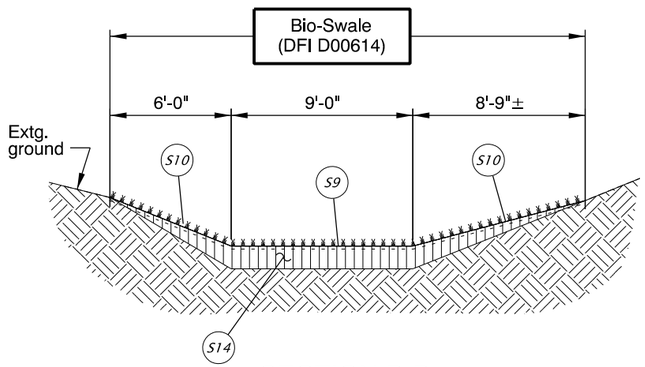
SECTION A-A
N.T.S.

LEGEND:

- Photo Location / Direction
- S# — Facility Component (see table 1 in O&M Manual)
- and / or — Manhole
- Ditch Line
- Swale Bottom
- Conveyance Direction
- Pavement / Facility Flow Path



FLOW SPREADER DETAIL
N.T.S.



SECTION B-B
N.T.S.

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Chris Carman

Drafted By: Michael Skelton

DFI D00614
MAINTENANCE DISTRICT 3 OR22
WATER QUALITY BIOFILTRATION SWALE
NORTH SANTIAM HIGHWAY MP 3.38 LT.
MARION COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 45v-073

45V-073

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

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

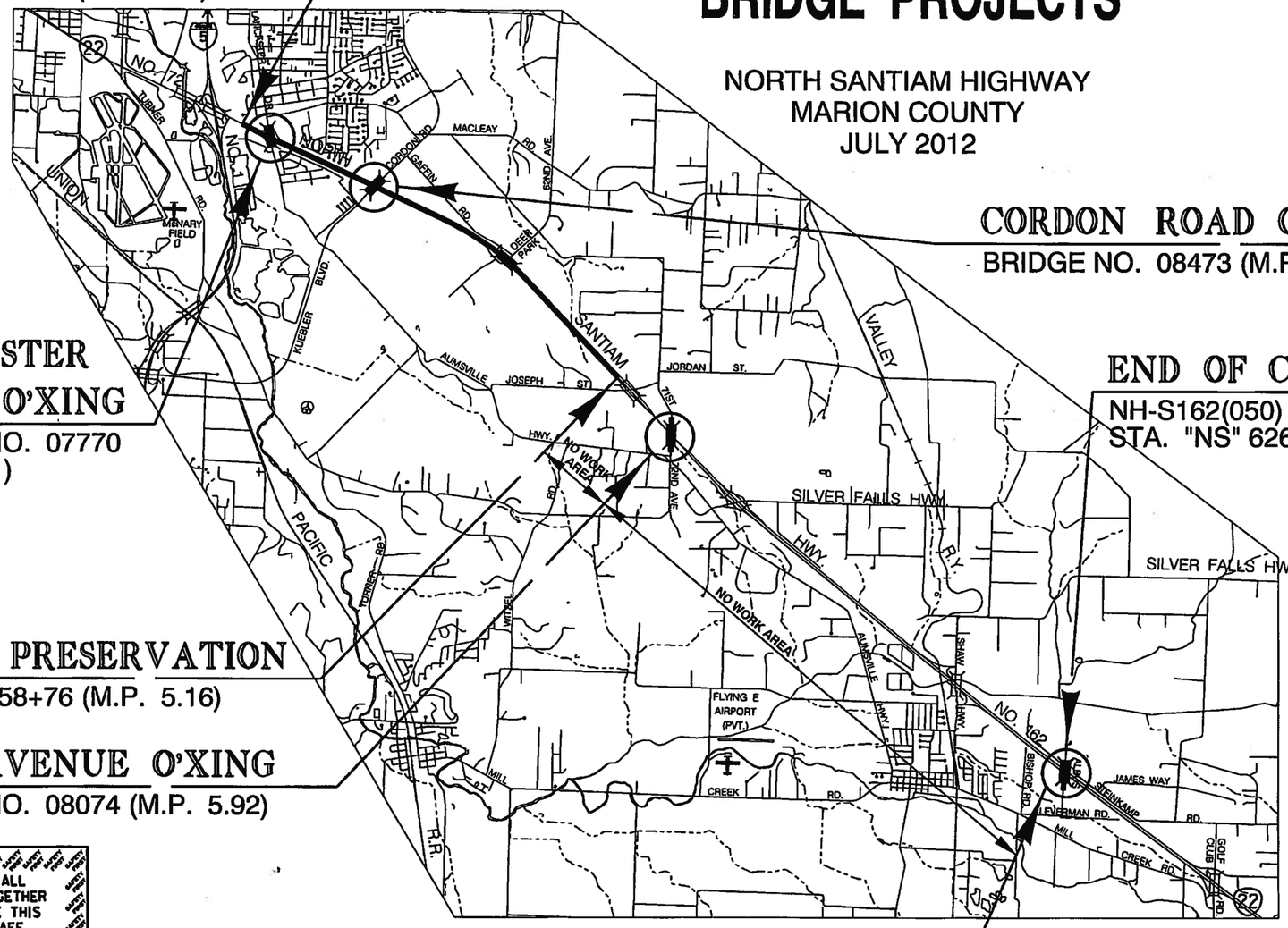
NORTH SANTIAM HIGHWAY
MARION COUNTY
JULY 2012

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

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)



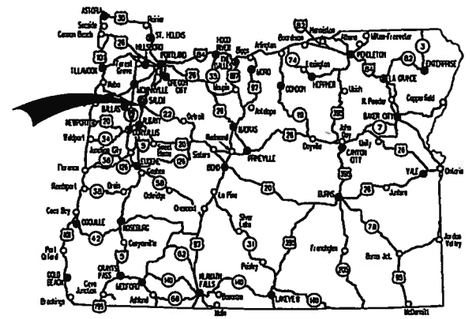
CORDON ROAD O'XING
BRIDGE NO. 08473 (M.P. 2.82)

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

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.

