

OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: **December 2018**

DFI No. **D00604**



Figure 1: DFI No. D00604, looking North

Identification

Drainage Facility ID (DFI):	D00604
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 45V-029
Location:	District: 01 Highway No.: 047 Mile Post: 57.10 to 57.12, left (North)

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**

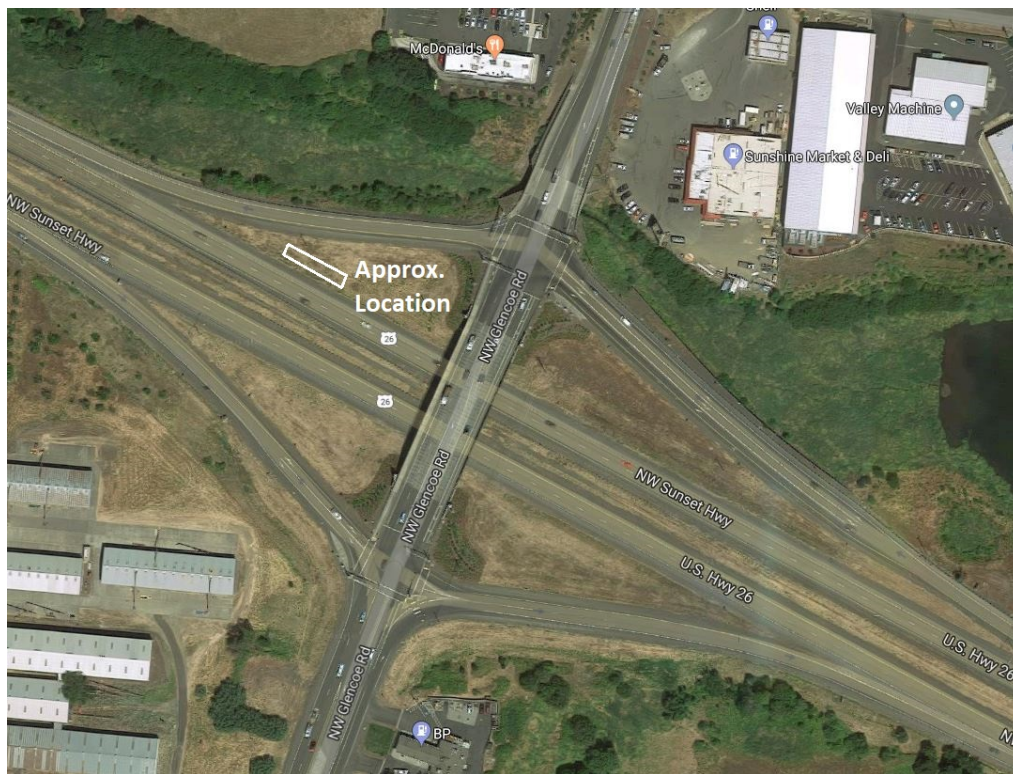


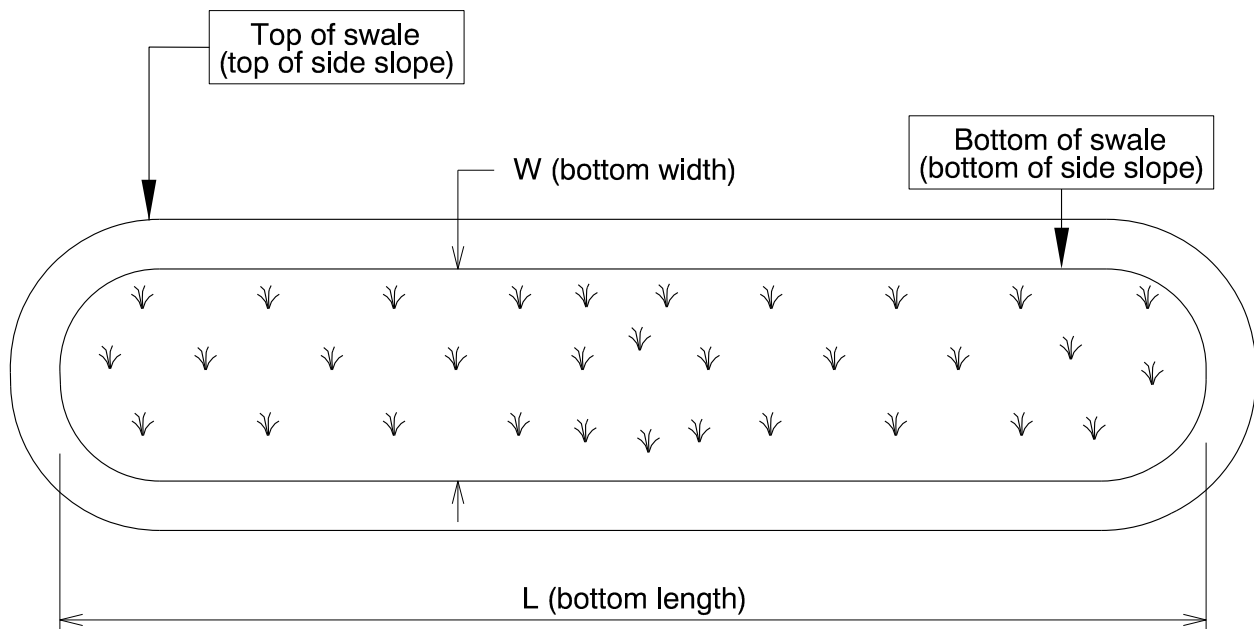
Figure 2: Facility location map

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:

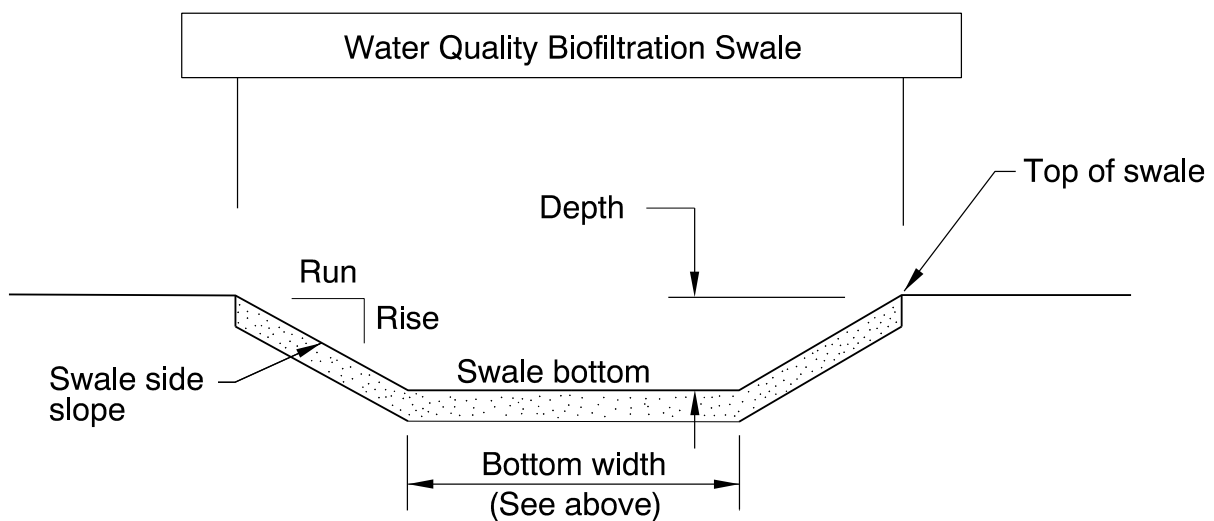
Bottom Length (feet)	Bottom Width (feet)
112	11.5



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)
Unknown	1	4



Site Specific Information: Water enters from the west via a 12" pipe, flows to the east before outleting into another 12" pipe which discharges into the creek north of the interchange.

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 via roadside shoulder

5. Operational Components / Maintenance Items

Classification

This facility is classified as an:

<input checked="" type="checkbox"/> On-line Swale	<input 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 checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
There is no bypass component. High flows drain into and through the facility	There is a bypass component. Only low/small flows drain into the swale. High flows are diverted around the swale using a bypass component

Operational Components

A swale has many components that assist with treatment, conveyance, and reducing flow velocity to minimize erosion. The components in use can vary depending if the facility was designed to operate on-line or off-line. The facility components table (**Table 1**) has been provided to highlight the applicable components for this facility. The component is in use when the box contains an "x" (e.g.).

The Standard Operation Manual for Water Quality Biofiltration Swales (implemented March 2017) outlines facility operation, typical footprint configuration, and component definitions and details. A link to the manual is attached to the feature marker in TransGIS.

<https://gis.odot.state.or.us/TransGIS/>

Operational Plan

The applicable standard operational plan for this facility is:

<input type="checkbox"/> Operational Plan A	<input checked="" type="checkbox"/> Operational Plan B	<input type="checkbox"/> 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	<input type="checkbox"/>	S1
Weir type flow splitter/flow splitter manhole	<input type="checkbox"/>	S2
Orifice type flow splitter/flow splitter manhole	<input type="checkbox"/>	S3
Standard manhole	<input checked="" type="checkbox"/>	S4
Swale Inlet		
Pavement sheet flow	<input type="checkbox"/>	S5
Inlet Pipe (s)	<input checked="" type="checkbox"/>	S6
Open channel inlet	<input type="checkbox"/>	S7
Riprap pad	<input checked="" type="checkbox"/>	S8
Ground Cover		
Grass bottom	<input checked="" type="checkbox"/>	S9
Grass side slopes	<input checked="" type="checkbox"/>	S10
Granular drain rock	<input type="checkbox"/>	S11
Plantings	<input type="checkbox"/>	S12
Underground Components		
Geotextile fabric	<input type="checkbox"/>	S13
Water quality mix	<input checked="" type="checkbox"/>	S14
Perforated pipe	<input type="checkbox"/>	S15
Porous pavers (access grid)	<input type="checkbox"/>	S16
Flow Spreader		
Rock basin (used at inlet)	<input type="checkbox"/>	S17
Anchored board (midpoint of swale or every 50 feet along swale bottom)	<input checked="" type="checkbox"/>	S18
Other: <i>N/A</i>	<input type="checkbox"/>	S19
Swale Outlet		
Catch basin with grate	<input checked="" type="checkbox"/>	S20
Outlet Pipe (s)	<input checked="" type="checkbox"/>	S21
Open channel outlet	<input type="checkbox"/>	S22
Auxiliary Outlet: <i>N/A</i>	<input type="checkbox"/>	S23
Outfall Type		
Waterbody (Creek/Lake/Ocean)	<input checked="" type="checkbox"/> C <input type="checkbox"/> L <input type="checkbox"/> O	S24
Ditch	<input type="checkbox"/>	S25
Storm drain system	<input type="checkbox"/>	S26
Outfall Components		
Riprap pad	<input type="checkbox"/>	S27
Riprap bank protection	<input checked="" type="checkbox"/>	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:

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

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

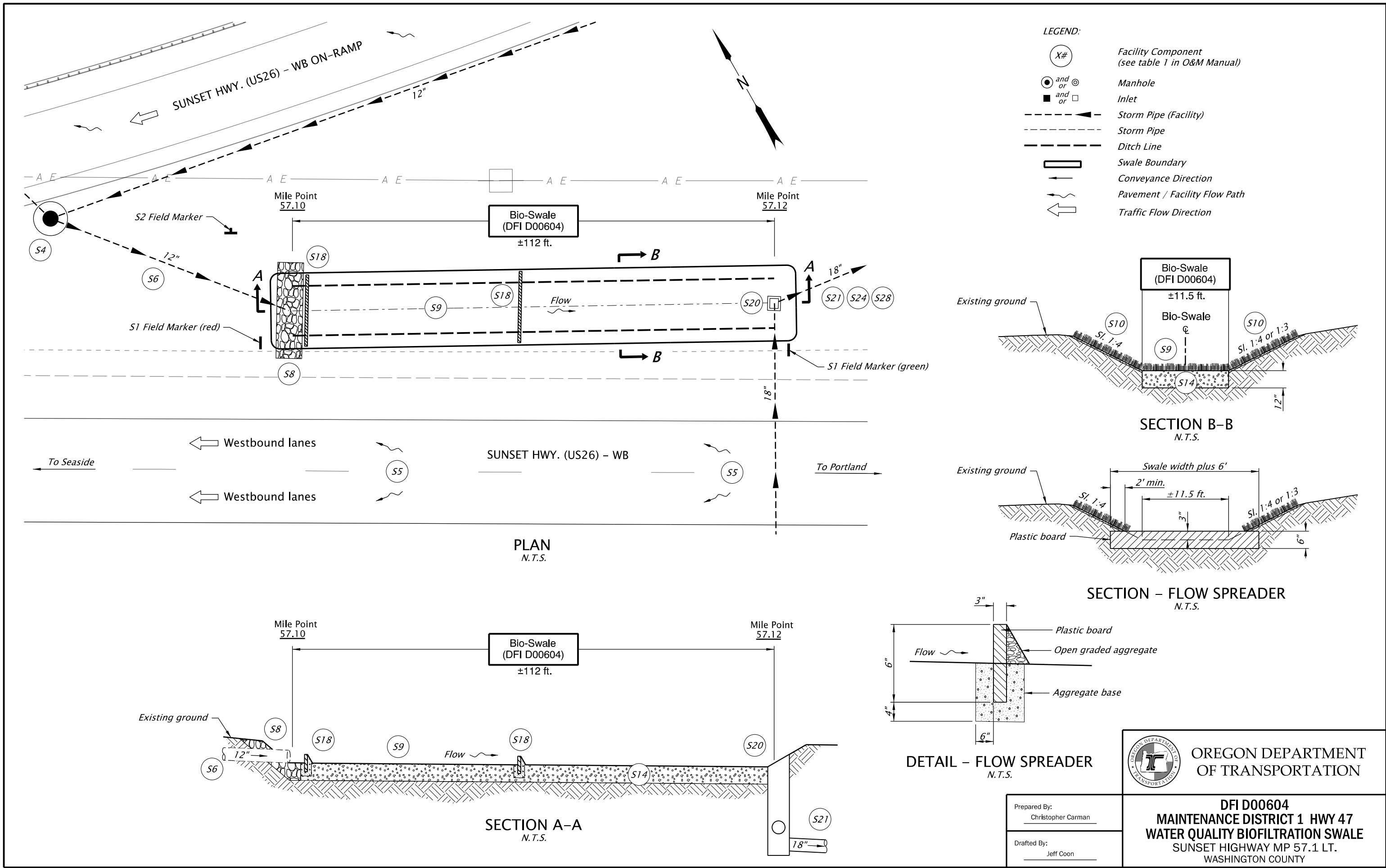
Contact any of the following for more detailed information about management of waste materials found on site:

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 D00604



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

PLAN
N.T.S.

SECTION B-B
N.T.S.

SECTION - FLOW SPREADER
N.T.S.

SECTION A-A
N.T.S.

DETAIL - FLOW SPREADER
N.T.S.


OREGON DEPARTMENT OF TRANSPORTATION

Prepared By:
Christopher Carman

Drafted By:
Jeff Coon

DFI D00604
MAINTENANCE DISTRICT 1 HWY 47
WATER QUALITY BIOFILTRATION SWALE
 SUNSET HIGHWAY MP 57.1 LT.
 WASHINGTON COUNTY

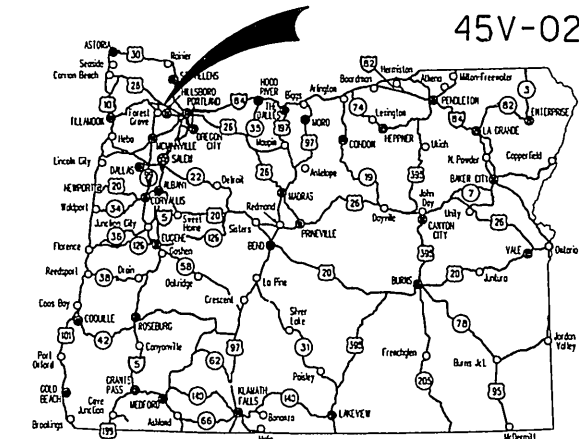
B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 45V-029

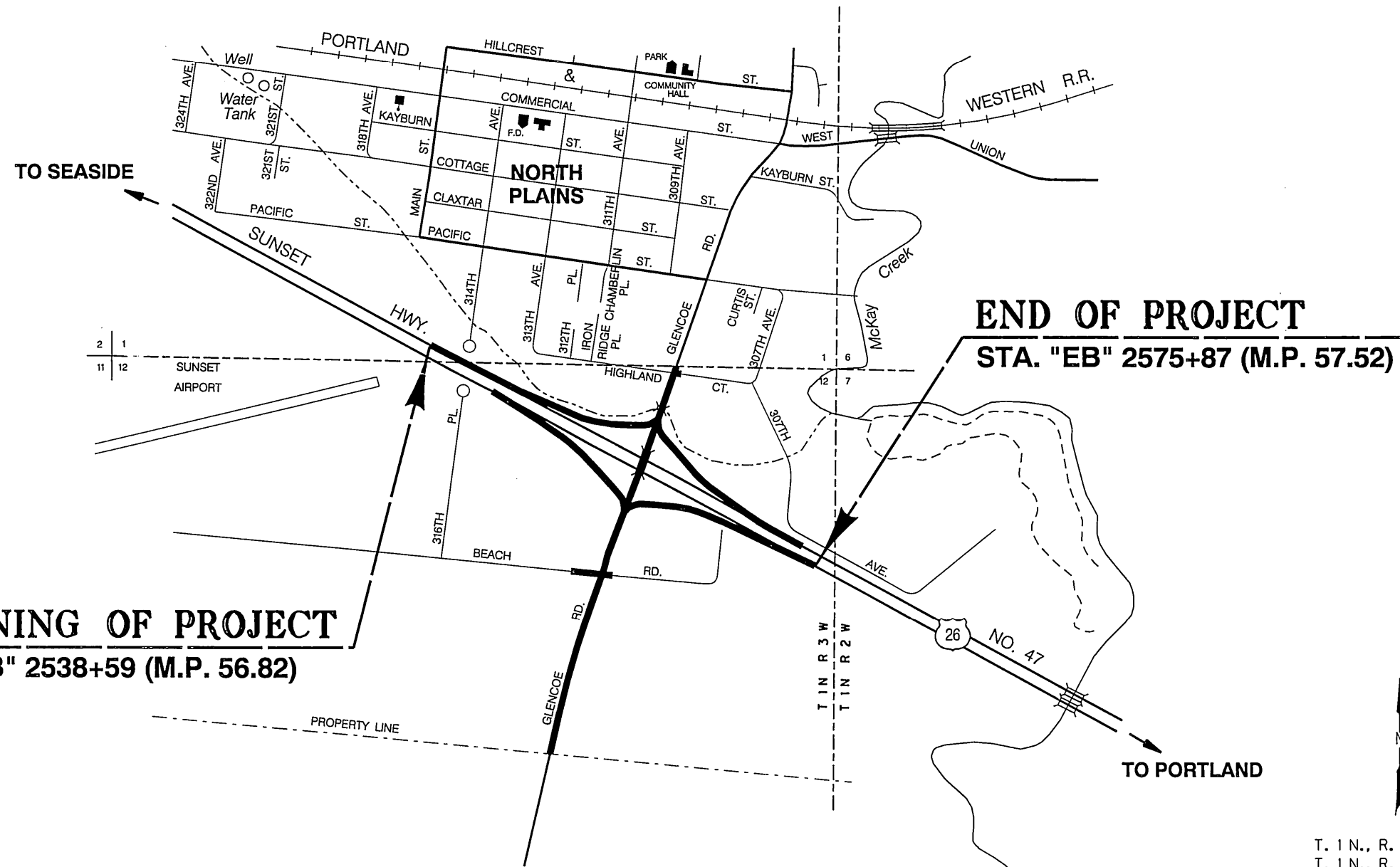
INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.
1A-2	Standard Drg.nos.
1B	Sheet Layout

