

# OPERATION & MAINTENANCE MANUAL

**DFI No.: D00906, D00907, D00908,  
D00909, D00910, & D00911**

**Facility Type: Water Quality  
Biofiltration Swales**



**Figure 1: DFI No. D00906 and D00907 looking north along highway**

**May, 2019**



Figure 2: DFI No. D00909 and D00911 looking east from highway shoulder

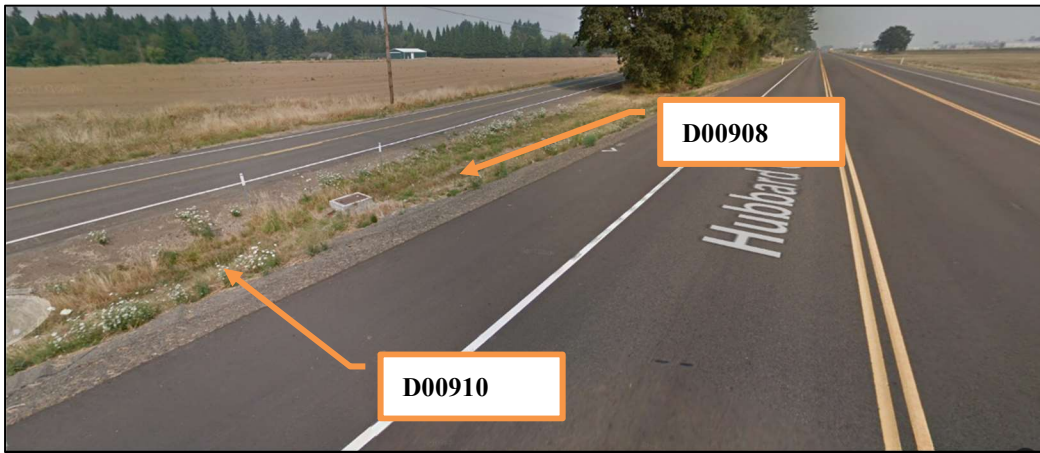


Figure 3: DFI No. D00908 and 910 looking northwest along highway



## 1. Identification

Drainage Facility ID (DFI): **D00906, D00907, D00908, D00909, D00910, D00911**

Facility Type: Water Quality Biofiltration Swales

Construction Drawings: (V-File Number) 49V-038

Location: District: 3

Highway No.: 051

Mile Post:

D00906: 2.94-2.97 (Right Side)

D00907: 2.94-2.97 (Right Side)

D00908: 3.34-3.36 (Right Side)

D00909: 3.34-3.36 (Left Side)

D00910: 3.37-3.39 (Right Side)

D00911: 3.37-3.39 (Left Side)

Description: These facilities are located on OR 551 between Keil Road and Ehlen Road

## 2. Facility Contact Information

Contact the Engineer of Record, Region Technical Center, or Geo-Environmental's Senior Hydraulics Engineer for:

- Operational clarification
- Maintenance clarification
- Repair or restoration assistance

Engineering Contacts:

Region Technical Center Hydro Unit Manager

Or

Geo-Environmental Senior Hydraulics Engineer (503) 986-3365.

## 3. Construction

Engineer of Record: ODOT Designer – Region 2 Tech. Center, Bruce Carmichael, PE, Phone no. 503.986.2713

Facility construction: 2016  
Contractor: [\_\_\_\_\_ Construction Company.]

#### 4. Storm Drain System and Facility Overview

A water quality biofiltration swale is a flat-bottomed open channel designed to treat stormwater runoff from highway pavement areas. This type of facility is lined with grass and has a cell containing water quality mix under the bottom of the swale which stormwater can be filtered through. Treatment by trapping sedimentation occurs when stormwater runoff flows through the grass.

- A. Maintenance equipment access:  
There is no special access. Access as would normally access a highway drainage ditch.
- B. Heavy equipment access into facility: Not allowed.

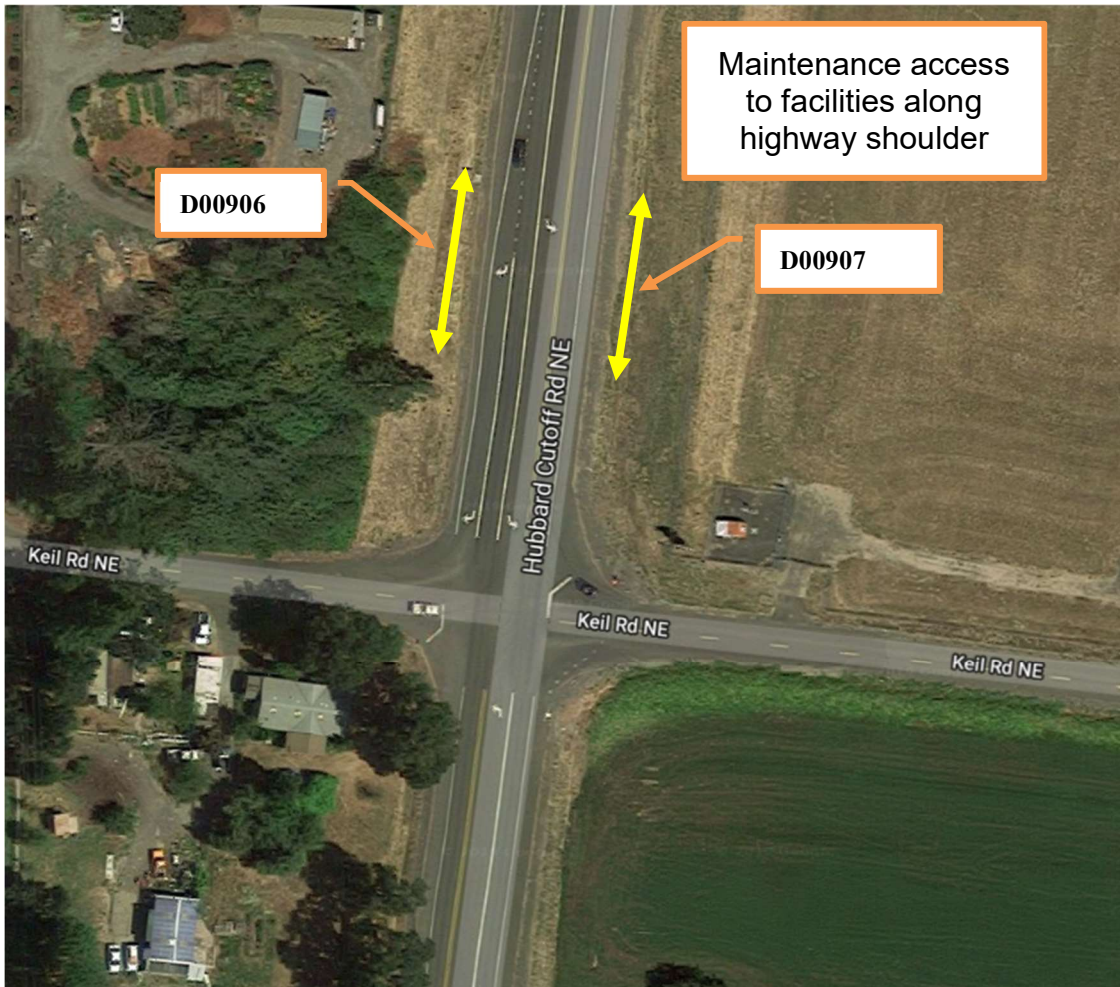


Figure 4: Facility location map, D00906 and D00907

p

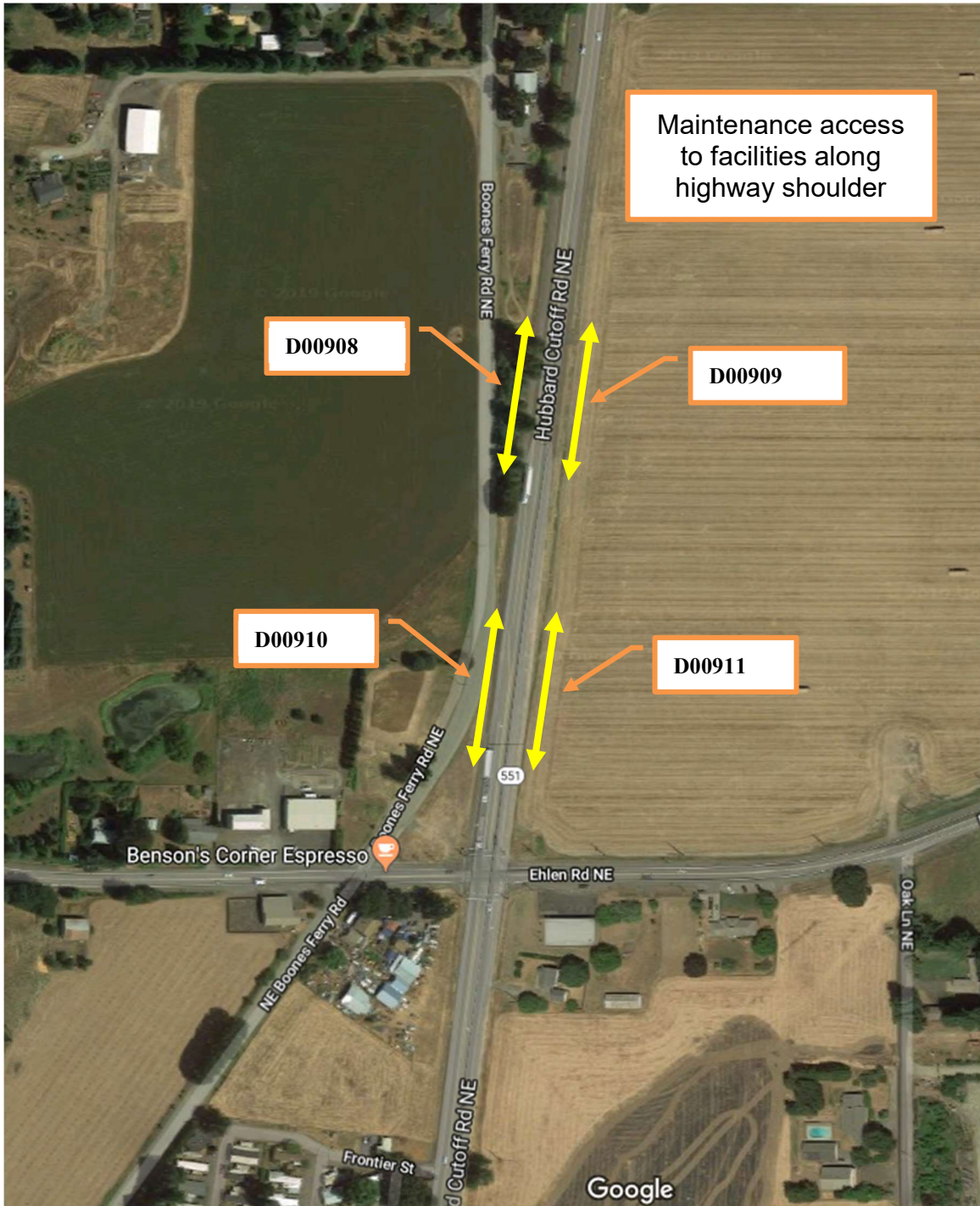


Figure 5: DFI No. D00908, D00909, D00910 and D00911

## 5. Facility Haz Mat Spill Feature(s)

The Water Quality Biofiltration Swale can be used to store a volume of liquid by damming the end of the swale(s) such that liquids cannot exit the swale.

