OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: October 2018

DFI No. D00529

Figure 1: DFI No. D00529, looking Northwest

Identification

Drainage Facility ID (DFI):	D00529
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 44V-016
Location:	District: 01
	Highway No.: 092
	Mile Post: 61.55-61.57 (end to beginning))

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: Northwest

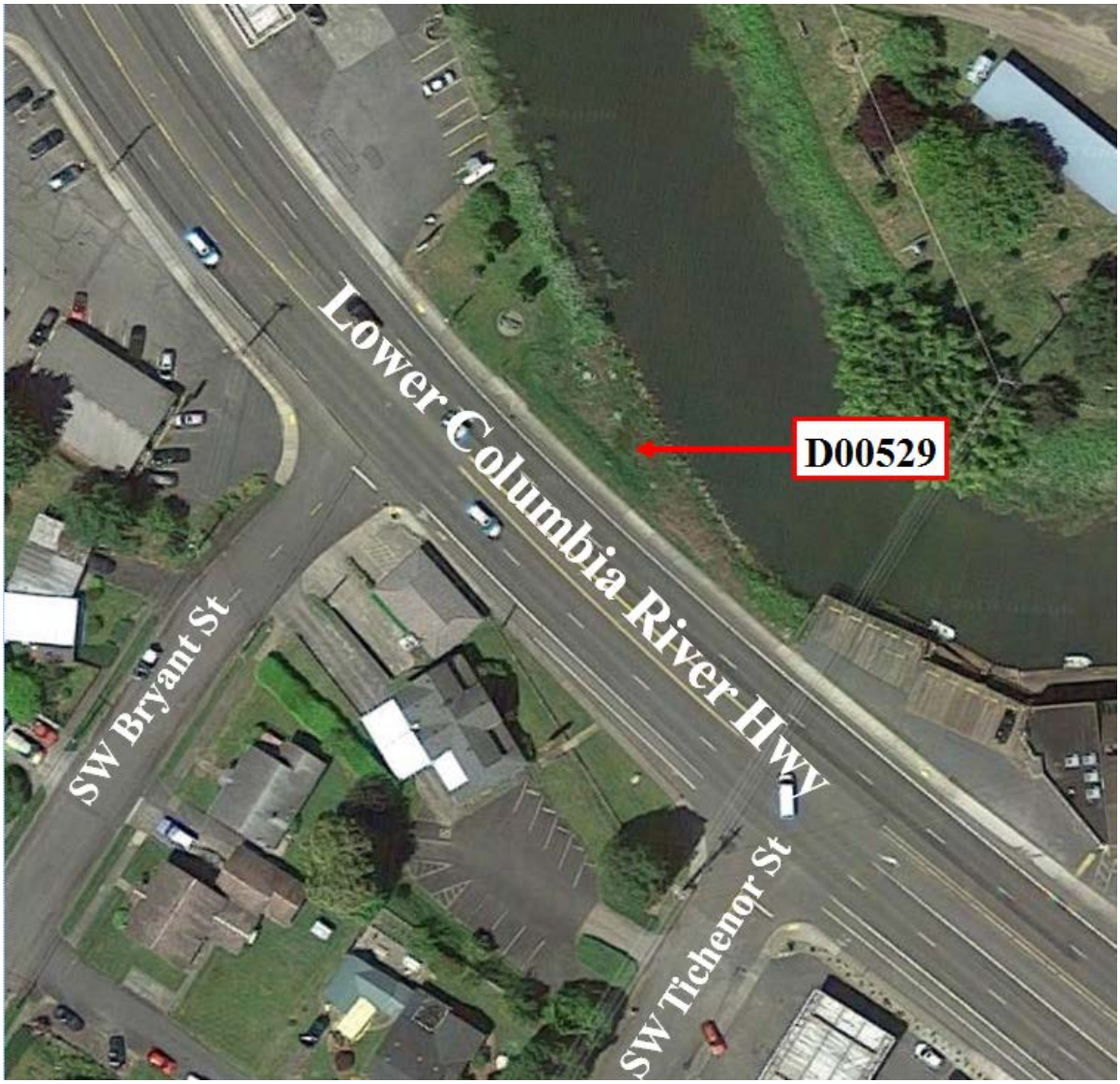


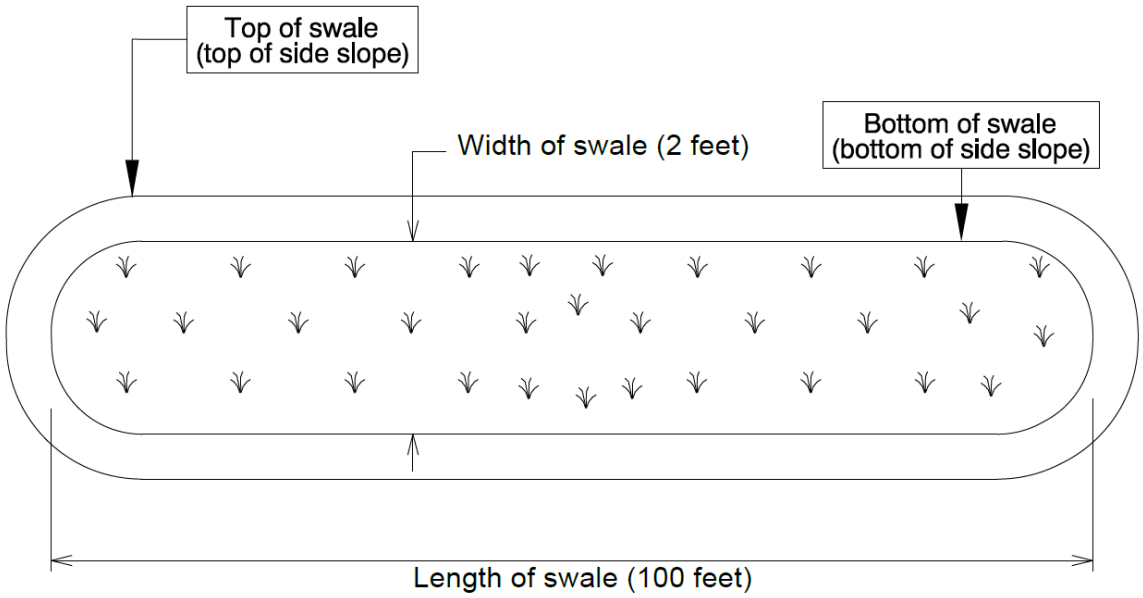
Figure 2: Facility location map

