# OPERATION & MAINTENANCE MANUAL

# Water Quality Biofiltration Swale

**Manual prepared: March 2019**

DFI No. D00610

**Figure 1: DFI No. D00610, looking south**

**Identification**

| | |
|---|---|
| Drainage Facility ID (DFI): | D00610 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 45V-062 (41V-046 Prior) |
| Location: | District: 2B |
| | Highway No.: 144 |
| | Mile Post: 0.93-0.96 [left side] |

## 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: Interchange

Flow direction: South

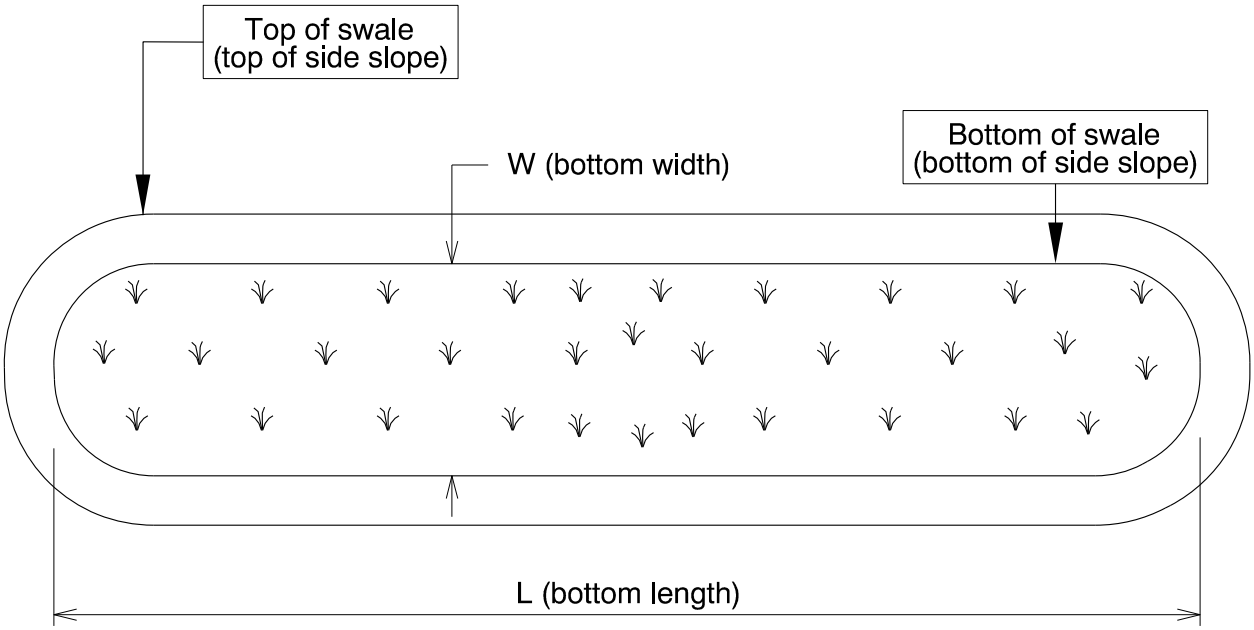

**Figure 2: Facility location map**

## 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:

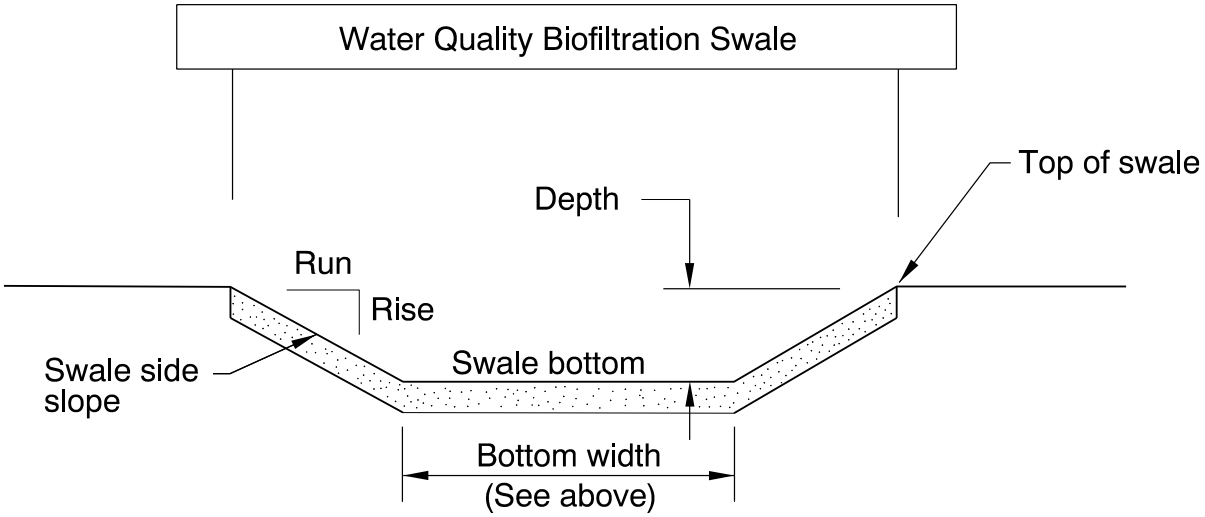
| Bottom Length (feet) | Bottom Width (feet) |
|---|---|
| 150 | Varies 8-12 |



The depth of the swale is the vertical distance measured from the bottom of the swale to the top. The slope of the swale sides is presented by a vertical distance (rise) followed by the horizontal distance (run).

Depth and side slopes:

| Depth (feet) | Rise (feet) | Run (feet) |
|---|---|---|
| 1.5 | 1 | 4 |




**Site Specific Information:** No as-built plans exist for this swale. This location was originally meant to have a detention tank (Appendix B, plans 41V-046, Sheet GJ-3). The flow control manhole and standard manhole from the detention tank were built and are in place (Figure 8). A swale was built at this location in place of a detention tank (Appendix B, plans 45V-062, Sheet 4). On the as-builts for 45V-062, there is only a general layout of the swale. The measurements in this manual are general estimates from an on-site visit, and bottom of swale appears to vary in width, as related to site conditions.

The water flows into the facility in two ways. The water flows from the north in the sewer drain system and into the flow control manhole. The flow control manhole diverts most of the water to the south through a pipe system. Small flows are diverted into a standard manhole and through a piped inlet into the swale. Flows also can enter the swale through two gravel trench drains that have inlets from SW Walker Rd

(Figure 6). These two gravel trench drains combine into a single trench drain that feeds into the swale. The water flows through the swale to the south. It exits the swale through a type “D” inlet. The water flows through another standard manhole and into a storm drain system.

There is no direct access to the water quality facility for heavy equipment. There is a concrete barrier and several trees that restrict equipment access to the water quality facility. There is a roadside pad for maintenance to park vehicles at mile point 0.99 (approximately 150 feet away from the swale).

4. **Facility Access**

Maintenance access to the facility:

