# OPERATION & MAINTENANCE MANUAL

## Water Quality Biofiltration Swale

**Manual prepared: July 2017**

**DFI No. D00666**


**Figure 1: DFI No. D00666, looking south**

## 1. Identification

| | |
|---|---|
| Drainage Facility ID (DFI): | D00666 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 46V-120 |
| Location: | District: 3 |
| | Highway No.: 150 |
| | Mile Post: 17.20 to 17.25, right side |

## 2. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions.

## 3. 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.

Flow direction: south

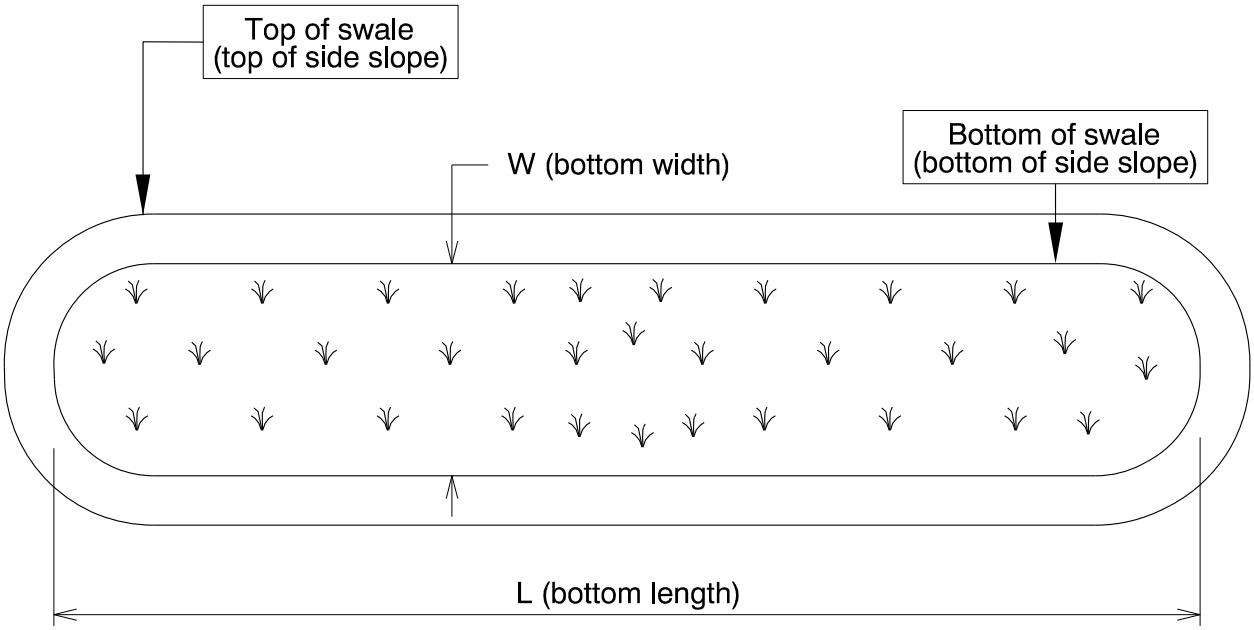

**Figure 2: Facility location map**

## 4. 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:

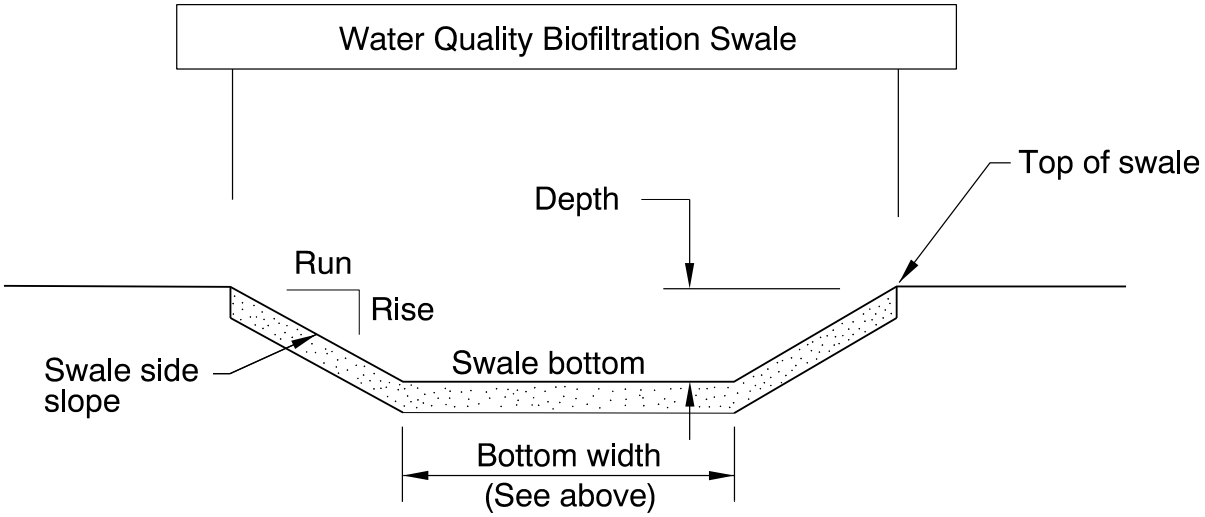
| Bottom Length (feet) | Bottom Width (feet) |
|---|---|
| **110 (South Segment)**<br>**55 (North Segment)** | **6** |



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) |
|---|---|---|
| 2 - 5 | 1 | 4 |

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**Site Specific Information:** This facility is located on the west side of Wallace Road NW (OR 221/ Hwy 150) approximately one third of a mile past the Michigan City Ln NW intersection. Access can be obtained from the southbound lane of Wallace Road NW. The swale is separated into two segments by the Evesham Wood Vineyard driveway. An 18 inch culvert connects the two segments. The swale conveys stormwater from sheet flow off the highway that enters a roadside ditch along Wallace Rd NW. The stormwater flows through the first section of the swale, and then continues south to the next portion of the swale via the 18 inch culvert. After treatment in the second portion of the swale, the stormwater exits into a Type B inlet that connects to a stormwater pipe system. The drainage ditch south of the swale provides an auxiliary outlet for the facility. The flow spreaders are constructed from aggregate rock; however, the V-file indicates that they were to be constructed from plastic lumber.

