OPERATION & MAINTENANCE MANUAL

WATER QUALITY BIOFILTRATION SWALE

Manual prepared: July 2017

DFI No. D00162

Figure 1: DFI No. D00162, looking North

1. Identification

Drainage Facility ID (DFI):	D00162
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 39V-070
Location:	District: 2B
	Highway No.: 140
	Mile Post: 4.00 to 3.85

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 points, side streets, access location, and stormwater flow direction is noted on the map.

Flow direction: North

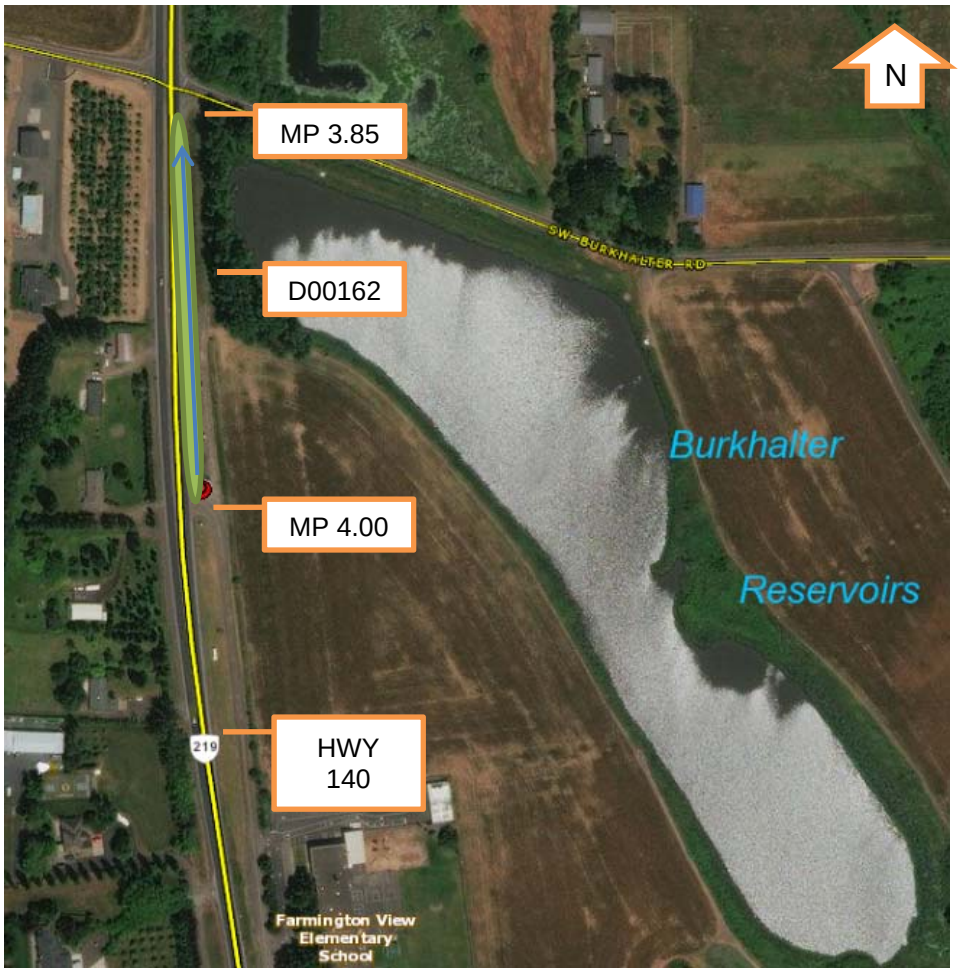


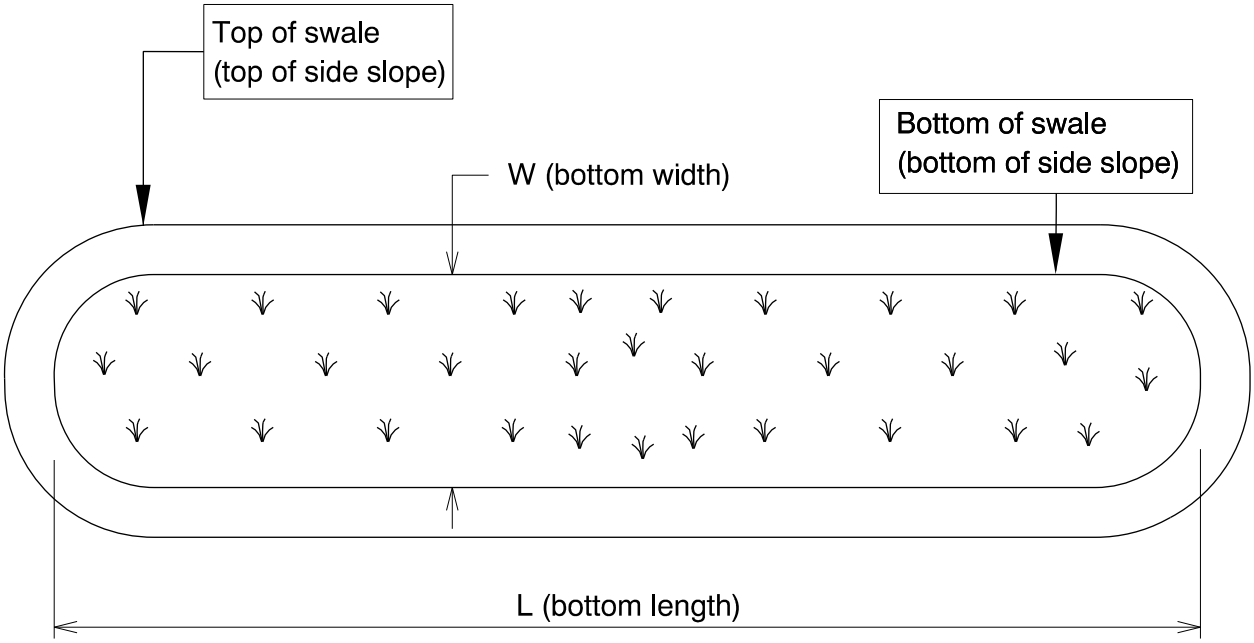
Figure 2: Facility location

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)
510	**6**

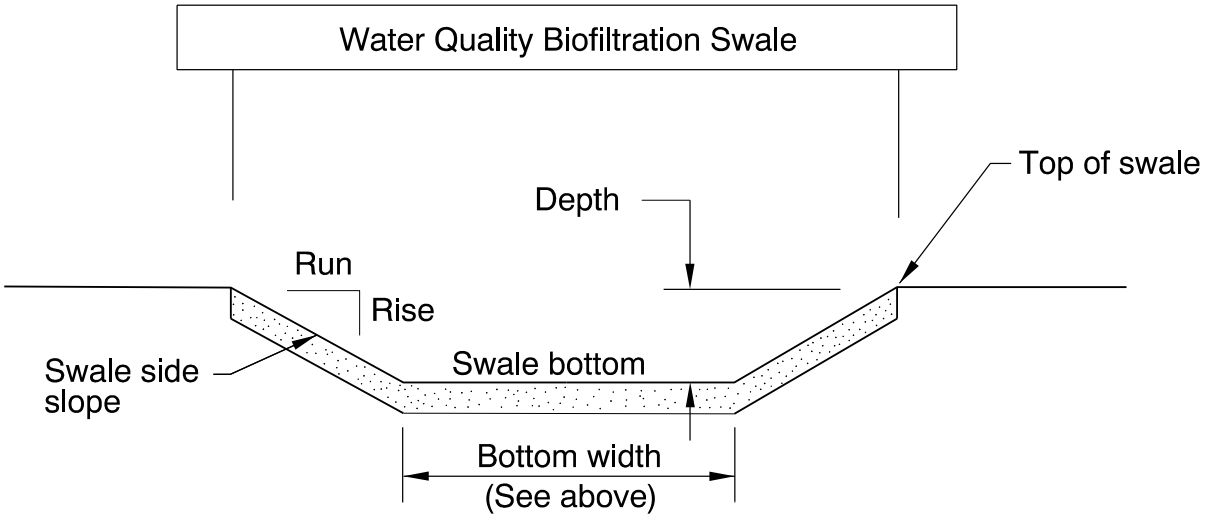


The depth of the swale is the vertical distance measured from the bottom of the swale to the top. The slope of the swale sides is presented by a vertical distance (rise) followed by the horizontal distance (run).

Depth and side slopes:

Depth (feet)
Varies

Side slope	
Rise (feet)	**1**
Run (feet)	**4**



Site Specific Information: This facility has ten “water quality check slots” which are pockets of granular drain rock that are placed in the bottom of the swale. See site specific operational plan in Appendix A of this document.

5. Facility Access

Maintenance access to the swale:

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

Figure 3: Swale facility with shoulder access, looking 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 table below titled "Swale Components" has been provided to highlight the applicable components for this facility. The component is in use when the box contains an "x" (e.g. ☒).

How a swale operates, typical footprint configuration, and component definitions and details are outlined in the Standard Operation Manual for Water Quality Biofiltration Swales (implemented March 2017). A link to the Manual is attached to the feature marker in 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 of this O& M Manual for site specific operational plan.

Maintenance Items

Operational components marked in the "Swale Components" table should be inspected and maintained according to Section 7. Each swale component is defined and detailed in the Standard Operation Manual using the associated "ID" number noted below.

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**
Storm drain inlet pipe(s)	☒	**S6**
Open channel inlet	☐	**S7**
Riprap pad	☐	**S8**
Ground Cover		
Grass bottom	☒	**S9**
Grass side slopes	☒	**S10**
Granular drain rock	☒	**S11**
Plantings	☐	**S12**
Underground Components		
Geotextile fabric	☒	**S13**
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: 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 (**C**reek/**L**ake/**O**cean)	☐ **C** ☐ **L** ☐ **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 the Activity 125 in the Maintenance Guide for conditions when maintenance is needed.

c. Keep a record of inspections, maintenance, and repairs.

Maintenance Guide/Maintenance Actions

The Maintenance Guide outlines the standard maintenance actions for water quality and detention facilities under Activity 125.