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE



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 Pipebend 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 Lohman	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: [signature] 5/14/12
Signature & date

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

Concurrence by ODOT Chief Engineer

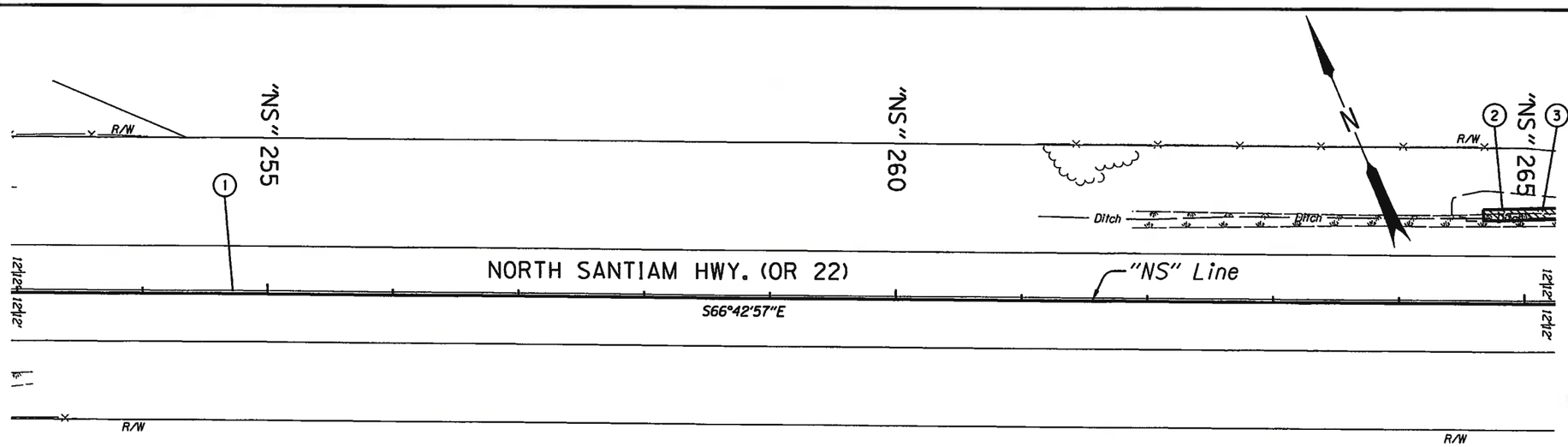
OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS

NORTH SANTIAM HIGHWAY
MARION COUNTY

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

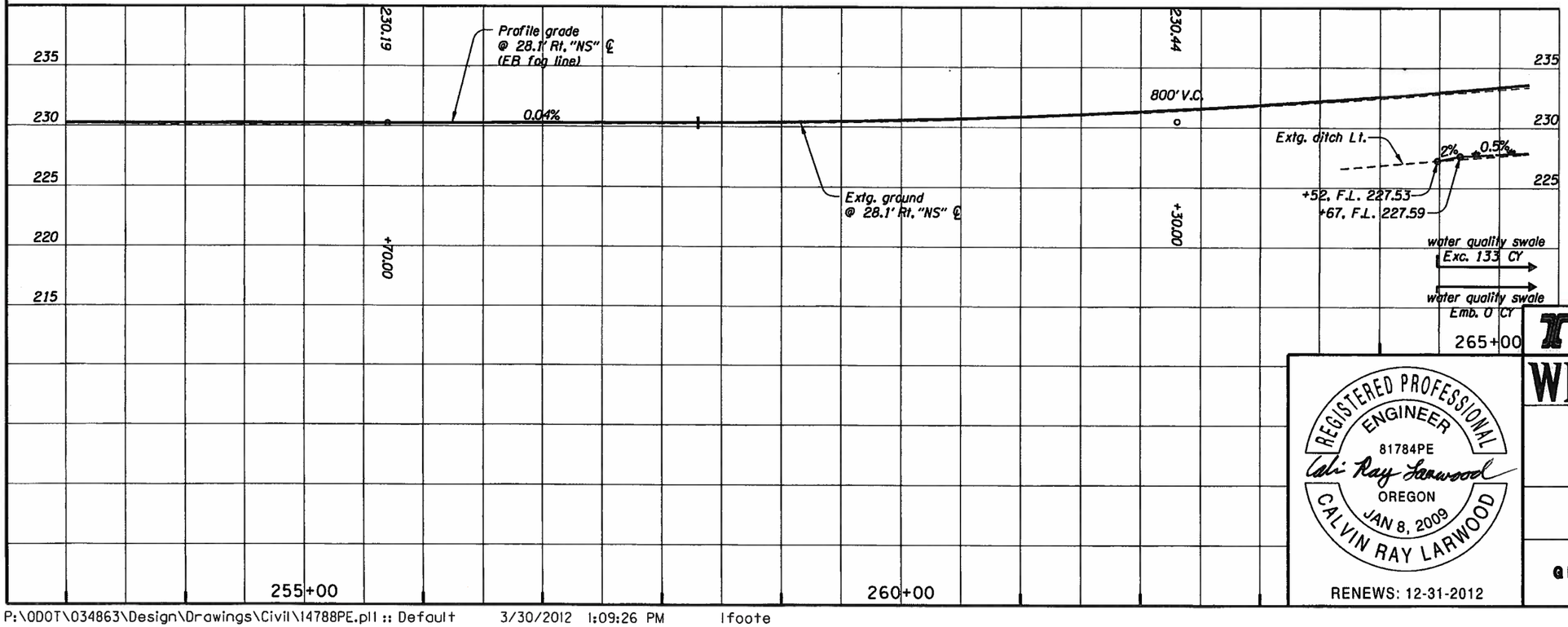
P:\ODOT\034863\Design\Drawings\Civil\15774F.tsl :: Default 5/14/2012 1:47:29 PM tsater