## 6. Auxiliary Outlet (High Flow Bypass)

There is no auxiliary outlet for the swales.

## 7. Maintenance Requirements

Routine maintenance table for non-proprietary stormwater treatment and storage/detention facilities have been incorporated into ODOT's Maintenance Guide. These tables summarize the maintenance requirements for ponds, swales, filter strips, bioslopes, and detention tanks and vaults. Special maintenance requirements in addition to the routine requirements are noted below when applicable.

The ODOT Maintenance Guide can be viewed at the following website:

<http://www.oregon.gov/ODOT/HWY/OOM/MGuide.shtml>

Maintenance requirements for proprietary structures, such as underground water quality manholes and/or vaults with filter media are noted in Appendix C when applicable.

The following stormwater facility maintenance table (See ODOT Maintenance Guide) should be used to maintain the facility outlined in this Operation and Maintenance Manual or follow the Maintenance requirements outlined in Appendix C when proprietary structure is selected below:

- Table 1 (general maintenance)
- Table 2 (stormwater ponds)
- Table 3 (water quality biofiltration swales)
- Table 4 (water quality filter strips)
- Table 5 (water quality bioslopes)
- Table 6 (detention tank)
- Table 7 (detention vault)
- Appendix C (proprietary structure)
- Special Maintenance requirements:

## 8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the roadwaste section of the ODOT Maintenance Yard Environmental

Management System (EMS) Policy and Procedures Manual for disposal options: <http://egov.oregon.gov/ODOT/HWY/OOM/EMS.shtml>

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

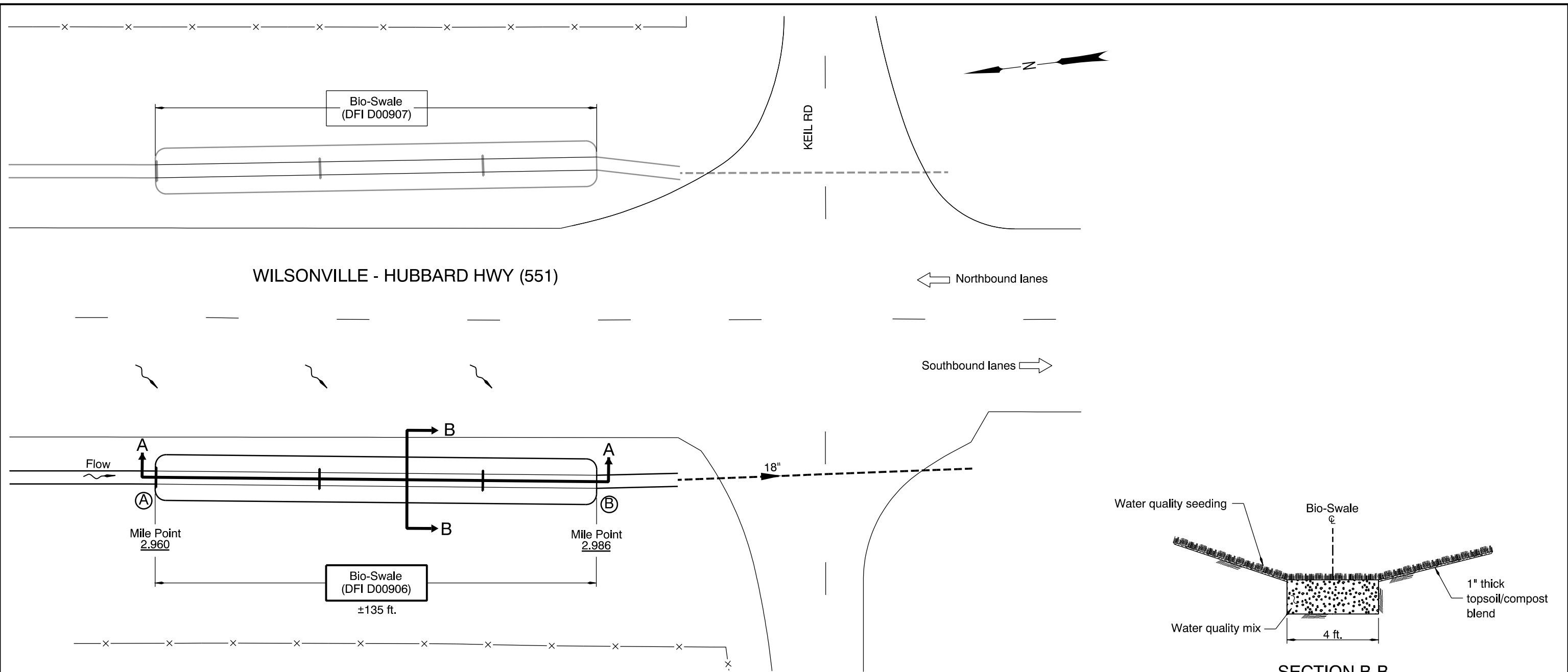
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129
ODOT Region Hazmat Coordinator	(503) 986-2647
ODEQ Northwest Region Office	(503) 229-5263



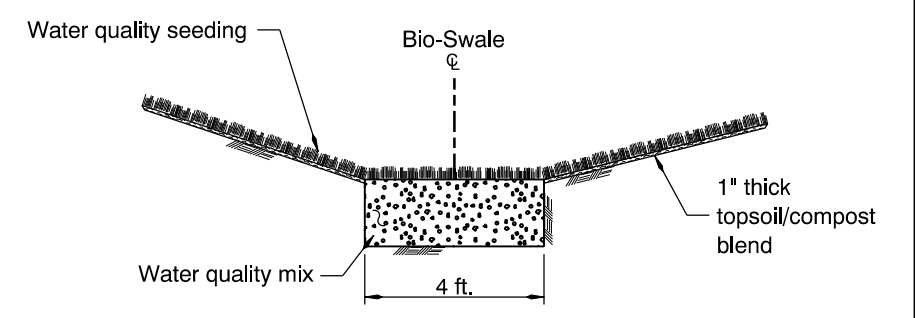
# Appendix A

## Content:

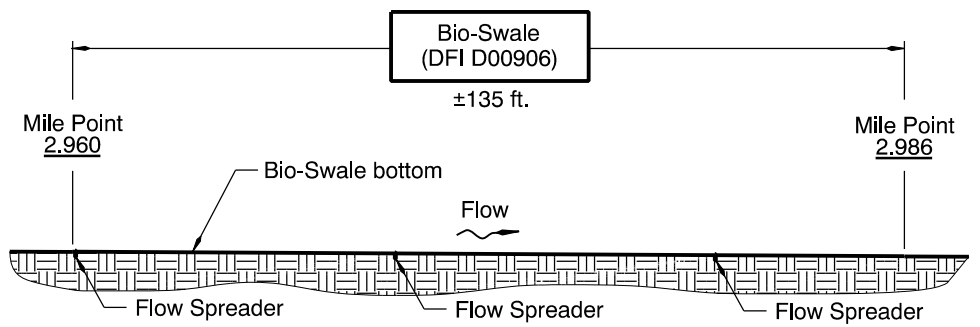
- **Operational Plan and Profile Drawing(s)**



**PLAN**  
N.T.S.



**SECTION B-B**  
N.T.S.



**SECTION A-A**  
N.T.S.

- LEGEND:**
- (A) Swale Inlet
  - (B) Swale Outlet
  - - - Storm Pipe (Facility)
  - ▭ Swale Boundary
  - ~ Pavement / Facility Flow Path