STATE OF OREGON
 DEPARTMENT OF TRANSPORTATION
 PLANS FOR PROPOSED PROJECT
**GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION,
 SIGNALS & ROADSIDE DEVELOPMENT**
US 26: SUNSET HWY @ GLENCOE ROAD PROJECT
SUNSET HIGHWAY
 WASHINGTON COUNTY
 MAY 2012



Overall Length Of Project - 0.70 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.)



BEGINNING OF PROJECT
 STA. "WB" 2538+59 (M.P. 56.82)

END OF PROJECT
 STA. "EB" 2575+87 (M.P. 57.52)

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: *Naveen G. Chandra*
 Naveen G. Chandra, P.E.
 Project Delivery Manager, Region 1

[Signature]
 Concurrence by ODOT Chief Engineer

US 26: SUNSET HWY @ GLENCOE ROAD PROJECT
 SUNSET HIGHWAY
 WASHINGTON COUNTY

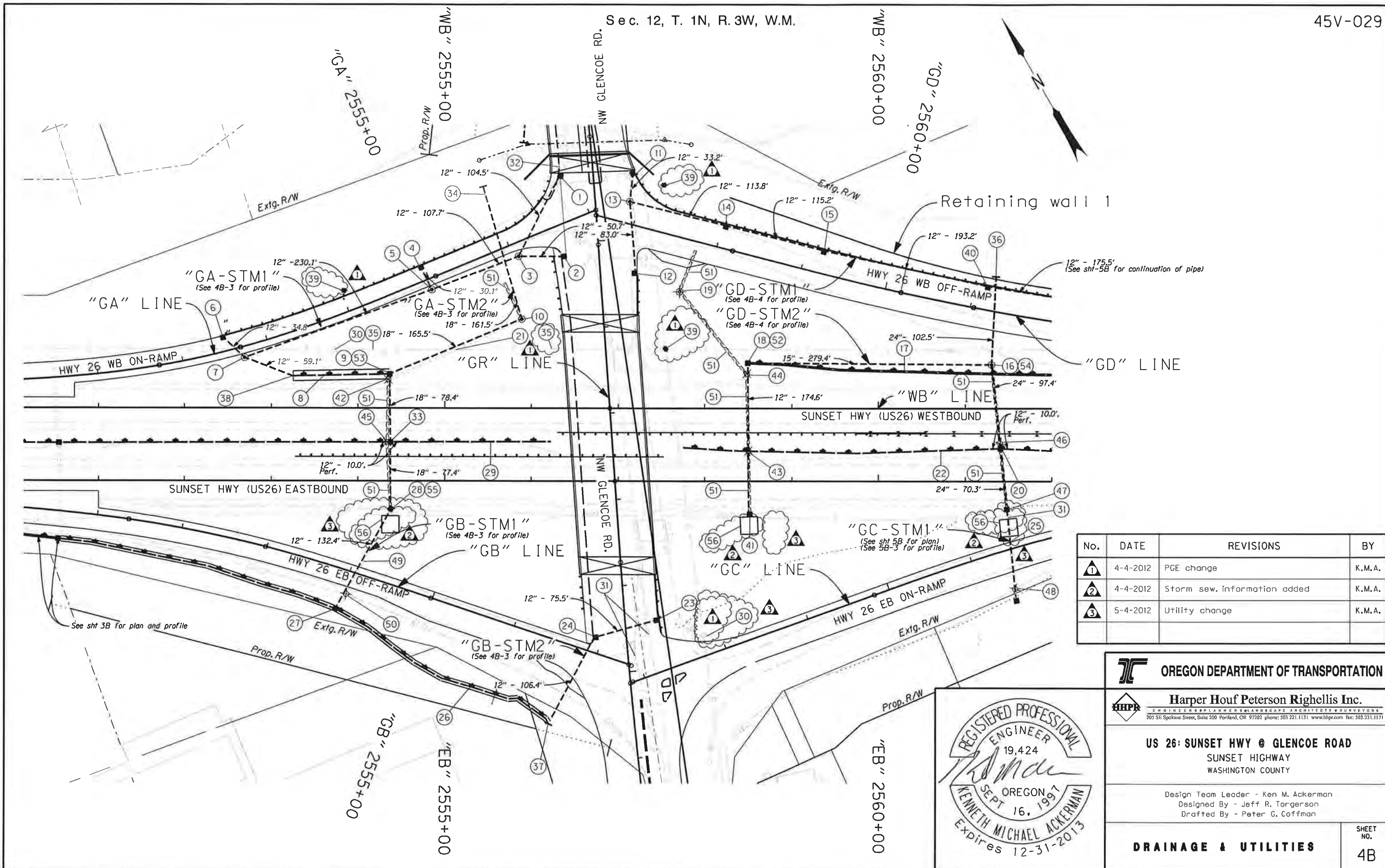
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	STATE	1

T. 1 N., R. 3 W., W.M.
 T. 1 N., R. 2 W., W.M.



PE001028-020

Sec. 12, T. 1N, R. 3W, W.M.



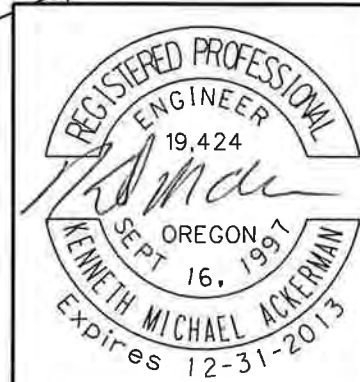
No.	DATE	REVISIONS	BY
1	4-4-2012	PGE change	K.M.A.
2	4-4-2012	Storm sew. information added	K.M.A.
3	5-4-2012	Utility change	K.M.A.