There are standard maintenance tables for standard ODOT designs. The maintenance tables describe the following (a) conditions when maintenance is needed (b) recommended maintenance to correct the condition. 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 and detention facilities
- Tables 3 (Maintenance of Water Quality or Biofiltration Swales): Contains maintenance information for swales

The ODOT Maintenance Guide 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 (light, med., heavy) duty 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, or 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 road waste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:

http://www.oregon.gov/ODOT/HWY/OOM/pages/ems.aspx

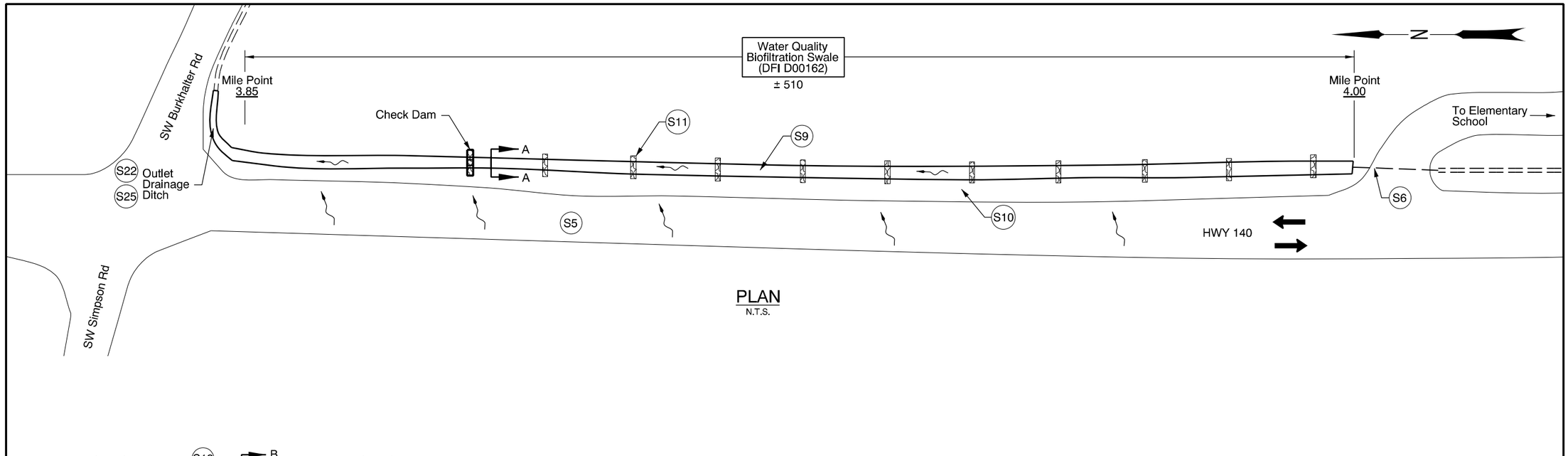
Contact any of the following for more detailed information about management of waste materials found on site:

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

Contents:

- **Site Specific Operational Plan**



PLAN
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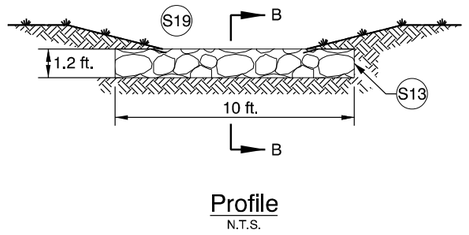

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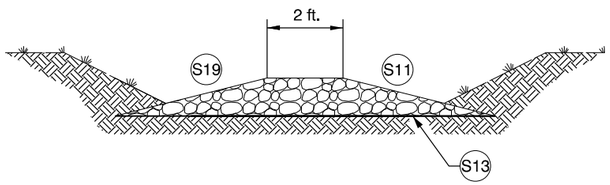
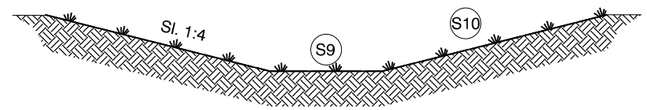
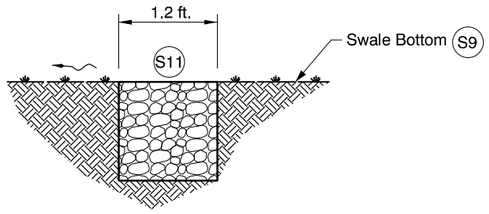


Water Quality Check Dam
N.T.S.



Section A-A
N.T.S.



Section B-B
N.T.S.