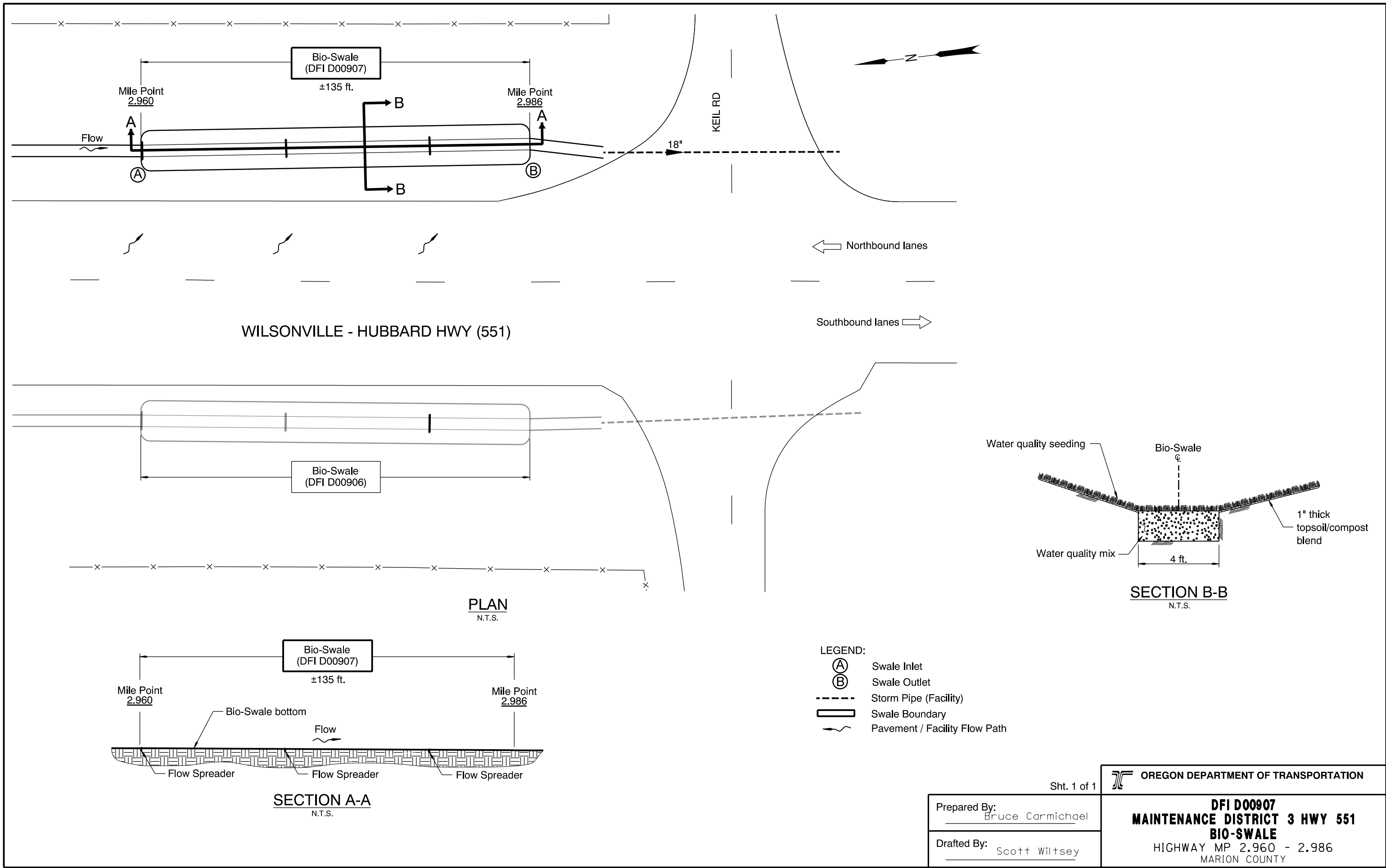
Sht. 1 of 1



Prepared By:  
Bruce Carmichael

Drafted By:  
Scott Wiltsey

**DFI D00906**  
**MAINTENANCE DISTRICT 3 HWY 551**  
**BIO-SWALE**  
HIGHWAY MP 2.960 - 2.986  
MARION COUNTY



WILSONVILLE - HUBBARD HWY (551)

PLAN  
N.T.S.

SECTION A-A  
N.T.S.

SECTION B-B  
N.T.S.

LEGEND:

- (A) Swale Inlet
- (B) Swale Outlet
- Storm Pipe (Facility)
- ▭ Swale Boundary
- ~ Pavement / Facility Flow Path

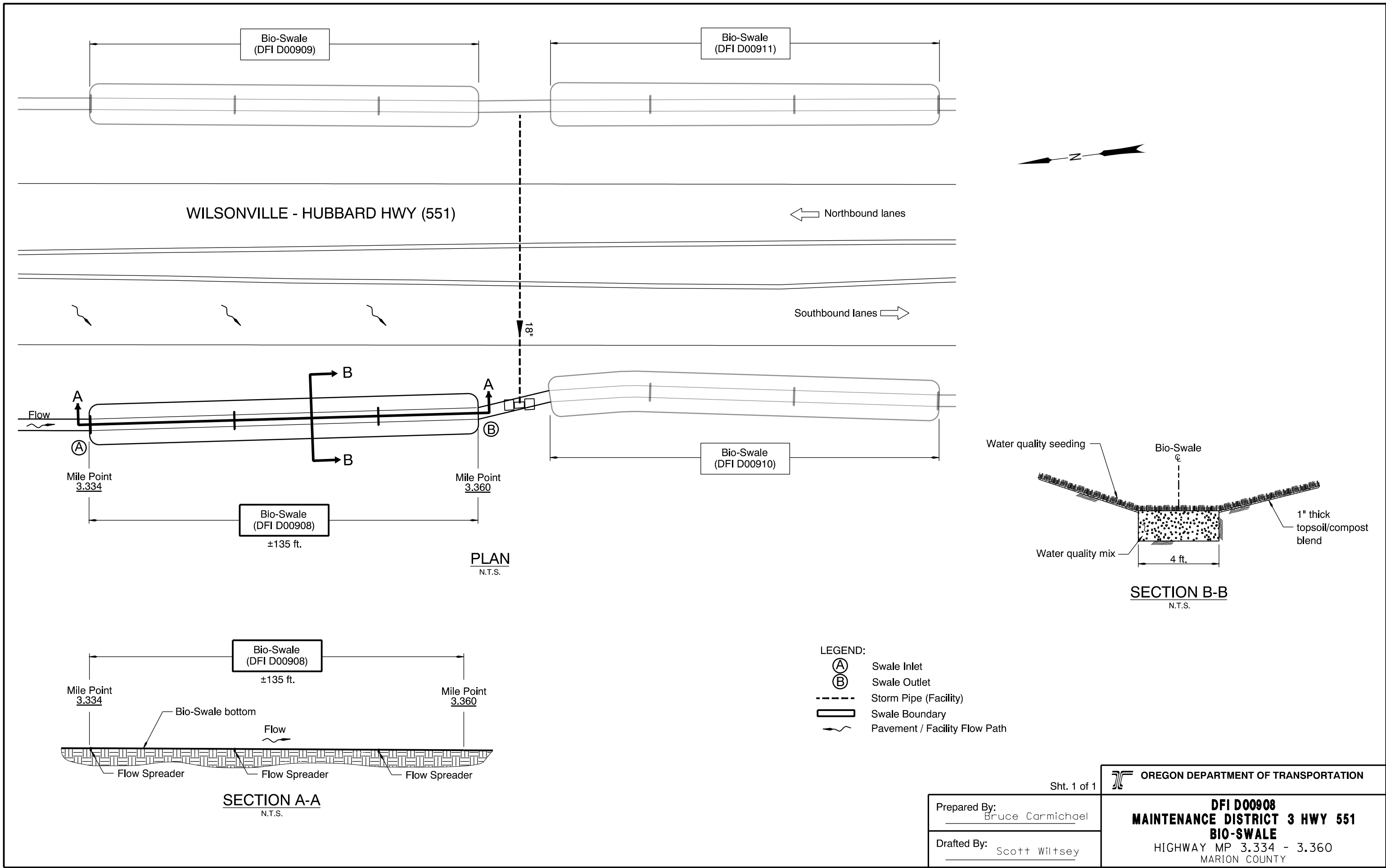
Sht. 1 of 1



Prepared By:  
Bruce Carmichael

Drafted By:  
Scott Wiltsey

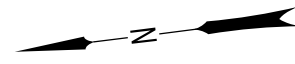
**DFI D00907**  
**MAINTENANCE DISTRICT 3 HWY 551**  
**BIO-SWALE**  
 HIGHWAY MP 2.960 - 2.986  
 MARION COUNTY



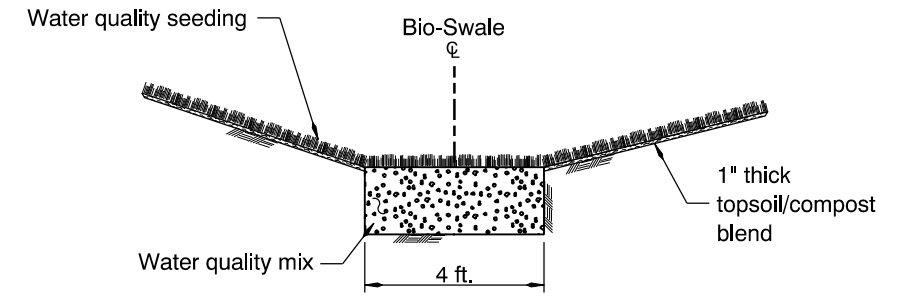
WILSONVILLE - HUBBARD HWY (551)

← Northbound lanes

Southbound lanes →

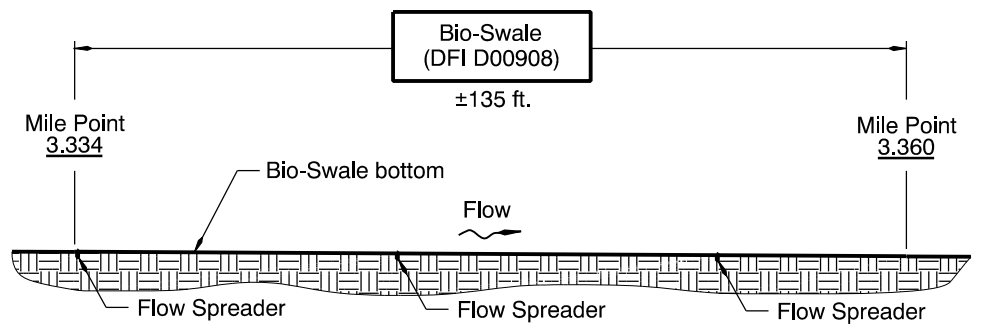


**PLAN**  
N.T.S.



**SECTION B-B**  
N.T.S.

- LEGEND:**
- Ⓐ Swale Inlet
  - Ⓑ Swale Outlet
  - Storm Pipe (Facility)
  - ▭ Swale Boundary
  - ~ Pavement / Facility Flow Path



