# OPERATION & MAINTENANCE MANUAL

# Water Quality Biofiltration Swale

**Manual prepared: July 2019**

**DFI No.** **D00559, D00563, D00564, D00566, D00568, D00569 & D00570**


**Figure 1: DFI No. D00559, looking North**


**Figure 2: DFI No. D00563, looking Southeast**


**Figure 3: DFI No. D00564, looking Southeast**


**Figure 4: DFI No. D00566, looking Southeast**


**Figure 5: DFI No. D00568, looking Southeast**


**Figure 6: DFI No D00569, looking North**


**Figure 7: DFI No. D00570, looking North**

**Identification**

| | |
|---|---|
| Drainage Facility ID (DFI): | D00559 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 0.77 to 0.83, Left |

| | |
|---|---|
| Drainage Facility ID (DFI): | D00563 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 1.82 to 1.84, Right |

| | |
|---|---|
| Drainage Facility ID (DFI): | D00564 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 1.91 to 1.93, Right |

| | |
|---|---|
| Drainage Facility ID (DFI): | D00566 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 2.03 to 2.06, Right |

| | |
|---|---|
| Drainage Facility ID (DFI): | D00568 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 2.16 to 2.19, Right |

| | |
|---|---|
| Drainage Facility ID (DFI): | D00569 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 2.34 to 2.39, Left |

| | |
|---|---|
| Drainage Facility ID (DFI): | D00570 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-035 |
| Location: | District: 1<br>Highway No.: 037<br>Mile Post: 1.82 to 1.83, 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:
East to West (D00563, D00564, D00566, D00568, D00569, D00570)

North to South (D00570)

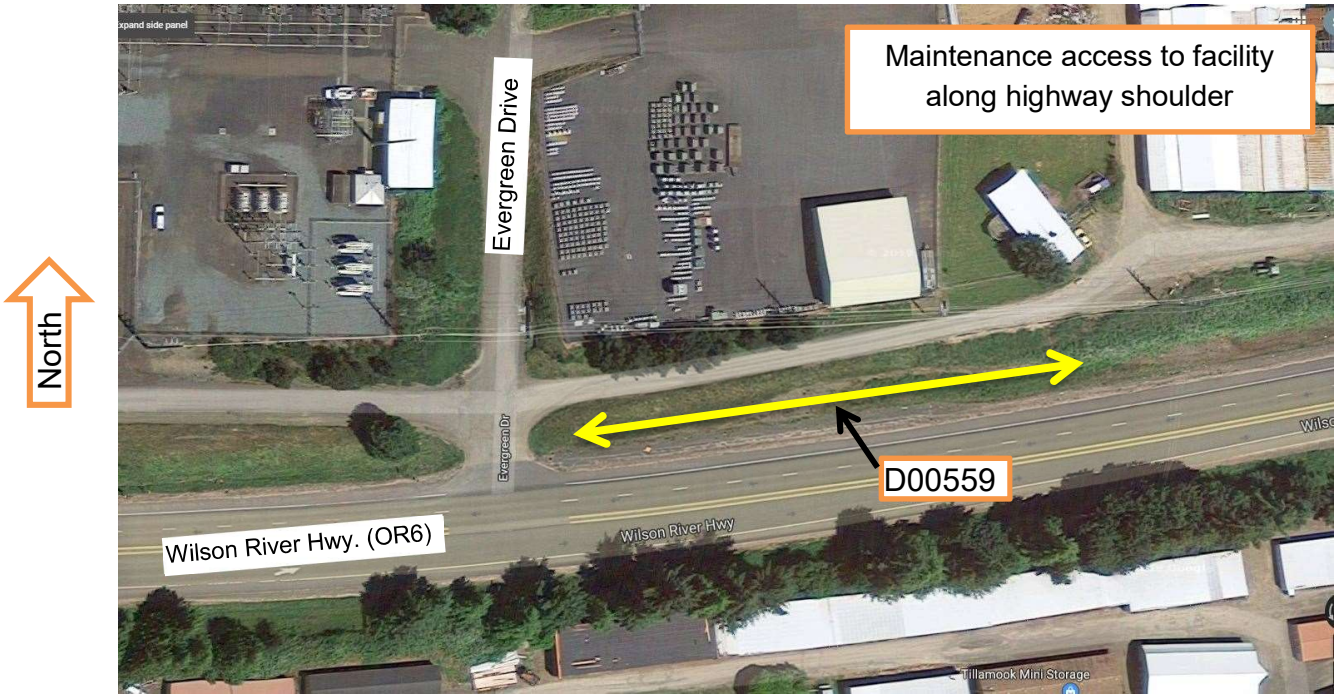



**Figure 8: D00559 Facility location map**

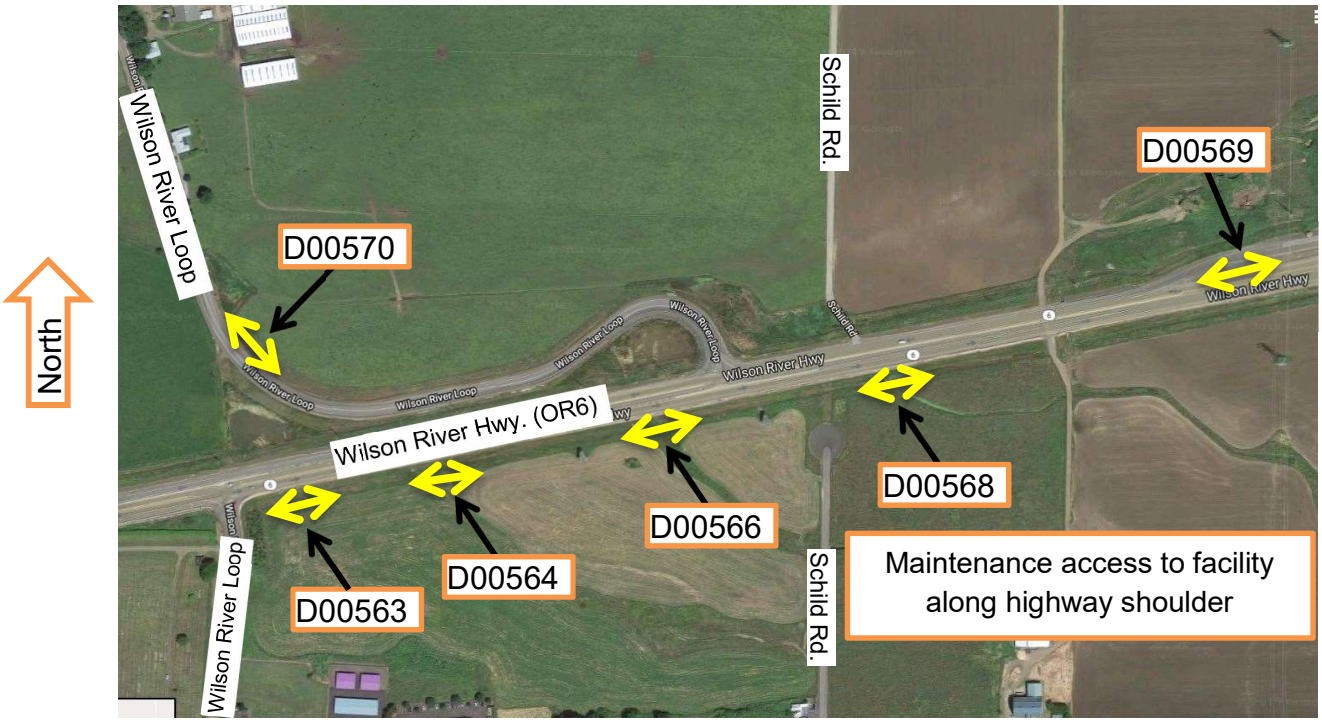


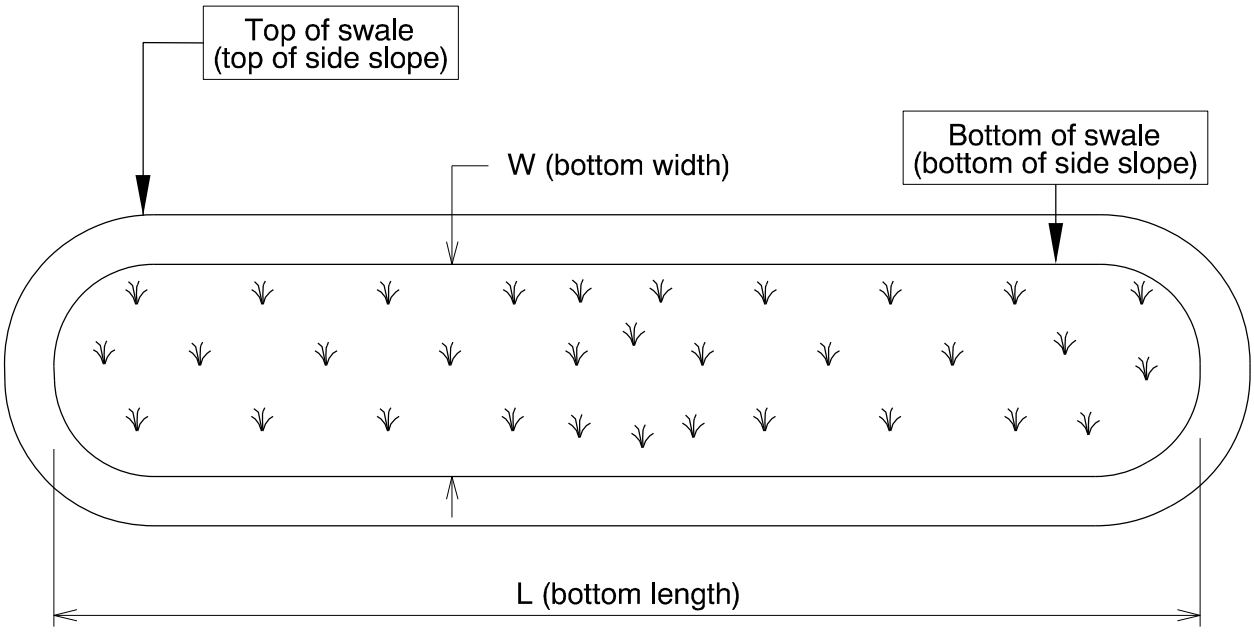

**Figure 9: D00563, D00564, D00566, D00568, D00569, D00570 Facility location map**

## 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:

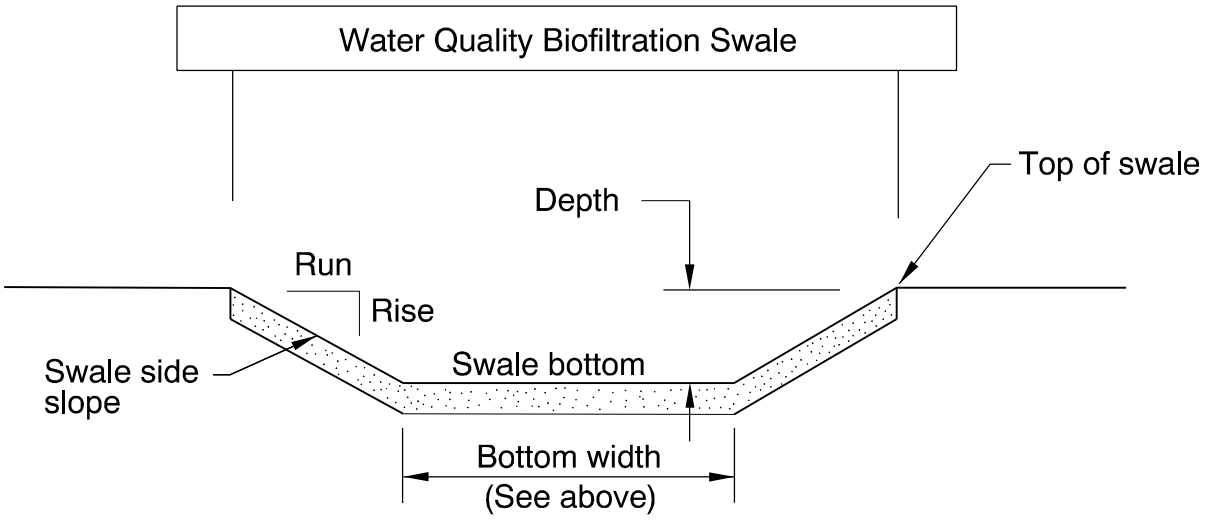
| Facility Id (DFI) | Bottom Length (feet) | Bottom Width (feet) |
|---|---|---|
| D00559 | 275 | 9.5 |
| D00563 | 100 | 9 |
| D00564 | 125 | 9 |
| D00566 | 140 | 9 |
| D00568 | 150 | 9 |
| D00569 | 210 | Varies 1 to 12 |
| D00570 | 150 | 9 |



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:

| Facility Id (DFI) | Depth (feet) | Rise (feet) | Run (feet) |
|---|---|---|---|
| D00559 | 1.5 | 1 | 6 – Foreslope<br>2 – Backslope |
| D00563 | 1.3 | 1 | 4 |
| D00564 | 1.3 | 1 | 4 |
| D00566 | 1.3 | 1 | 4 |
| D00568 | 1.3 | 1 | 4 |
| D00569 | 1.3 | 1 | 4 |
| D00570 | 1.3 | 1 | 4 |



**Site Specific Information:**

## 4. Facility Access

Maintenance access to the facility:

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

## 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 |
|---|---|---|
| **An on-line swale with roadside ditches** | **An on-line swale with piped inlets and outlets** | **An off-line swale with a piped high flow bypass** |
| **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** |
| Ecology mix (18”) | ☒ | **S14** |

| | | |
|---|---|---|
| Perforated pipe | ☒ | **S15** |
| Porous pavers (access grid) | ☐ | **S16** |
| **Flow Spreader** | | |
| Rock basin (used at inlet) | ☒ | **S17** |
| Anchored board (midpoint of swale or every 50 feet along swale bottom) | ☐ | **S18** |
| Other: describe type | ☐ | **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**<br>☐ **L**<br>☐**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 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

Materials routinely removed from the facility for disposal will generally be considered as solid or special (i.e. non-hazardous) waste appropriate for disposal as such at an appropriate waste management facility. Accumulated sediments and other potentially contaminated materials, however, will require representative sampling and analysis for determination of appropriate disposal methods. At a minimum analytical testing for total petroleum hydrocarbons in the extended diesel range and total metals including lead, arsenic, cadmium, chromium, zinc, copper, selenium and silver will be necessary for disposal.