Water Quality Check Slot

LEGEND

- Water Quality Check Slot
- Stormwater Flow Path
- 16" Inlet Culvert
- Traffic Direction
- (S#) Table 1: Facility Components

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Brooklyn Scholz

Drafted By: Brooklyn Scholz

DFI D00162
MAINTENANCE DISTRICT 2B HWY 140
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 4.00, 3.85
WASHINGTON

DFI_D00162_OP_Plan.dgn

Appendix B

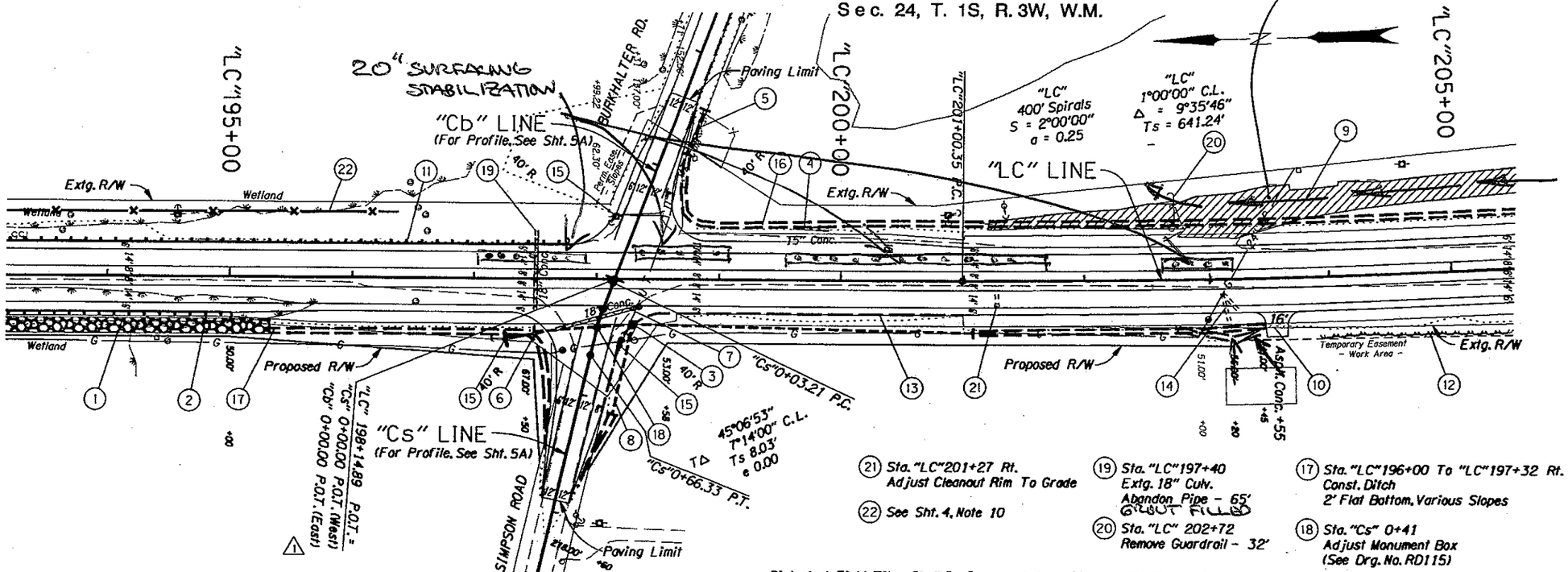
Contents:

- **ODOT Project Plan Sheets**

AGG. BASE ACESS RD, FIRE DIST #2, #45 WATER SOURCE, FIRE STATION 19 WASH. CO.

39V-70

Sec. 24, T. 1S, R. 3W, W.M.



(1) See Sht. 4, Note 3

(2) See Sht. 4, Note 5

(3) Sta. "LC" 198+30 Rt.
Const. Type "CG-2" Inlet
Inst. 15" Culvert Pipe ~~275'~~ 271'
5' Depth
(See Drg. No. RD366)

(4) Sta. "LC" 197+64 Lt.
Remove Culv. Pipe - 29'

(5) Remove 12" Pipe - 39'
Inst. 18" Ductile Iron Pipe - ~~40'~~ 45.3'
5' Depth

(6) Sta. "LC" 197+52 Rt.
Inst. 18" Culv. Pipe - ~~80'~~ 101'
5' Depth

(7) Sta. "LC" 197+85 Rt.
~~Remove Culv.~~ - 70' ABANDON IN PLACE

(8) Sta. "LC" 198+18 Rt.
Inst. 15" Culv. Pipe - ~~81'~~ 78'
5' Depth

(9) Sta. "LC" 201+16 To Sta. "LC" 206+79
Removal Of Surfacing, ADD AGG. BASE RD.
~~Place 6" To 8" Selected Topsoil Material~~

(10) Sta. "LC" 203+55, Rt.
Const. Appr.
(See Drg. No. RD715)

(11) See Sht. 4, Note 1

(12) Sta. "LC" 203+95 To Sta. "LC" 206+48
Protect Existing Arborvitae

(13) Const. Mountable Curb
(See Drg. No. RD700)

(14) Sta. "LC" 203+13 Rt.
Remove Pipe, LOWERED DITCH 1' TO RECONNECT DRAINS

(15) Relocate Utility Pole - 3
(By Others)

(16) Sta. "LC" 198+73 To Sta. 206+30
Sta. "Cb" 0+58 To "Cb" 1+00
Const. Ditch
6" Flat Bottom, 1:4 Slopes

(17) Sta. "LC" 196+00 To "LC" 197+32 Rt.
Const. Ditch
2' Flat Bottom, Various Slopes

(18) Sta. "Cs" 0+41
Adjust Monument Box
(See Drg. No. RD115)