**SECTION A-A**  
N.T.S.

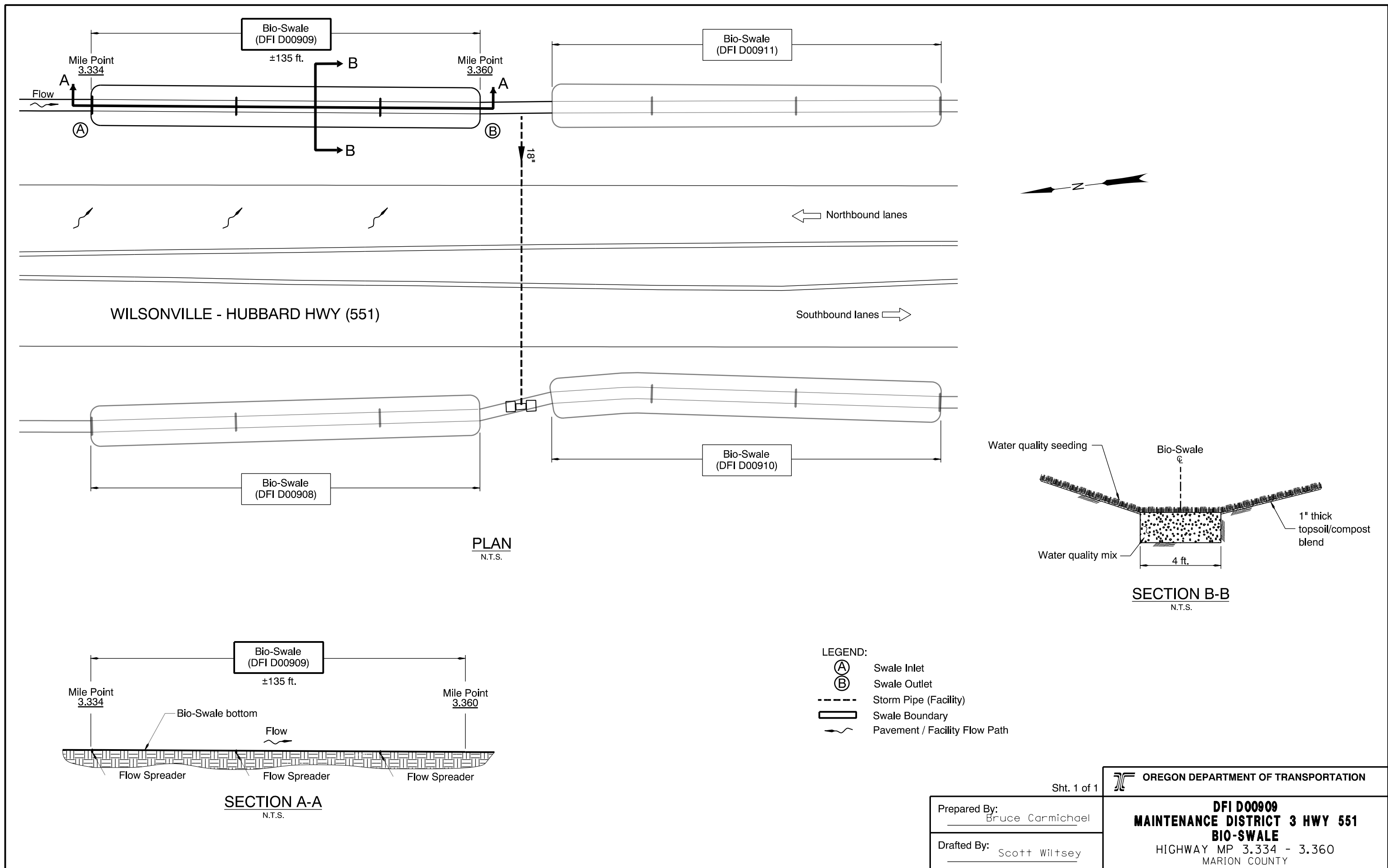
Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By:  
Bruce Carmichael

Drafted By:  
Scott Wiltsey

**DFI D00908**  
**MAINTENANCE DISTRICT 3 HWY 551**  
**BIO-SWALE**  
HIGHWAY MP 3.334 - 3.360  
MARION COUNTY

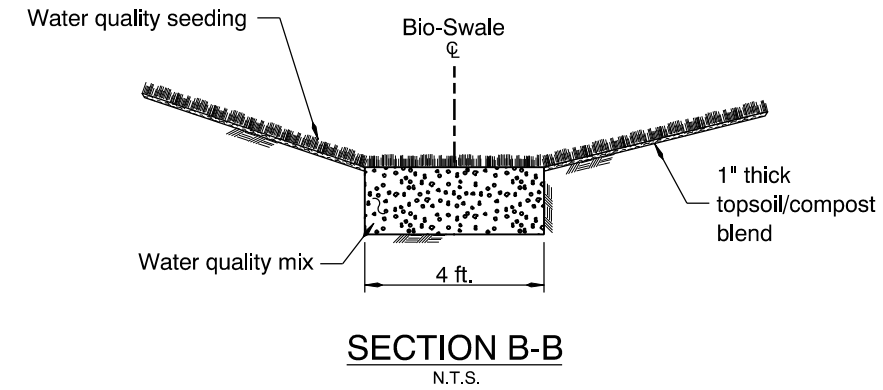


WILSONVILLE - HUBBARD HWY (551)

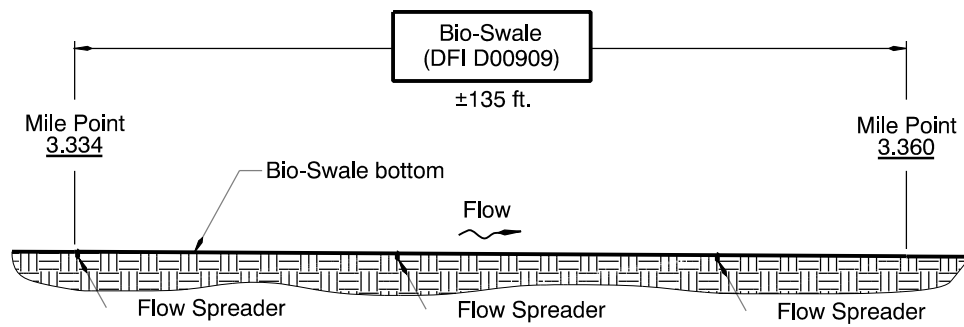
Northbound lanes ←

Southbound lanes →

PLAN  
N.T.S.



SECTION B-B  
N.T.S.



SECTION A-A  
N.T.S.

- LEGEND:
- Ⓐ Swale Inlet
  - Ⓑ Swale Outlet
  - Storm Pipe (Facility)
  - ▭ Swale Boundary
  - ~ Pavement / Facility Flow Path

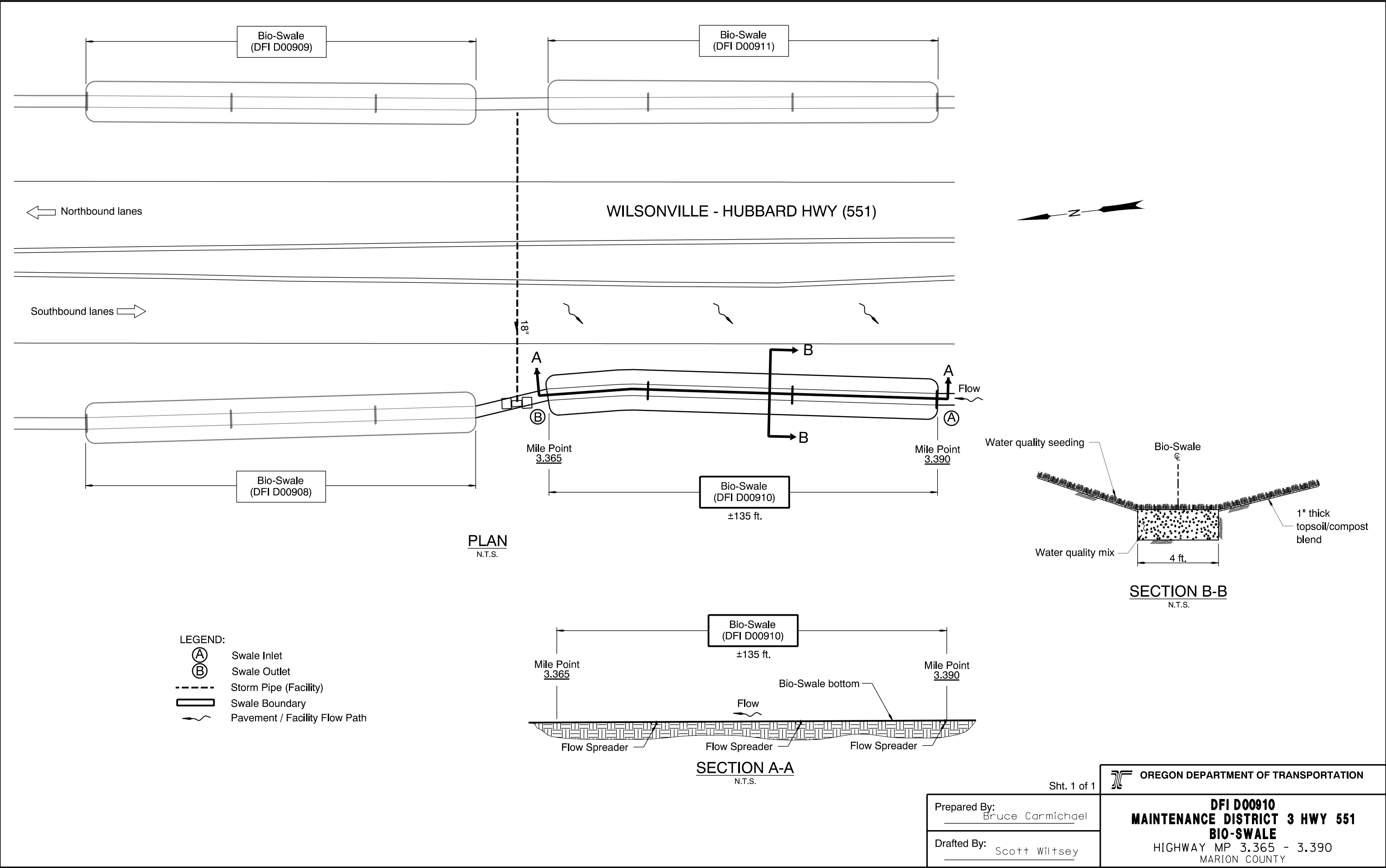
Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Bruce Carmichael

Drafted By: Scott Wiltsey

**DFI D00909**  
**MAINTENANCE DISTRICT 3 HWY 551**  
**BIO-SWALE**  
 HIGHWAY MP 3.334 - 3.360  
 MARION COUNTY



**PLAN**  
N.T.S.

**SECTION B-B**  
N.T.S.

**SECTION A-A**  
N.T.S.

- LEGEND:**
- (A) Swale Inlet
  - (B) Swale Outlet
  - Storm Pipe (Facility)
  - ▭ Swale Boundary
  - ~ Pavement / Facility Flow Path