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

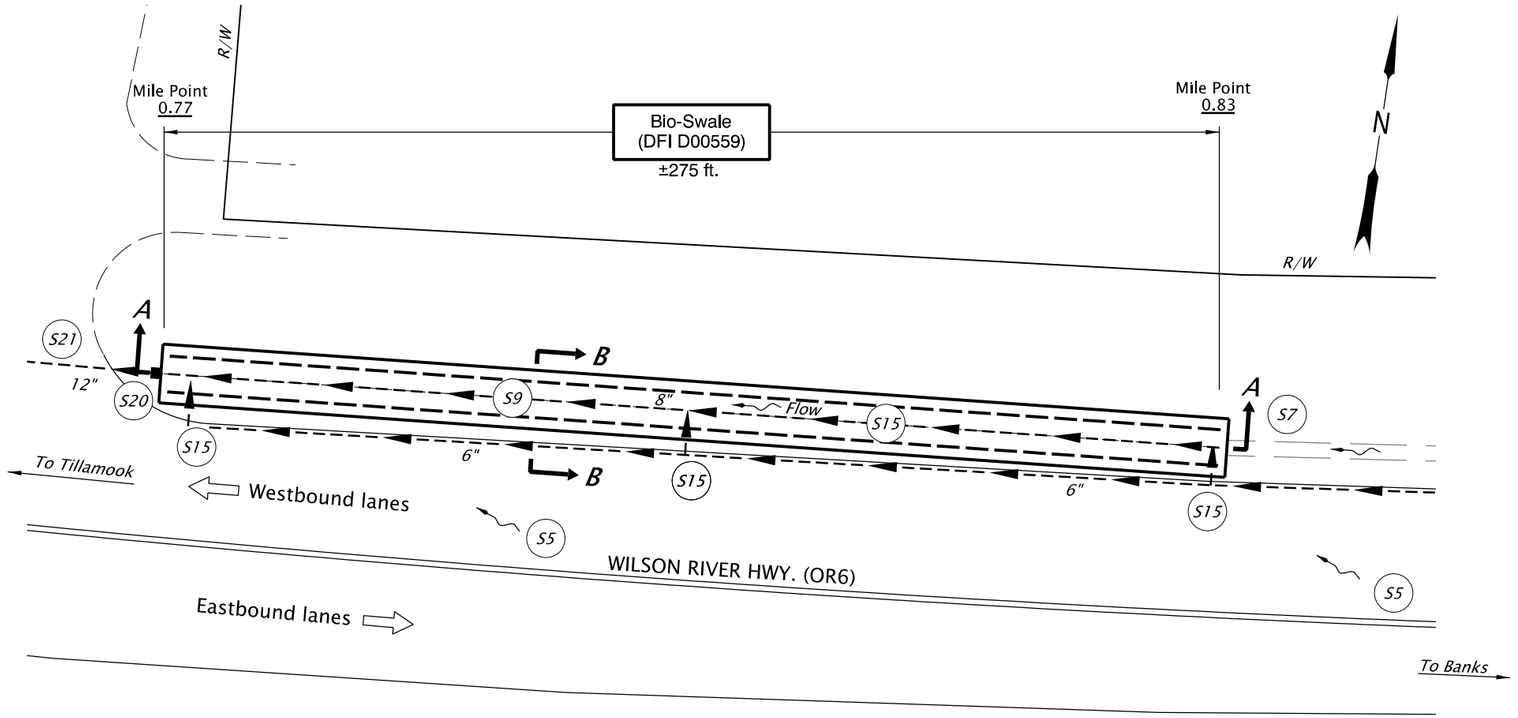
Contact any of the following for more detailed information about management of waste materials found on site:

| | |
|---|---|
| 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** **D00559, D00563, D00564, D00566, D00568, D00569 & D00570**

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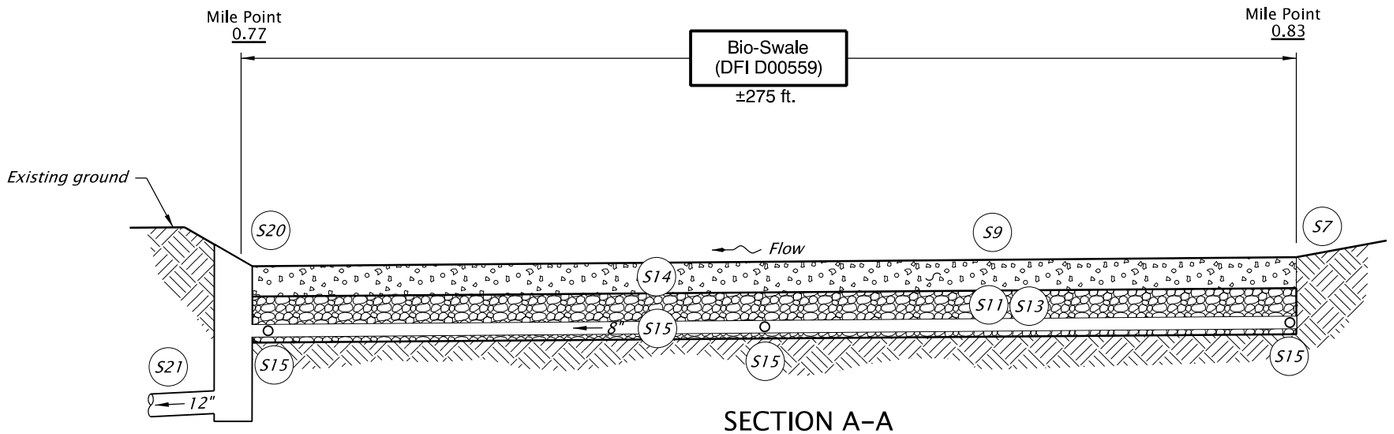


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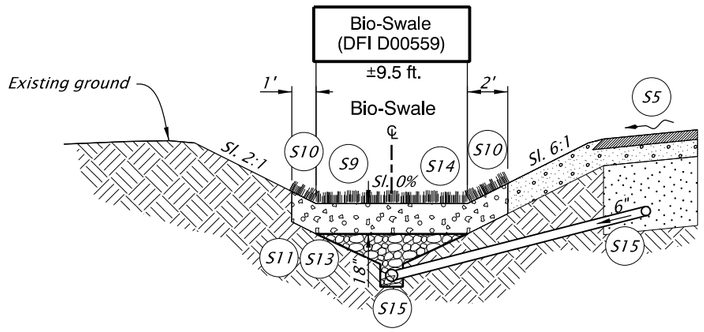



SECTION B–B
*N.T.S.*

*LEGEND:*

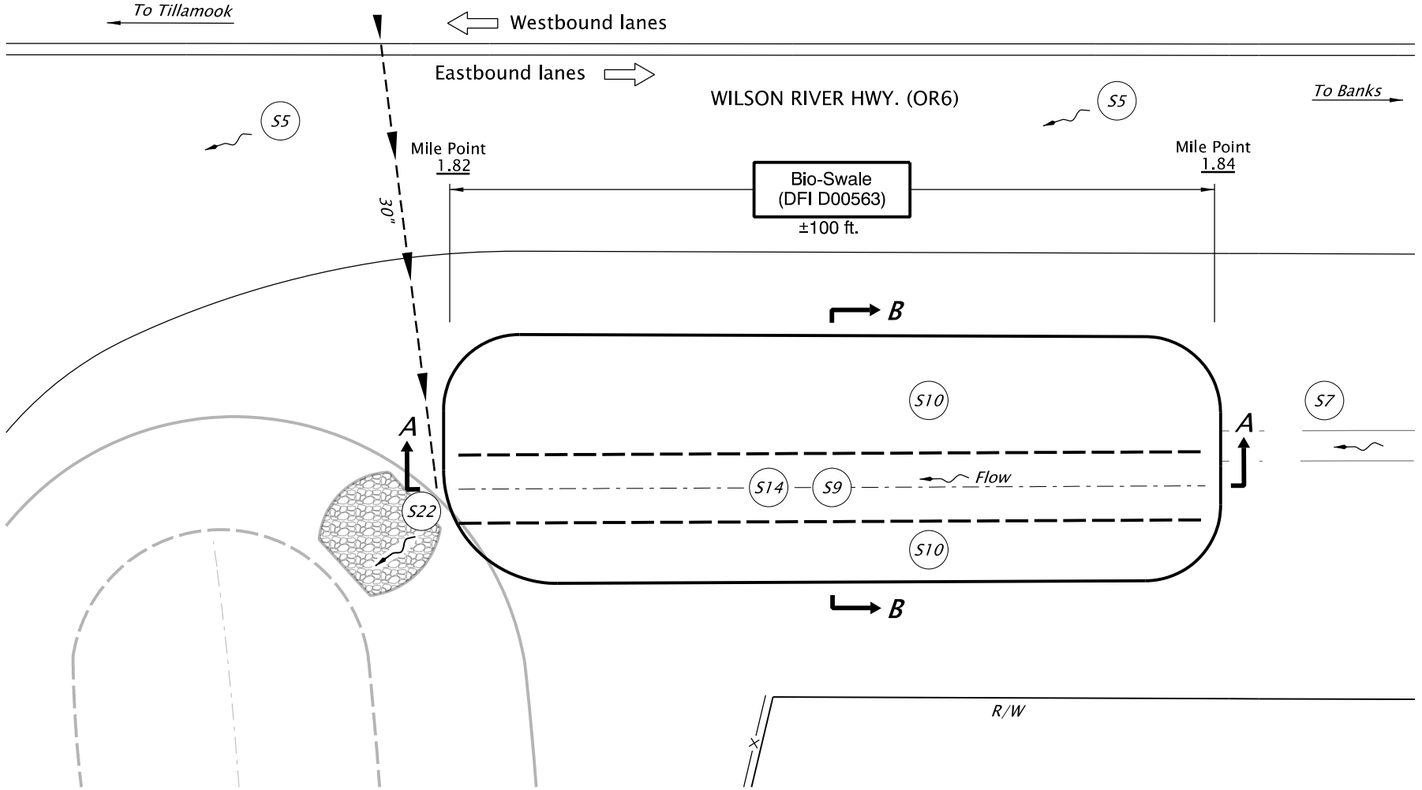
- S# — *Facility Component (see table 1 in O&M Manual)*
- *Manhole*
- *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Ditch Line*
- *Swale Bottom*
- *Swale Boundary*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

**DFI D00559**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 0.77
TILLAMOOK COUNTY

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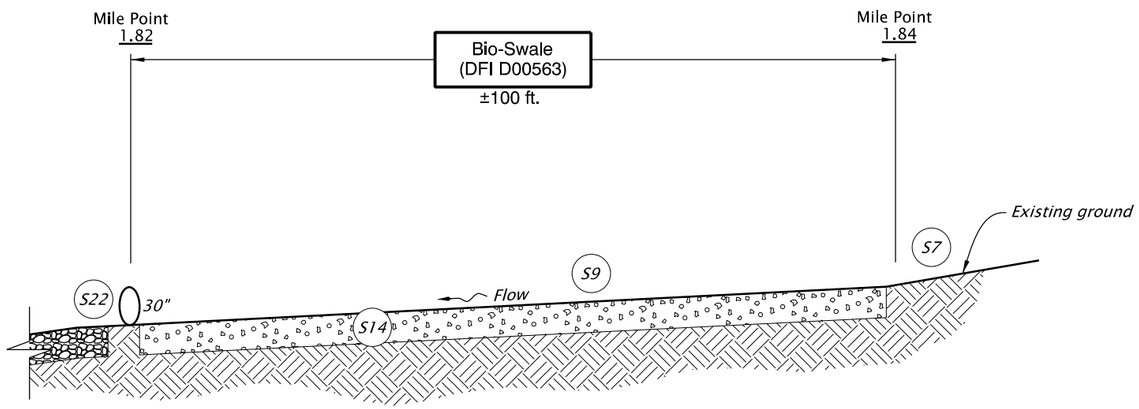


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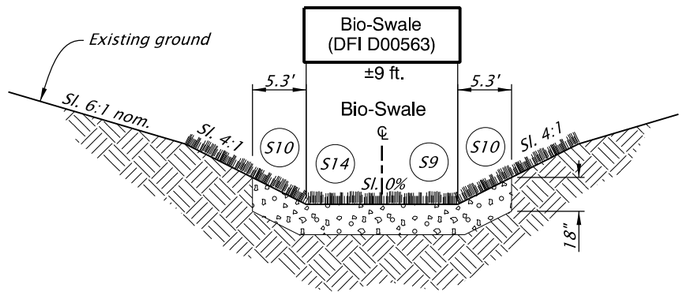


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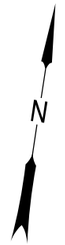



LEGEND:

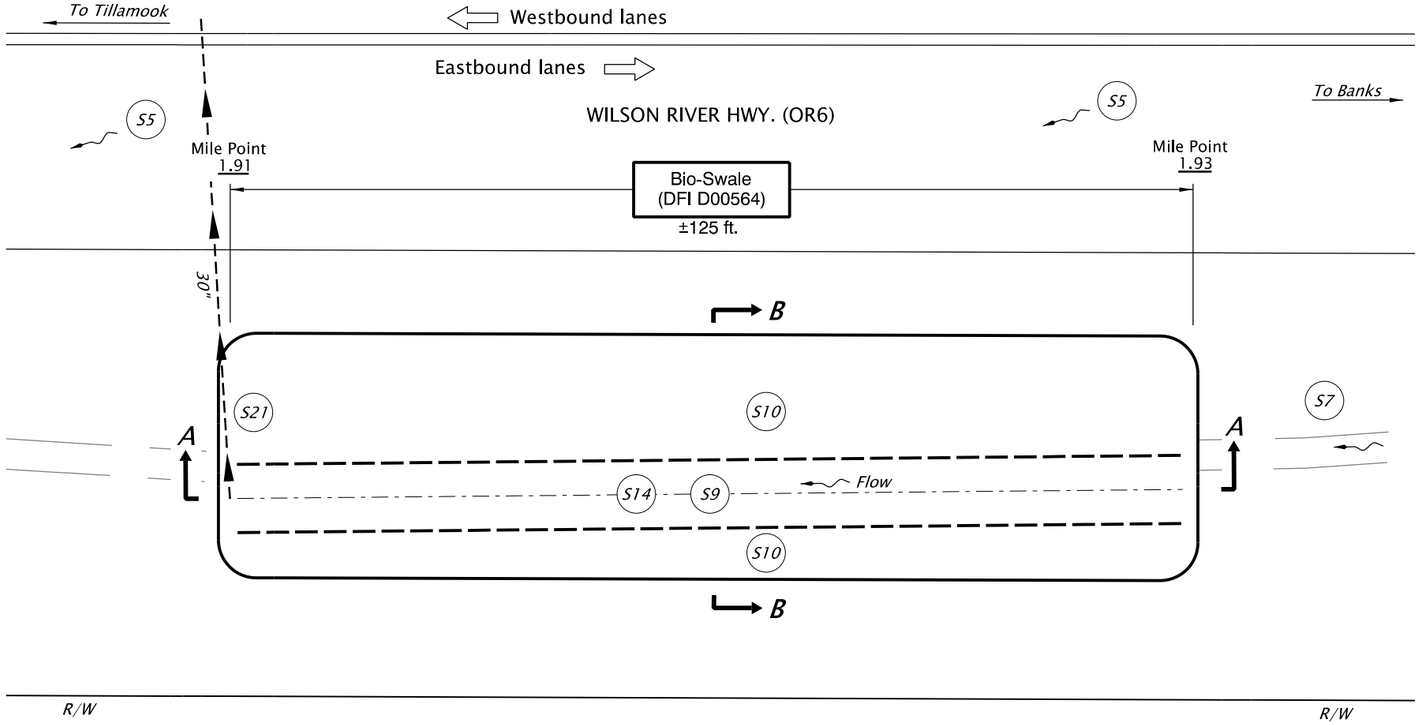
- S# — Facility Component (see table 1 in O&M Manual)
- and / or — Manhole
- and / or — Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Ditch Line
- Swale Bottom
- Swale Boundary
- Conveyance Direction
- Pavement / Facility Flow Path
- Traffic Flow Direction

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

**DFI D00563**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 1.82
TILLAMOOK COUNTY

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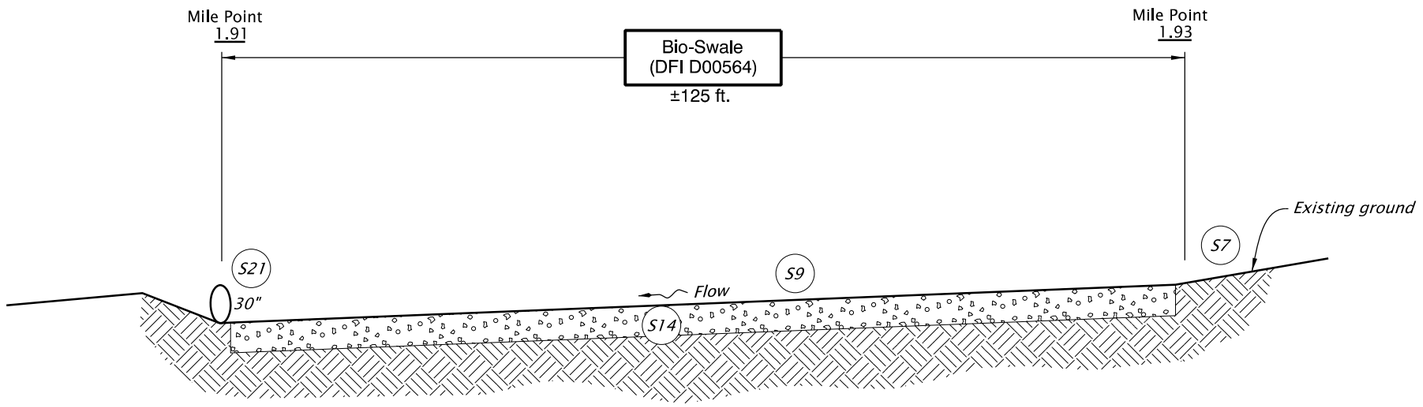


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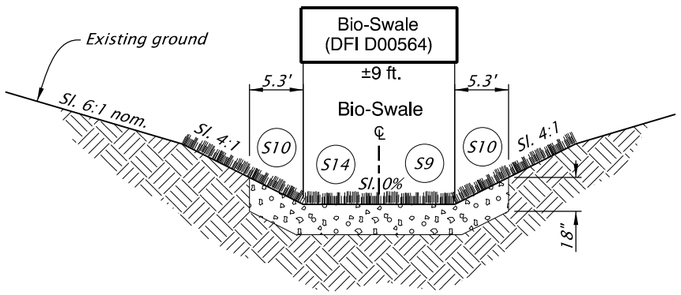


SECTION B–B
*N.T.S.*

*LEGEND:*

- *S#* — *Facility Component (see table 1 in O&M Manual)*
- *and / or* — *Manhole*
- *and / or* — *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Ditch Line*
- *Swale Bottom*
- *Swale Boundary*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

**DFI D00564**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 1.91
TILLAMOOK COUNTY

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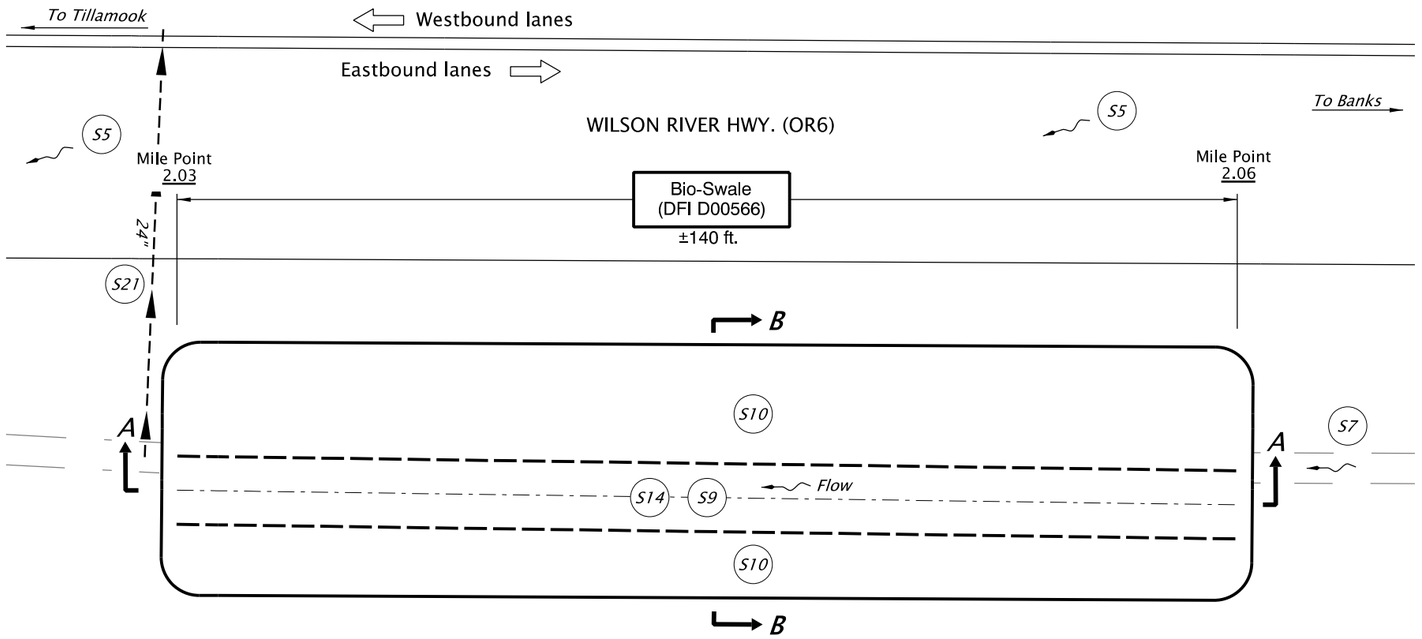


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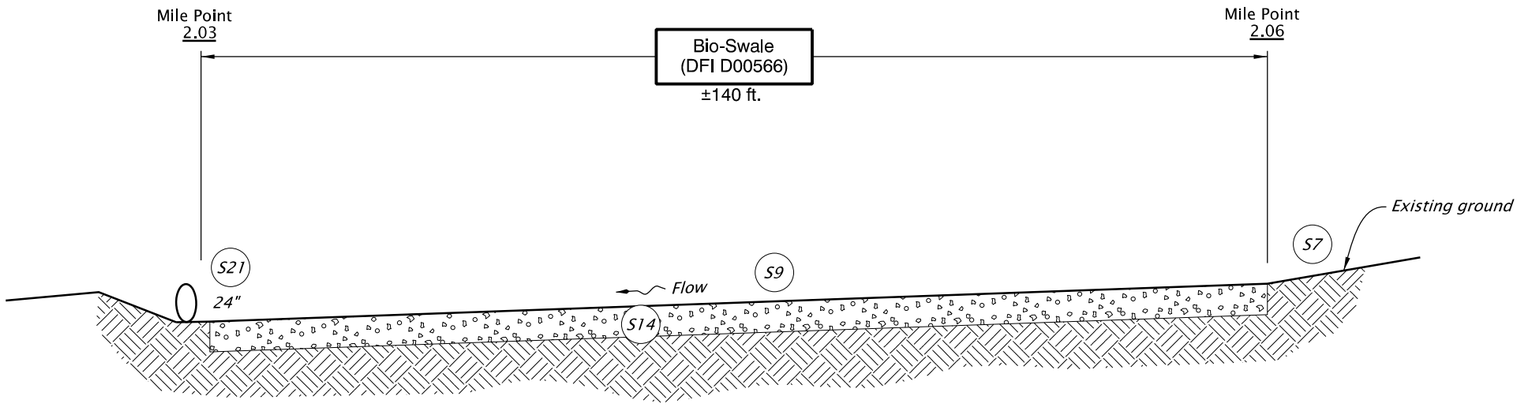


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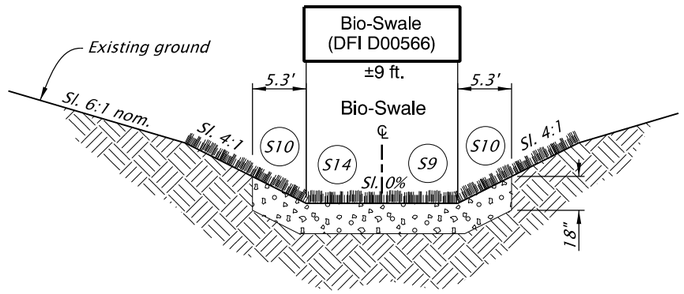


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- Ditch Line
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- Traffic Flow Direction

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

**DFI D00566**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 2.03
TILLAMOOK COUNTY

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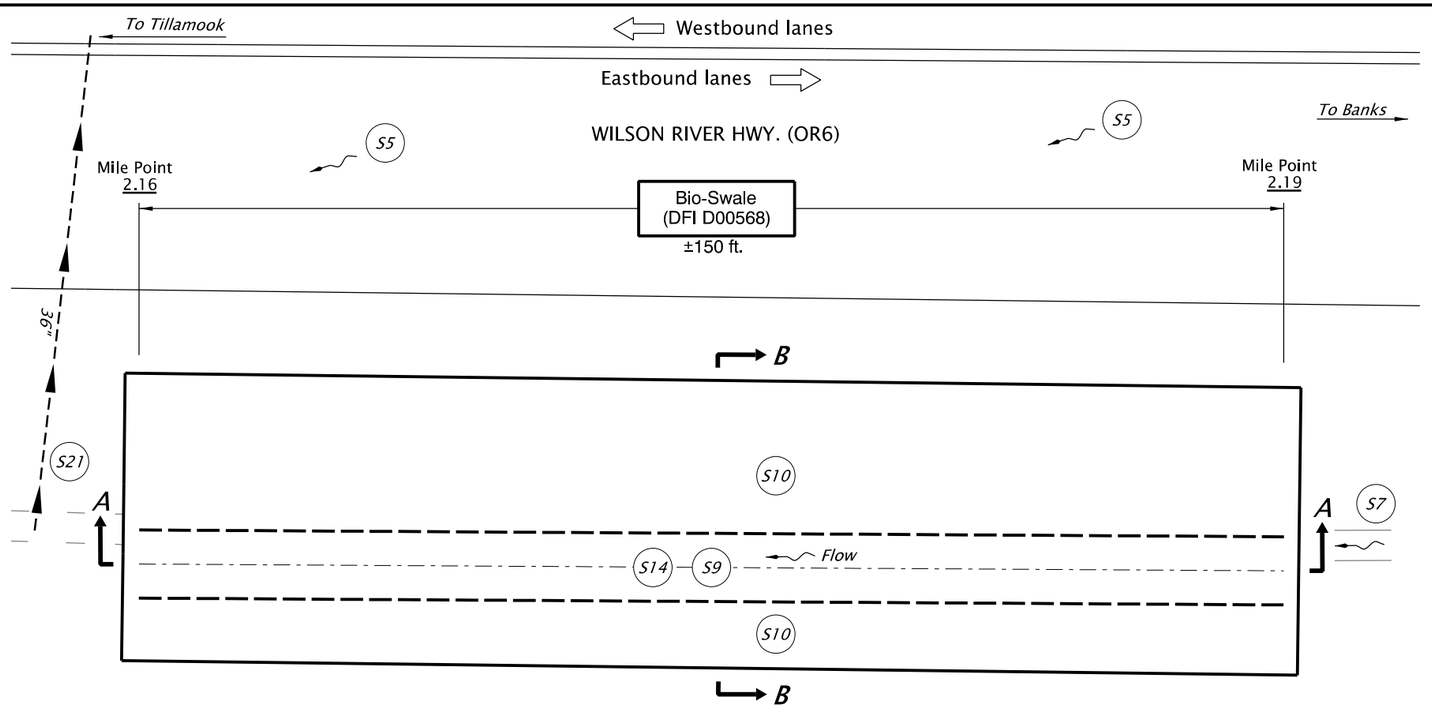