OREGON DEPARTMENT OF TRANSPORTATION

Harper Houf Peterson Righellis Inc.
ENGINEERS PLANNERS LANDSCAPE ARCHITECTS SURVEYORS
 205 SE Spokane Street, Suite 200 Portland, OR 97202 phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

US 26: SUNSET HWY @ GLENCOE ROAD
 SUNSET HIGHWAY
 WASHINGTON COUNTY

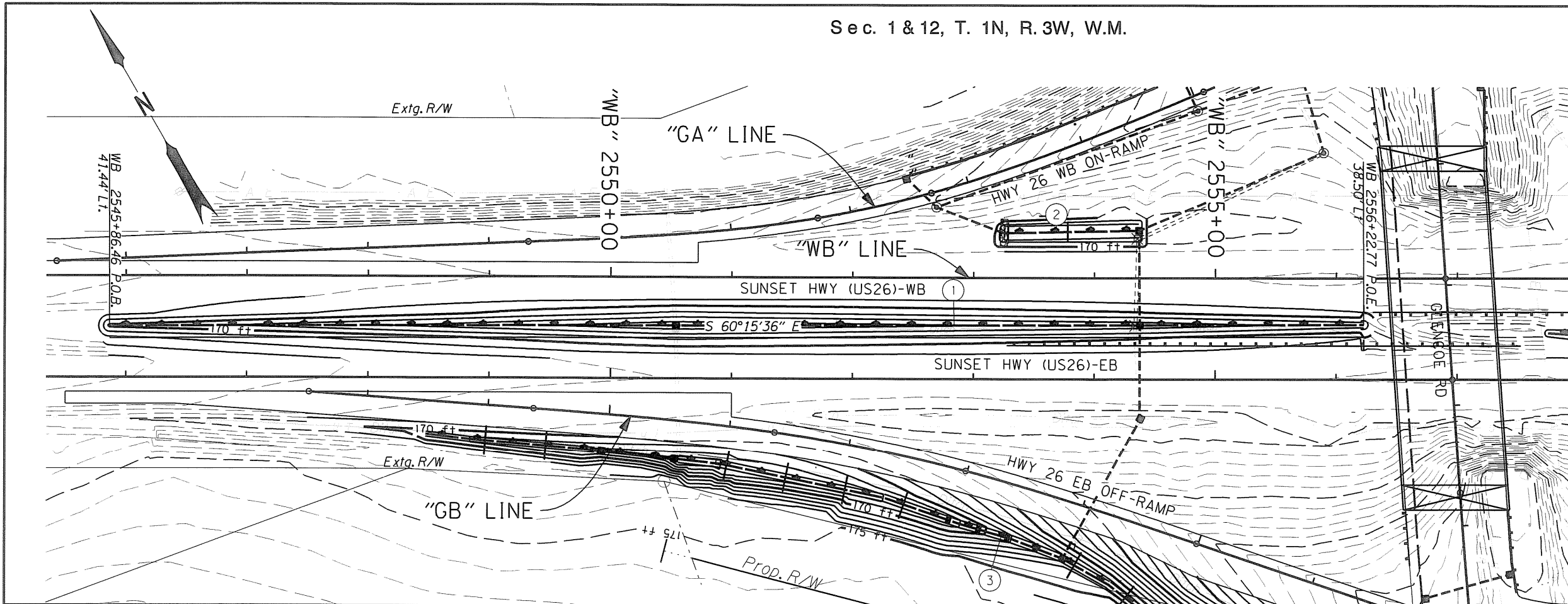
Design Team Leader - Ken M. Ackerman
 Designed By - Jeff R. Torgerson
 Drafted By - Peter G. Coffman



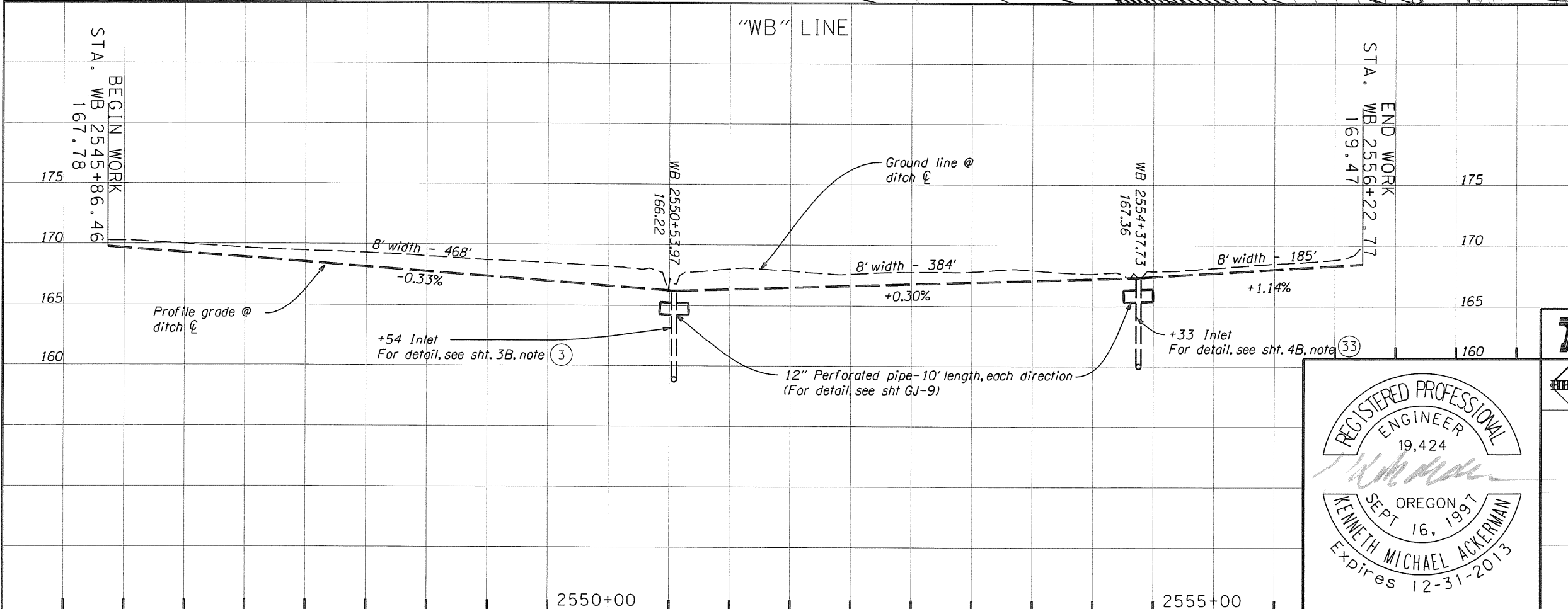
DRAINAGE & UTILITIES

SHEET NO.
4B

Sec. 1 & 12, T. 1N, R. 3W, W.M.