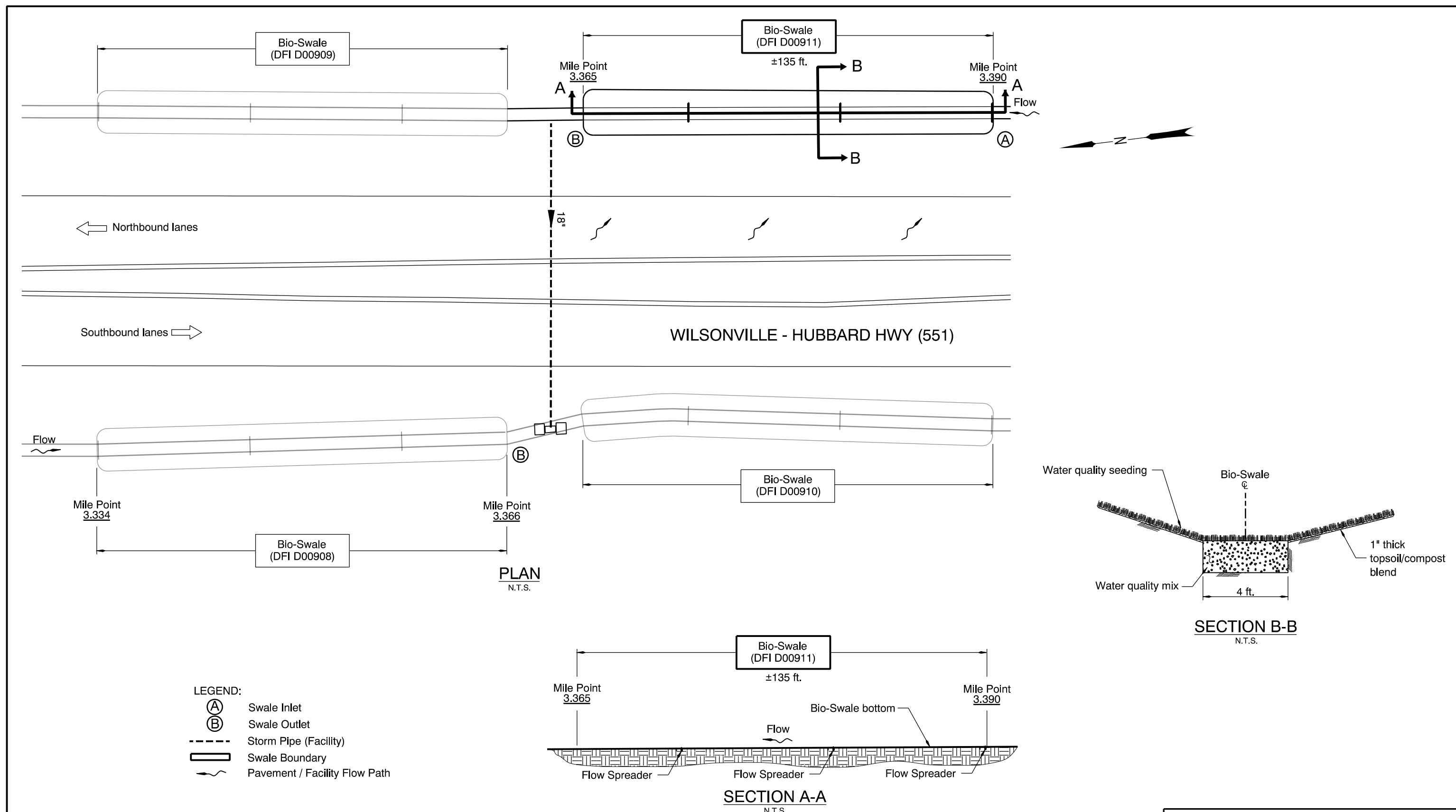
Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

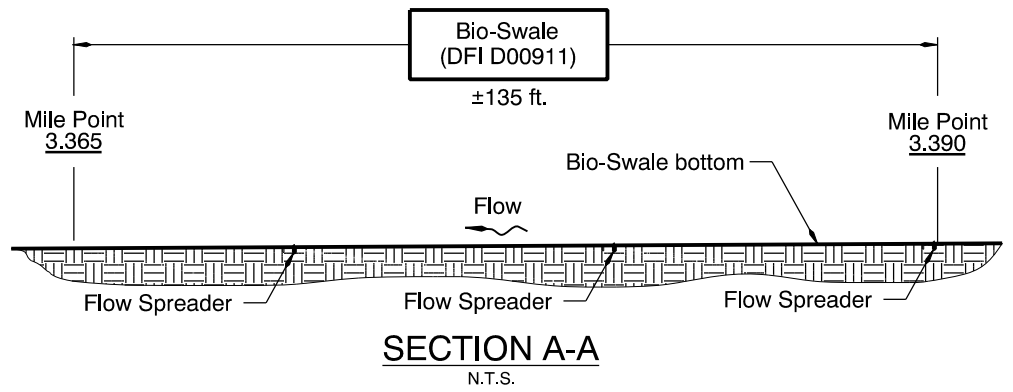
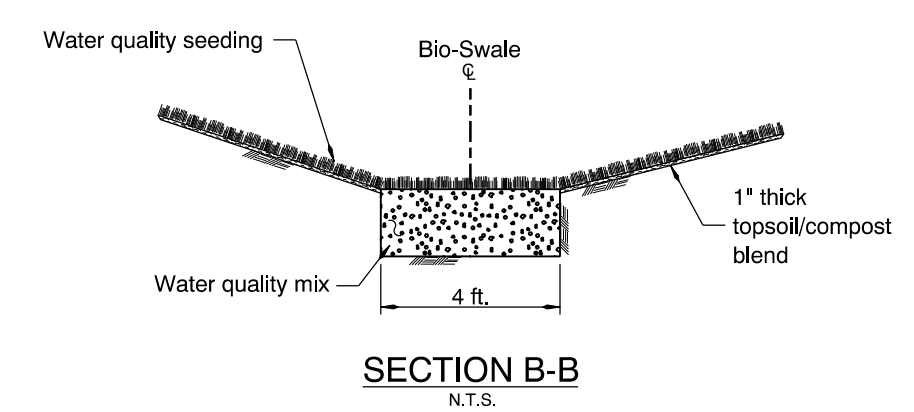
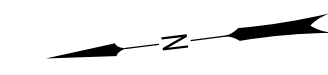
Prepared By:  
Bruce Carmichael

Drafted By:  
Scott Wiltsey

**DFI D00910**  
**MAINTENANCE DISTRICT 3 HWY 551**  
**BIO-SWALE**  
HIGHWAY MP 3.365 - 3.390  
MARION COUNTY



- LEGEND:**
- Ⓐ Swale Inlet
  - Ⓑ Swale Outlet
  - Storm Pipe (Facility)
  - ▭ Swale Boundary
  - ~ Pavement / Facility Flow Path



Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By:  
Bruce Carmichael

Drafted By:  
Scott Wiltsey

**DFI D00911**  
**MAINTENANCE DISTRICT 3 HWY 551**  
**BIO-SWALE**  
 HIGHWAY MP 3.365 - 3.390  
 MARION COUNTY

# Appendix B

## Content:

- **ODOT Project Plan Sheets**
  - *Cover/Title Sheet*
  - *Water Quality/Detention Plan Sheets*
  - *Other Details*