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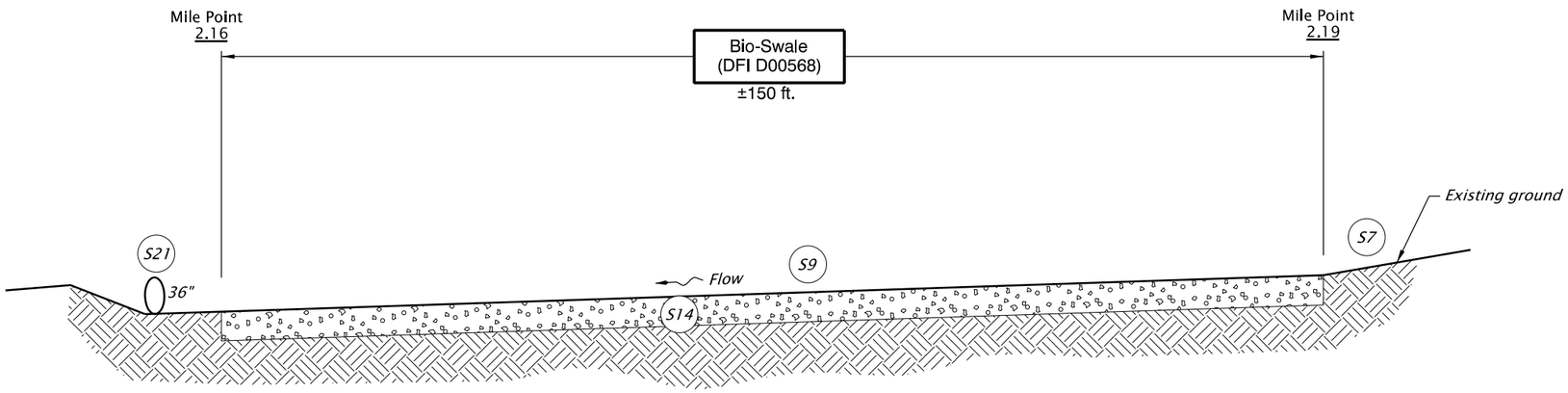


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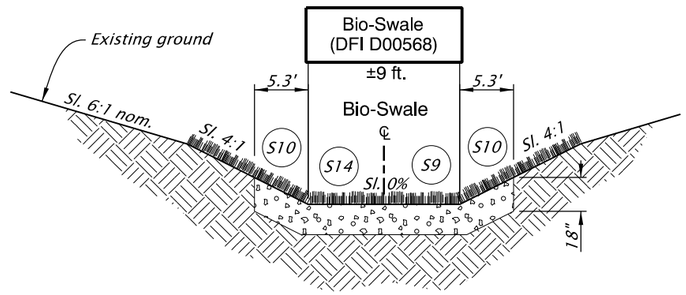


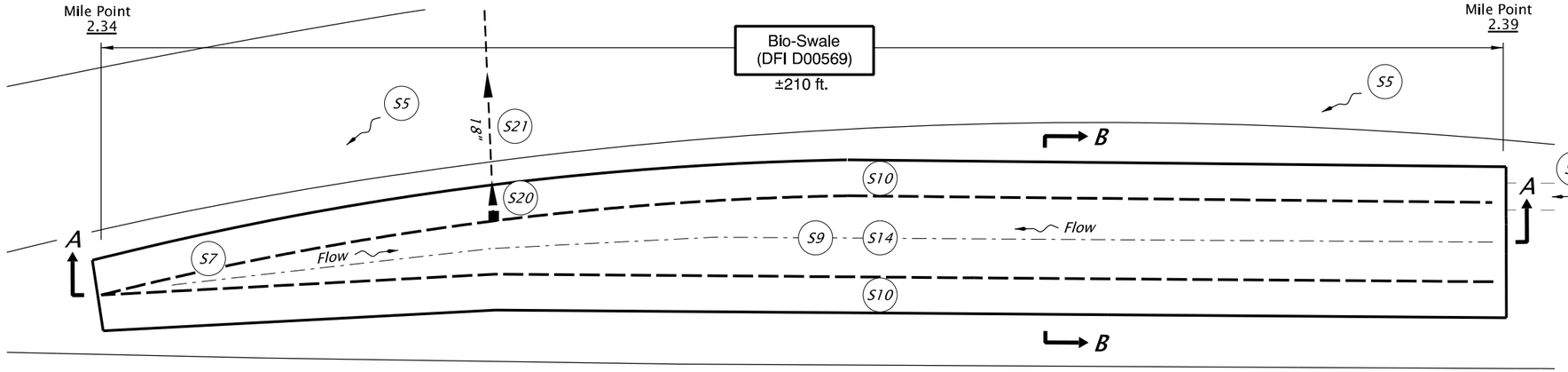

SECTION B–B
*N.T.S.*

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

**DFI D00568**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 2.16
TILLAMOOK COUNTY

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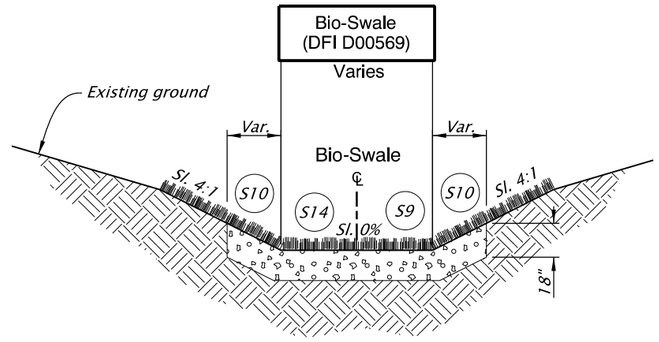


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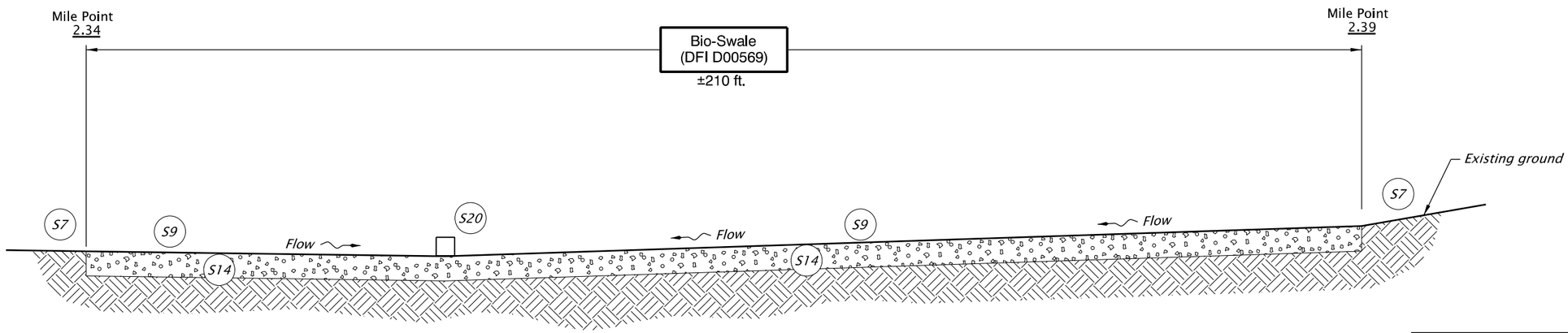


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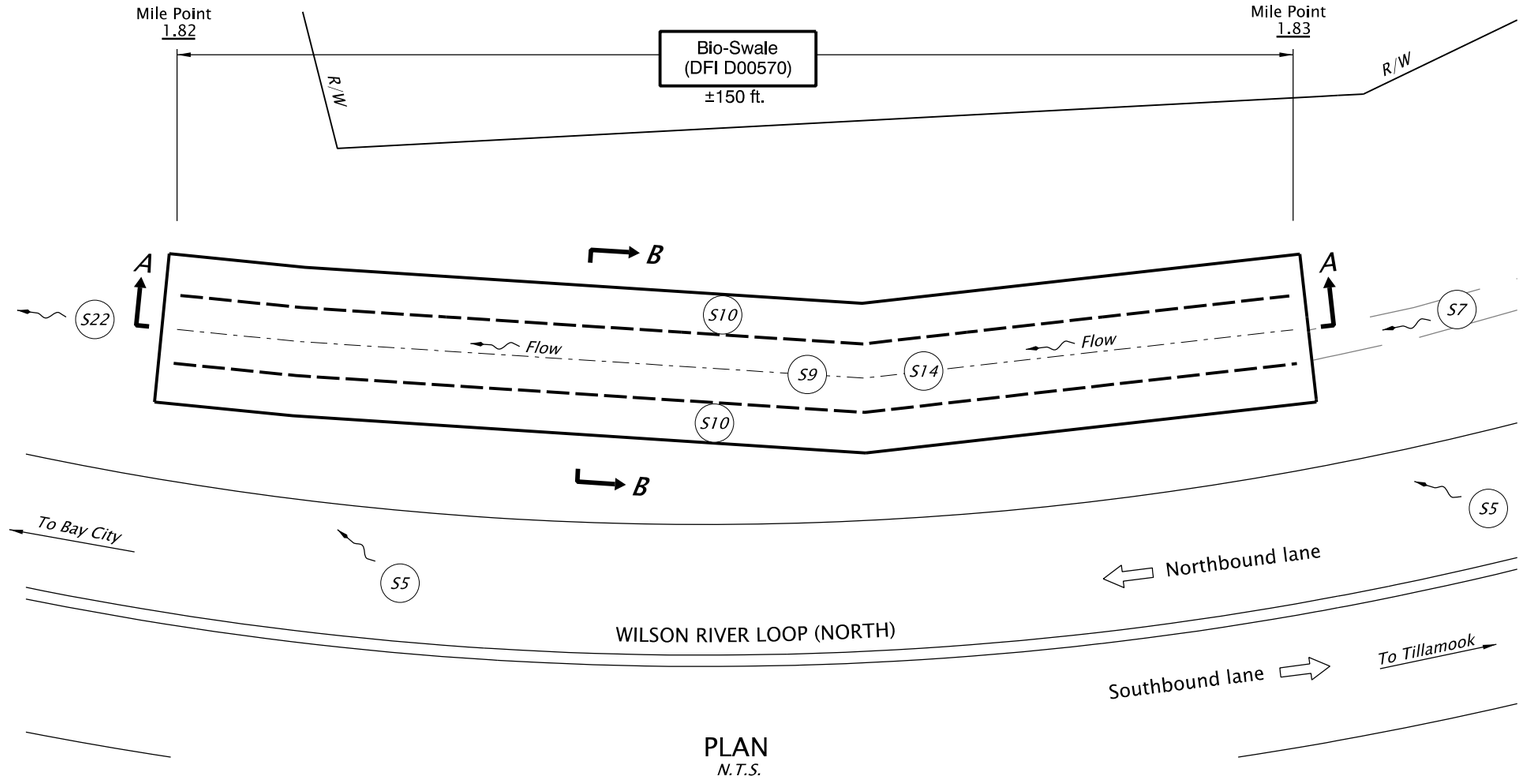
OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

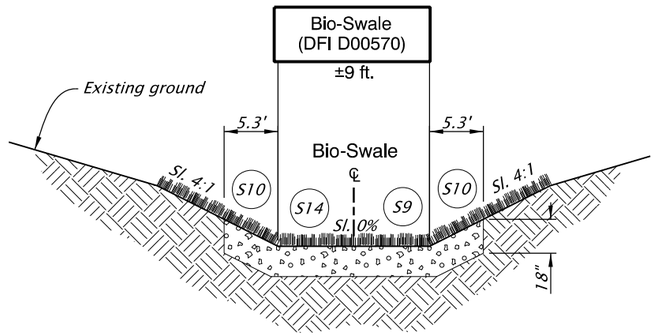
**DFI D00569**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 2.34
TILLAMOOK COUNTY



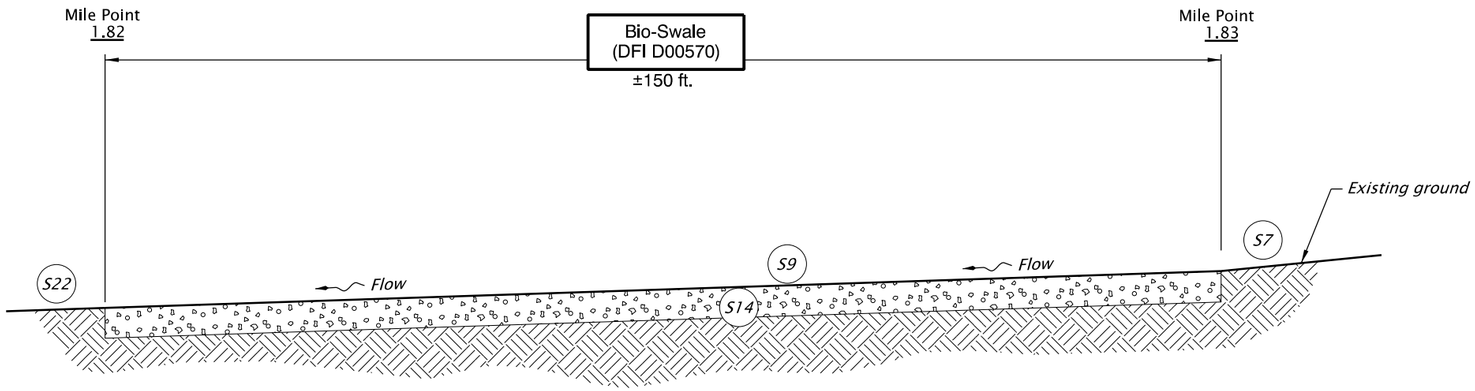

PLAN
*N.T.S.*

*LEGEND:*

- *S#* — *Facility Component (see table 1 in O&M Manual)*
- *and / or* — *Manhole*
- *and / or* — *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Ditch Line*
- *Swale Boundary*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*