1:1200 - 1



1. See Sht. 4, Note 1
   Remove and reinstall extg. precast tall conc. barrier with scuppers
2. Const. water quality swale, D00614 - 105'
   9' flat bottom, 1:4 max. side slopes
   Inst. stormwater field markers
   (For details, see Sht. GJ & GJ-8)
3. Seed and mulch water quality swale with water quality seeding, mix no. 1 - 0.05 ac.

DFI D00614



Wetland Shown Thus:

OREGON DEPARTMENT OF TRANSPORTATION

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REGISTERED PROFESSIONAL ENGINEER
81784PE
Calvin Ray Larwood
OREGON
JAN 8, 2009
CALVIN RAY LARWOOD
RENEWS: 12-31-2012

OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS

NORTH SANTIAM HIGHWAY
MARION COUNTY

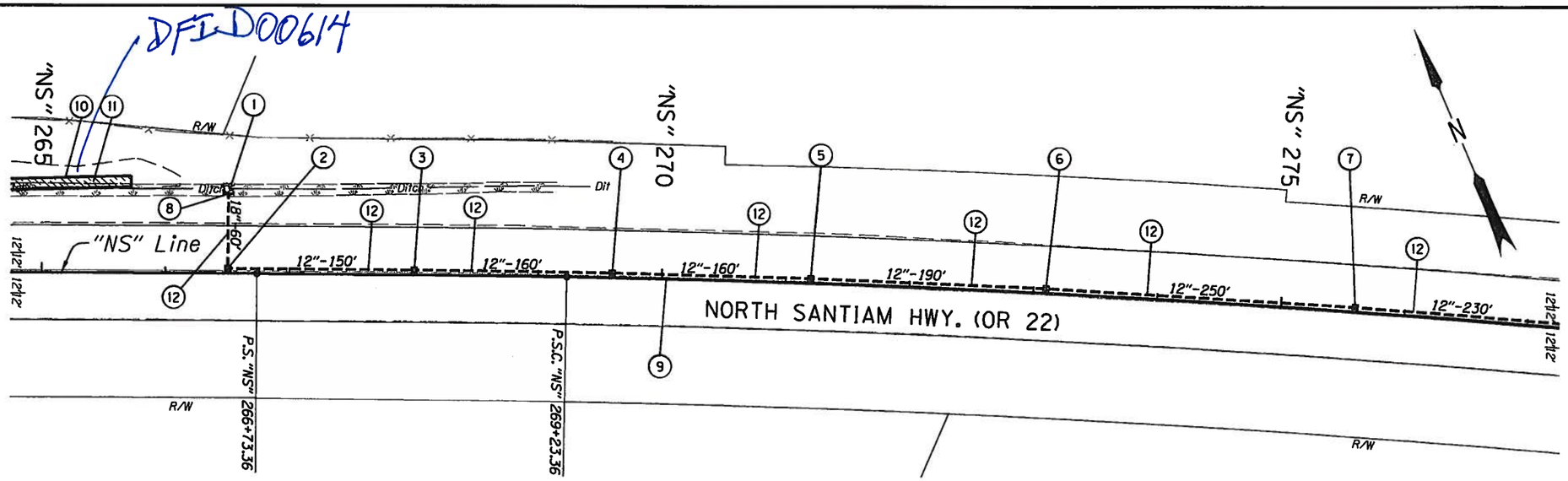
Design Team Leaders - Sarah Heller, Ed Chamberland
Designed By - Calvin Larwood, Travis Sater
Drafted By - Linda Foote