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

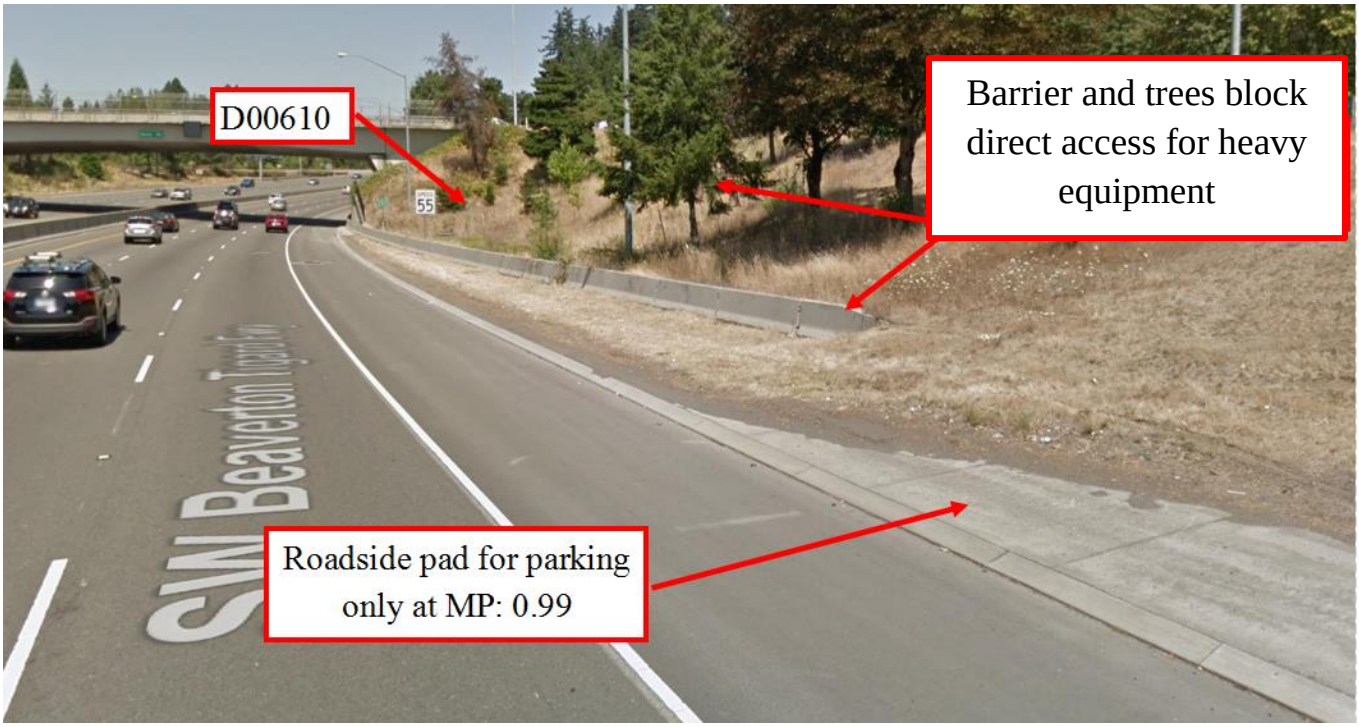



**Figure 3: Parking location on OR217, looking north**

## 4. 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** |
| Gravel Drain Pipe | ☒ | **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: describe type | ☐ | **S19** |
| **Swale Outlet** | | |
| Type “D” Inlet | ☒ | **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** |