SECTION B–B
*N.T.S.*




SECTION A–A
*N.T.S.*

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Ramiro Perez

Drafted By: Jeff Coon

**DFI D00570**
**MAINTENANCE DISTRICT 1 HWY 37**
**WATER QUALITY BIOFILTRATION SWALE**
WILSON RIVER HIGHWAY MP 1.82
TILLAMOOK COUNTY

# B Appendix B – Project Contract Plans

## Contents:

**Site Specific Subset of Project Contract Plan 45V-035**

45V-035

| INDEX OF SHEETS | |
|---|---|
| SHEET NO. | DESCRIPTION |
| 1 | Title Sheet |
| 1A | Index Of Sheets Cont'd. & Std. Drg. Nos. |

STATE OF OREGON

# DEPARTMENT OF TRANSPORTATION

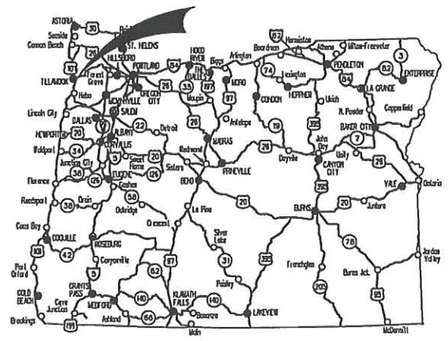
PLANS FOR PROPOSED PROJECT

## GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION, AND ROADSIDE DEVELOPMENT

# OR6 @ WILSON RIVER LOOP ROAD SEC.

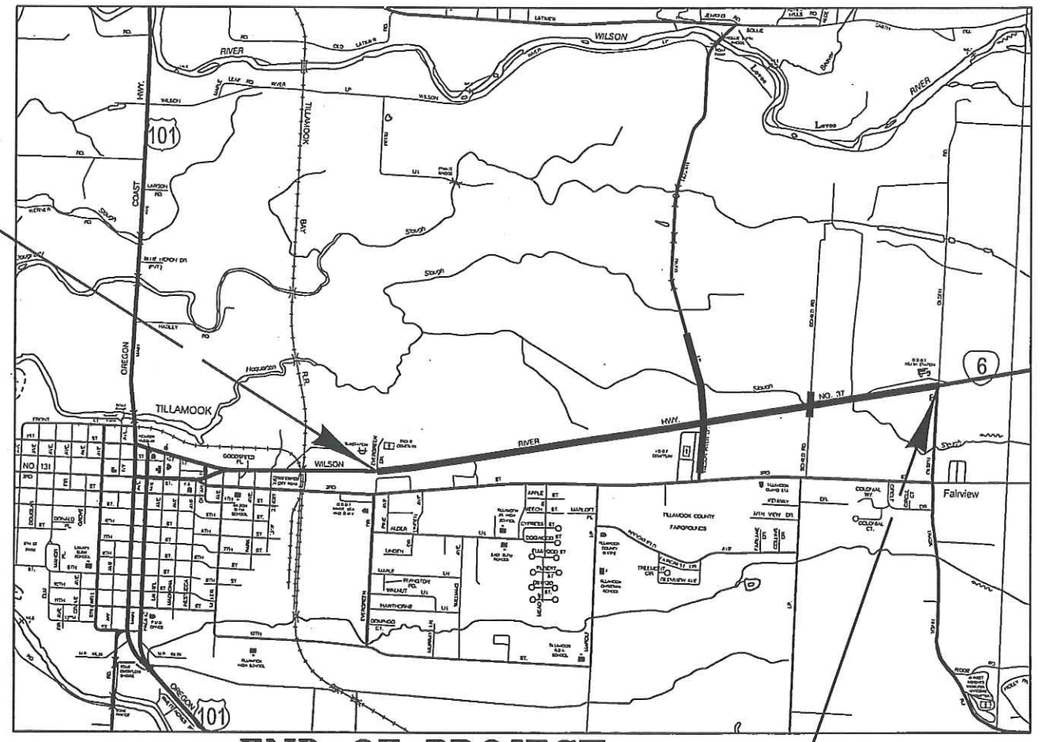
## WILSON RIVER HIGHWAY

**TILLAMOOK COUNTY**
**JUNE 2012**



*Overall Length Of Project - 1.78 Miles*


**BEGINNING OF PROJECT**
**NH-S037(026)**
**STA. "L" 39+50 (M.P. 0.75)**




**END OF PROJECT**
**NH-S037(026)**
**STA. "L" 133+35 (M.P. 2.52)**

T. 1 S., R. 9 W., W.M.


EXPIRES: 6-30-2014

**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
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Salem, OR 97301
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OREGON TRANSPORTATION COMMISSION

| | |
|---|---|
| Pat Egan | CHAIR |
| Mary F. Olson | COMMISSIONER |
| David Lohman | COMMISSIONER |
| Mark Frohnmayer | COMMISSIONER |
| Tommy 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: 4/25/12
Signature & date

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

Concurrence by ODOT Chief Engineer

**OR6 @ WILSON RIVER LOOP ROAD SEC.**
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | NH-S037(026) | 1 |

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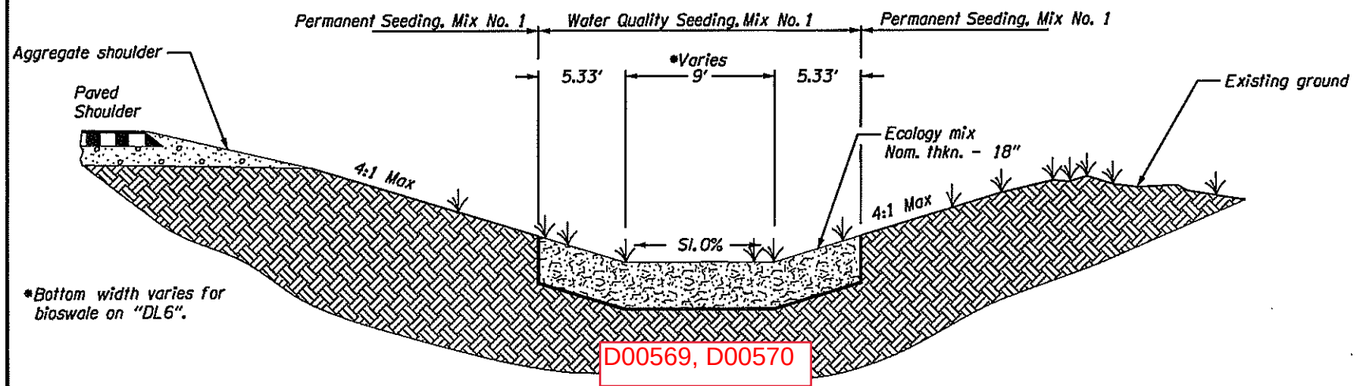
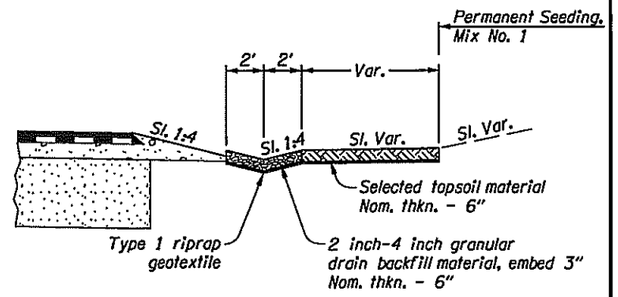
1:200 - 1

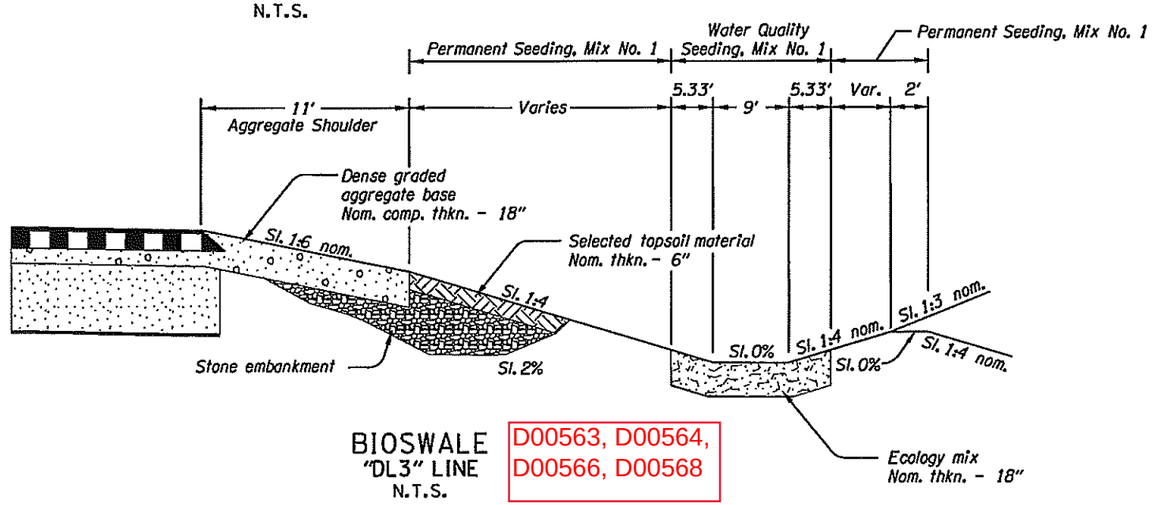



D00569, D00570

BIOSWALE
"DL4" AND "DL6" LINES
N.T.S.

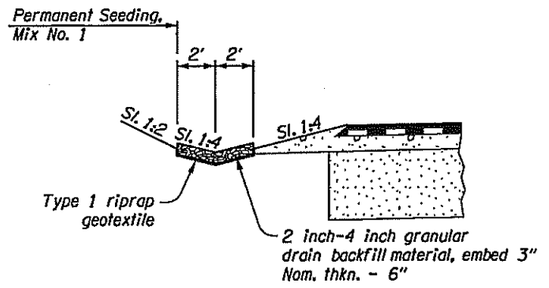



FLAT BOTTOM DITCH
"WRLS" LINE
N.T.S.

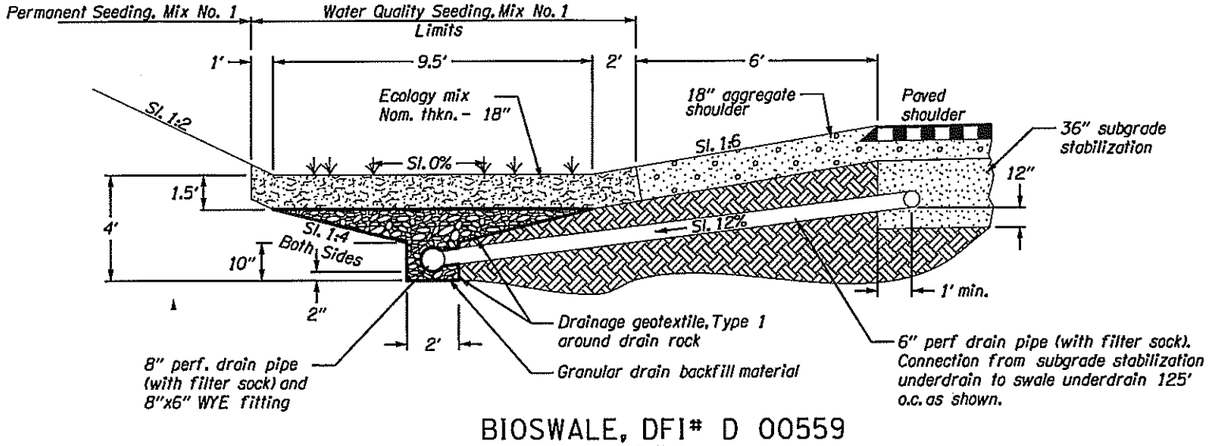



BIOSWALE
"DL3" LINE
N.T.S.

D00563, D00564, D00566, D00568




"V" BOTTOM DITCH
"WRLS" LINE
N.T.S.




BIOSWALE, DFI# D 00559
N.T.S.

Note: See GN series for seed mix in ditches, wetland mitigation areas, bioslopes, bioswales, biofilter strips, and biofiltration pond.