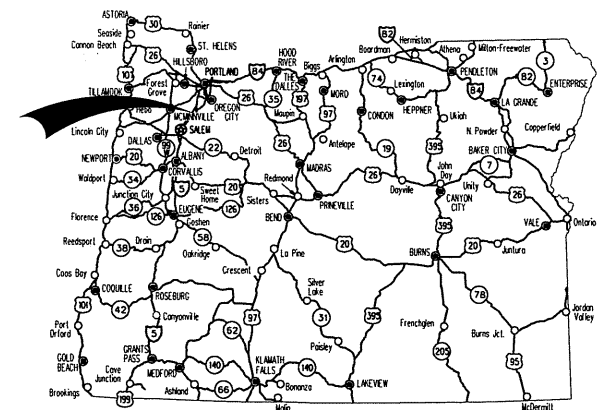
STATE OF OREGON  
DEPARTMENT OF TRANSPORTATION  
PLANS FOR PROPOSED PROJECT

GRADING & PAVING

**OR551 @ KEIL RD. SEC.**  
**WILSONVILLE - HUBBARD HIGHWAY**

MARION COUNTY

APRIL 2016



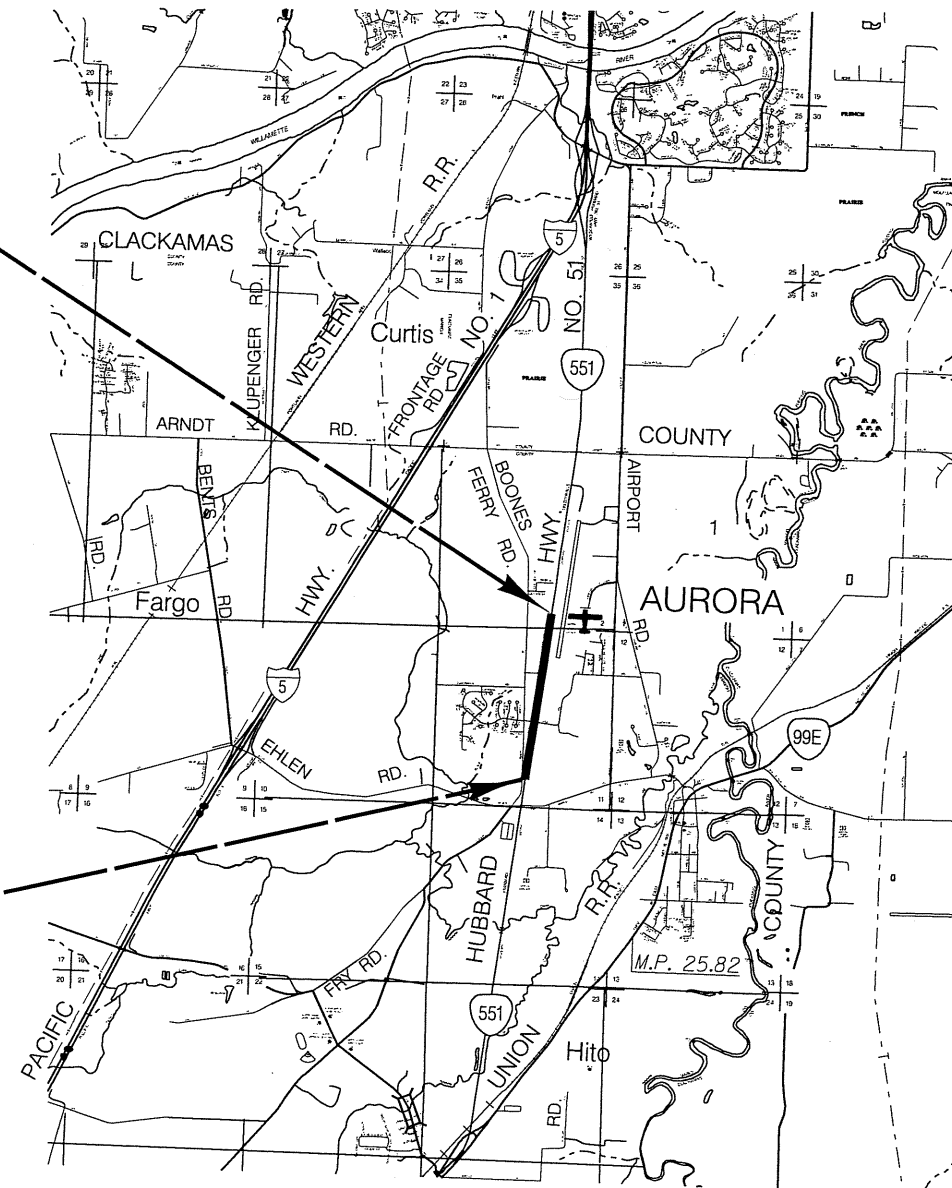
Overall Length Of Project - 0.93 Miles

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

**ATTENTION:**  
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center is (503) 232-1987.)



**BEGINNING OF PROJECT**  
**HSIP-S051(002)**  
STA. "L" 30+00 (M.P. 2.49)



**END OF PROJECT**  
**HSIP-S051(002)**  
STA. "L" 79+00 (M.P. 3.42)

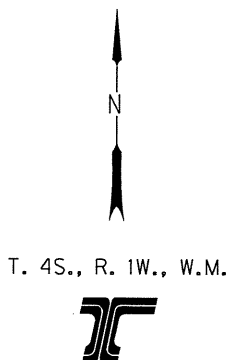
OREGON TRANSPORTATION COMMISSION  
 Tammy Boney CHAIR  
 David Lohman COMMISSIONER  
 Susan Morgan COMMISSIONER  
 Alando Simpson COMMISSIONER  
 Sean O'Hollaren COMMISSIONER  
 Matthew L. Garrett DIRECTOR OF TRANSPORTATION

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.

By: *[Signature]* 2-10-16  
Signature & date

James E. West - R2 Tech Center Manager  
Print name and title

*[Signature]*  
Concurrence by ODOT Chief Engineer



OR551 @ KEIL RD. SEC. WILSONVILLE - HUBBARD HIGHWAY MARION COUNTY		
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	HSIP-S051(002)	1

PE002298

INDEX OF SHEETS, CONT'D.	
SHEET NO.	DESCRIPTION
2 Thru 2A-3 Incl.	Typical Sections
2B	Details
2C Thru 2C-22 Incl.	Traffic Control
2D	Pipe Data
3	Alignment
3A	General Construction
3B	"L" Profile
4	Alignment
4A	General Construction
4B	"L" Profile
5	Alignment
5A	General Construction
5B	"L" Profile
6	Alignment
6A	General Construction
6B	"L" Profile
7	Alignment
<b>GEO/HYDRO</b>	
GA Thru GA-4 Incl.	Erosion And Sediment Control Plan
GJ	Stormwater Plan
GJ-2	Stormwater Details
<b>STRIPING</b>	
ST	Striping Plan
ST-2	Striping Plan
ST-3	Striping Plan
<b>SIGNING</b>	
S-15773	Permanent Signing
S-15774	Permanent Signing
S-15775	Permanent Signing
S-15776	Sign Details
S-15777	Sign & Post Data Table
<b>SIGNALS</b>	
18672	Flashing Beacon Details

Standard Drg. Nos.

- RD140 - Roadway Cross Slopes Superelevated Sections
- RD150 - Slope Rounding
- RD300 - Trench Backfill, Bedding, Pipe Zone And Mult. Installations
- RD306 - Concrete Encasement, Cradle, And Cap Details
- RD316 - Sloped Ends For Metal Pipe
- RD318 - Sloped Ends For Concrete Pipe
- RD319 - Miscellaneous Culvert Details
- RD380 - Fill Height Tables For Aluminum & Steel Corrugated Pipe
- RD386 - Fill Height Tables For Circular Concrete Pipe
- RD388 - Fill Height Tables For PVC Pipe
- RD390 - Fill Height Tables For Corrugated HDPE Pipe
- RD393 - Fill Height Tables For Polypropylene Pipe
- RD398 - Culvert ID Marker
- RD399 - Stormwater Treatment And Storage Facility Field Markers
- RD610 - Asphalt Concrete Pavement (ACP) Details
- RD715 - Approaches And Non-Sidewalk Driveways
- RD1006 - Check Dams Type 2 and 6
- RD1032 - Sediment Barrier Type 8

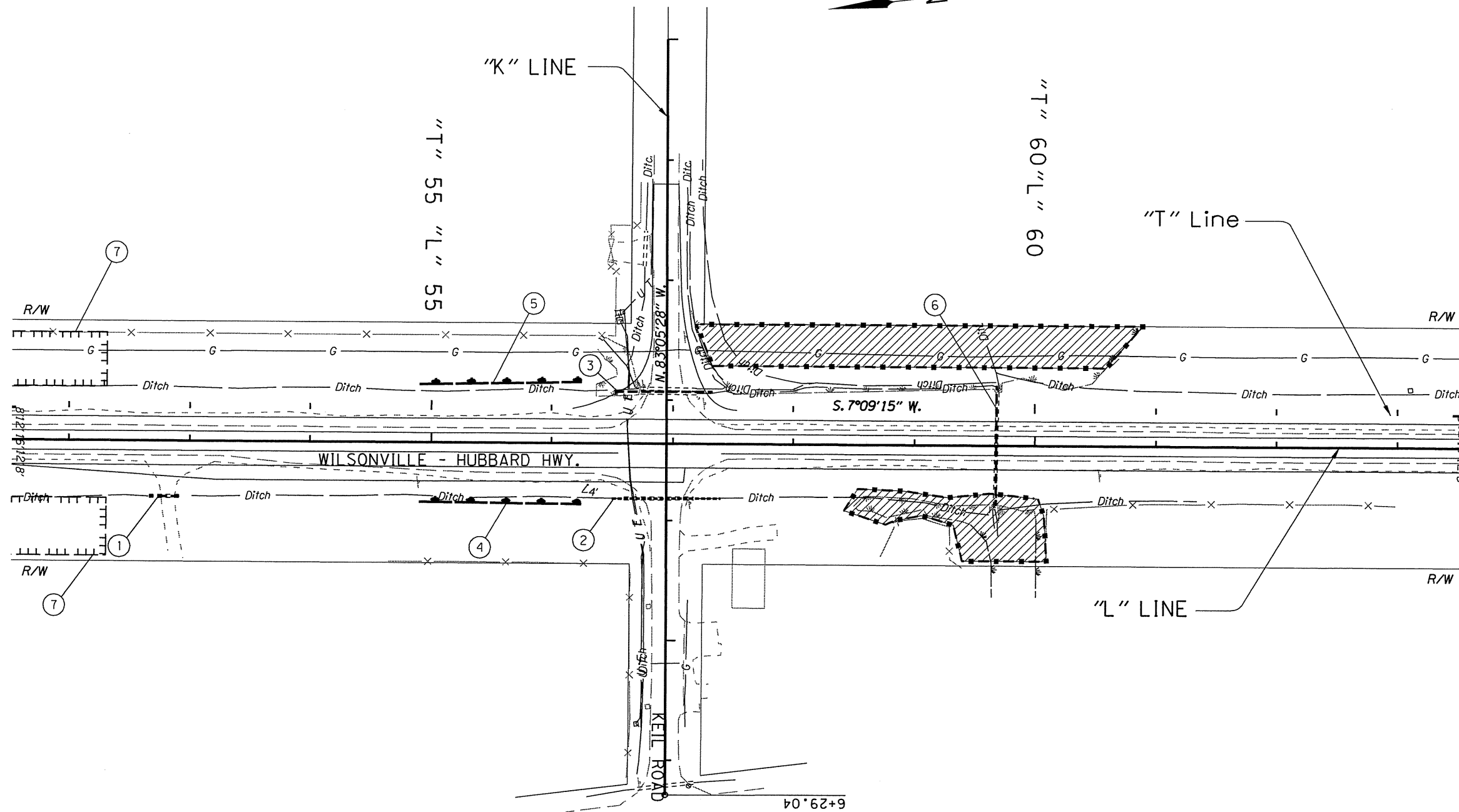
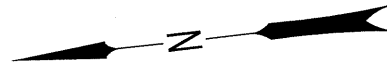
- TM200 - Sign Installation Details
- TM201 - Miscellaneous Sign Placement Details
- TM204 - Flag Board Mounting Details
- TM223 - Conventional Roads Directional Sign Layout Street Name Signs
- TM230 - Mounting Details For Removable Legend 4" Through 8" Letters & Numbers
- TM492 - Ramp Meter Pedestal Details
- TM500 - Pavement Marking Standard Detail Blocks
- TM501 - Pavement Marking Standard Detail Blocks
- TM502 - Pavement Marking Standard Detail Blocks
- TM503 - Pavement Marking Standard Detail Blocks
- TM515 - Pavement Markers
- TM517 - Recessed Pavement Markers
- TM521 - Durable Pavement Markings Method "A" & Method "B" Surface & Groove Installed Non-Profiled
- TM576 - Traffic Delineator Installation For Non-Freeways
- TM530 - Intersection Pavement Markings (Crosswalk, Stop Bar & Bike Lane Stencil)
- TM531 - Turn Arrow Marking Details
- TM539 - Median and Left Turn Channelization Details
- TM560 - Alignment Layout: General
- TM561 - Alignment Layout: Left Turn Lane, Centerline & Medians
- TM570 - Traffic Delineators
- TM576 - Traffic Delineator Installation For Non-Freeways
- TM602 - Triangular Base Breakaway Multi-Directional Slip Base Design
- TM670 - Wood Post Sign Supports
- TM671 - 3 Second Gust Wind Speed Map
- TM675 - Extruded Aluminum Panels
- TM676 - Sign Attachments
- TM677 - Sign Mounts
- TM681 - Perforated Steel Square Tube (PSST) Sign Support Installation
- TM687 - Perforated Steel Square Tube (PSST) Anchor Foundation
- TM688 - Perforated Steel Square Tube (PSST) Slip Base Foundation
- TM800 - Tables, Abrupt Edge And PCMS Details
- TM810 - Temporary Pavement Markings
- TM821 - Temporary Sign Supports
- TM840 - Closure Details
- TM841 - Intersection Work Zone Details
- TM842 - Signalized Intersection Details
- TM850 - 2-Lane, 2-Way Roadways

R/W Map No. 9B-23-20

<b>OR551 @ KEIL RD. SEC.</b> WILSONVILLE - HUBBARD HIGHWAY MARION COUNTY		
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	SEE SHEET 1	1A

Standard Drawings located on the web at:  
[http://www.oregon.gov/ODOT/HWY/ENGSERVICES/standard\\_drawings\\_home.shtml](http://www.oregon.gov/ODOT/HWY/ENGSERVICES/standard_drawings_home.shtml)

Sec. 11, T. 4S., R. 1W., W.M.