**Figure 4: Swale Inlet**


**Figure 5: Swale Components**

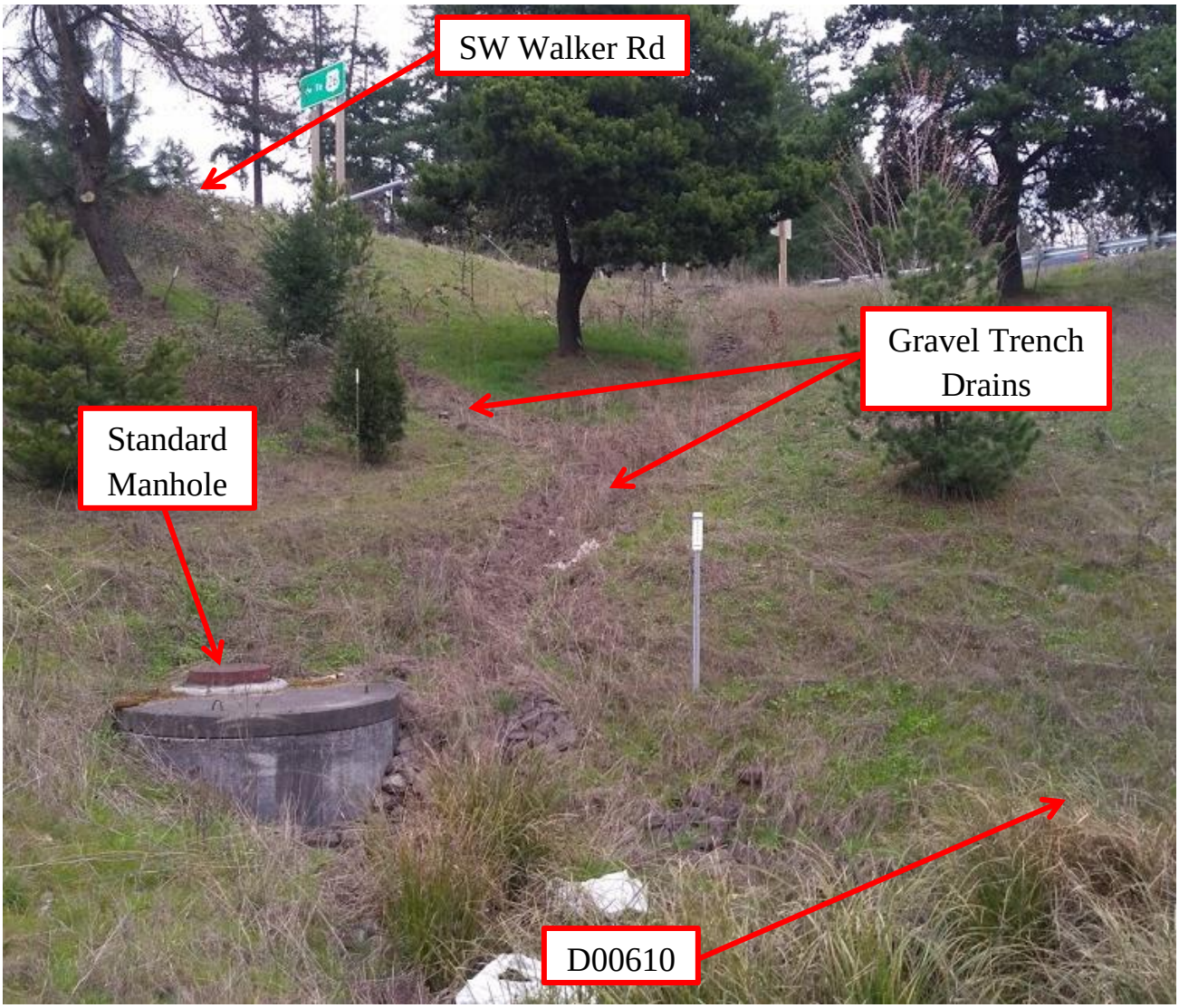



**Figure 6: Swale components**

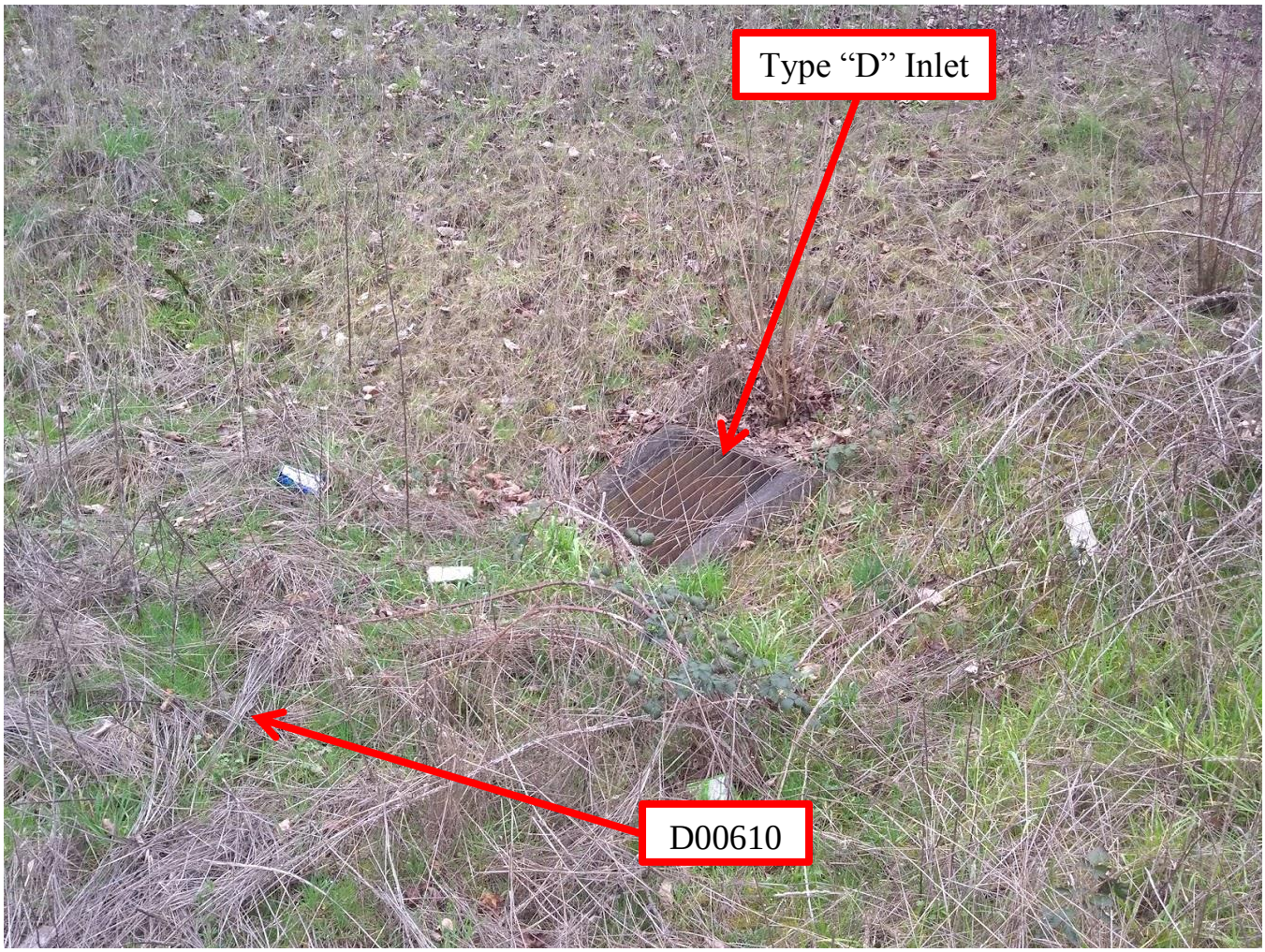



**Figure 7: Swale outlet**

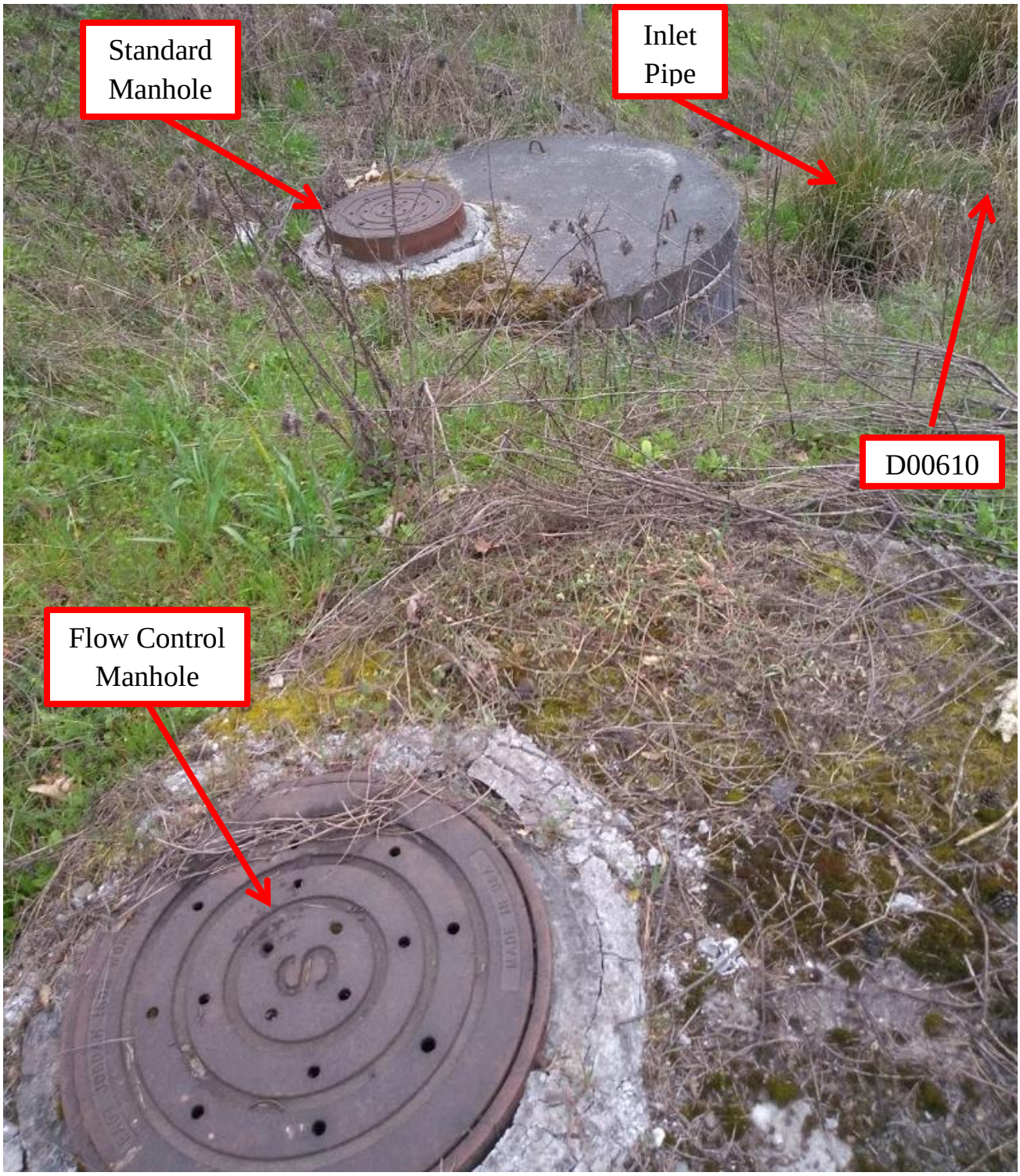



**Figure 8: Swale Components**

## 5. 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

## 6. 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.

## 7. 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:

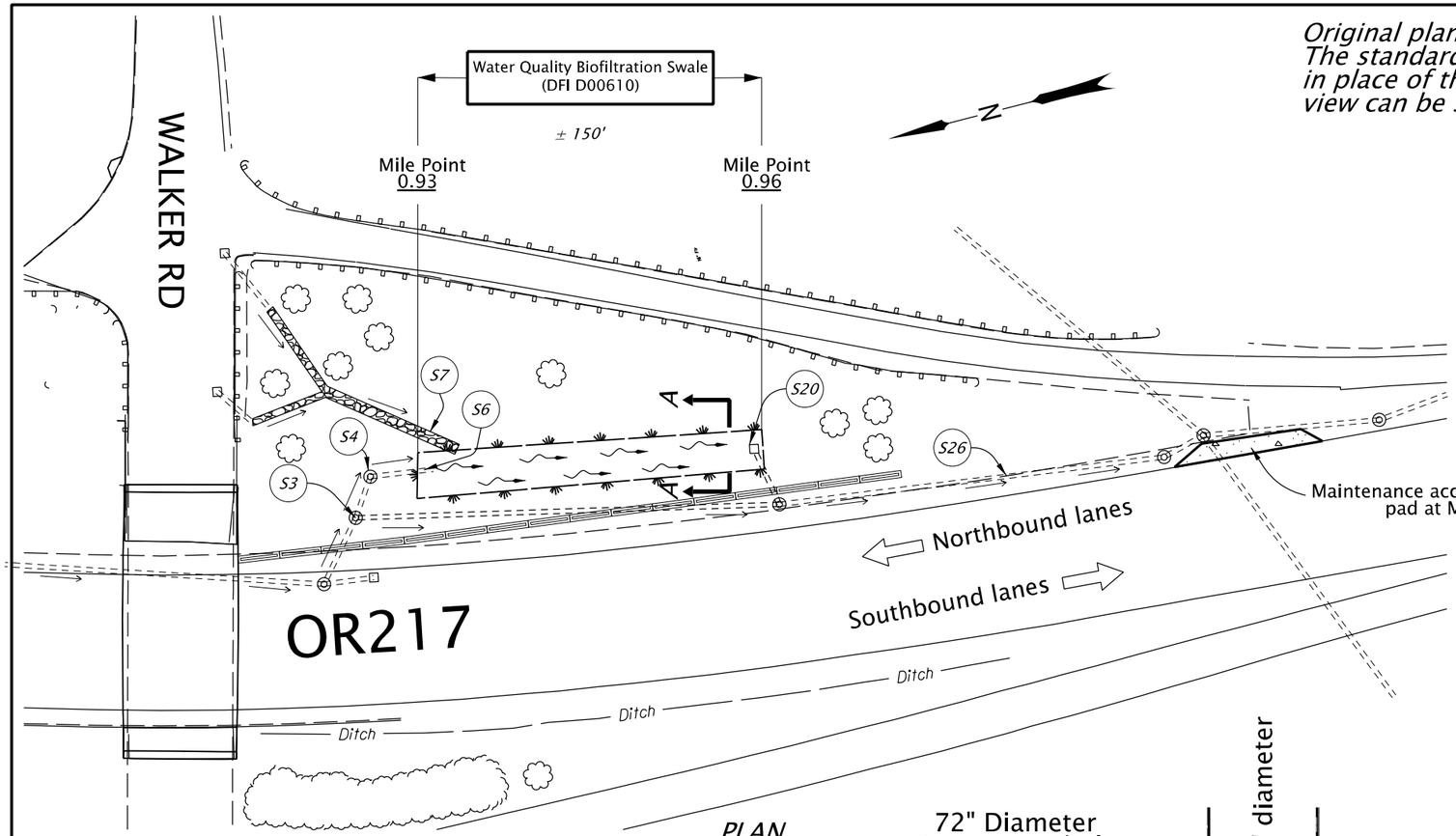
| | |
|---|---|
| ODOT Clean Water Unit | (503) 986-3008 |
| ODOT Statewide Hazmat Coordinator | (503) 667-7442 |
| ODOT Region 1 Hazmat Coordinator | (503) 731-8290 |
| ODOT Region 2 Hazmat Coordinator | (503) 986-2647 |
| ODOT Region 3 Hazmat Coordinator | (541) 957-3594 |
| ODOT Region 4 Hazmat Coordinator | (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