## 5. Facility Access

Maintenance access to the facility:

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


**Figure 3: Swale facility footprint with shoulder access, facing south**

## 6. 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: Facility 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** |
| Storm drain inlet pipe | ☒ | **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 (used at inlet) | ☒ | **S17** |
| Anchored board (midpoint of swale or every 50 feet along swale bottom) | ☐ | **S18** |
| Other: aggregate rock check dams | ☒ | **S19** |
| **Swale Outlet** | | |
| Catch basin with grate | ☒ | **S20** |
| Storm drain outlet pipe | ☒ | **S21** |
| Open channel outlet | ☐ | **S22** |
| Auxiliary Outlet | ☒ | **S23** |
| **Outfall Type** | | |
| Waterbody (Creek/Lake/Ocean) | ☐ **C**<br>☐ **L**<br>☐ **O** | **S24** |
| Ditch | ☐ | **S25** |
| Storm drain system | ☒ | **S26** |
| **Outfall Components** | | |
| Riprap pad | ☐ | **S27** |
| Riprap bank protection | ☐ | **S28** |

## 7. 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/HWY/OOM/pages/mguide.aspx

## 8. Limitations

Access grid installed:

| ☒ No | ☐ Yes |
|---|---|
| **There are no porous pavers installed in this swale** | |

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.

## 9. 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

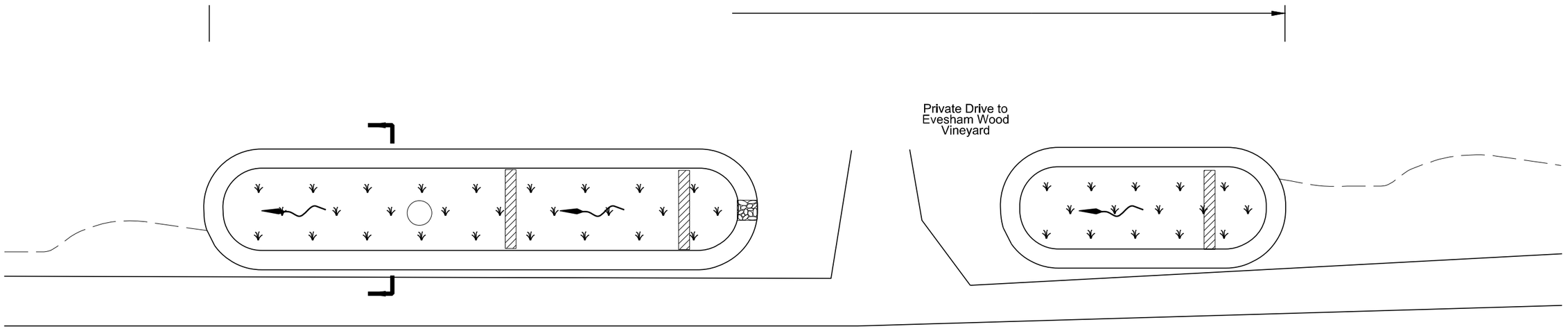
Contact any of the following for more detailed information about management of waste materials found on site:

| | |
|---|---|
| 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 D00666**




Private Drive to
Evesham Wood
Vineyard

direction/flow

Table 1: Facility Components

# B Appendix B – Project Contract Plans

## Contents:

**Site Specific Subset of Project Contract Plan 46V-1**

46V-120

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

STATE OF OREGON

# DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

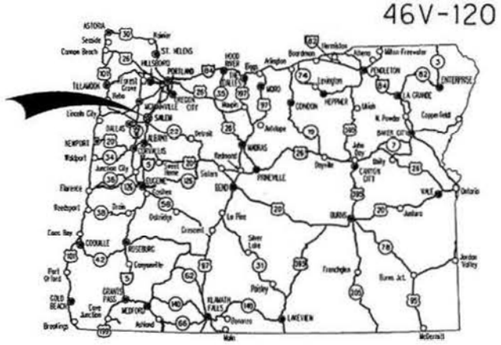
**GRADING, DRAINAGE, STRUCTURE, PAVING, SIGNING, SIGNALS & ROADSIDE DEVELOPMENT**