- ① Sta. "L" 52+66.48 To Sta. 52+91.48, Rt.  
Remove extg. pipe  
Inst. 12" culvert pipe - 30'  
5' Depth  
Const. sloped end section - 2  
Const. approach  
(See drg. nos. RD300, RD306, RD316, RD318, RD319 and RD715)
- ② Sta. "L" 56+49.91 To Sta. 57+39.91, Rt.  
Remove extg. pipe  
Inst. 18" culvert pipe - 90'  
5' Depth  
Const. sloped end section - 2
- ③ Sta. "L" 56+50.53 To Sta. 57+32.53, Lt.  
Remove extg. pipe  
Inst. 18" culvert pipe - 164'  
5' Depth  
Const. sloped end section - 4
- ④ Sta. "L" 54+90 To Sta. 56+25, Rt.  
Const. swale  
(For drg. nos., see sht. 1A)
- ⑤ Sta. "L" 54+90 To Sta. 56+25, Lt.  
Const. swale  
(For drg. nos., see sht. 1A)
- ⑥ Sta. "L" 59+68  
Remove extg. pipe  
Inst. 18" culvert pipe - 100'  
5' Depth  
Const. sloped end section - 2
- ⑦ Const. berm as directed

LEGEND:

- - - - - ORENCE CONSTRUCTION FENCE
- ▨ NO WORK ZONE

**OREGON DEPARTMENT OF TRANSPORTATION**

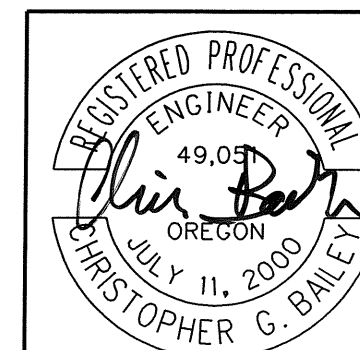
**REGION 2 TECH CENTER**

**OR551 @ KEIL ROAD SEC.**  
WILSONVILLE - HUBBARD HIGHWAY  
MARION COUNTY

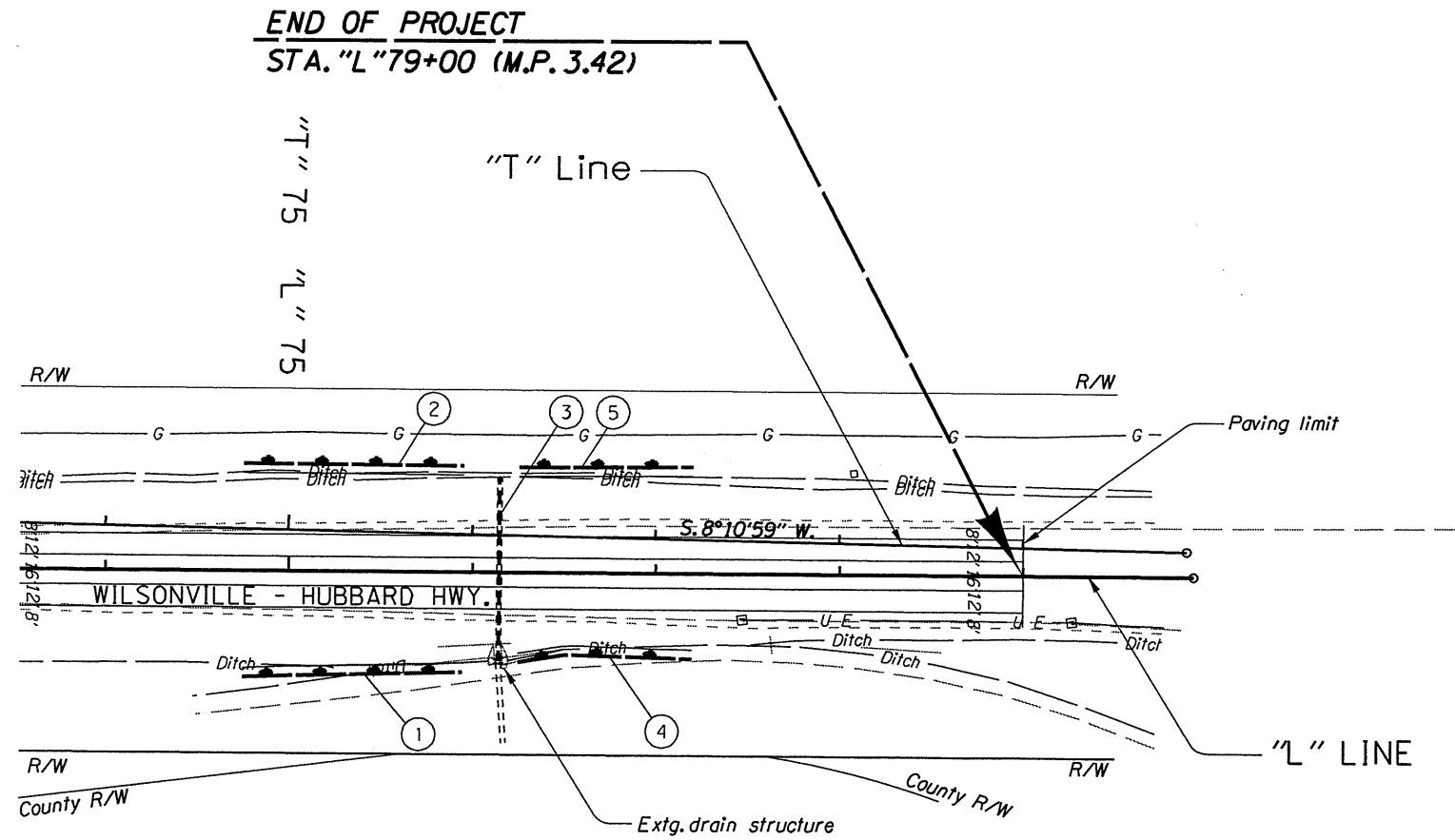
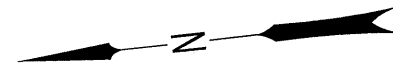
Design Team Leader - Ed Cantrell  
Designed By - Chris Bailey  
Drafted By - Rick Krekeler

**GENERAL CONSTRUCTION**

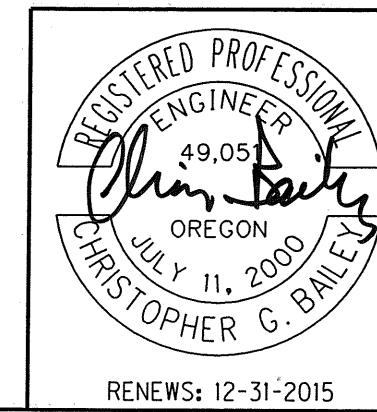
SHEET NO.  
**4A**



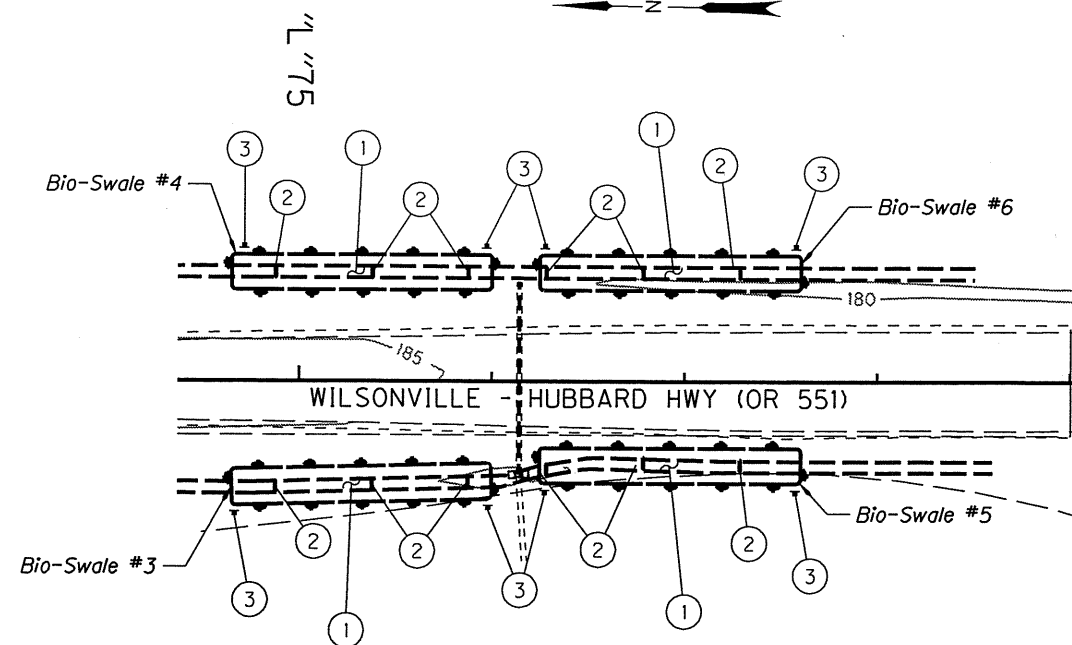
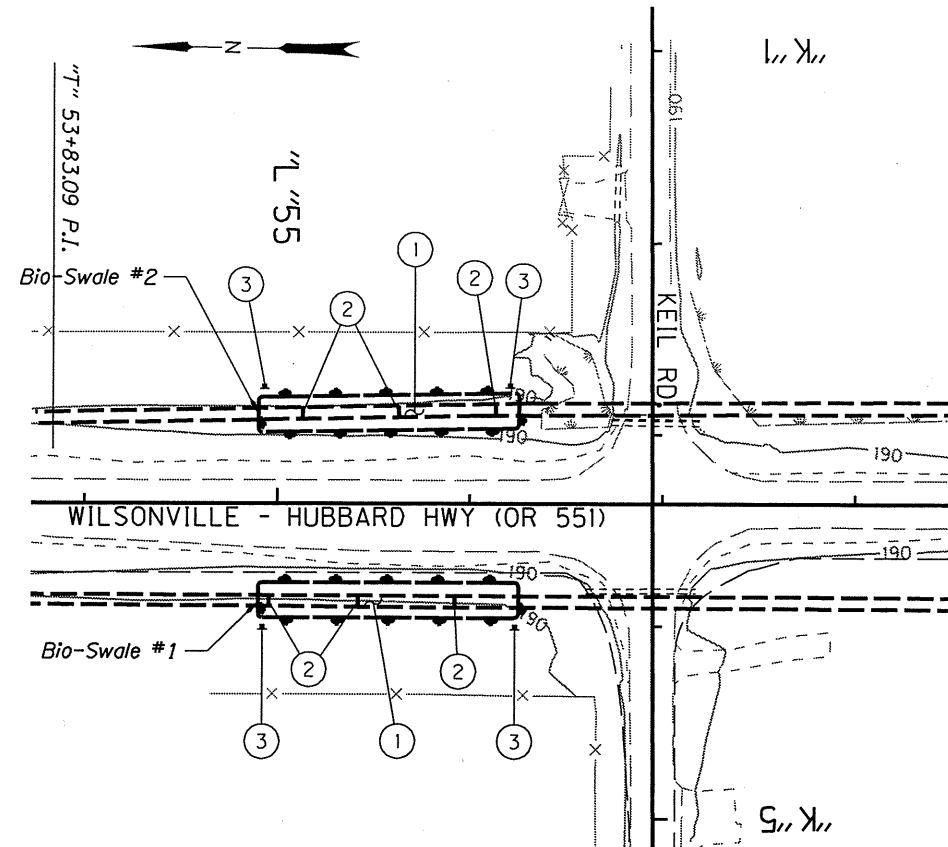
RENEWS: 12-31-2015