GENERAL CONSTRUCTION

SHEET NO. 11

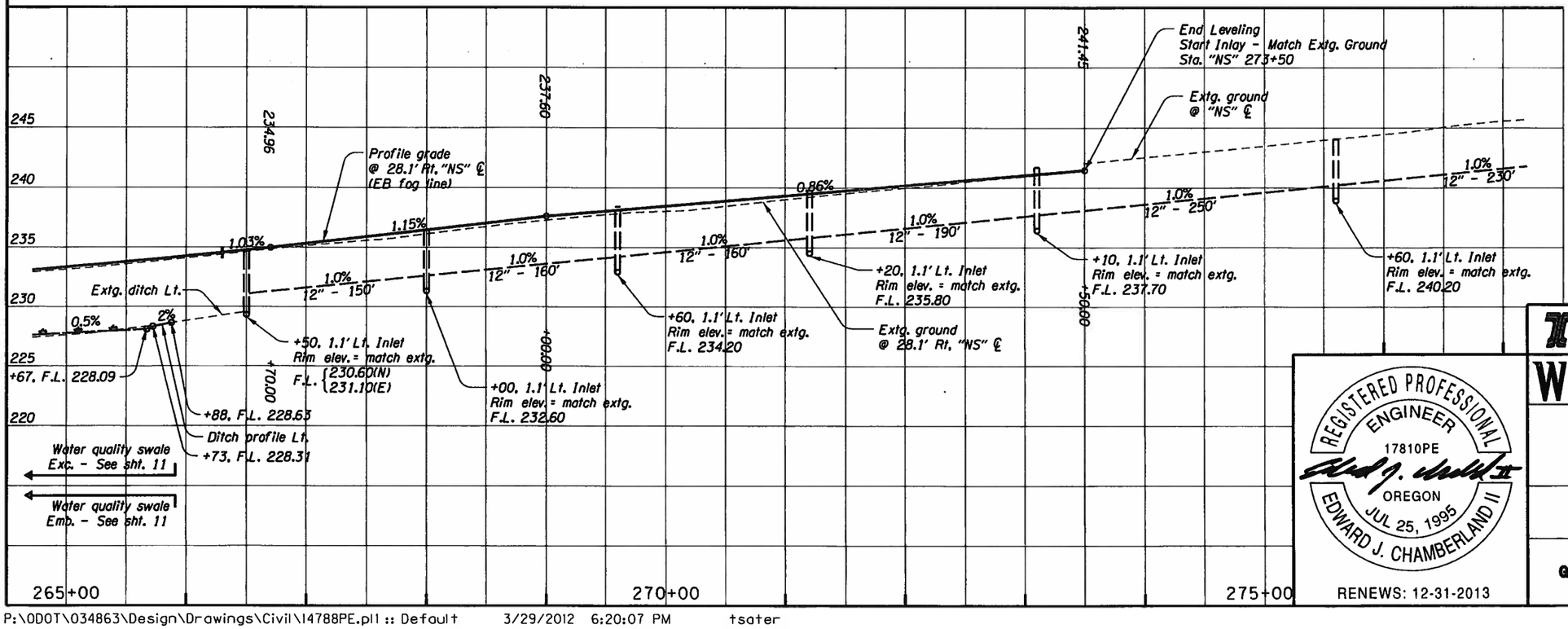
DFI-D00614

45V-073



Note:
1. Station/callouts for Type "G-2" inlets are to face of barrier.

Wetland Shown Thus:



1. ① Sta. "NS" 266+50, 62' Lt.
   Const. loose riprap (class 50) - 4 cu.yd.
   8'x8'x1.5'
   Inst. riprap geotextile type 1 - 11 sq.yd.
2. ② Sta. "NS" 266+50, 1.1' Lt.
   Const. Type G-2 inlet with 18" sump
   Inst. 12" storm sew. pipe - 150'
   5' depth
3. ③ Sta. "NS" 268+00, 1.1' Lt.
   Const. Type G-2 inlet with 18" sump
   Inst. 12" storm sew. pipe - 160'
   5' depth
4. ④ Sta. "NS" 269+60, 1.1' Lt.
   Const. Type G-2 inlet with 18" sump
   Inst. 12" storm sew. pipe - 160'
   5' depth
5. ⑤ Sta. "NS" 271+20, 1.1' Lt.
   Const. Type G-2 inlet with 18" sump
   Inst. 12" storm sew. pipe - 190'
   5' depth
6. ⑥ Sta. "NS" 273+10, 1.1' Lt.
   Const. Type G-2 inlet with 18" sump
   Inst. 12" storm sew. pipe - 250'
   5' depth
7. ⑦ Sta. "NS" 275+60, 1.1' Lt.
   Const. Type G-2 inlet with 18" sump
   Inst. 12" storm sew. pipe - 230'
   5' depth
8. ⑧ Sta. "NS" 266+50, 61' Lt.
   Inst. 18" storm sew. pipe - 60'
   5' depth, Sl. = 0.5%
   I.E. (outfall) = 230.30
   Const. sloped end, Lt.
   Inst. culvert field marker
   (For details, see sht. GJ)
9. ⑨ See Sht. 4, Note 1
   Remove and reinstall extg. precast tall conc. barrier with scuppers
10. ⑩ See Sht. 11, Note 2
    Const. water quality swale
11. ⑪ See Sht. 11, Note 3
    Seed and mulch water quality swale
12. ⑫ Trench resurf. - 427 sq. yd.
    (For detail, see sht. 2B-2)