(19) Sta. "LC" 197+40
Extg. 18" Culv.
Abandon Pipe - 65'
GROUT FILL

(20) Sta. "LC" 202+72
Remove Guardrail - 32'

(21) Sta. "LC" 201+27 Rt.
Adjust Cleanout Rim To Grade

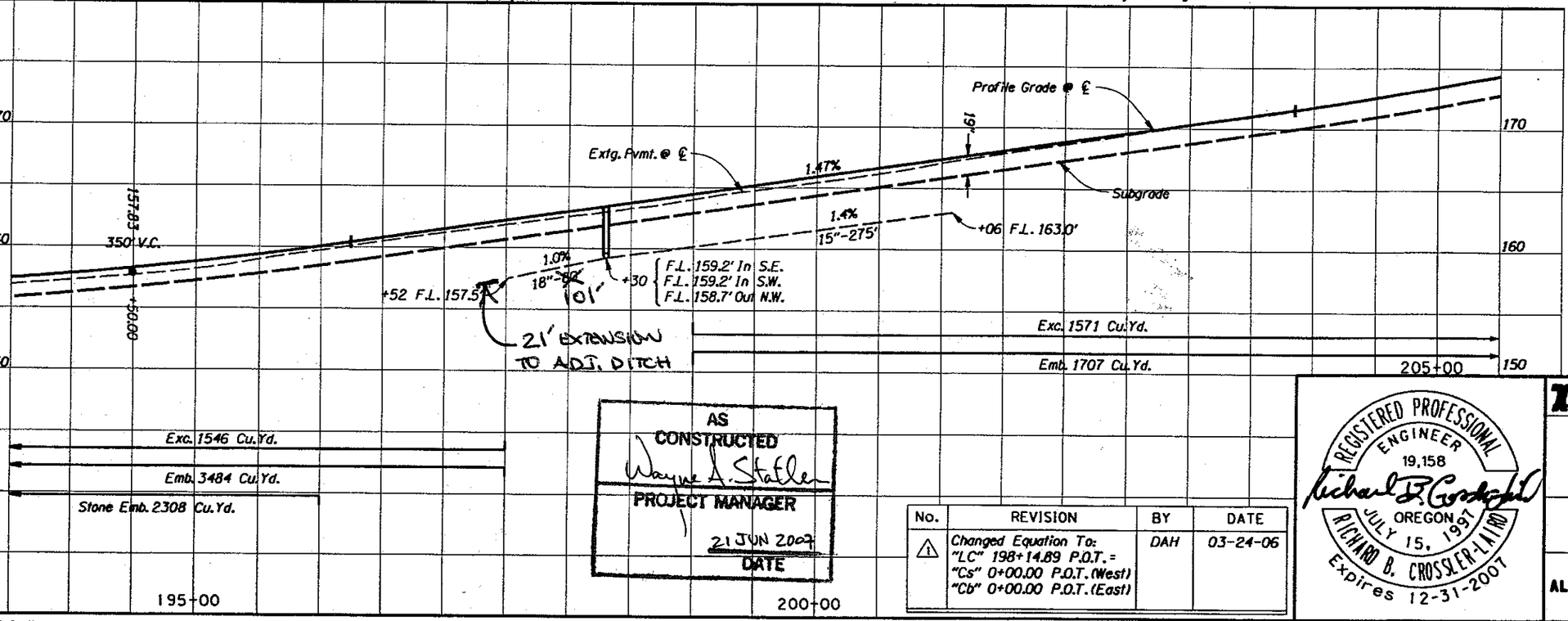
(22) See Sht. 4, Note 10

Disturbed Field Tiles Shall Be Reconnected As Directed By The Engineer

Stone Embankment Shown Thus:

Pavement Removal Shown Thus:

Abandon Pipe Shown Thus:



AS CONSTRUCTED
Wayne A. Stafler
PROJECT MANAGER
21 JUN 2007
DATE

No.	REVISION	BY	DATE
1	Changed Equation To: "LC" 198+14.89 P.O.T. = "Cs" 0+00.00 P.O.T. (West) "Cb" 0+00.00 P.O.T. (East)	DAH	03-24-06

REGISTERED PROFESSIONAL ENGINEER
19,158
Richard B. Crossler
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Expires 12-31-2007

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

OR219: HILLSBORO - SILVERTON HIGHWAY AT BURKHALTER RD. / SIMPSON RD.
HILLSBORO - SILVERTON HIGHWAY
WASHINGTON COUNTY

Project Leader - Sandy Van Bemmel
Designed By - John M Marshall
Drafted By - David Haase