# OR221: WALLACE RD. @ GLEN CREEK RD. (SALEM) SEC.

## SALEM - DAYTON HIGHWAY

**POLK COUNTY**

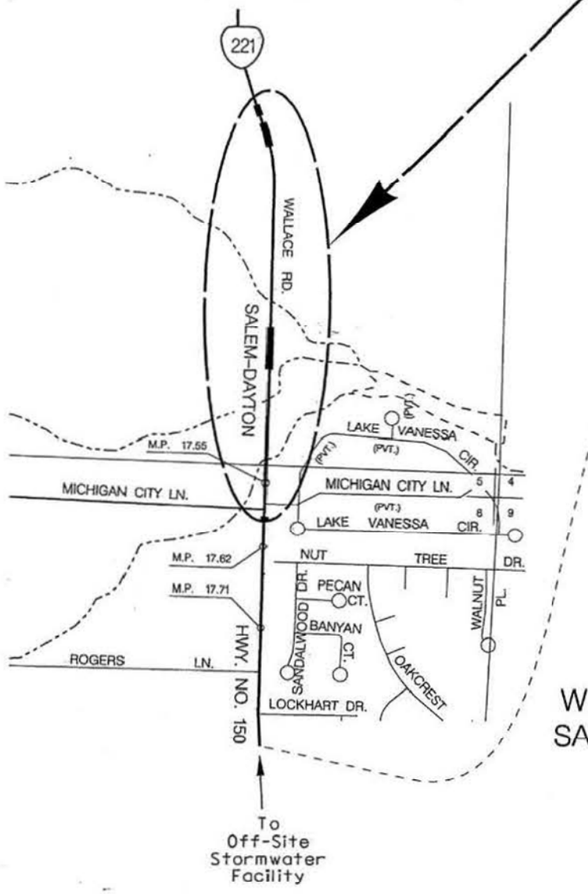
**SEPTEMBER 2013**



*Overall Length Of Project - 0.18 Miles*

**STA. "W2" 189+00 (M.P. 17.20)**

**STA. "W2" 928+60 (M.P. 17.59)**

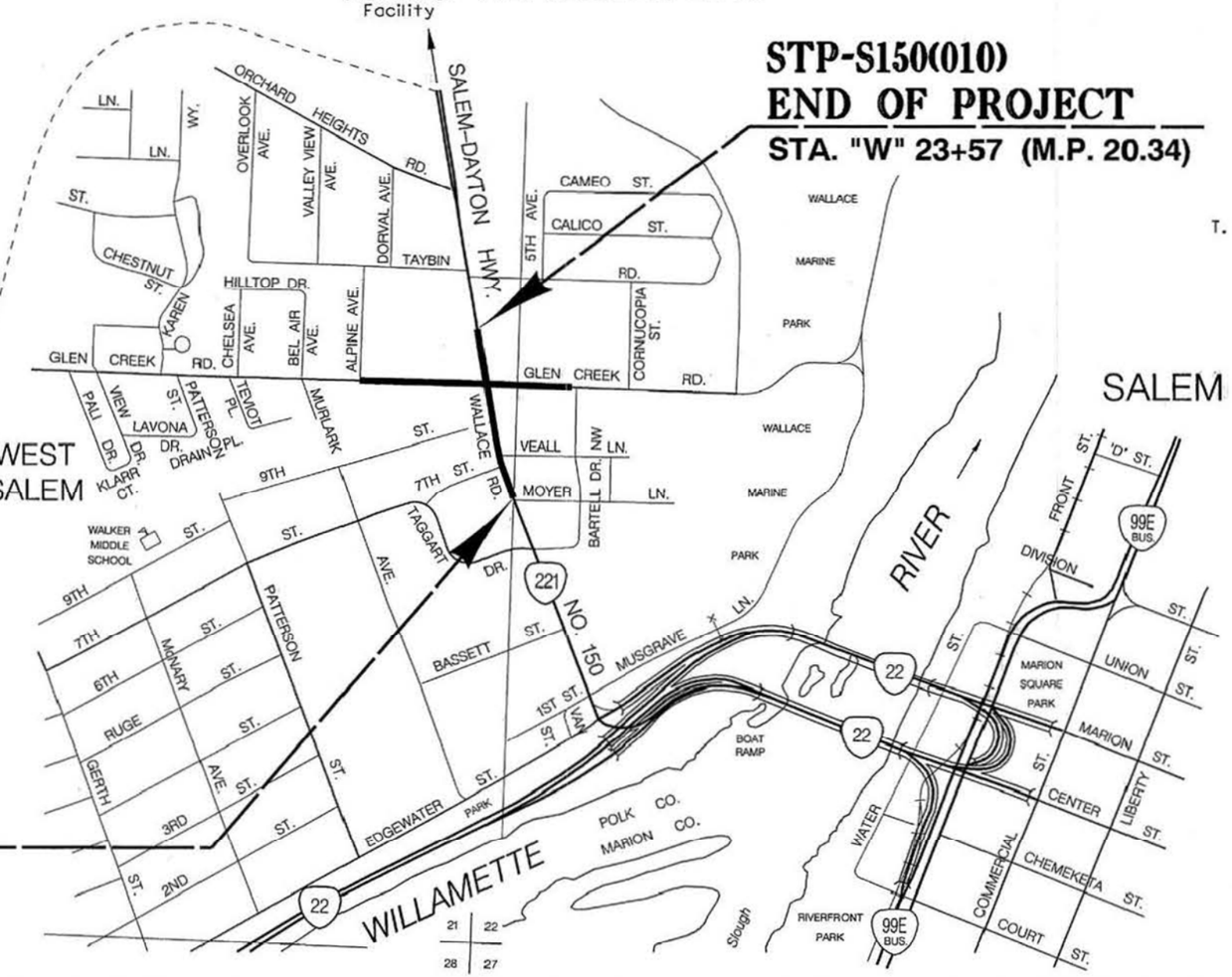



To Off-Site Stormwater Facility

**STP-S150(010)**

**END OF PROJECT**

**STA. "W" 23+57 (M.P. 20.34)**




**STP-S150(010)**

**BEGINNING OF PROJECT**

**STA. "W" 14+06 (M.P. 20.52)**

T. 7 S., R. 3 W., W.M.

**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.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

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.

By: _____ 8-12-13
Signature & date

Michael T. Long - R2 Tech Center Manager
Print name and title

_____
Concurrence by ODOT Chief Engineer

**OR221: WALLACE RD. @ GLEN CREEK RD. (SALEM) SEC.**
SALEM - DAYTON HIGHWAY
POLK COUNTY

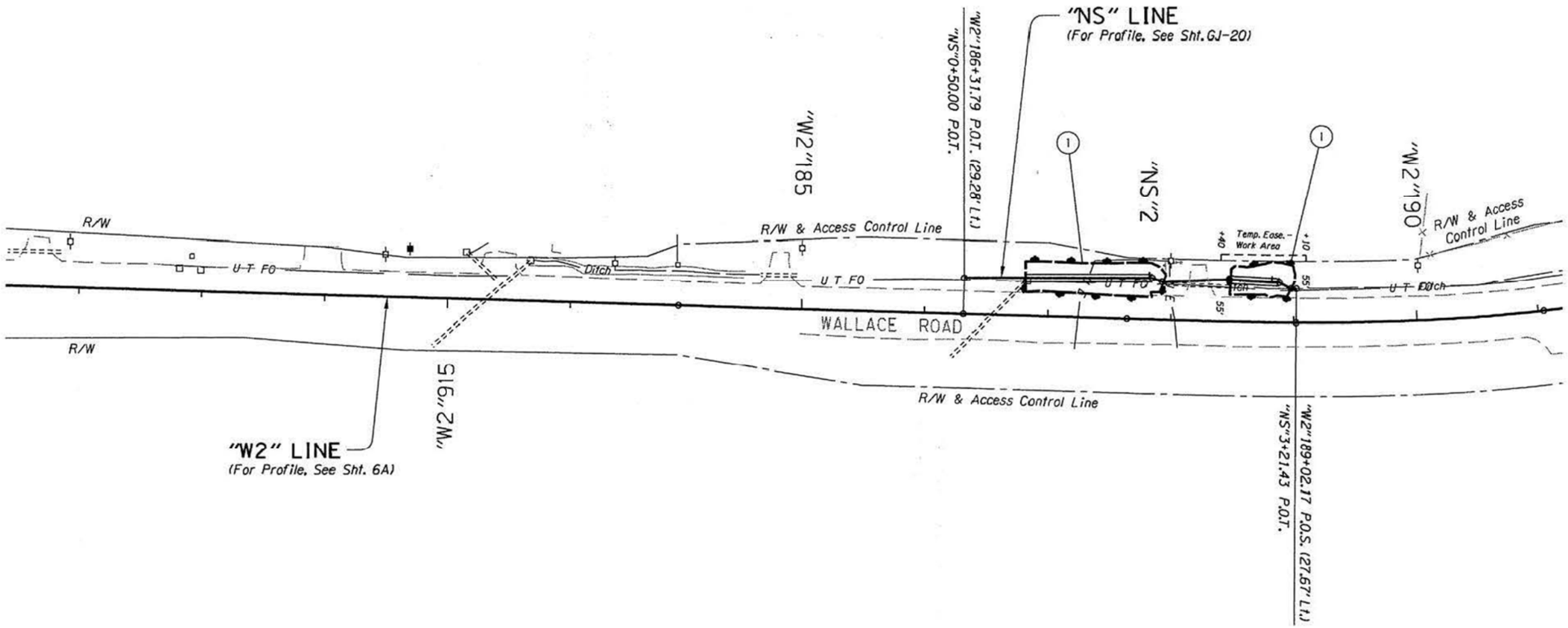
| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | STP-S150(010) | 1 |