REGISTERED PROFESSIONAL ENGINEER
17810PE
OREGON
JUL 25, 1995
EDWARD J. CHAMBERLAND II
RENEWS: 12-31-2013

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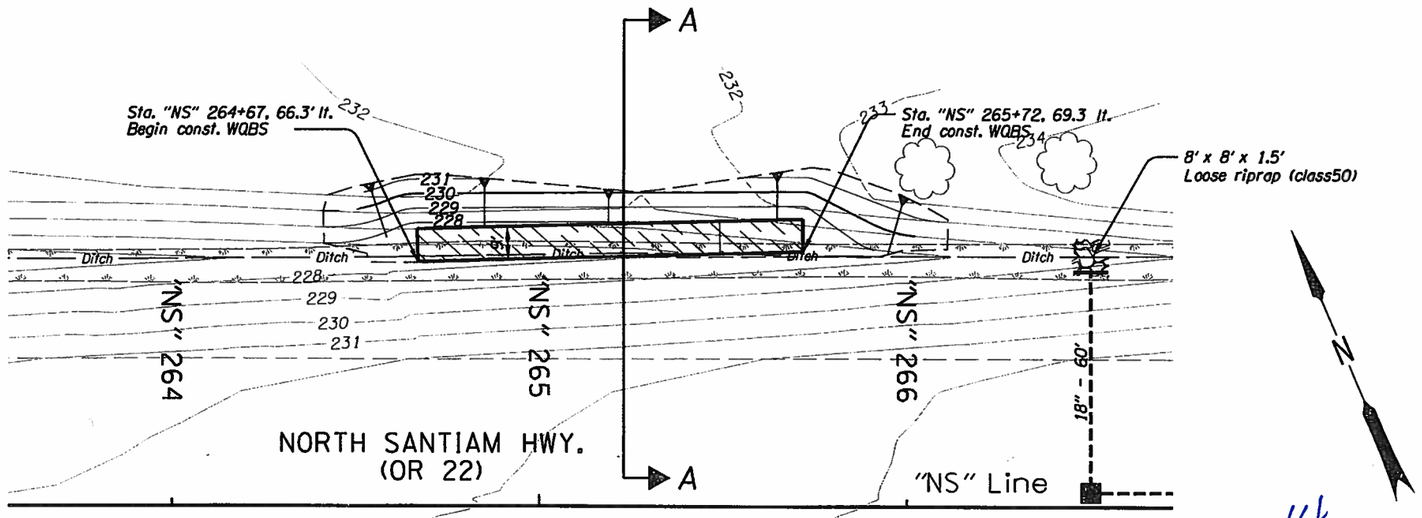
OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS

NORTH SANTIAM HIGHWAY
MARION COUNTY

Design Team Leaders - Sarah Heller, Ed Chamberland
Designed By - Calvin Larwood, Travis Sater
Drafted By - Linda Foote

GENERAL CONSTRUCTION

SHEET NO. 12



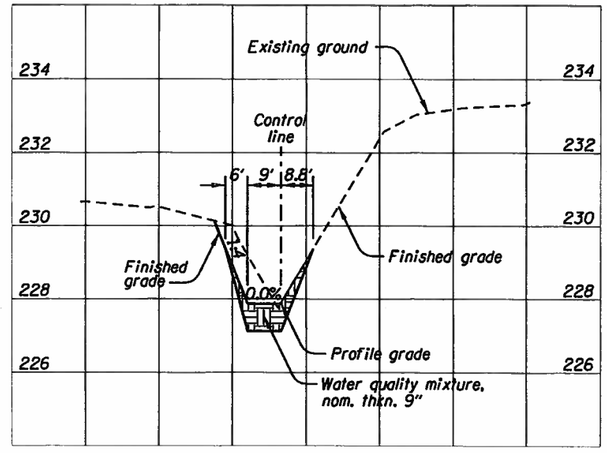
WATER QUALITY BIOFILTRATION SWALE (WQBS)
SCALE: 1"=40'

DFI D00614

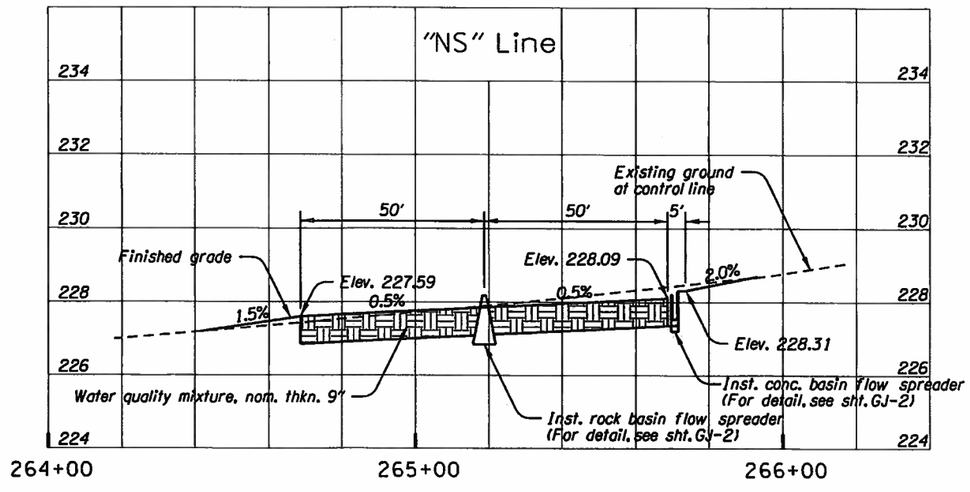
LEGEND

Up Down

Slope direction indicator



SECTION A-A
SCALE: 1"=40'



DITCH AND WQBS PROFILE LT.
SCALE: 1"=40'

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RENEWS: 12-31-2013

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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-8

45V-073

STORMWATER CONTROL FIELD FACILITY MARKER TABLE

FACILITY LOCATION		DFI #	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		✓		✓