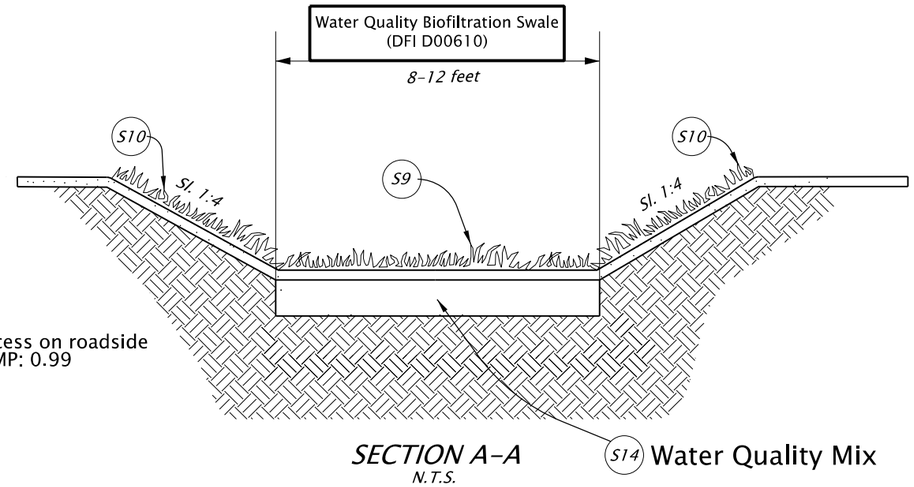
## Contents:

**Operational Plan: DFI D00610**

*Original plans in 41V-046 were to build a detention tank (2009). It was never built. The standard manhole and flow control manhole were constructed and a swale in place of the detention tank appears to have been constructed. A general plan view can be seen in 45V-062 (2013).*



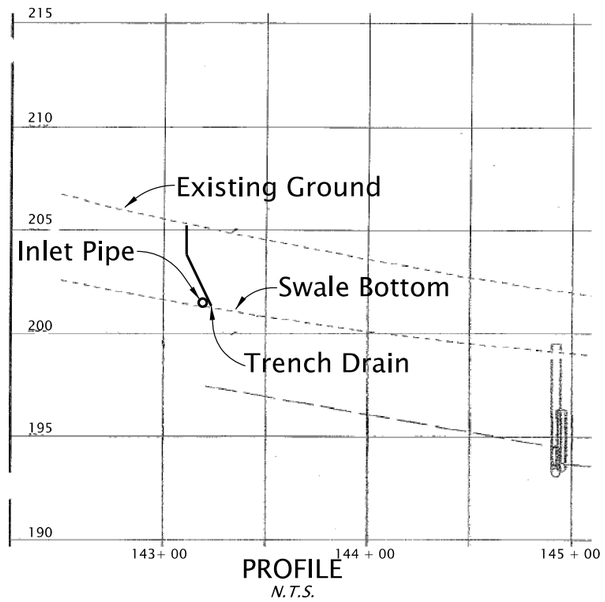

*PLAN*
*N.T.S.*



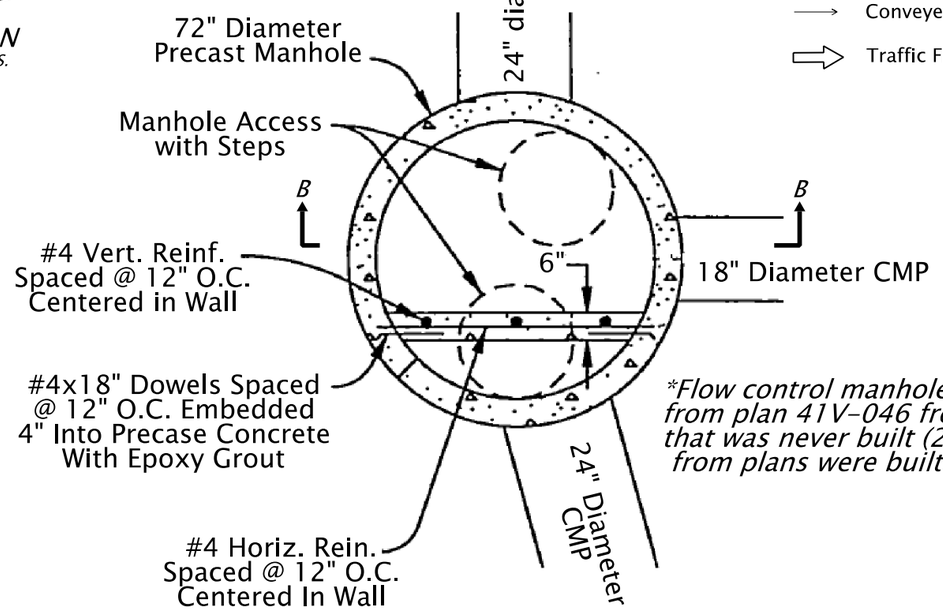

*SECTION A-A*
*N.T.S.*

## Legend

- Manhole
- Inlet
- Water Flow Direction
- Conveyence Direction
- Traffic Flow Direction

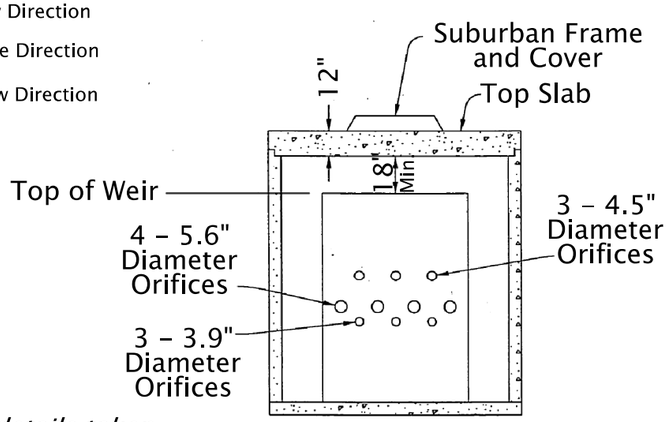



PROFILE
*N.T.S.*




*Flow Control Manhole Details*

**Flow control manhole details taken from plan 41V-046 from detention tank that was never built (2009). The manholes from plans were built.*