PE001439

Sec. 5, T. 7 S., R. 3 W., W.M.
WEST SALEM

46V-120

(1) Const. north water quality swale and drainage facilities (For drg. nos., see sht. 1A)




OREGON DEPARTMENT OF TRANSPORTATION

REGION 2 TECH CENTER

OR221: WALLACE RD. @
GLEN CREEK RD. (SALEM) SEC.
SALEM - DAYTON HIGHWAY
POLK COUNTY

Design Team Leader - Carol Cartwright
Designed By - Jerry Rosenblad
Drafted By - Jeff Larson

GENERAL CONSTRUCTION

SHEET NO. 6

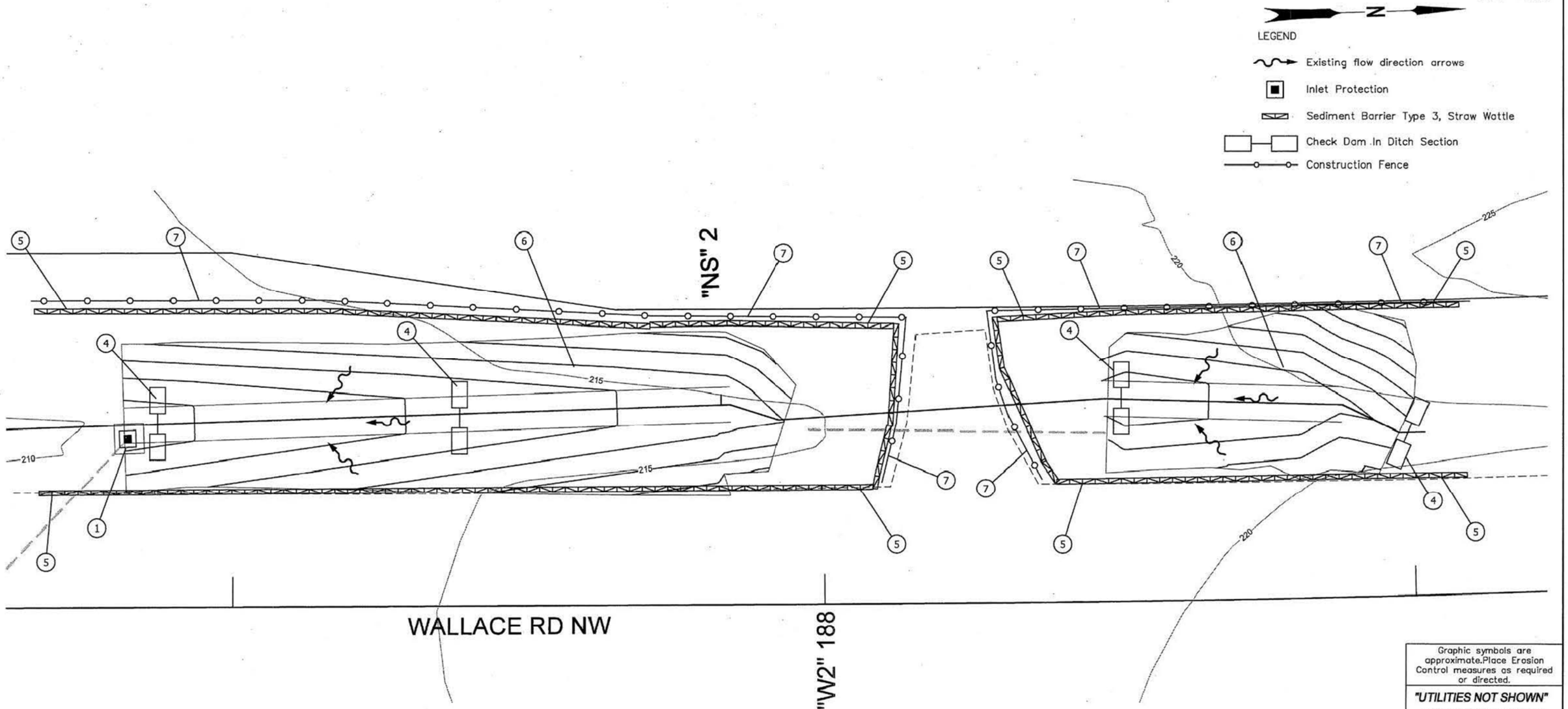
REGISTERED PROFESSIONAL ENGINEER
19,288
Jerry Rosenblad
OREGON
JULY 15, 1997
JERRY A. ROSENBLAD
RENEWS: 12-31-2014

F:\ODOT_DATA\Projects\14870Wallace_Glen\14870f.pl2 :: Default 7/2/2013 12:07:13 PM hwye07x

1:1200 BL - 002

# NORTH BIOSWALE

46V–120




1. Const. inlet protection (Type 3 & 4)
4. Const. check dam
5. Const. straw wattle
6. Temporary mulch
7. Construction fence

Graphic symbols are approximate. Place Erosion Control measures as required or directed.