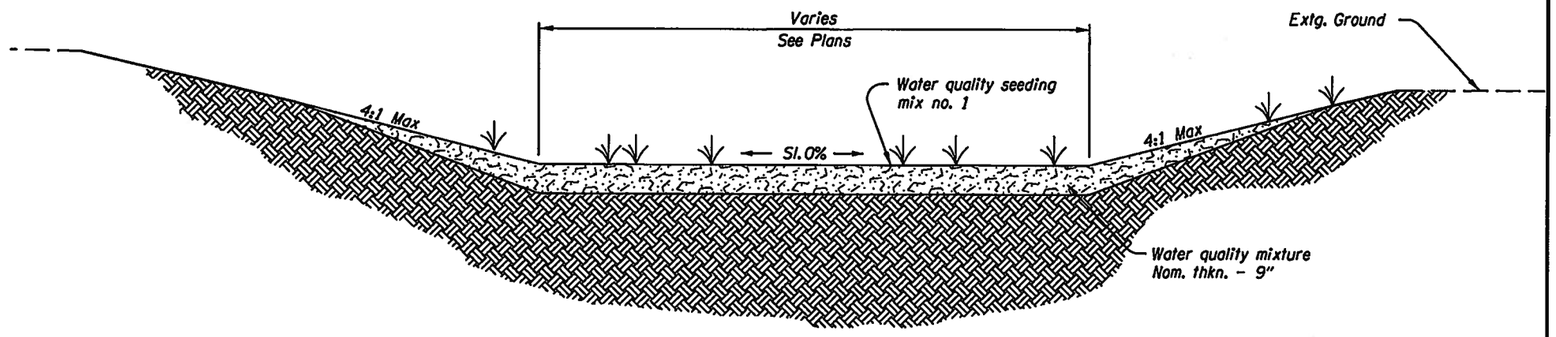
See drg. no. RD399

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

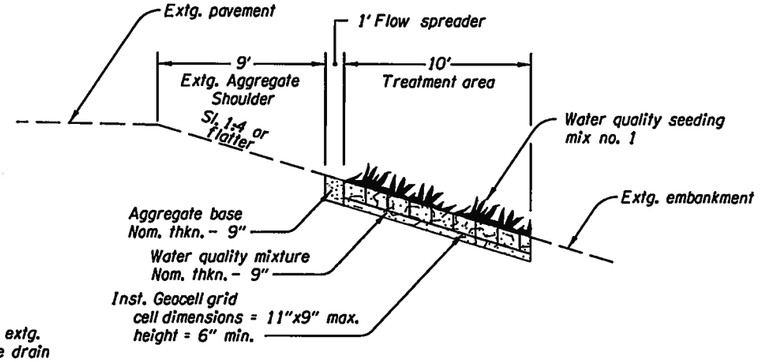
CULVERT DRAINAGE FACILITY MARKER TABLE

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	✓	

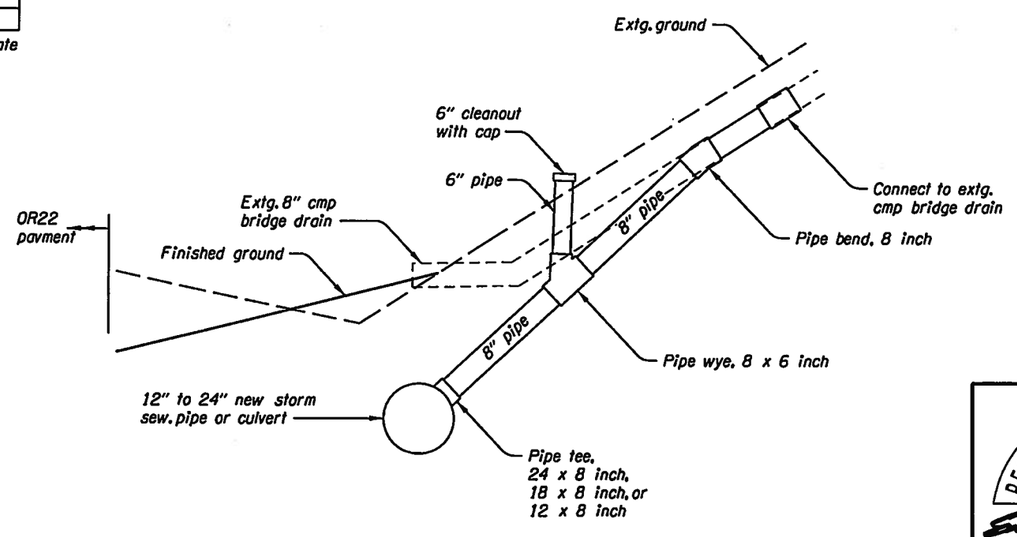
See drg. no. RD398 ✓Check where appropriate



WATER QUALITY BIOFILTRATION SWALE
N.T.S.



WATER QUALITY FILTER STRIP
N.T.S.



TYPICAL BRIDGE DRAIN CONNECTION
N.T.S.

REGISTERED PROFESSIONAL ENGINEER
17810PE
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JUL 25, 1995
EDWARD J. CHAMBERLAND II
RENEWS: 12-31-2013

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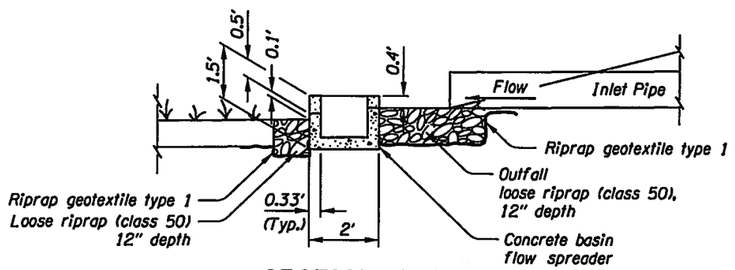
OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS
NORTH SANTIAM HIGHWAY
MARION COUNTY