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

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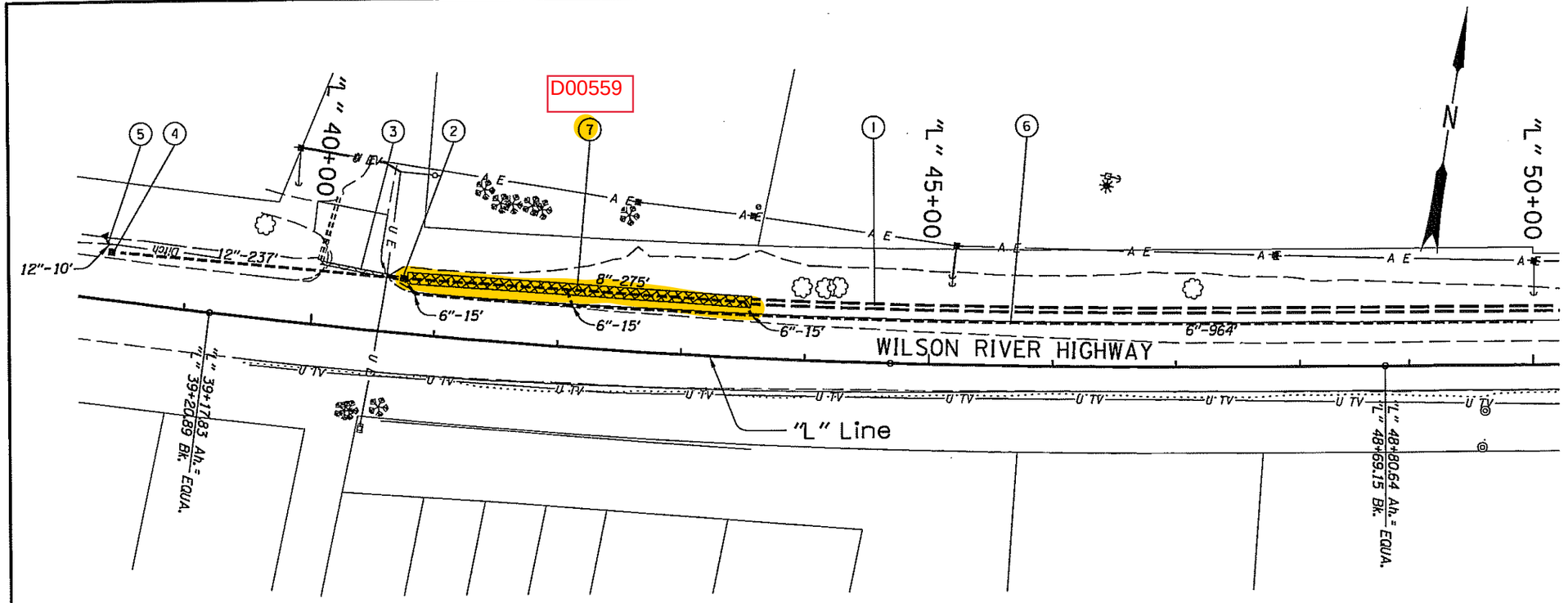
OR6 @ WILSON RIVER
LOOP ROAD SEC.
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Doring
Drafted By - Linda Foote

STORMWATER DETAILS

SHEET NO. GJ-2




(1) *Sta. "L" 43+50 to Sta. "L" 52+20*
*Const. ditch*
*2' flat bottom, 1:2 slope Lt., 1:6 slope Rt.*

(2) *Sta. "L" 40+71, 44.4' Lt.*
*Const. modified Type D ditch inlet*
*Rim=16.75'*
*I.E.=13.92'*
*(For details, see sht. GJ)*
*(See drg. no. RD370)*

(3) *Sta. "L" 40+03, 50.4' Lt.*
*Remove 15" pipe - 64'*

(4) *Sta. "L" 38+36.10, 38.6' Lt.*
*Const. modified Type D ditch inlet*
*Inst. 12" storm sewer pipe - 237', 5' depth*
*Rim=14.79'*
*Sl.=0.4%*
*I.E.=12.98'*
*Trench resurf. - 33.3 sq. yd.*
*(For details, see sht. GJ)*

(5) *Sta. "L" 38+31.40, 47.2' Lt.*
*Inst. 12" storm sewer pipe - 10', 5' depth*
*Const. paved end slope, Lt. - 23 sq.ft.*
*Sl.=0.4%*
*I.E.=12.95'*

(6) *Sta. "L" 40+81, 33' Lt. to*
*Sta. "L" 50+00, 35' Lt.*
*Inst. 6" perf. underdrain - 964', 5' depth*
*Connect to swale underdrain every 125' - 45', 5' depth*
*(For details, see sht. GJ-2)*
*(See drg. no. RD312)*

(7) *Sta. "L" 40+75 to Sta. "L" 43+50*
*Const. bioswale with 8" underdrain - 275', 5' depth, DFI# D00559*
*(For details, see sht. GJ-2)*

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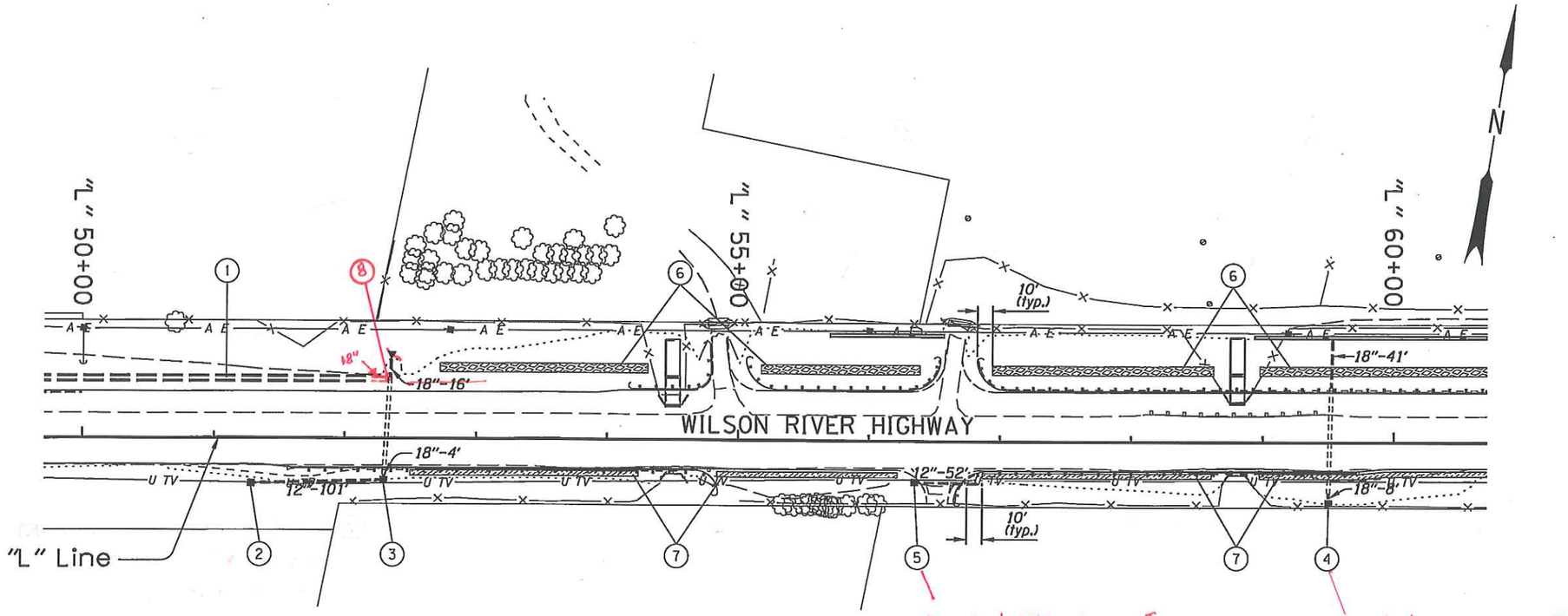
**OR6 @ WILSON RIVER LOOP ROAD SEC.**
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Daring
Drafted By - Linda Foote

**STORMWATER PLAN**

SHEET NO. GJ-6




(1) See Sht. GJ-6, note 1
Const. ditch

(2) Sta. "L" 51+28, 34.3' Lt.
Const. modified Type D ditch inlet
Inst. 12" storm sewer pipe - 101', 5' depth
Rim=23.6'
Sl.=0.78%
I.E.=22.60' (W)
I.E.=21.81' (E) (field verify)
(For details, see sht. GJ)

(3) Sta. "L" 52+34
Const. modified Type D ditch inlet
Extend 18" culv. pipe - ~~16' Lt., 5' depth~~
- 4' Rt., 5' depth
Rim=23.8'
Match extg. slope
Const. paved end slope, Lt. - 30 sq.ft.
(Field verify)
(For details, see sht. GJ)

(4) Sta. "L" 59+52
~~Const. modified Type D ditch inlet~~
Extend 18" culv. pipe - 41' Lt., 5' depth
- 8' Rt., 5' depth
Rim=18.2'
Match extg. slope
(Field verify)
(For details, see sht. GJ)

(5) Sta. "L" 53+34.80, 31.3' Rt. to
Sta. "L" 56+87, 32.5' Rt.
~~Const. modified Type D ditch inlet~~
Inst. 12" storm sewer pipe - 52', 5' depth
Rim=25.4'
Sl.=0.4%
I.E.=23.90' (W)
I.E.=23.70' (E)
Regrade slope on downstream end to drain
Trench resurf. - 17.3 sq.yd.
(For details, see sht. GJ)

(6) Sta. "L" 52+70 to Sta. "L" 86+48, Lt.
Const. bioslope, DF1# D00561
(For details, see sht. GJ)

(7) Sta. "L" 52+50 to Sta. "L" 94+94, Rt.
Const. biofilter strip, DF1# D00560
(For details, see sht. GJ)

(8) Sta "L" 52+34 Lt
Construct modified Type D ditch Inlet
Extend 18" CMP pipe West to Sta 52+33
5' depth

REVISED AS CONSTRUCTED
CONTRACT 14479

Dave True, Project Manager DATE: 2/26/14

REGISTERED PROFESSIONAL ENGINEER
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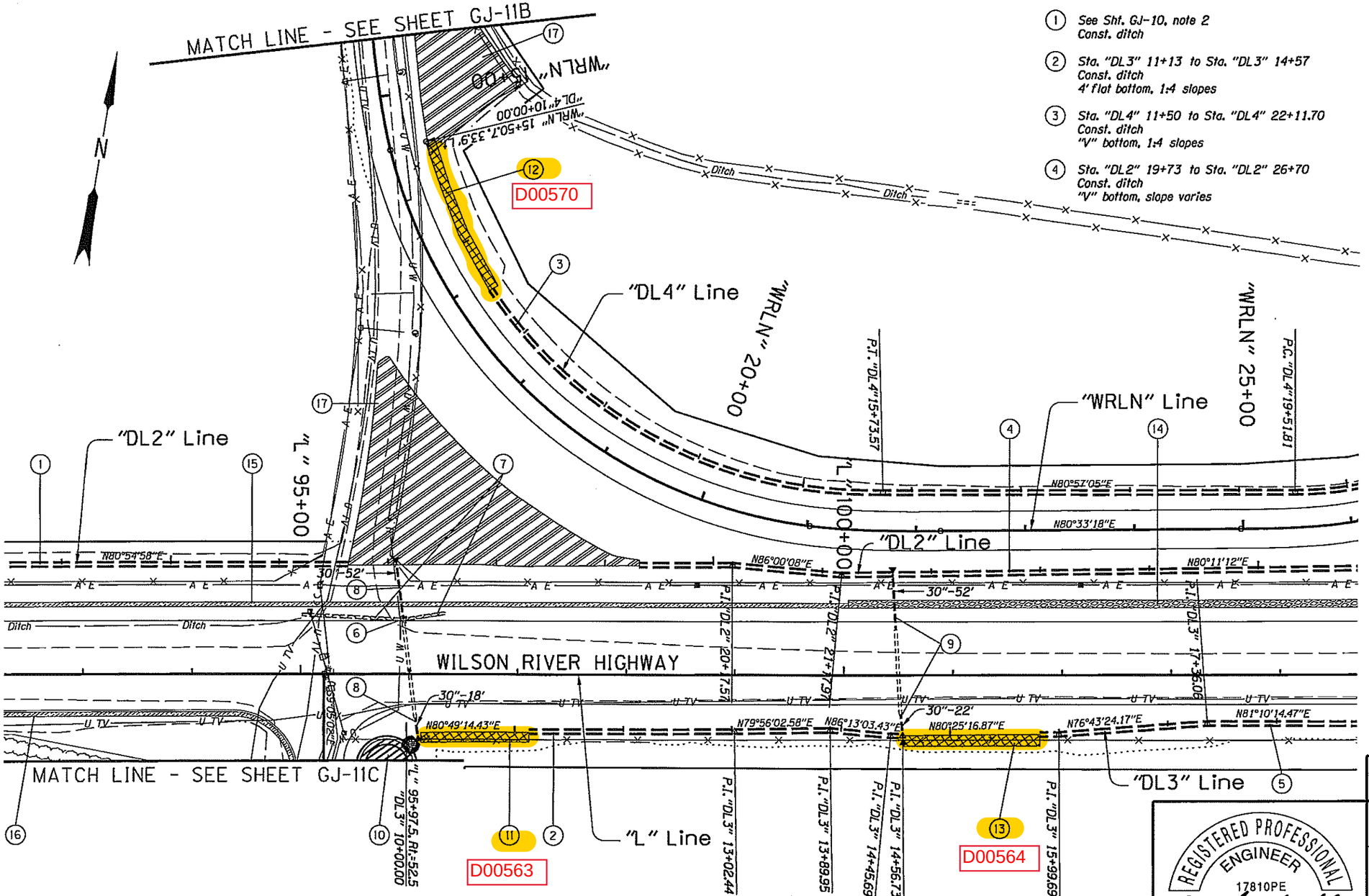
OR6 @ WILSON RIVER
LOOP ROAD SEC.
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Doring
Drafted By - Linda Foote

STORMWATER PLAN

SHEET NO. GJ-7




1. See Sht. GJ-10, note 2
   Const. ditch
2. Sta. "DL3" 11+13 to Sta. "DL3" 14+57
   Const. ditch
   4' flat bottom, 1:4 slopes
3. Sta. "DL4" 11+50 to Sta. "DL4" 22+11.70
   Const. ditch
   "V" bottom, 1:4 slopes
4. Sta. "DL2" 19+73 to Sta. "DL2" 26+70
   Const. ditch
   "V" bottom, slope varies
5. Sta. "DL3" 15+82 to Sta. "DL3" 21+05
   Const. ditch
   4' flat bottom, 1:4 slopes
6. Sta. "L" 95+94, 50' Lt.
   Remove storm junction box
7. Sta. "L" 95+01, 54.4' Lt.
   Remove 36" pipes - 133'
8. Sta. "L" 96+00
   Extend 30" culv. pipe - 52' Lt., 5' depth
   - 18' Rt., 5' depth
   Match extg. slope
   Const. paved end slope, Lt.& Rt.- 70 sq.ft.
9. Sta. "L" 100+50
   Extend 30" culv. pipe - 52' Lt., 5' depth
   - 22' Rt., 5' depth
   Match extg. slope
   Const. paved end slope, Lt.& Rt.- 110 sq.ft.
10. Const. biofiltration pond, DFI# D00572
    (For details, see sht. GJ-3)
11. Sta. "DL3" 10+00 to Sta. "DL3" 11+13
    Const. bioswale, DFI# D00563
    (For details, see sht. GJ-2)
12. Sta. "DL4" 10+00 to Sta. "DL4" 11+50
    Const. bioswale, DFI# D00570
    (For details, see sht. GJ-2)
13. Sta. "DL3" 14+57 to Sta. "DL3" 15+82
    Const. bioswale, DFI# D00564
    (For details, see sht. GJ-2)
14. Sta. "L" 100+00 to Sta. "L" 109+00. Lt.
    Const. bioslope, DFI# D00565
    (For details, see sht. GJ)
15. See Sht. GJ-10, note 6
    Const. biofilter strip
16. See Sht. GJ-7, note 7
    Const. biofilter strip
17. Const. wetlands shown thus
    (For drg. nos., see sht. 1A)