*"UTILITIES NOT SHOWN"*
*See Utility Plan Sheet*

REGISTERED PROFESSIONAL ENGINEER
73415
OREGON
JULY 15, 2003
TROY D. THOMSON
EXPIRES: 6-30-2014

**OREGON DEPARTMENT OF TRANSPORTATION**
**TRAFFIC - ROADWAY SECTION**

CITY OF Salem AT YOUR SERVICE
ENGINEERING DIVISION
SALEM PUBLIC WORKS DEPARTMENT

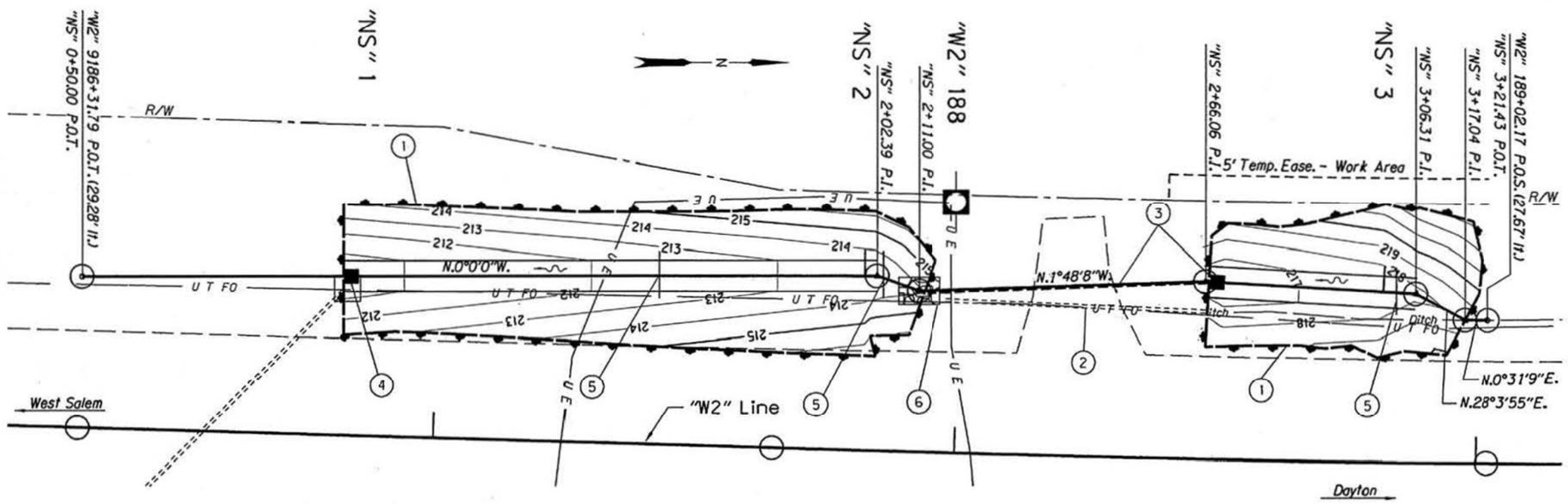
**OR 221: WALLACE ROAD AT GLEN CREEK ROAD (SALEM)**
SALEM - DAYTON HIGHWAY
POLK COUNTY

DESIGNED BY: T. Thomson
REVIEWED BY: S. Cramer
DRAWN BY: TDT / JAK

**EROSION AND SEDIMENT CONTROL PLAN**

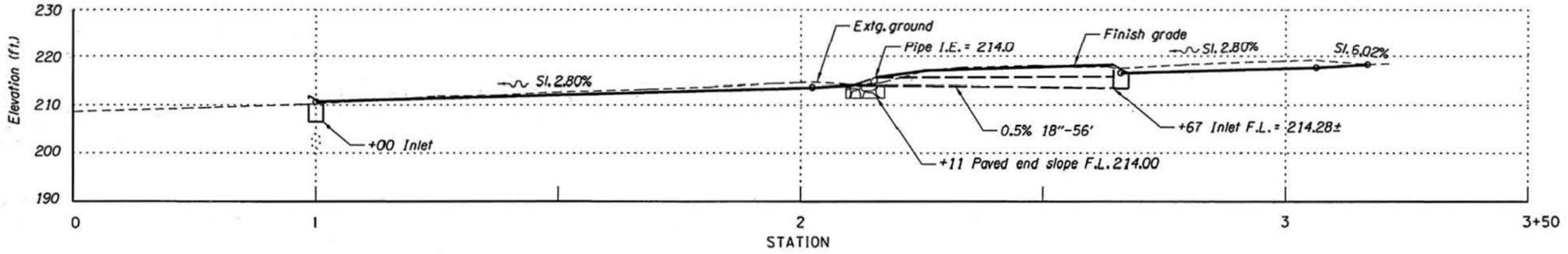
SHEET NO. GA–10

G:\Group\techpool\PROJECTS\709501–(Wallace Rd at Glen Creek Rd)\Design\ODOT–Wallace Rd–Erosion Control Plan.dwg (GA–10 tab)




1. Sta. "NS" 1+00.00 to Sta. "NS" 3+20.43
   Const. water quality swale to contours shown.
   Blended topsoil/compost mixture - 45 cu. yd.
2. Remove 12" pipe
3. Sta. "NS" 2+67.00
   Const. type "D" inlet
   Grate sl. 1V:3H
   Inst. 18" drain pipe (conc. Class IV) - 56'
   5' depth
4. Sta. "NS" 1+00.00
   Remove inlet
   Const. type "B" inlet
   Top of grate El. 210.2±. field fit
   Connect to extg. pipe
5. Inst. flow spreaders - 22'
6. Sta. "NS" 2+1.00
   Const. 6'x4'x1' ripr p (class 50) pad - 0.9 cu. yd.