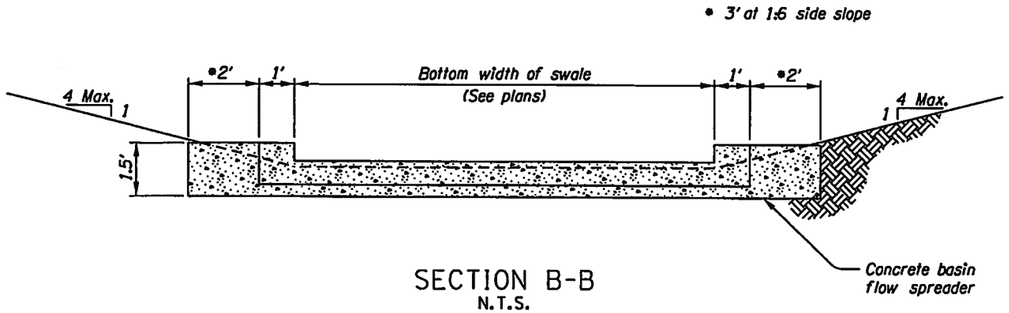
Design Team Leader - Ed Chamberland
Designed By - Travis Sater
Drafted By - Linda Foote

STORMWATER DETAILS

SHEET NO. GJ



SECTION A-A
N.T.S.



SECTION B-B
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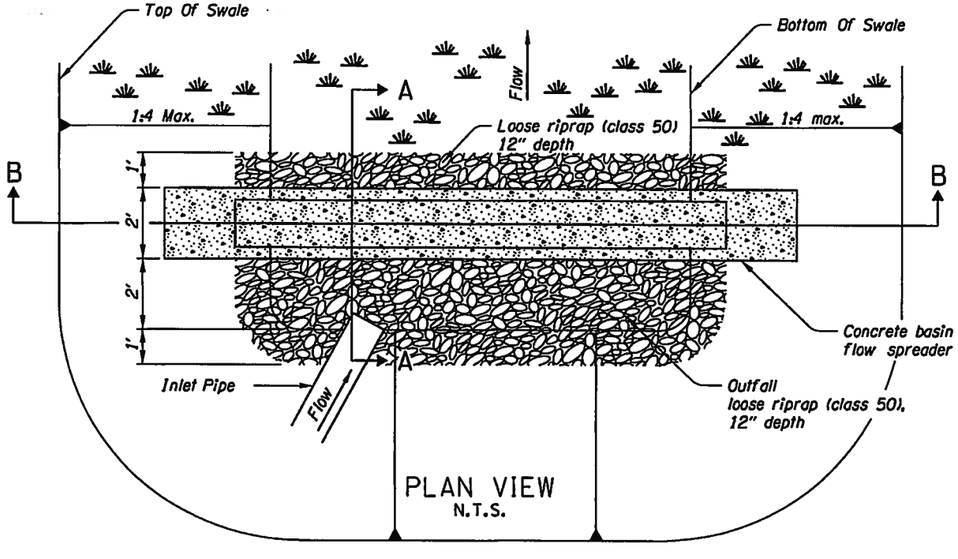
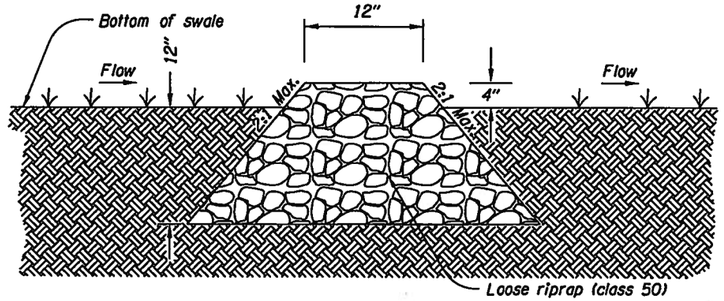


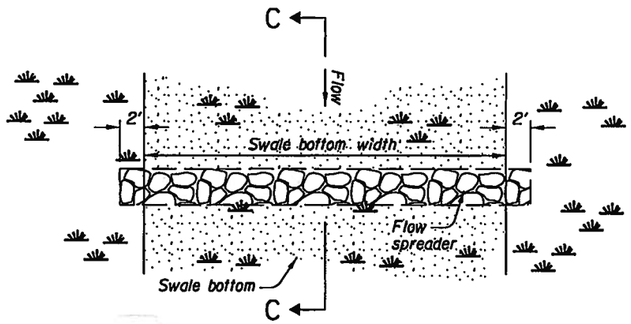
PLAN VIEW
N.T.S.

CONCRETE BASIN FLOW SPREADER



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

SECTION C-C
N.T.S.



PLAN VIEW
N.T.S.

ROCK BASIN FLOW SPREADER

OREGON DEPARTMENT OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
17810PE
OREGON
JUL 25, 1995
EDWARD J. CHAMBERLAND II
RENEWS: 12-31-2013