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

OREGON DEPARTMENT
OF TRANSPORTATION

Sht. 01 of 01

Prepared By:
Katrina Sepulveda

Drafted By:
Katrina Sepulveda

**DFI D00610**
**MAINTENANCE DISTRICT 2B HWY 144**
**Water Quantity Biofiltration Swale**
Beaverton-Tigard Highway MP 0.93 - 0.96
Washington County

# B Appendix B – Project Contract Plans

## Contents:

**Site Specific Subset of Project Contract Plan 45V-062 (41V-046 Prior)**

Partial Plan Set

Revised Plan
Sheets Incorporated

41V-046

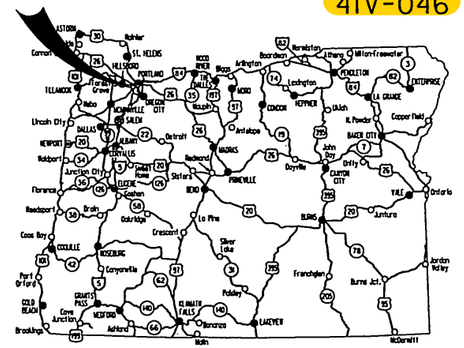
| INDEX OF SHEETS | |
|---|---|
| SHEET NO. | DESCRIPTION |
| 1 | Title Sheet |
| 1A | Index Of Sheets Cont'd |
| 1A-2, 1A-3 | Std. Drg. Nos. |
| 1B | Sheet Layout |

Revised Plan
Sheets Incorporated

STATE OF OREGON
# DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT

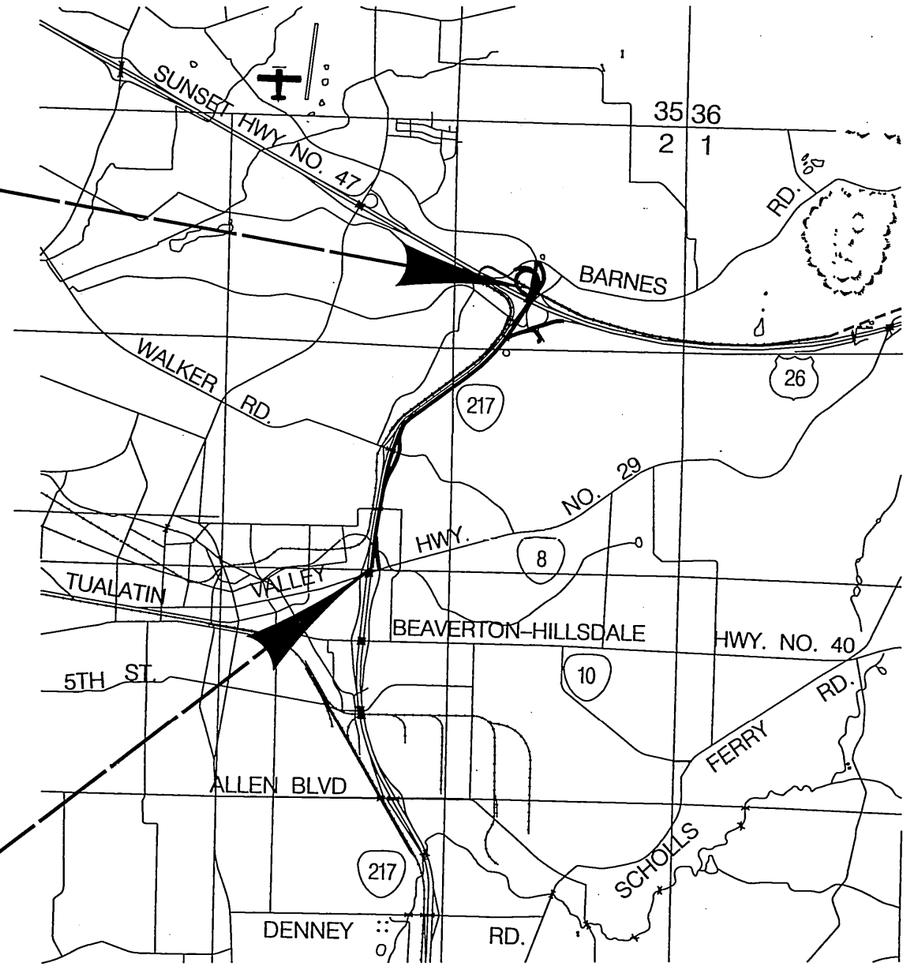
**GRADING, DRAINAGE, STRUCTURES, PAVING,SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT**

# OR 217: SUNSET HWY - TUALATIN VALLEY HWY
## BEAVERTON - TIGARD HIGHWAY
### WASHINGTON COUNTY
### NOVEMBER 2008



*Overall Length Of Project - 1.54 Miles*

**BEGINNING OF PROJECT**
**STP-S144(018)**
**STA. "NW" 3197+95 (M.P. 0.00)**




**END OF PROJECT**
**STP-S144(018)**
**STA. "L217NB" 169+17 (M.P. 1.47)**

N

T. 1 S., R. 1 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

| | |
|---|---|
| Gail Achterman | CHAIR |
| Michael Nelson | VICE-CHAIR |
| Janice Wilson | COMMISSIONER |
| Alan Brown | COMMISSIONER |
| David Lohman | COMMISSIONER |
| Matthew L. Garrett | DIRECTOR OF TRANSPORTATION |

"I certify this project complies with applicable ODOT design standards and practices and that any exceptions have been submitted and approved by the ODOT Chief Engineer or her/his delegated authority."

By: Naveen Chandra
Naveen Chandra, P.E. Project Delivery Manager
8-21-2008

Concurrence by ODOT Chief Engineer

**OR 217: SUNSET HWY - TUALATIN VALLEY HWY**
BEAVERTON - TIGARD HIGHWAY
WASHINGTON COUNTY

| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | STP-S144(018) | 1 |

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41V-046

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| 2B Thru 2B-11 Incl. | Details |
| 2C Thru 2C-20 Incl. | Traffic Control Plans |
| 2D Thru 2D-3 Incl. | Pipe Data Sheets |
| 3 | Alignment |
| 3A | General Construction |
| 3A-2 | Construction Notes |
| 3B | Alignment And General Construction |
| 3C | Profile |
| 4 | Alignment |
| 4A | General Construction |
| 4A-2 | Construction Notes |
| 4B | Drainage & Utilities |
| 4B-2 | Drainage & Utility Notes |
| 4C | Alignment |
| 4D | General Construction |
| 4D-2 | Construction Notes |
| 4E | Drainage & Utilities |
| 4E-2 | Drainage & Utility Notes |
| 4F, 4G, 4H, 4J, 4K | Profile |
| 5 | Alignment |
| 5A | General Construction |
| 5A-2 | Construction Notes |
| 5B | Drainage & Utilities |
| 5B-2 | Drainage & Utility Notes |
| 5C, 5D | Profile |
| 6 | Alignment |
| 6A | General Construction |
| 6A-2 | Construction Notes |
| 6B | Drainage & Utilities |
| 6B-2 | Drainage & Utility Notes |
| 6C, 6D | Profile |
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| 8 | Alignment |
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| 75770 | Staging - Sections & Bent 4 |
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| 75773 | Deck Section |
| 75774 | Prestressed Box Schedules |
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| 75776 | Bent 3 Retrofit - Column And Footing |
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| 75786 | Section Details |
| *BRIDGE NO.20536 - RETAINING WALL NO.2* | |
| 75787 | Plan And Elevation |
| 75788 | Geotechnical Data |
| 75789 | Section Details |
| *BRIDGE NO.20537 - RETAINING WALL NO.3* | |
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| 75792 | Section Details |
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| 75798 | Foundation Data - Plan |
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| 75805 | Misc. Wall Details |
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| *BRIDGE NO.20539 - RETAINING WALL NO.5* | |
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| 75819 | Section Details |
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| 14555 | Ramp Meter Modification Plan |
| 14556 | Ramp Meter Plan |
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| 14559 | Loop Replacement Plan |
| 14560 | Interconnect Plan |
| 14561 | Pole Entrance Chart |
| *WATER LINE INFORMATION* | |
| 79828 | Vicinity Map And Title Sheet |
| 79829 | Waterline Plan |
| 79830 | Details |
| *For INFORMATION ONLY* | |
| 20343 | Pedestrian Handrail |