- ① Sta. "WB" 2545+86.46, 41.44' Rt to Sta. "WB" 2556+22.77, 38.50' Rt Const. MFD ditch (For details, see sht. GJ-9)
- ② Water quality swale See sht. GJ-5 for plan and profile
- ③ Water quality swale See sht. GJ-6 for plan and profile



LEGEND	
Major contour - 5'	} Extg. contours
Minor contour - 1'	
Major contour - 5'	} Proposed stormwater contours
Minor contour - 1'	

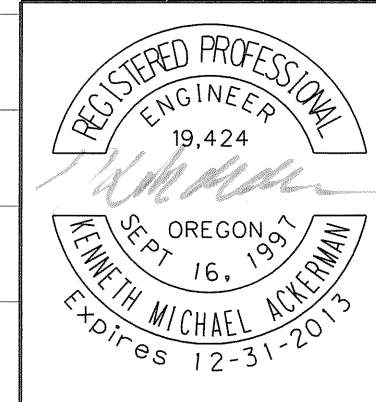
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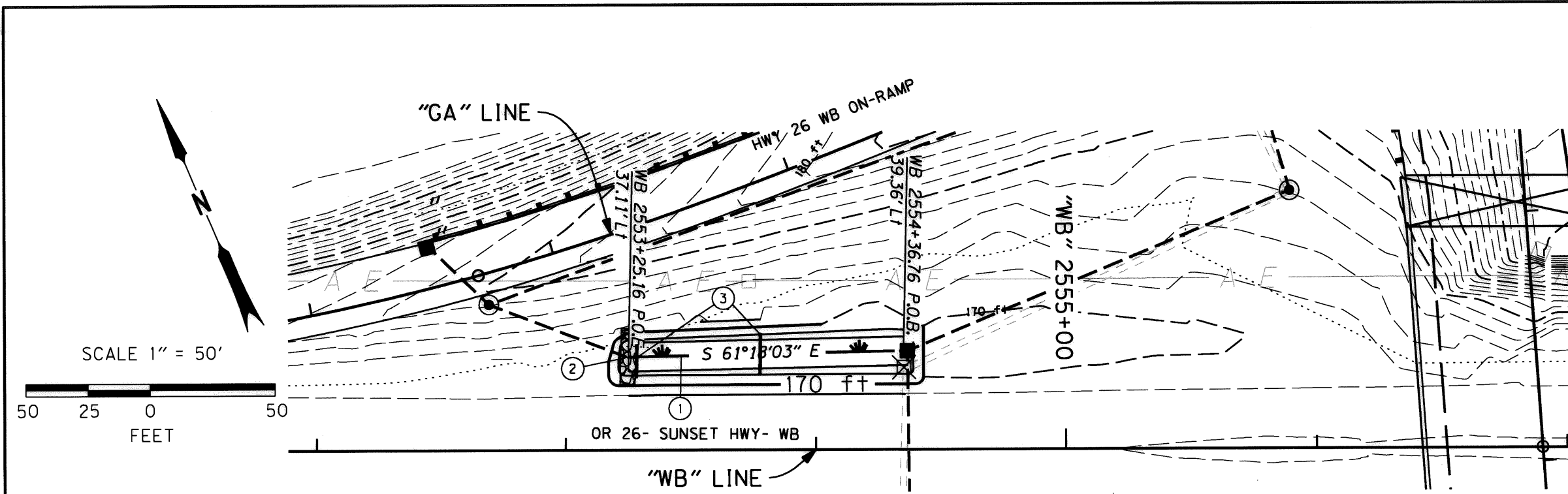
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 SUNSET HIGHWAY
 WASHINGTON COUNTY

Design Team Leader - Ken M. Ackerman
 Designed By - Jeff R. Torgerson
 Drafted By - Peter G. Coffman