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

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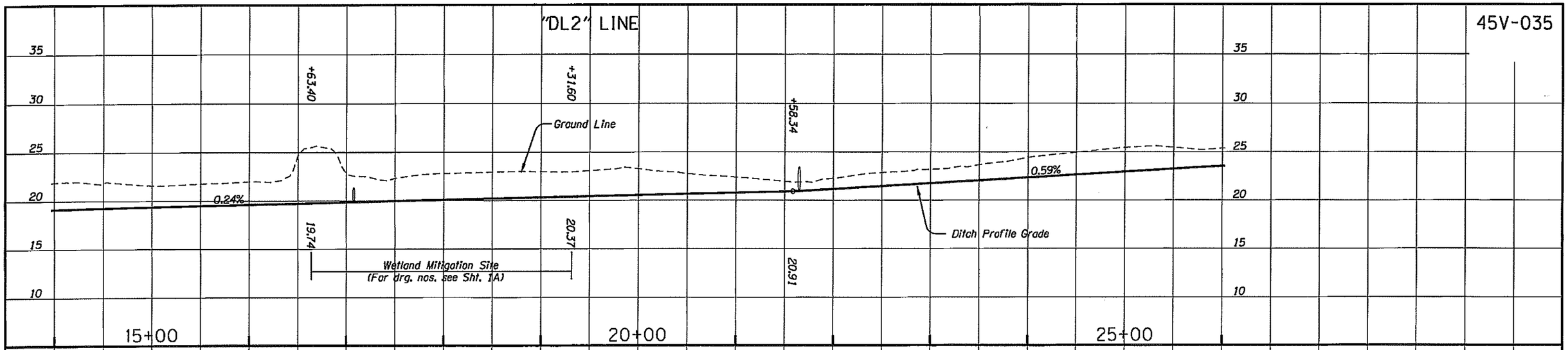
**OR6 @ WILSON RIVER**
**LOOP ROAD SEC.**
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Doring
Drafted By - Linda Foote

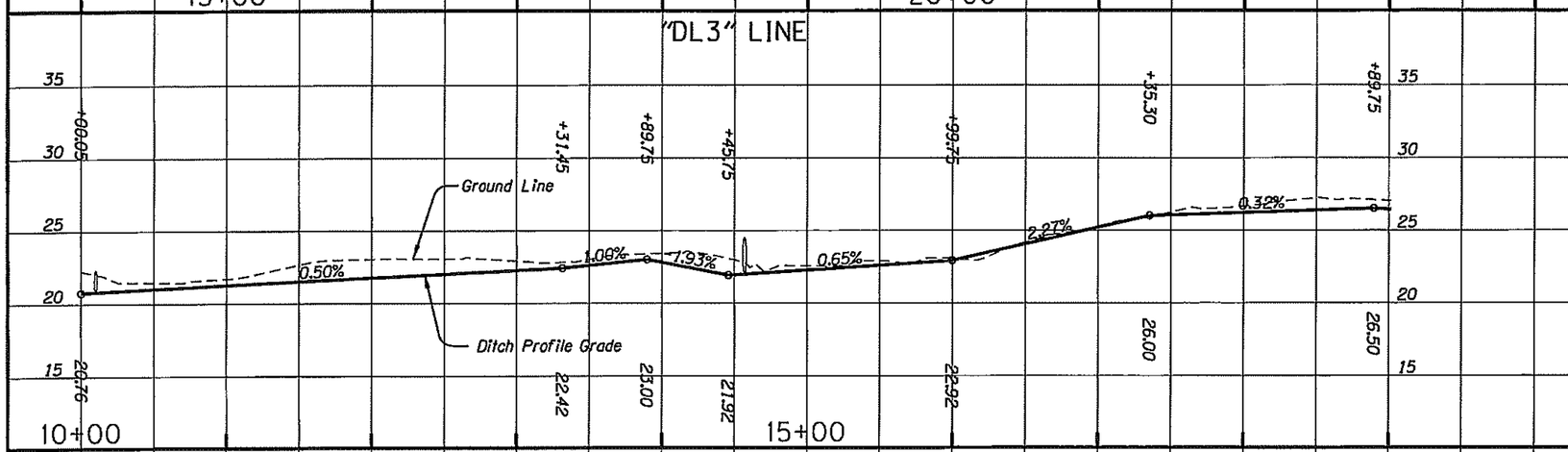
**STORMWATER PLAN**

SHEET NO. GJ-11

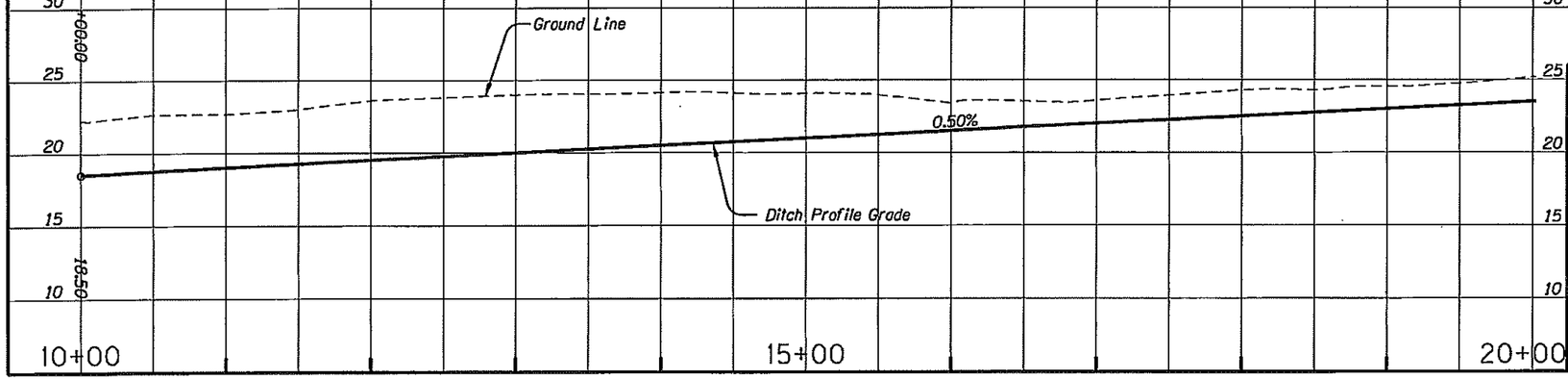
"DL2" LINE




"DL3" LINE




"DL4" LINE

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JUL 25, 1995
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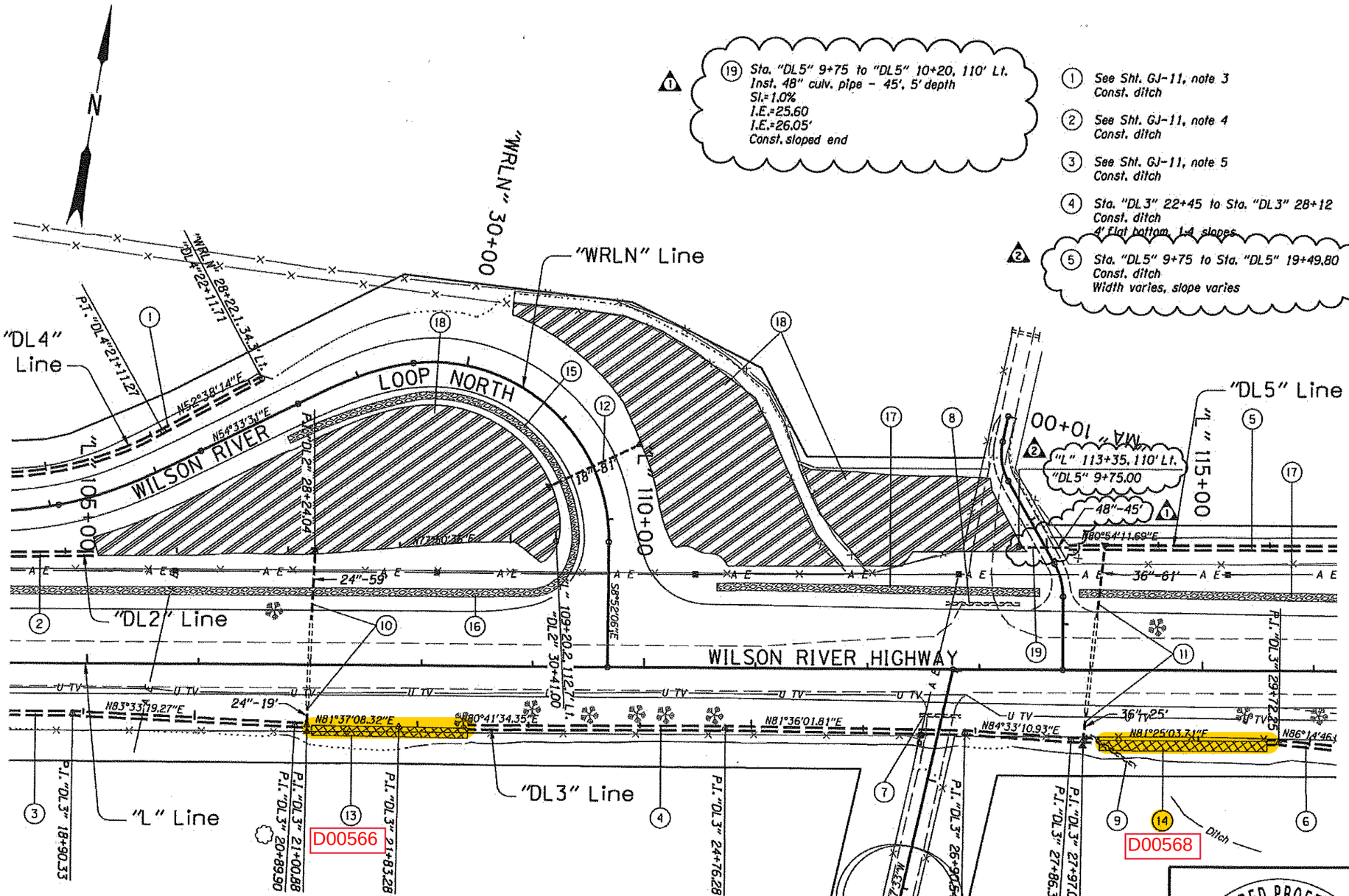
Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Doring
Drafted By - Linda Foote

**STORMWATER PROFILES**

SHEET NO. GJ-11A

45V-035




(19) Sta. "DL5" 9+75 to "DL5" 10+20, 110' Lt.
Inst. 48" culv. pipe - 45', 5' depth
Sl.= 1.0%
I.E.=25.60
I.E.=26.05'
Const. sloped end

(1) See Sht. GJ-11, note 3
Const. ditch

(2) See Sht. GJ-11, note 4
Const. ditch

(3) See Sht. GJ-11, note 5
Const. ditch

(4) Sta. "DL3" 22+45 to Sta. "DL3" 28+12
Const. ditch
4' flat bottom, 1:4 slopes

(5) Sta. "DL5" 9+75 to Sta. "DL5" 19+49.80
Const. ditch
Width varies, slope varies

(6) Sta. "DL3" 29+62 to Sta. "DL3" 47+43.80
Const. ditch
4' flat bottom, 1:4 slopes

(7) Sta. "L" 112+47, 41' Rt.
Remove 24" pipe - 45'

(8) Sta. "L" 112+70, 59' Lt.
Remove 48" pipe - 66'

(9) Sta. "L" 114+00, 59' Rt.
Remove 24" pipe - 50'

(10) Sta. "L" 107+00
Extend 24" culv. pipe - 59' Lt., 5' depth
- 19' Rt., 5' depth
Match exlg. slope
Const. paved end slope, Lt.& Rt.- 88 sq.ft.

(11) Sta. "L" 114+00
Extend 36" culv. pipe - 61' Lt., 5' depth
- 25' Rt., 5' depth
Match exlg. slope
Const. paved end slope, Lt.& Rt.- 115 sq.ft.

(12) Sta. "WRLN" 31+50, 42' Lt. to 39' Rt.
Inst. 18" culv. pipe - 81', 5' depth
Sl.= 1.25%
I.E.=25.00' (SW)
I.E.=26.00' (NE)
Const. paved end slope, Lt.& Rt.- 70 sq.ft.