ALIGNMENT & GENERAL CONSTRUCTION

SHEET NO. 5

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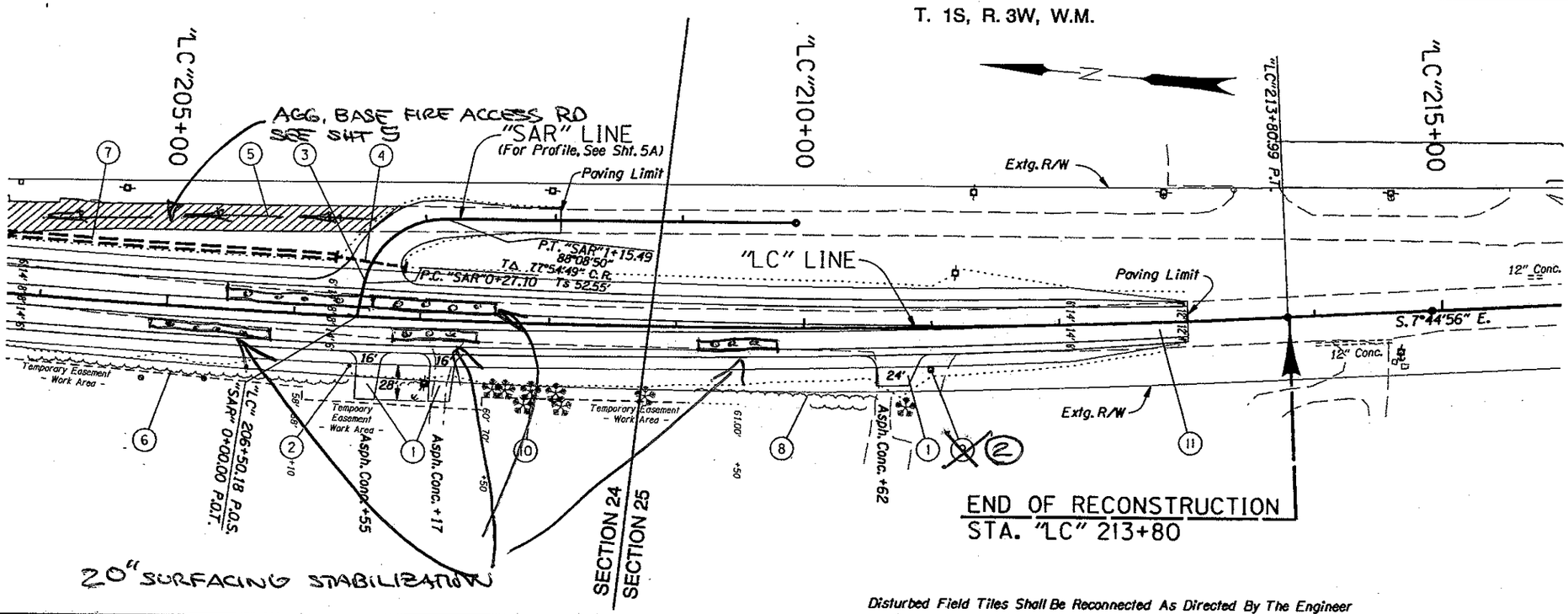
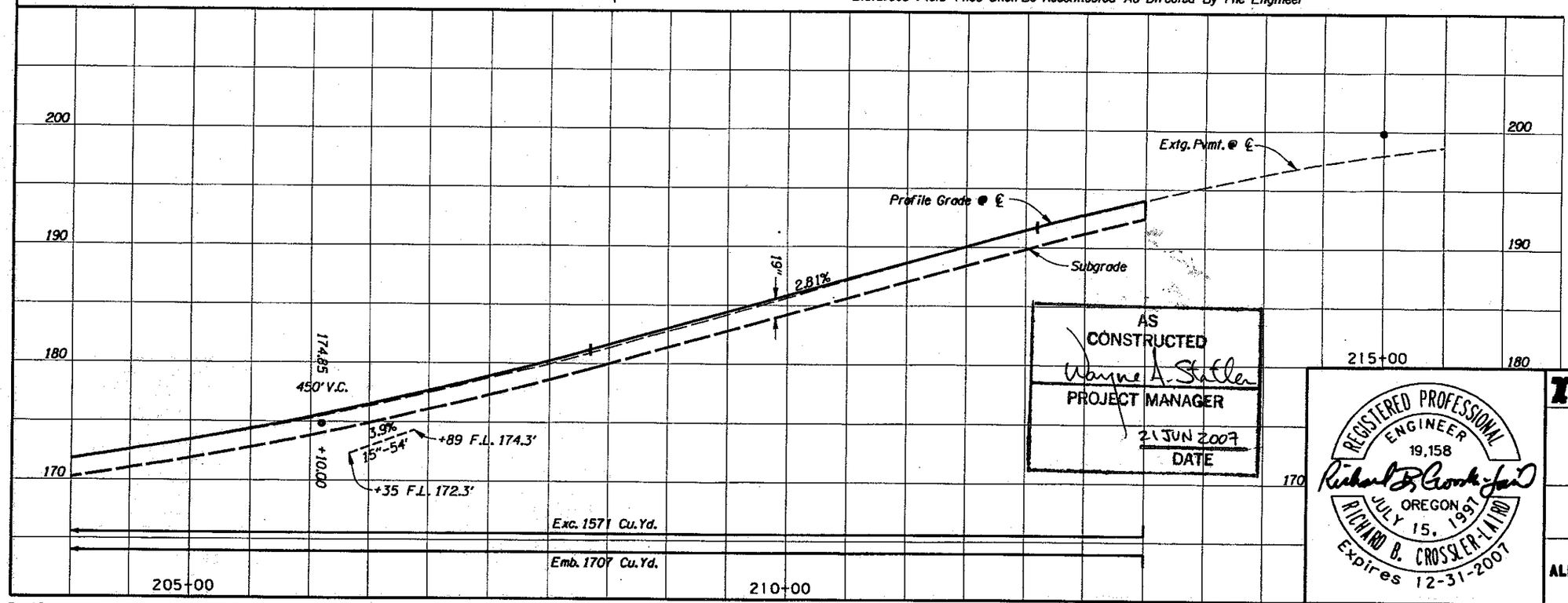
T. 1S, R. 3W, W.M.