MFD DITCH PLAN & PROFILE

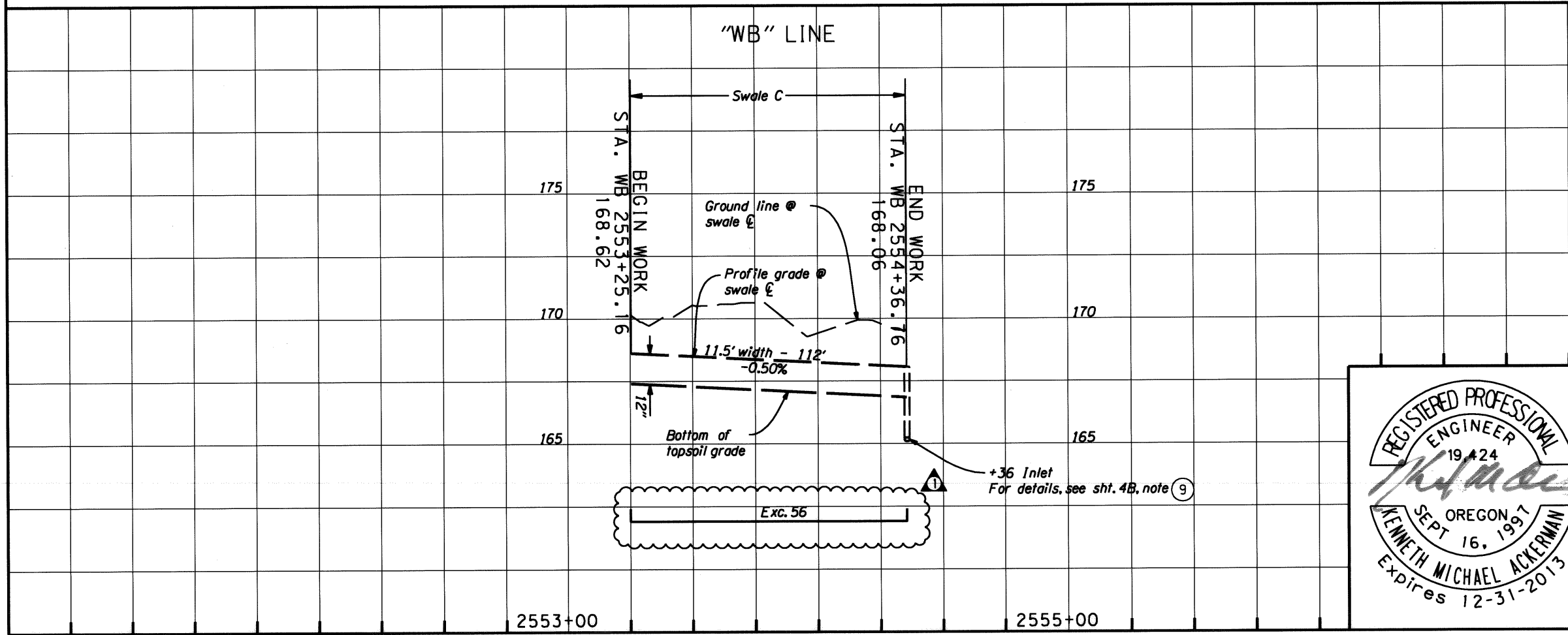


SHEET NO. GJ



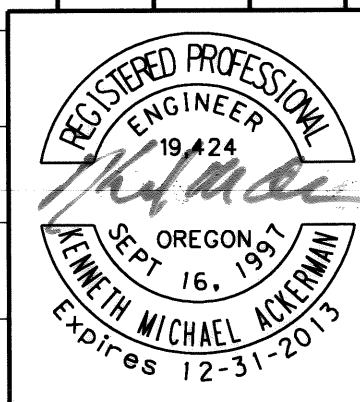
- ① Sta. "WB" 2553+25.16, 37.11' Lt to Sta. "WB" 2554+36.76, 39.36' Lt
Const. 11.5' wide water quality swale
(For details, see sht. GJ-9)
- ② Const. outfall protection
(For details, see sht. GJ-10)
- ③ Const. flow spreading check dam
(For details, see sht. GJ-9)

No.	DATE	REVISIONS	BY
1	05-02-12	Exc. quantity added	K.M.A.



LEGEND

- Major contour-5' } Extg. contours
- Minor contour-1' }
- Major contour-5' } Proposed stormwater contours
- Minor contour-1' }



OREGON DEPARTMENT OF TRANSPORTATION

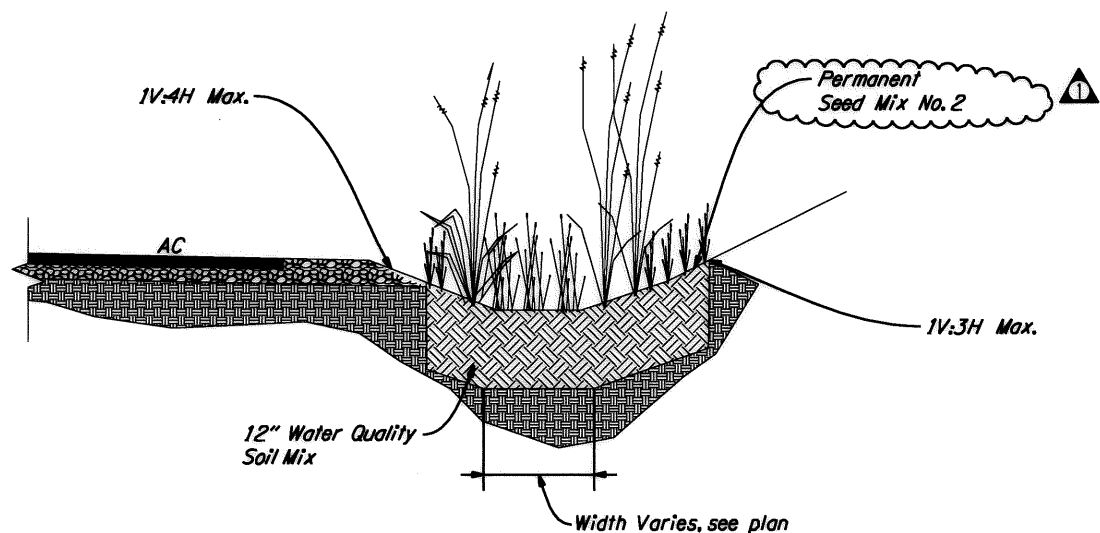
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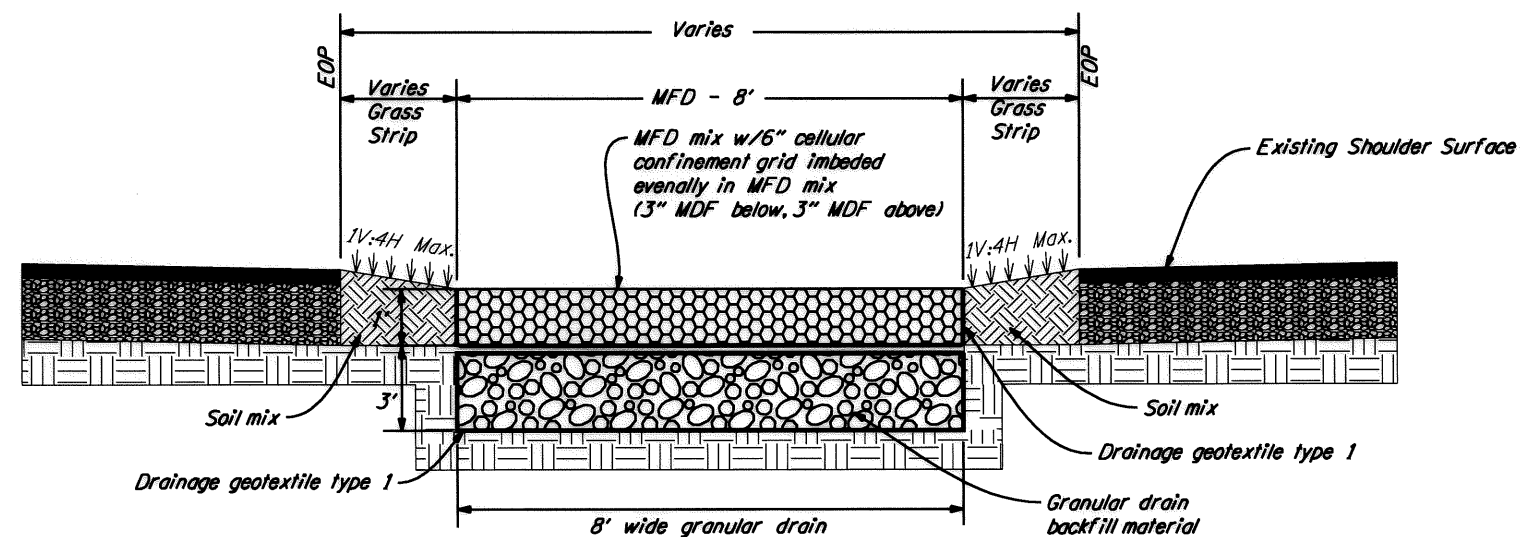
Design Team Leader - Ken M. Ackerman
Designed By - Jeff R. Torgerson
Drafted By - Peter G. Coffman