- ① Sta. "L" 74+65 To Sta. 76+00 Rt. Const. swale
- ② Sta. "L" 74+65 To Sta. 76+00 Lt. Const. swale
- ③ Sta. "L" 76+14.40  
Remove extg. pipe  
Inst. 18" culver pipe - 100'  
5' Depth  
Const. sloped end section  
Protect extg. drain structure  
Connect to extg. drain structure
- ④ Sta. "L" 77+60 To Sta. 76+25, Rt. Const. swale
- ⑤ Sta. "L" 77+60 To Sta. 76+25, Lt. Const. swale



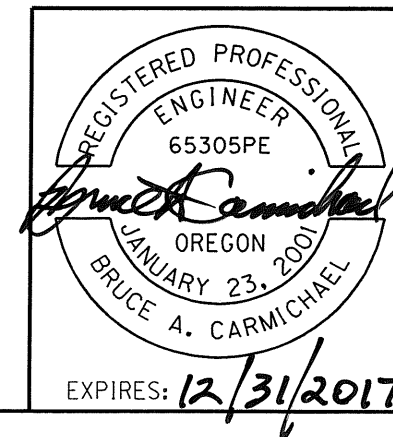
OREGON DEPARTMENT OF TRANSPORTATION	
<b>REGION 2 TECH CENTER</b>	
OR551 @ KEIL ROAD SEC. WILSONVILLE - HUBBARD HIGHWAY MARION COUNTY	
Design Team Leader - Ed Cantrell Designed By - Chris Bailey Drafted By - Rick Krekeler	
<b>GENERAL CONSTRUCTION</b>	SHEET NO. <b>6A</b>




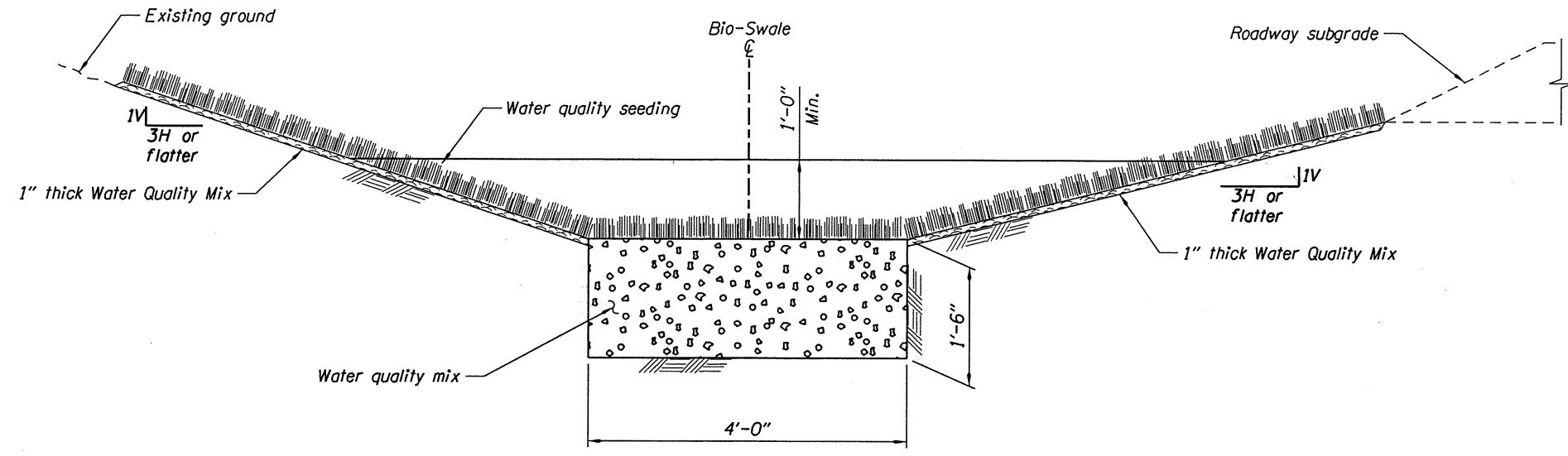
- ① Const. Bio-Swale - see table for information  
Water Quality Cell Excavation - 180 cu.yd.  
Water Quality Mix - 205 cu.yd.  
(For details see sht.GJ-2)
- ② Install flow spreaders, plastic lumber  
(50' spacing) - 115 ft.  
(For details see sht.GJ-2)
- ③ Install Type S2 markers  
(For details std. dwg. RD399)

BIO-SWALE TABLE

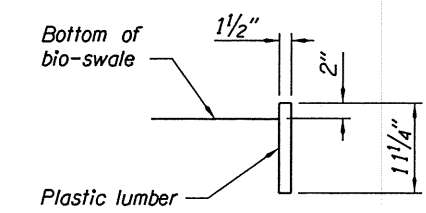
FACILITY #	DFI #	Inlet station offset	Outlet station offset	Inlet flow line elev. (ft)	Outlet flow line Elev. (ft.)	Bottom width	Length (ft.)	Slope (%)
1	D00906	"L"54+90. 48.37 Rt.	"L"56+25. 49.55 Rt.	188.49	187.81	4	135	0.5
2	D00907	"L"54+90. 45.37 Lt.	"L"56+25. 47.86 Lt.	188.76	188.08	4	135	0.5
3	D00908	"L"74+65. 55.81 Rt.	"L"76+00. 51.75 Rt.	180.74	179.50	4	135	0.92
4	D00909	"L"74+65. 55.68 Lt.	"L"76+00. 54.85 Lt.	180.57	179.44	4	135	0.84
5	D00910	"L"77+60. 45.17 Rt.	"L"76+25. 46.35 Rt.	181.22	179.54	4	135	1.24
6	D00911	"L"77+60. 55.71 Lt.	"L"76+25. 55.14 Lt.	180.01	179.33	4	135	0.5



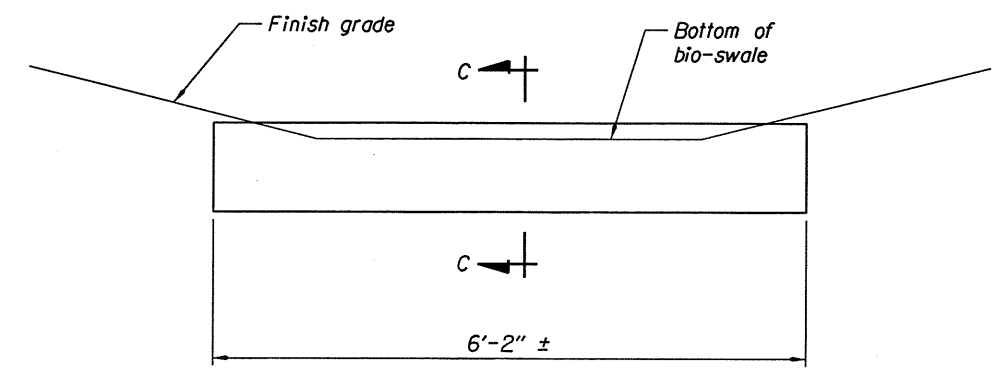
 OREGON DEPARTMENT OF TRANSPORTATION	
<b>REGION 2 TECH CENTER</b>	
OR551 @ KEIL ROAD SEC. WILSONVILLE - HUBBARD HIGHWAY MARION COUNTY	
Reviewed By - Bo Miller Designed By - Bruce Carmichael Drafted By - Julie Rentz	
<b>STORMWATER PLAN</b>	SHEET NO. GJ



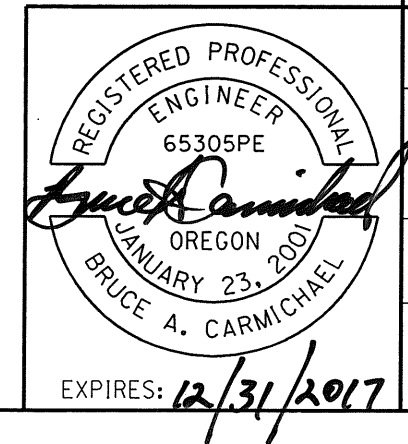
TYPICAL SECTION



SECTION C-C



FLOW SPREADER DETAIL



OREGON DEPARTMENT OF TRANSPORTATION	
REGION 2 TECH CENTER	
OR551 @ KEIL ROAD SEC. WILSONVILLE - HUBBARD HIGHWAY MARION COUNTY	
Reviewed By - Bo Miller Designed By - Bruce Carmichael Drafted By - Julie Rentz	
STORMWATER DETAILS	SHEET NO. GJ-2