PLAN




PROFILE

REGISTERED PROFESSIONAL ENGINEER
65305
OREGON
JANUARY 23, 2001
BRUCE A. CARMICHAEL
EXPIRES: 12/31/2013

OREGON DEPARTMENT OF TRANSPORTATION

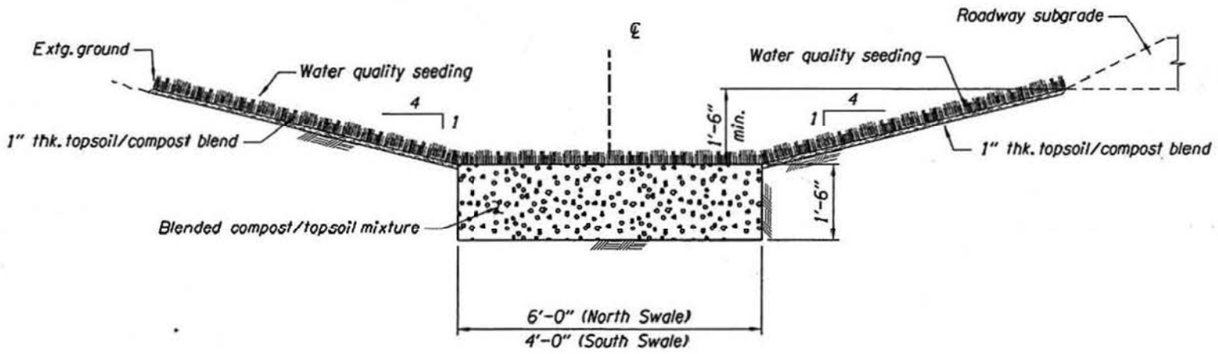
**REGION 2 TECH CENTER**

OR221: WALLACE RD. @
GLEN CREEK RD. (SALEM) SEC.
SALEM - DAYTON HIGHWAY
POLK COUNTY

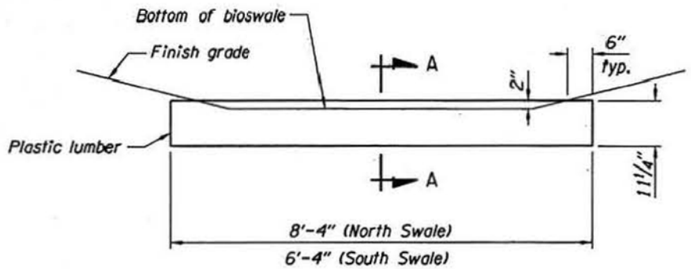
Reviewed By - Bo Miller
Designed By - Bruce Carmichael
Drafted By - Sandra Gish

**STORMWATER PLAN**
**NORTH WATER QUALITY SWALE**

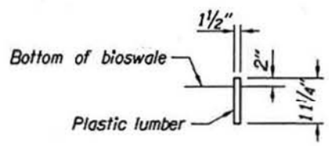
SHEET NO. GJ-20




TYPICAL SECTION




ELEVATION




SECTION A-A

## FLOW SPREADER DETAILS

REGISTERED PROFESSIONAL ENGINEER
65305
OREGON
JANUARY 23, 2001
BRUCE A. CARMICHAEL
EXPIRES: 12/31/2013

**OREGON DEPARTMENT OF TRANSPORTATION**

**REGION 2 TECH CENTER**

OR221: WALLACE RD. @
GLEN CREEK RD. (SALEM) SEC.
SALEM - DAYTON HIGHWAY
POLK COUNTY

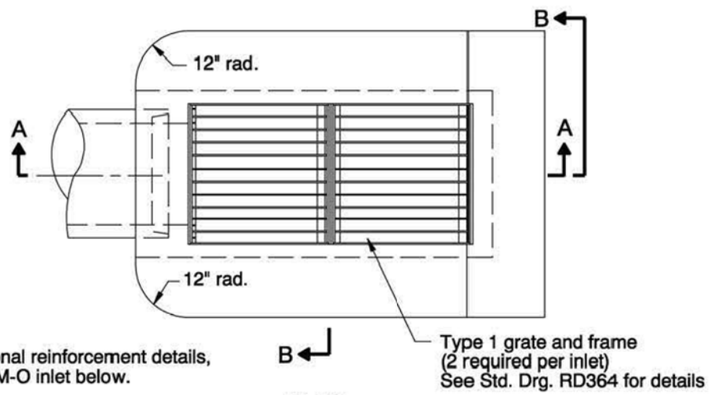
Reviewed By - Bo Miller
Designed By - Bruce Carmichael
Drafted By - Sandra Gish

**STORMWATER DETAILS**

SHEET NO. GJ-21

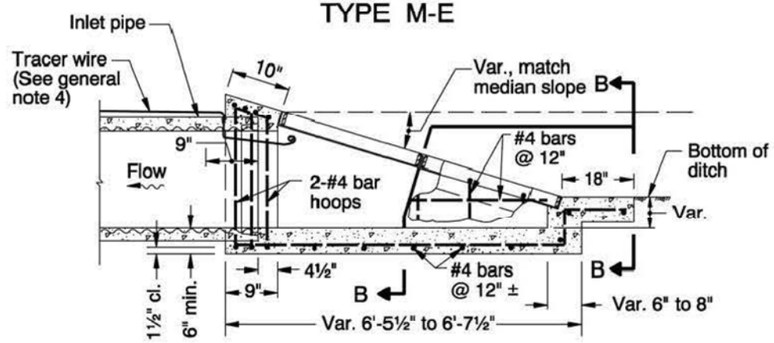
rd368.dgn 23-JUL-2012

## TYPE M-E

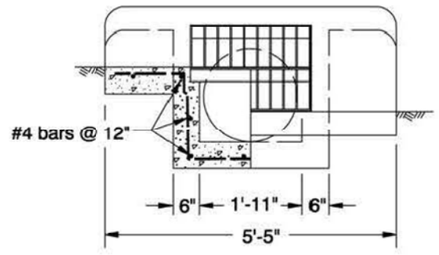



NOTE:
For additional reinforcement details, see Type M-O inlet below.