WHPacific
3470 Pipebend Place NE Ste 170
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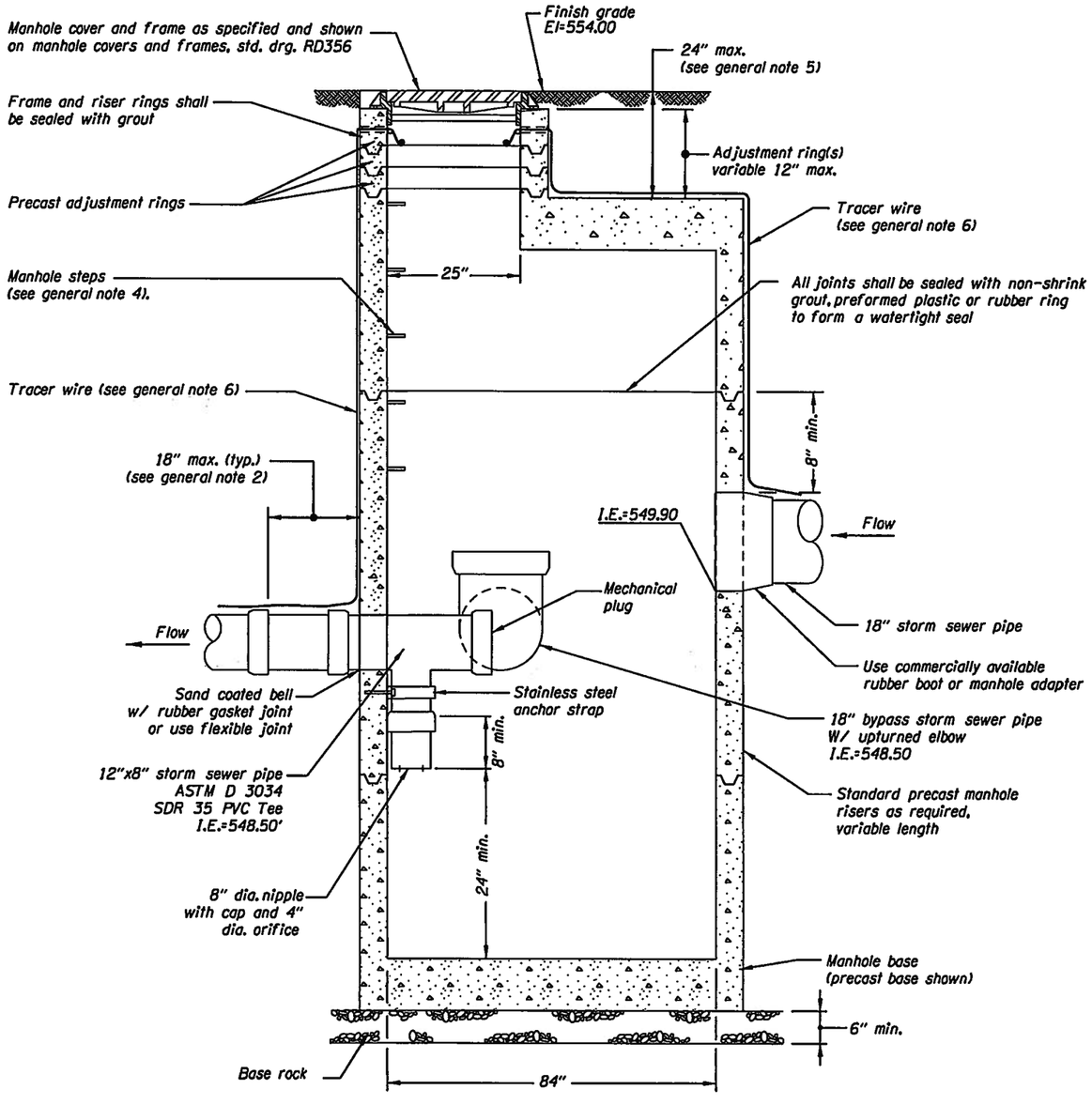
OR22 BRIDGE VERTICAL CLEARANCE BRIDGE PROJECTS

NORTH SANTIAM HIGHWAY
MARION COUNTY

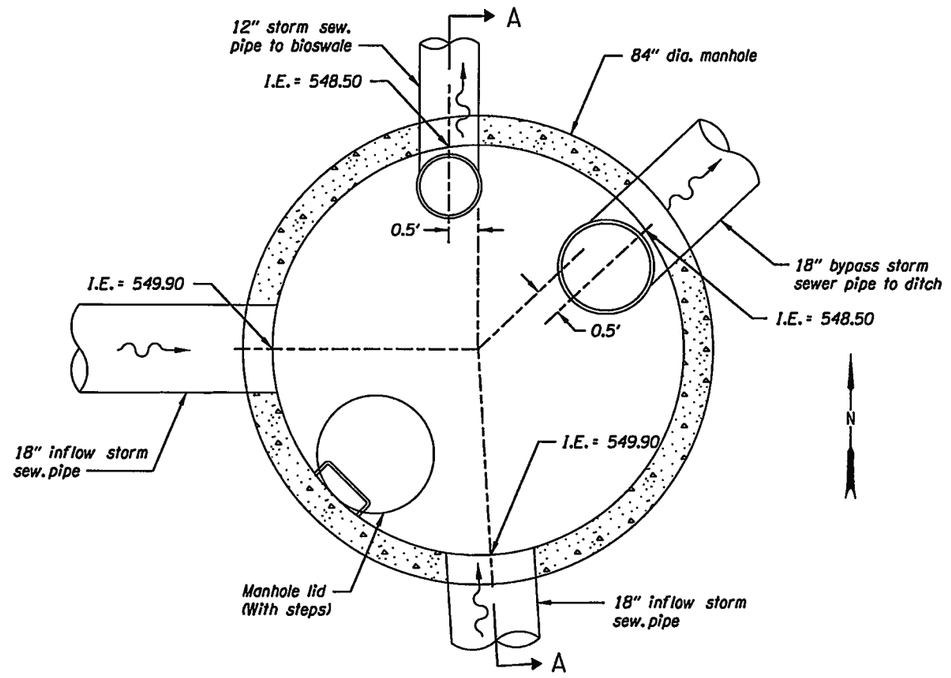
Design Team Leader - Ed Chamberland
Designed By - Travis Sater
Drafted By - Linda Foote

STORMWATER DETAILS

SHEET NO. GJ-2



SECTION A-A
N.T.S.



PLAN
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, gasketted, 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.*

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STORMWATER DETAILS

SHEET NO. GJ-4