39V-70



Disturbed Field Tiles Shall Be Reconnected As Directed By The Engineer



(1) Const. Appr. - 3
(See Drg. No. RD715)

(2) Const. Single Mailbox Support, 2 EA
(See Drg. No. RD100)

⚠1 (3) Sta. "LC" 206+50 Lt.
Const. Access Road
(For Details, See Sht. 2A-6)

(4) Sta. "LC" 206+35 Lt.
Inst. 16" Ductile Iron Pipe - ~~57'~~ 75'
5' Depth

(5) See Sht. 5, Note 9

(6) See Sht. 5, Note 12

(7) See Sht. 5, Note 16

(8) Sta. "LC" 209+15 To Sta. "LC" 210+50
Protect Existing Arborvitae

~~(9) Const. Multiple Mailbox Support~~
~~(See Drg. No. RD100)~~

(10) Sta. "LC" 207+50 To Sta. "LC" 208+80
Protect Extg. Trees

(11) Sta. "LC" ~~212+00~~ 212+98 To Sta. "LC" ~~213+80~~ 213+98
Cold Plane Pvmt. Removal
(For Details, See Sht. 2B)

Pavement Removal Shown Thus:

Abandon Pipe Shown Thus:

No.	REVISION	BY	DATE
⚠1	Changed Note 3 Sht. 2A-4 To 2A-6.	DAH	03-24-06

AS CONSTRUCTED
Wayne A. Stiller
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21 JUN 2007
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OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

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ALIGNMENT & GENERAL CONSTRUCTION

SHEET NO. 6

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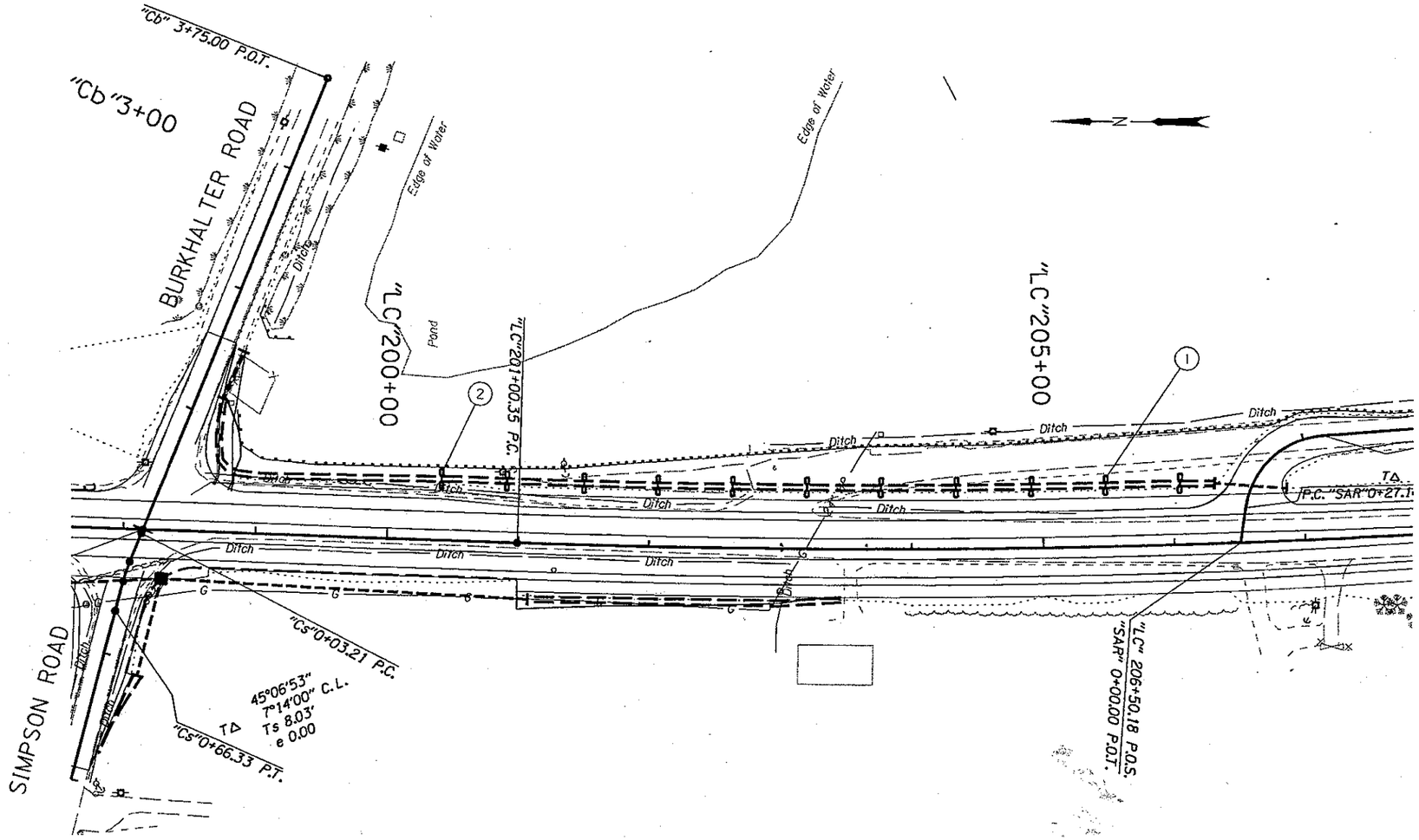