PLAN

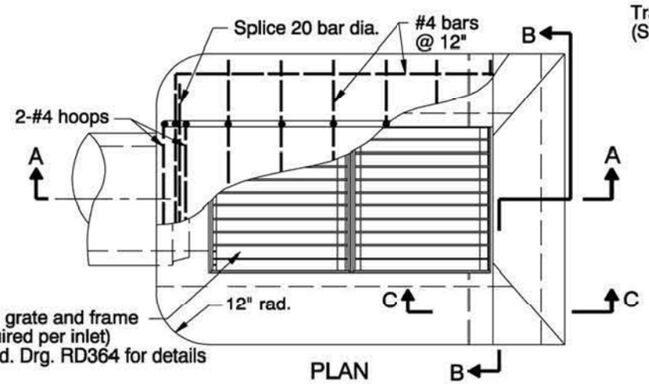



SECTION A-A

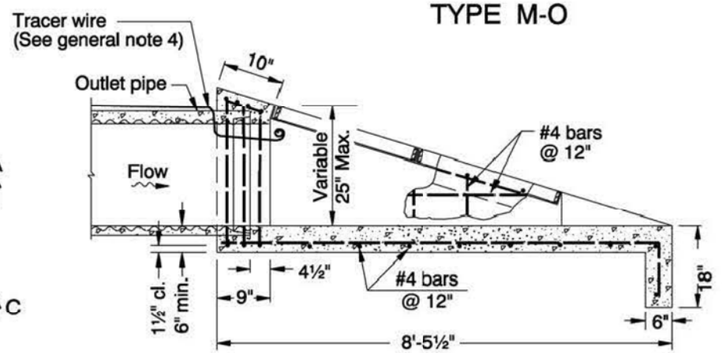



SECTION B-B

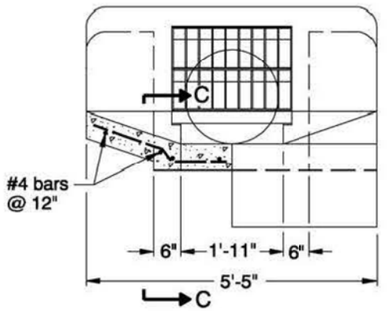
## TYPE M-O



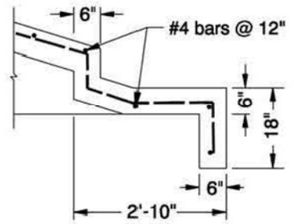

PLAN




SECTION A-A




SECTION B-B

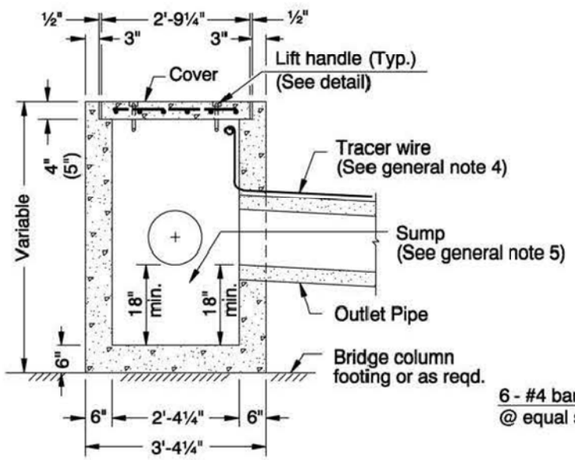



SECTION C-C

GENERAL NOTES FOR ALL DETAILS:

1. Max. pipe diameter varies with pipe material.
2. All reinforcement to be placed a minimum of 2" clear of nearest face of concrete unless otherwise shown or noted. Reinforcement to be lapped 20 bar diameters at splices.
3. When uncoated metal pipe or arch pipe are used, an asphaltic or similar type protective coating shall be applied to the exterior surface.
4. See Std. Drg. RD336 for tracer wire details, or approved alternate.
5. Provide sump only where shown on plans, and allowed by jurisdiction.
   For sump details, see Std. Drg. RD364.

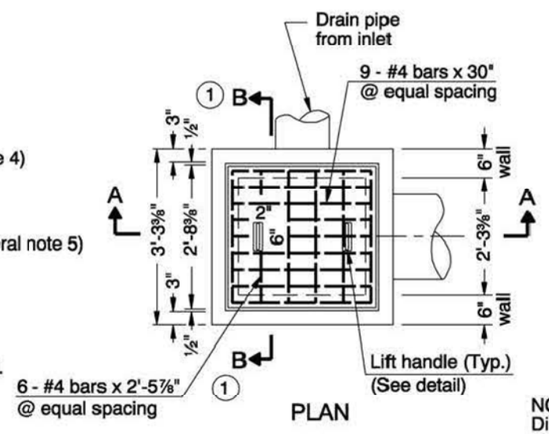
## TYPE B




SECTION A-A

* All cover bars for Type B & B-SL inlets to be placed 1½" clear of nearest face of concrete unless shown or noted otherwise.

## TYPE B-SL

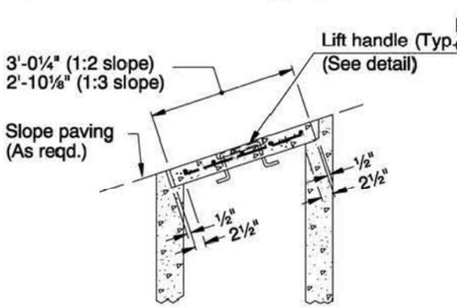



PLAN

1 See Type B-SL

## SLOPE INSTALLATION

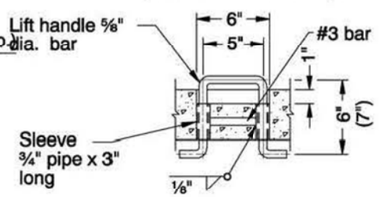
(For details not shown, see Type B)




SECTION B-B

## LIFT HANDLE

(Install loose in sleeve)




NOTE: ("TYPE B" MODIFIED INLET)
Dimensions shown in parenthesis are for Type B Modified inlet.
All cover bars for "Type B" Modified inlet are to be placed 1" min. clear of bottom face of concrete and 2½" min. clear of top face of concrete. "Type B" modified inlet to be used if B inlet is under traffic.