**OR 217: SUNSET HWY - TUALATIN VALLEY HWY**
BEAVERTON - TIGARD HIGHWAY
WASHINGTON COUNTY

| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | STP-S144(018) | 1A |

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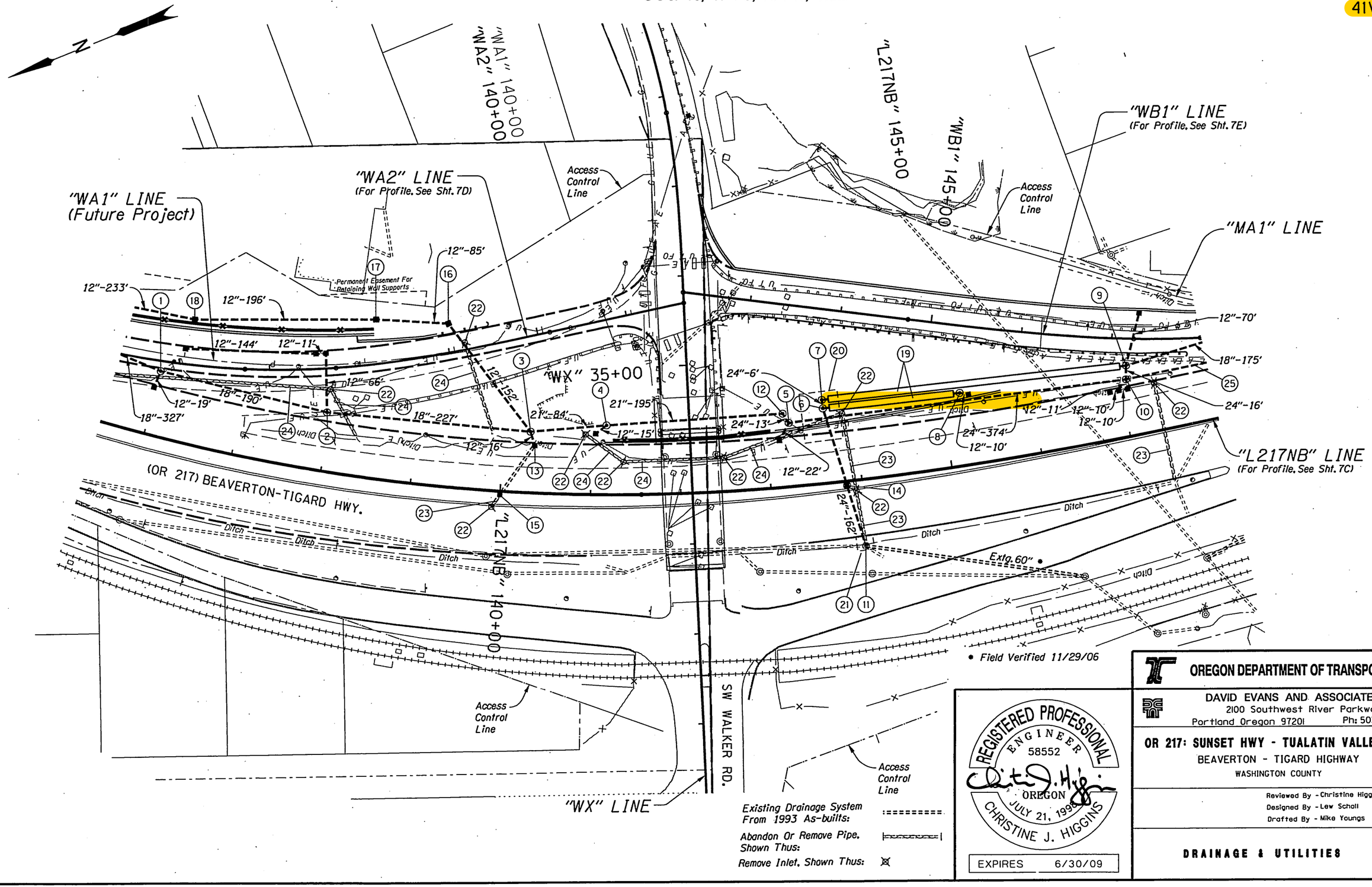
Sec. 10, T. 1 S, R. 1 W, W.M.

41V-046




Existing Drainage System From 1993 As-builts:

Abandon Or Remove Pipe. Shown Thus:

Remove Inlet. Shown Thus:

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1995
CHRISTINE J. HIGGINS
EXPIRES 6/30/09

**OREGON DEPARTMENT OF TRANSPORTATION**


DAVID EVANS AND ASSOCIATES, INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663


**OR 217: SUNSET HWY - TUALATIN VALLEY HWY**

BEAVERTON - TIGARD HIGHWAY

WASHINGTON COUNTY

Reviewed By - Christine Higgins CH
Designed By - Lew Scholl
Drafted By - Mike Youngs

**DRAINAGE & UTILITIES**

SHEET NO. 7B

41V-046

(1) Sta. "L217NB" 136+00.00, 73.21' Lt.
Const. Manhole
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 12" Storm Sew. Pipe - 19'
5' Depth
Inst. 18" Storm Sew. Pipe - 327'
10' Depth

(2) Sta. "L217NB" 137+96.21, 65.87' Lt.
Const. Manhole
Const. Type "G-2" Inlet - 3
Connect Wall Underdrain To Inlet
At "WA1" Sta. 136+00
Inst. 12" Storm Sew. Pipe - 155'
5' Depth
Inst. 12" Storm Sew. Pipe - 66'
10' Depth
Inst. 18" Storm Sew. Pipe - 190'
10' Depth

(3) Sta. "L217NB" 140+30.20, 68.31' Lt.
Const. Manhole
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 12" Storm Sew. Pipe - 16'
10' Depth
Inst. 12" Storm Sew. Pipe - 152'
10' Depth
Inst. 18" Storm Sew. Pipe - 227'
10' Depth

(4) Sta. "L217NB" 141+17.05, 77.52' Lt.
Const. Large Precast Manhole - 60" Dia.
Const. Manhole Slope Protector
Const. Type "G-2MA" Inlet
Inst. 12" Storm Sew. Pipe - 15'
10' Depth
Inst. 21" Storm Sew. Pipe - 84'
10' Depth

(5) Sta. "L217NB" 143+25.67, 71.45' Lt.
Const. Pollution Control Manhole - 84" Dia.
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 12" Storm Sew. Pipe - 22'
10' Depth
Inst. 24" Storm Sew. Pipe - 13'
10' Depth

(6) Sta. "L217NB" 143+66.07, 83.93' Lt.
Const. Flow Control Manhole - 72" Dia.
Connect West Detention Tank Assembly
Inst. 24" Storm Sew. Pipe - 6'
10' Depth
(For Details See Sht. GJ-3)

(7) Sta. "L217NB" 143+65.84, 93.46' Lt.
Const. Manhole
Connect East Detention Tank Assembly.
(For Details See Sht. GJ-3)

(8) Sta. "L217NB" 145+21.20, 81.43' Lt.
Const. Manhole
Connect West Detention Tank Assembly
Const. Type "G-2MA" Inlet
Inst. 12" Storm Sew. Pipe - 10'
5' Depth
(For Details See Sht. GJ-3)

(9) Sta. "L217NB" 147+10.64, 78.69' Lt.
Const. Large Precast Manhole - 60" Dia.
Connect East Detention Tank Assembly
Const. Manhole Slope Protector
Const. Type "G-2" Open Grade HMAC Inlet
Inst. 12" Storm Sew. Pipe - 70'
10' Depth
Inst. 24" Storm Sew. Pipe - 16'
10' Depth
Inst. 18" Storm Sew. Pipe - 175'
20' Depth
(For Details See Sht. GJ-3)

(10) Sta. "L217NB" 147+07.53, 63.66' Lt.
Const. Diversion Manhole - 72" Dia.
Const. Manhole Slope Protector
Const. Type "G-2" Open Grade HMAC Inlet - 3
Inst. 12" Storm Sew. Pipe - 20'
5' Depth
Inst. 12" Storm Sew. Pipe - 11'
10' Depth
Inst. 24" Storm Sew. Pipe - 374'
10' Depth
(For Details See Sht. GJ-2)