(1) Sta. "LC" 200+90 To 206+00, Lt.
Const. Water Quality Check Slots - 10
(For Details, See Sheet GJ-2)

(2) Sta. "LC" 200+40, Lt.
Const. Water Quality Check Dam - 1
(For Details, See Sheet GJ-2)

AS CONSTRUCTED
Wayne A. Sattler
PROJECT MANAGER
21 JUN2007
DATE

All Dimensions Are Shown In Feet,
Unless Otherwise Noted.

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19156
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Expires Dec. 31, 2007

OREGON DEPARTMENT OF TRANSPORTATION
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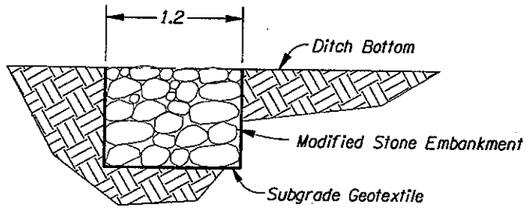
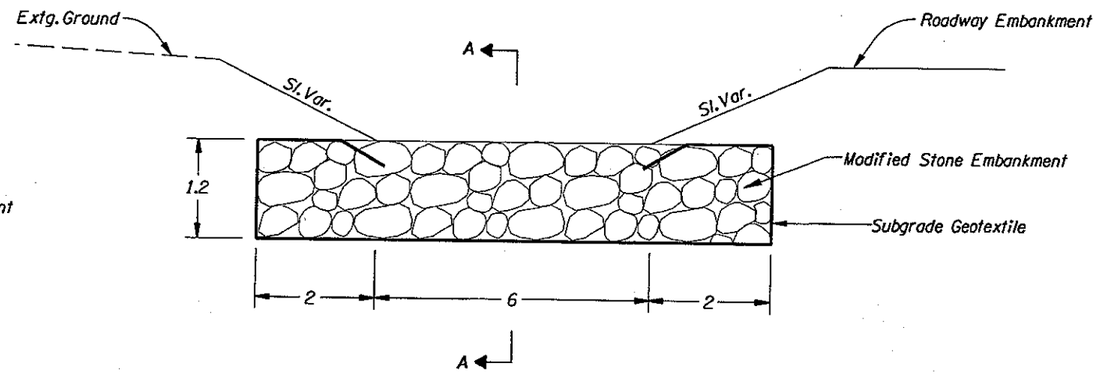
Project Leader - Sandy Van Bemmel
Designed By - Bruce S. Council
Drafted By - Bruce S. Council / Charlotte Gerken

WATER QUALITY PLAN

SHEET NO. GJ

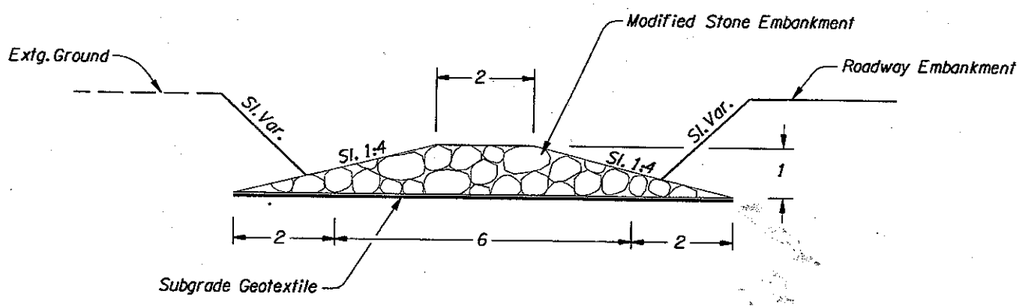


SECTION A-A



STA. "LC" 200+90 To STA. "LC" 206+00 Lt.

WATER QUALITY CHECK SLOT
FLAT BOTTOM DITCH



STA. "LC" 200+40, Lt.

WATER QUALITY CHECK DAM
FLAT BOTTOM DITCH

AS CONSTRUCTED
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21 JUN 2007
DATE

All Dimensions Are Shown In Feet, Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER 19156 OREGON JULY 15, 1997 BRUCE S. COUNCIL Expires Dec. 31, 2007

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WATER QUALITY PLAN

SHEET NO. GJ-2