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

CALC. BOOK NO. N/A

BASELINE REPORT DATE 23-JUL-2012

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

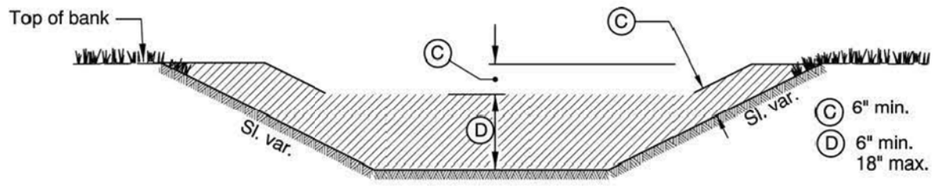
OREGON STANDARD DRAWINGS

**CONCRETE INLETS**
**TYPE M-E, M-O, B AND B-SL**

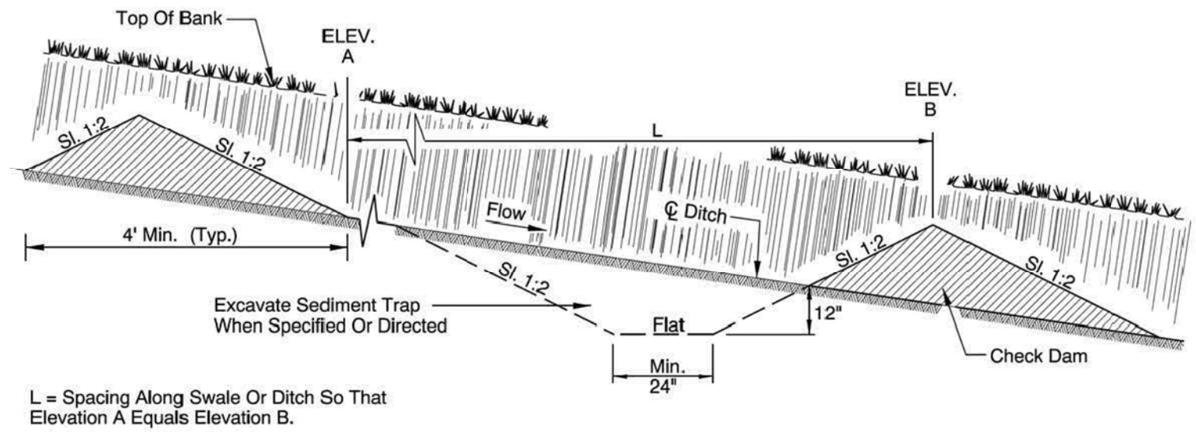
2008

| DATE | REVISION DESCRIPTION |
|---|---|
| 08-2009 | REVISED & ADDED NOTES |
| 01-2012 | REVISED & ADDED NOTES |
| 07-2012 | REMOVED & REVISED NOTES |
| | |
| | |

RD368




DITCH X-SECTION
AT CHECK DAM




L = Spacing Along Swale Or Ditch So That Elevation A Equals Elevation B.

DITCH PROFILE SECTION
WITH CHECK DAMS

Note:
When bid item is "Check Dams" the following materials may be used, as appropriate to meet the functional requirements of the control.
Type 1. aggregate
Type 2. straw bales with aggregate weir
Type 3. biofilter bags
Type 4. sand bags
Type 5. prefab. check dam system

CHECK DAM
Approximate Spacing

| Ditch Grade | D = Dimension | | |
|---|---|---|---|
| | 6" | 12" | 18" |
| 6% | * * | 15' O.C. | 25' O.C. |
| 5% | * * | 20' | 30' |
| 4% | * * | 25' | 40' |
| 3% | 15' | 30 | 50' |
| 2% | 25' | 50' | 80' |

* * Not Allowed

Notes:

(1) Type 2 only - - - -
Entrench bales and aggr. a min. of 4" into the soil. Toe of last bale is highest water control point.

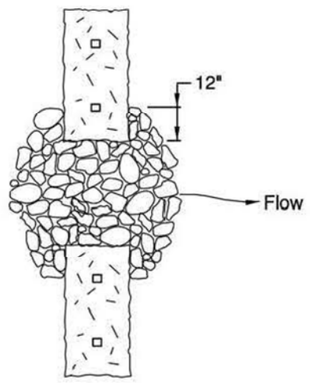
(2) Type 2 only - - - -
Place bales so wire/twine binding matl. is not in contact with the soil.

(3) Type 2 or 3 - - - -
Drive 2 stakes min. per bale or bag flush with top and into undisturbed ground a min. of 4". Stakes may be omitted if placed over paved surfaces.

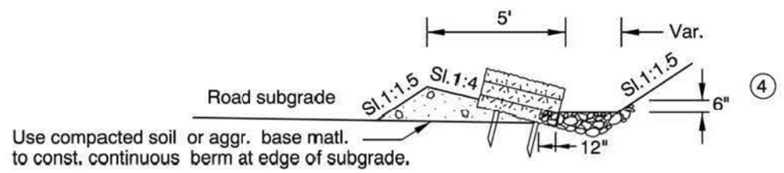
(4) Type 2, 3or 4 - - - -
Const. top of aggr. a min. of 6" lower than the toe of last bale or bag.

(5) Type 2 or 4 - - - -
Tightly abut or overlap ends of bales or bags at each joint.

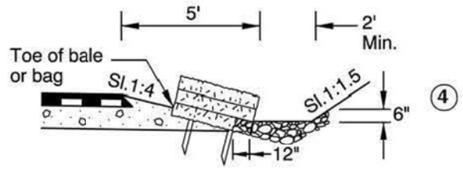
(6) Type 3 - - - -
Overlap bags 6" min. at each joint.



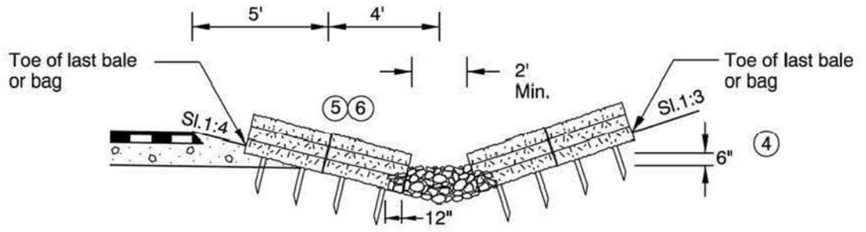

TOP VIEW
TYPE 2, 3 & 4



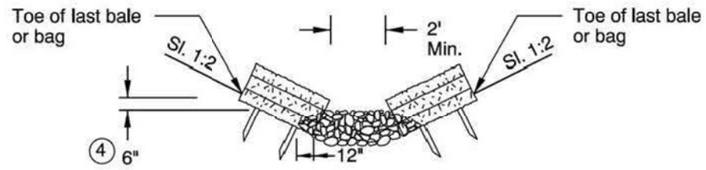

SUBGRADE SECTION




STEEP BACKSLOPE SECTION




VARIABLE BACKSLOPE SECTION - 1:3 TO 1:6




FLAT BOTTOM DITCH SECTION CHECK DAM
TYPE 2, 3 & 4

CALC. BOOK NO. _____

BASELINE REPORT DATE _____

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*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

OREGON STANDARD DRAWINGS

CHECK DAMS

2008

| DATE | REVISION DESCRIPTION |
|---|---|
| | |
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| | |
| | |

RD1005