(11) Sta. "L217NB" 143+96.21, 74.25' Rt.
Install 24" Storm Sew. Pipe - 162'
Connect 24" Storm Sew. Pipe to Extg. Manhole
Bore Under Roadway
Trench Resurfacing - 12 Sq. Yd.
(See Drg. No. RD308)

(12) Sta. "L217NB" 143+19.68, 82.39' Lt.
Const. Manhole
Inst. 21" Storm Sew. Pipe - 195'
Bore Under Roadway Embankment

(13) Sta. "L217NB" 140+35.87, Lt.
Field Verify Location Of Extg. Storm Sew. Pipe
Connect 12" Storm Sew. Pipe To Extg. Storm Sew. Pipe

(14) Sta. "L217NB" 143+82.99, 4.68' Rt.
Const. Manhole With Type "G-2" Open Grade
HMAC Inlet Over 24" Storm Sewer Pipe
Trench Resurfacing - 98 yd2

(15) Sta. "L217NB" 139+87.86, Rt.
Const. Type "G-2" Open Grade HMAC Inlet Over Existing Pipe
Rim Elev. 214.52

(16) Sta. "L217NB" 139+23.42, 182.12' Lt.
Const. Ditch Inlet - Type D
Inst. 12" Storm Sew. Pipe - 85', Sl.=9.15%
5' Depth

(17) Sta. "L217NB" 138+92.23, 183.66' Lt.
Const. Type "G-2MA" Inlet
Inst. 12" Storm Sew. Pipe - 196', Sl.=13.22%
5' Depth
Rim Elev. 230.30
F.L. (12" S.E.) 227.30

(18) Sta. "L217NB" 136+23.15, 137.63' Lt.
Const. Type "G-2MA" Inlet
Inst. 12" Storm Sew. Pipe - 233'
5' Depth
Rim Elev. 257.70
F.L. (12" S.E.) 254.70

(19) Const. Detention Tank Assembly
(See Drg. No. RD304)
(For Details See Sheet GJ-3)

(20) Approximate Location Of Bore Pit

(21) Approximate Location Of Receiving Pit

(22) Remove Inlets - 9

(23) Abandon Pipe - 375 LF

(24) Remove Pipe - 600 LF

(25) See Sht. 8B For Pipe Information

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
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OR 217: SUNSET HWY - TUALATIN VALLEY HWY
BEAVERTON - TIGARD HIGHWAY
WASHINGTON COUNTY

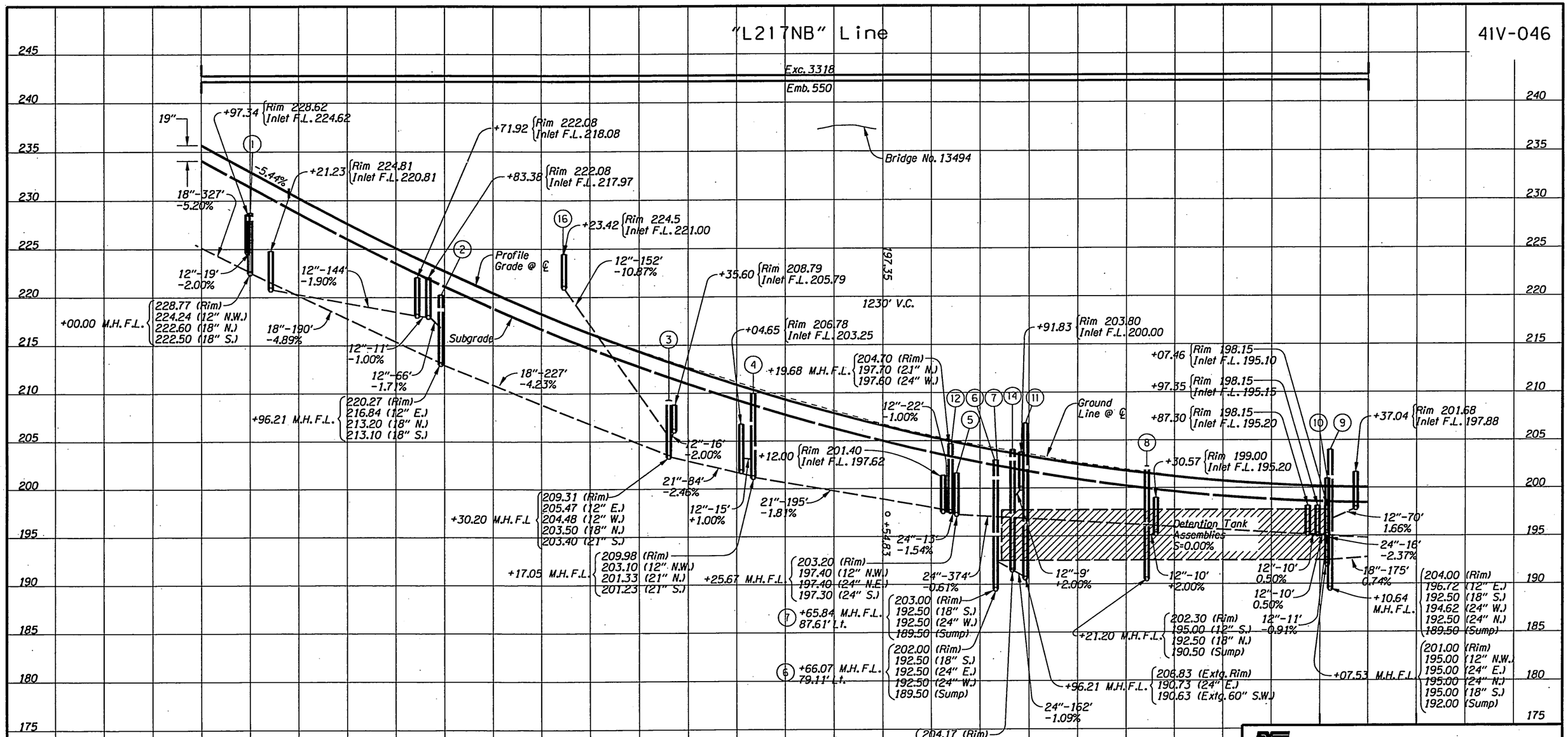
Reviewed By - Christine Higgins CPH
Designed By - Lew Scholl
Drafted By - Mike Youngs

DRAINAGE & UTILITY NOTES

SHEET NO. 7B-2

# "L217NB" Line

41V-046




Note: See Sht. 7B-2 For Drainage & Utility Notes

REGISTERED PROFESSIONAL ENGINEER
17,856
OREGON
JULY 25, 1995
DANNY Y. HORI
EXPIRES 6-30-09

**OREGON DEPARTMENT OF TRANSPORTATION**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2100 Southwest River Parkway
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**OR 217: SUNSET HWY - TUALATIN VALLEY HWY**