(13) Sta. "DL3" 21+05 to Sta. "DL3" 22+45
Const. bioswale, DF1# D00566
(For details, see sht. GJ-2)

(14) Sta. "DL3" 28+12 to Sta. "DL3" 29+62
Const. bioswale, DF1# D00568
(For details, see sht. GJ-2)

(15) Sta. "WRLN" 28+20 to Sta. "WRLN" 32+60
Const. bioslope, DF1# D00571

(16) See Sht. GJ-11, note 14
Const. bioslope

(17) Sta. "L" 110+60 to Sta. "L" 122+00
Const. bioslope, DF1# D00567
(For details, see sht. GJ)

(18) Const. wetlands shown thus
(For drg. nos., see sht. 1A)

| No. | DATE | REVISIONS | BY |
|---|---|---|---|
| 1 | 06-07-12 | ADDED 45' OF 48" RCP, EXTENDED "DL5" | D.A.D. |
| 2 | 06-08-12 | EXTENDED "DL5" TO STA. 9+75 | D.A.D. |
| | | | |
| | | | |

REGISTERED PROFESSIONAL ENGINEER
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JUL 25, 1995
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RENEWS: 12-31-2013

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OR6 @ WILSON RIVER
LOOP ROAD SEC.
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Daring
Drafted By - Linda Foote

STORMWATER PLAN

SHEET NO. GJ-12

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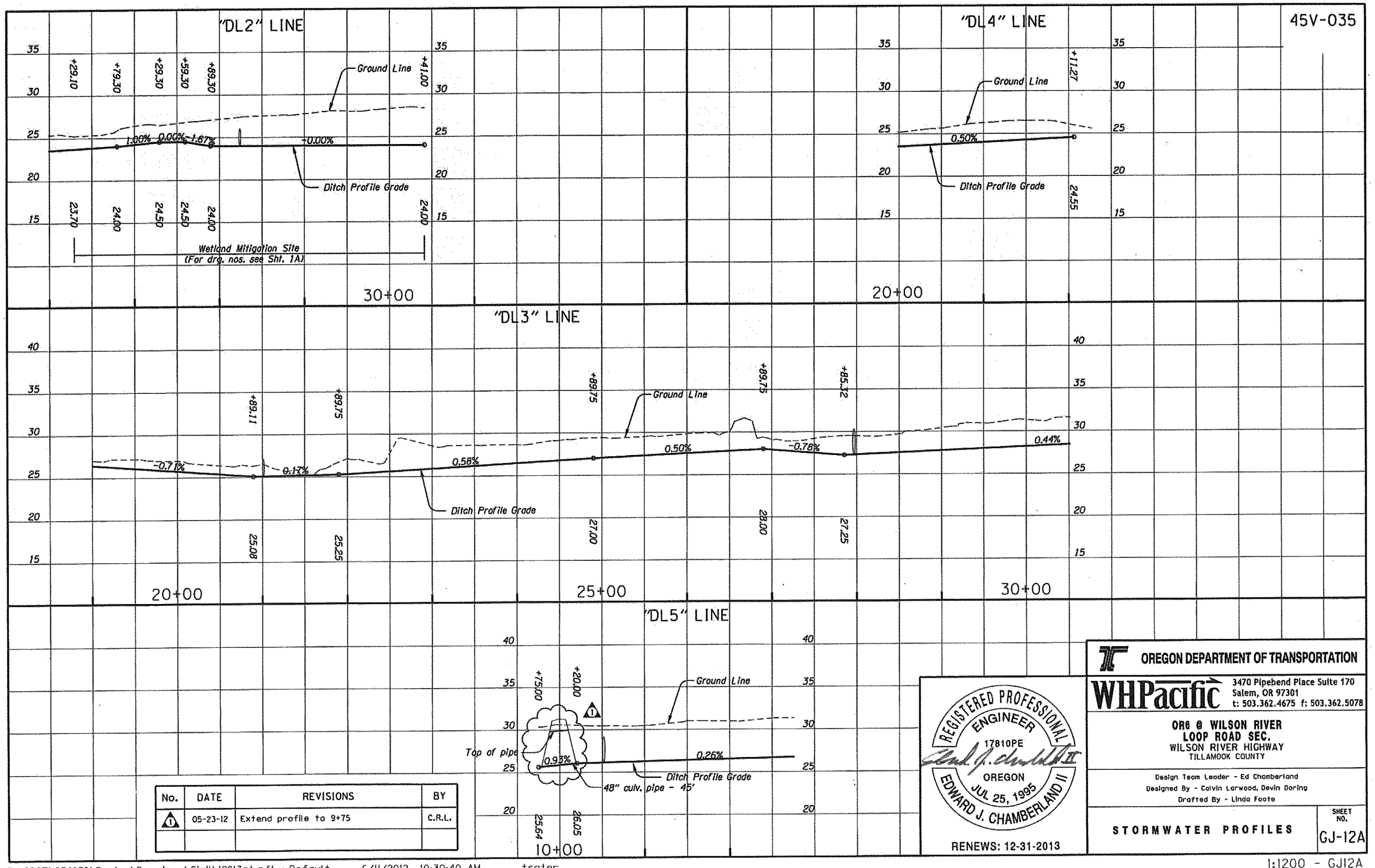
1:1200 - GJ12




| No. | DATE | REVISIONS | BY |
|---|---|---|---|
| 1 | 05-23-12 | Extend profile to 9+75 | C.R.L. |
| | | | |

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

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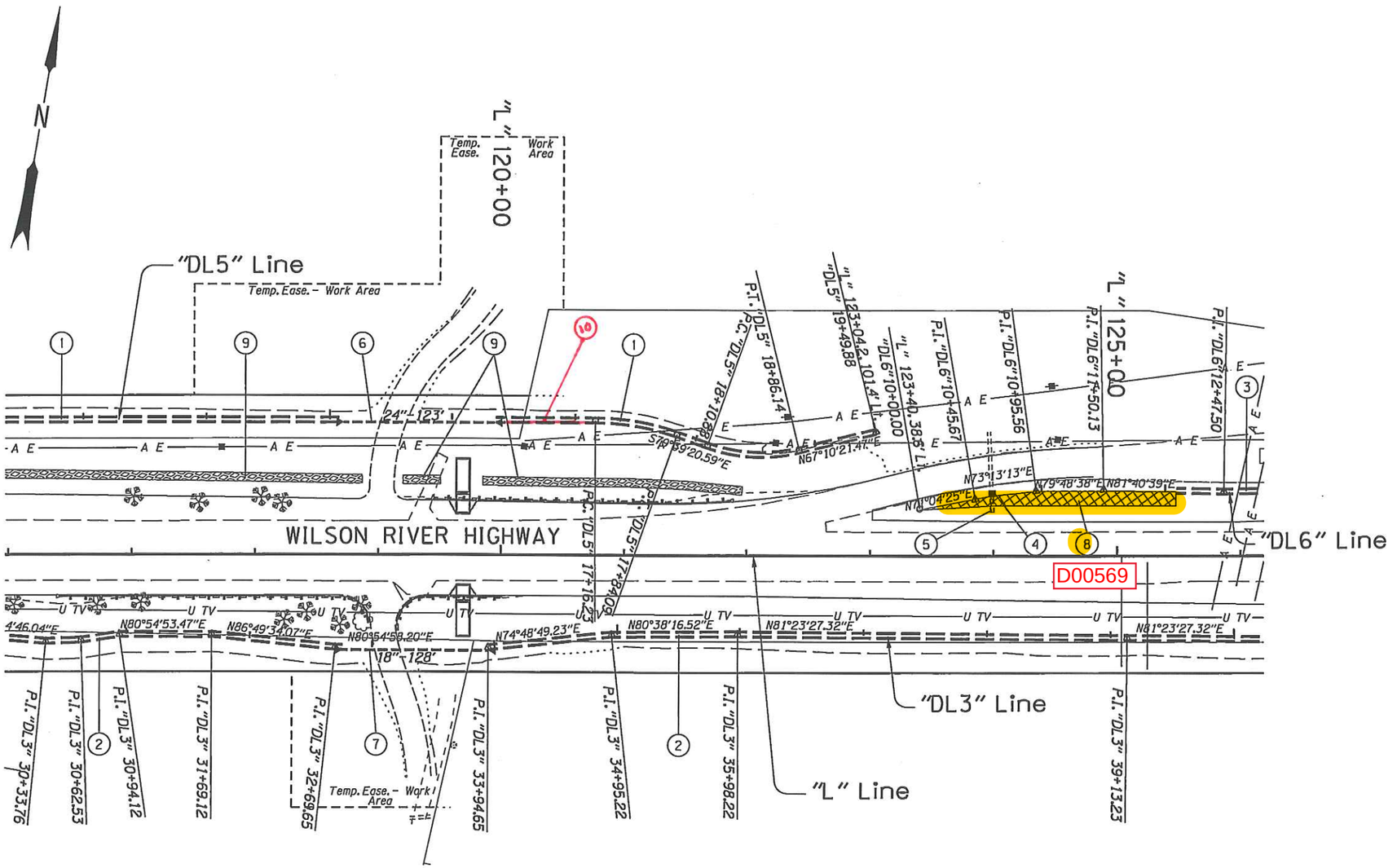
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Doring
Drafted By - Linda Foote

STORMWATER PROFILES

SHEET NO. GJ-12A




(1) See Sht. GJ-12, note 5
Const. ditch

(2) See Sht. GJ-12, note 6
Const. ditch

(3) Sta. "DL6" 12+10 to Sta. "DL6" 19+10.70
Const. ditch, width varies

(4) Sta. "DL6" 10+60, 2.8' Lt.
Const. modified Type D ditch inlet
Rim=36.2'
Connect to extg. pipe
(For details, see sht. GJ)

(5) Sta. "L" 123+99, 35.8' Lt.
Remove 15' of 18" pipe

(6) Sta. "DL5" 15+11.40 to
Sta. "DL5" 16+34.62, 2' Rt.
Inst. 24" culv. pipe - 123', 5' depth
I.E.=27.34' (W)
I.E.=27.68' (E)
Const. paved end slope, Lt. & Rt. - 88 sq.ft.

(7) Sta. "DL3" 32+75.60, 2.25' Rt. to
Sta. "DL3" 33+94.70, 2.5' Rt.
Inst. 18" culv. pipe - 128', 5' depth
I.E.=29.43' (W)
I.E.=30.03' (E)
Const. paved end slope, Lt. & Rt. - 70 sq.ft.

(8) Sta. "DL6" 10+00 to Sta. "DL6" 12+10
Const. bioswale, width varies, DFI# D00569
(For details, see sht. GJ-2)

(9) See Sht. GJ-12, note 17
Const. bioslope

(10) Sta "DL5" 16+34.62 to 16+90.62 2' RT EXTEND 24" culvert pipe - 56' 5' depth I.E. = 27.83' (E)

REVISED AS CONSTRUCTED
CONTRACT 14479

Dave True, Project Manager DATE: 2/26/14

REGISTERED PROFESSIONAL ENGINEER
17810PE
OREGON
JUL 25, 1995
EDWARD J. CHAMBERLAND II

RENEWS: 12-31-2013

OREGON DEPARTMENT OF TRANSPORTATION

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OR6 @ WILSON RIVER
LOOP ROAD SEC.
WILSON RIVER HIGHWAY
TILLAMOOK COUNTY

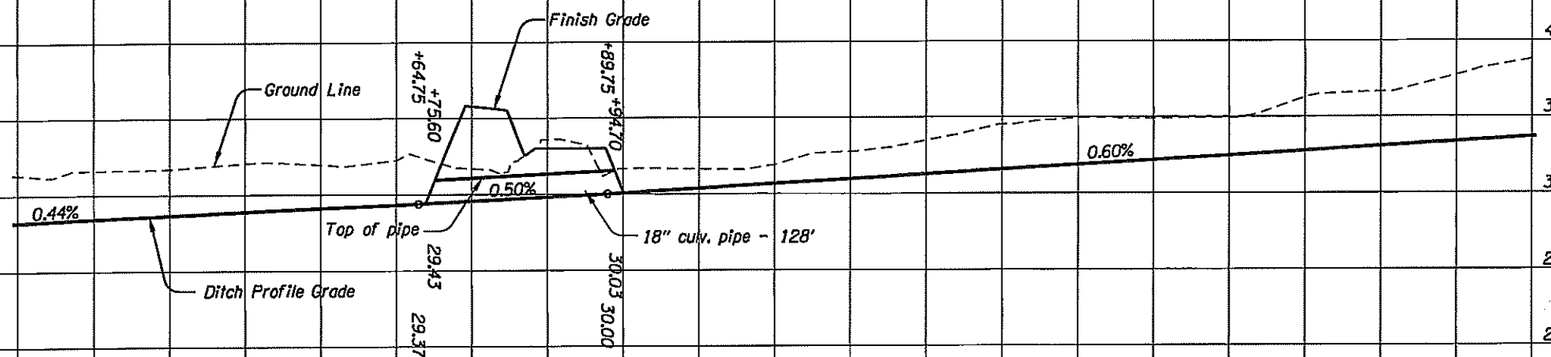
Design Team Leader - Ed Chamberland
Designed By - Calvin Larwood, Devin Doring
Drafted By - Linda Foote

STORMWATER PLAN

SHEET NO. GJ-13

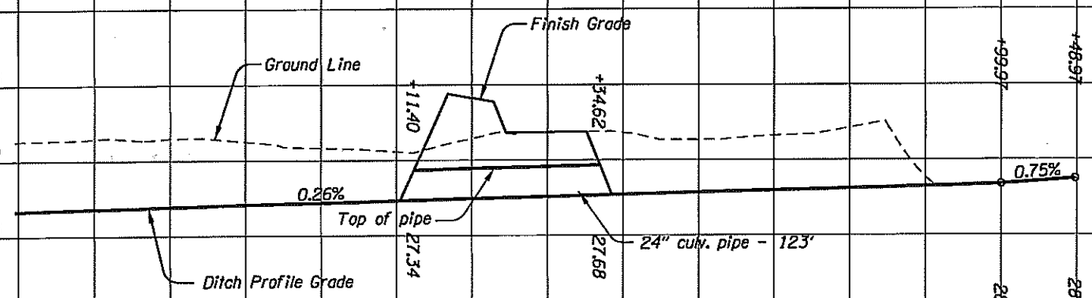
45V-035

"DL3" LINE



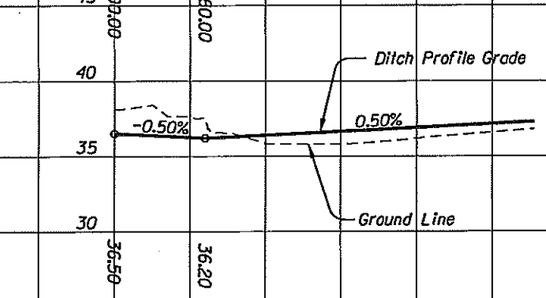

30+00 35+00 40+00

"DL5" LINE




15+00 20+00

"DL6" LINE




10+00

OREGON DEPARTMENT OF TRANSPORTATION

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**STORMWATER PROFILES**

SHEET NO. GJ-13A

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1:1200 - GJ13A