WATER QUALITY SWALE PLAN & PROFILE

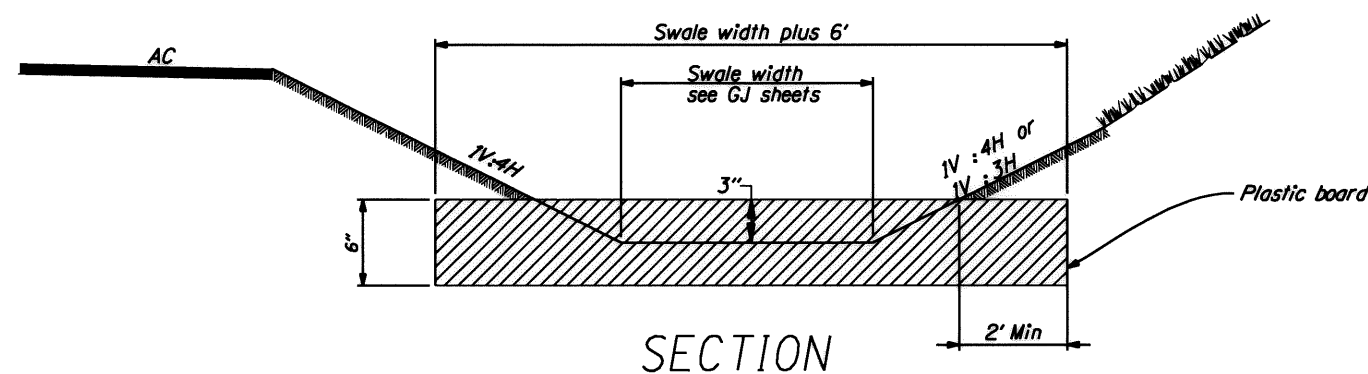
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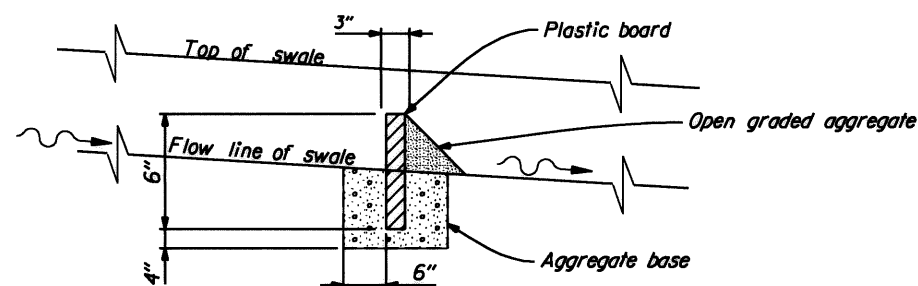
WATER QUALITY SWALE SECTION
N.T.S.



**MFD (TYPE 1) SECTION
DITCH CONFIGURATION**
N.T.S.



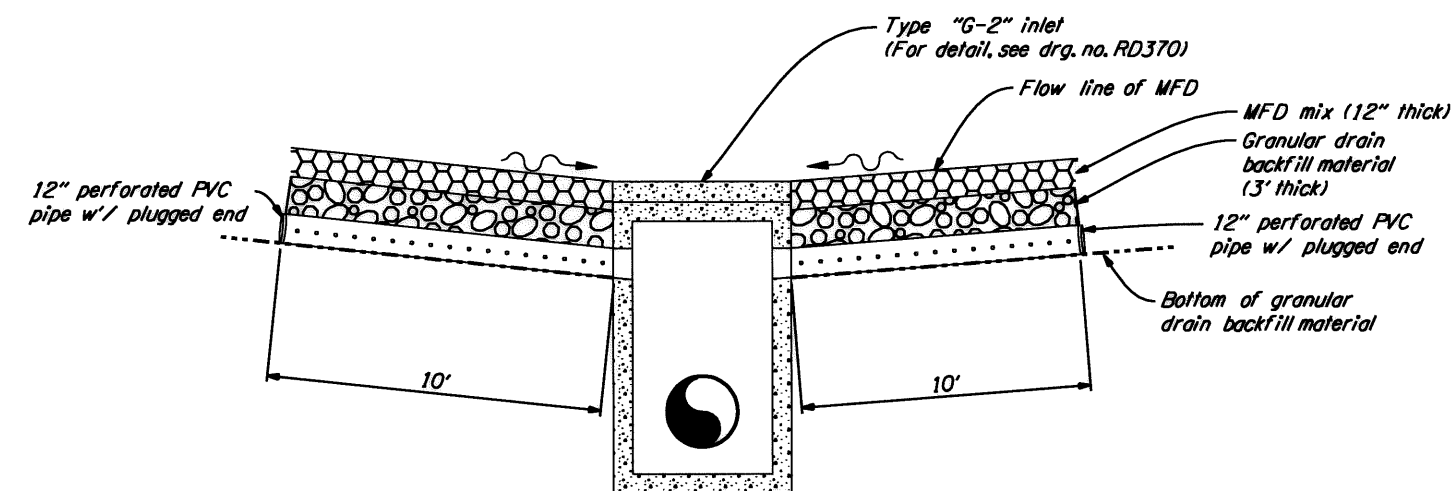
SECTION



ELEVATION

FLOW SPREADING CHECK DAM
N.T.S.

Note:
Space approx. every 50'
from pipe outfall



**TYPE "G-2" INLET W/
PERFORATED PIPE IN MFD**
N.T.S.

No.	DATE	REVISIONS	BY
1	04-25-2012	Changed Seed Mix Call Out	K.M.A.



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DETAILS

SHEET NO.
GJ-9