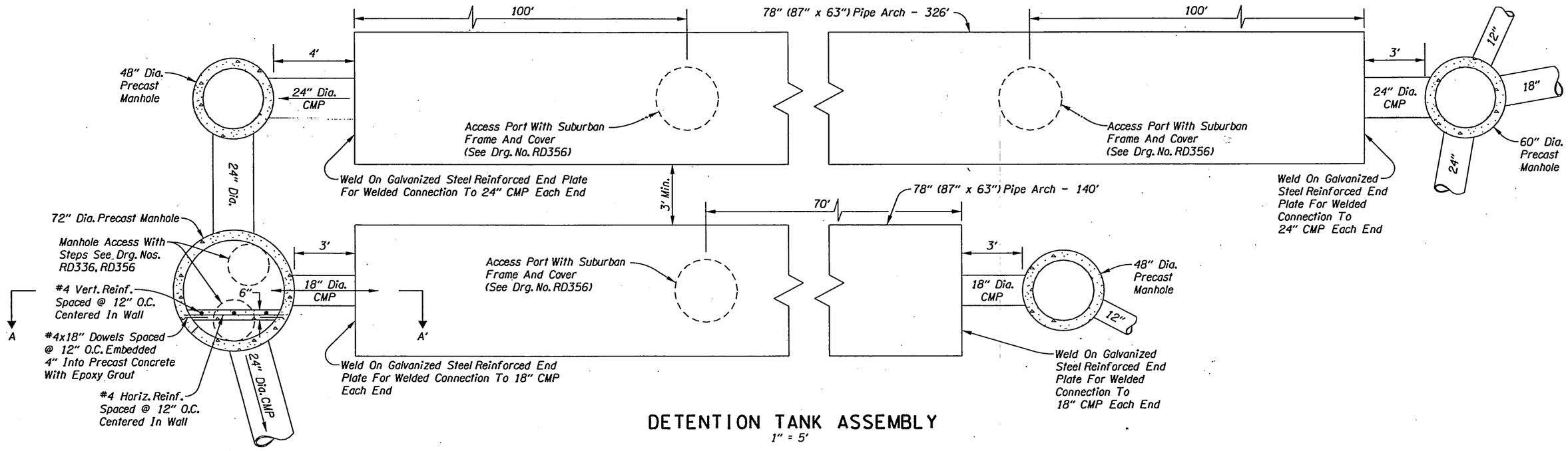
BEAVERTON - TIGARD HIGHWAY

WASHINGTON COUNTY

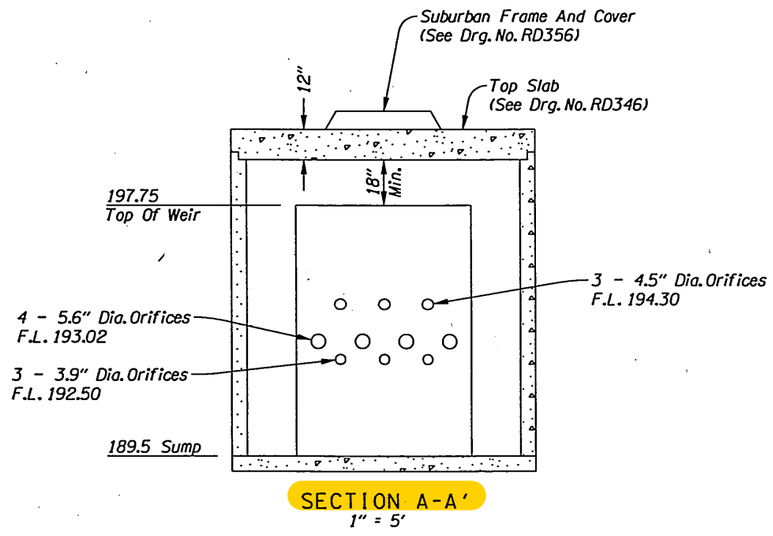
MJH Reviewed By - Mike Hohbach, Christine Higgins CH
Designed By - Danny Hori/Lew Scholl
Drafted By - Mike Youngs

**PROFILE**

SHEET NO. 7C




## DETENTION TANK ASSEMBLY
1" = 5'




SECTION A-A'
1" = 5'

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WASHINGTON COUNTY

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Drafted By - Mike Youngs

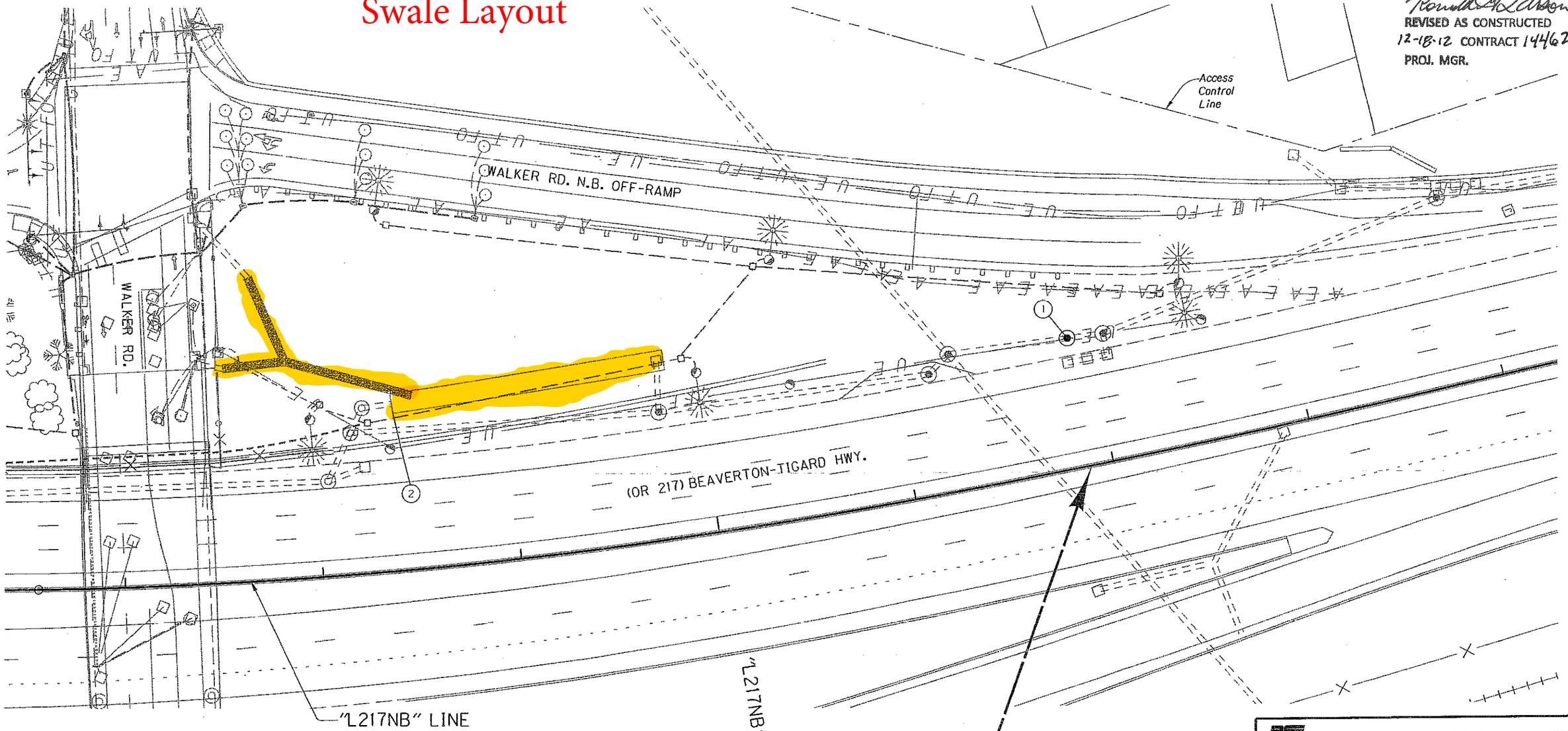
**DRAINAGE DETAILS**

SHEET NO. GJ-3

45V-062

# Swale Layout

REVISED AS CONSTRUCTED
12-18-12 CONTRACT 14462
PROJ. MGR.




(1) Sta. "L217NB" Sta. 146+89.34, 64.87' Lt.
Const. water quality manhole (snout) (84" dia.)
Over extg. 18" storm sewer pipe.
(For details, see sht. GJ-3)
Inst. field facility marker, Type S3
(For details, see sht. GJ-2)

(2) Inst. field facility marker, Type S1 Red
Inst. field facility marker, Type S2

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
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EXPIRES 06-30-13

OREGON DEPARTMENT OF TRANSPORTATION

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2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

OR 217: SUNSET HWY - TV HWY DETENTION FACILITY
BEAVERTON - TIGARD HIGHWAY
WASHINGTON COUNTY

Reviewed By - Terry Wheeler
Designed By - Christine Higgins
Drafted By - Mike Youngs

DRAINAGE AND UTILITIES

SHEET NO. 4

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45V-062

"L217NB" Line

215
210
205
200
195
190
185
180
175
170

Extg. Ground @ ℄

Extg. Ground (Gutter Line) @ 56' Lt.

18"-78'
1.50%

+89.34 M.H.F.L.
Match Extg. (Rim)
190.69 (18" S.)
190.69 (18" N.)
185.19 (Sump Elev.)

143+00 145+00 147+00 149+00

REVISED AS CONSTRUCTED
12-18-12 CONTRACT 14462
PROJ. MGR.

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
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EXPIRES 06-30-13

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WASHINGTON COUNTY

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Drafted By - Mike Youngs

DRAINAGE PROFILE

SHEET NO. 4A

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