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:

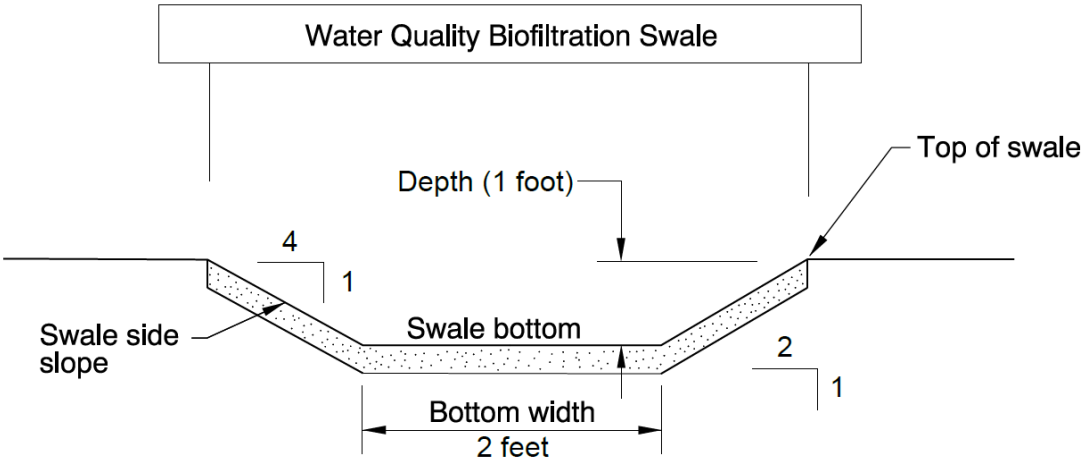
Bottom Length (feet)	Bottom Width (feet)
100	2



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	1 (Back slope)	4 (Back slope)
	1 (Fore slope)	2 (Fore Slope)



Site Specific Information: Facility is located north of US30 (Hwy 092) between SW Bryant St and SW Tichenor St.

4. **Facility Access**

Maintenance access to the facility:

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

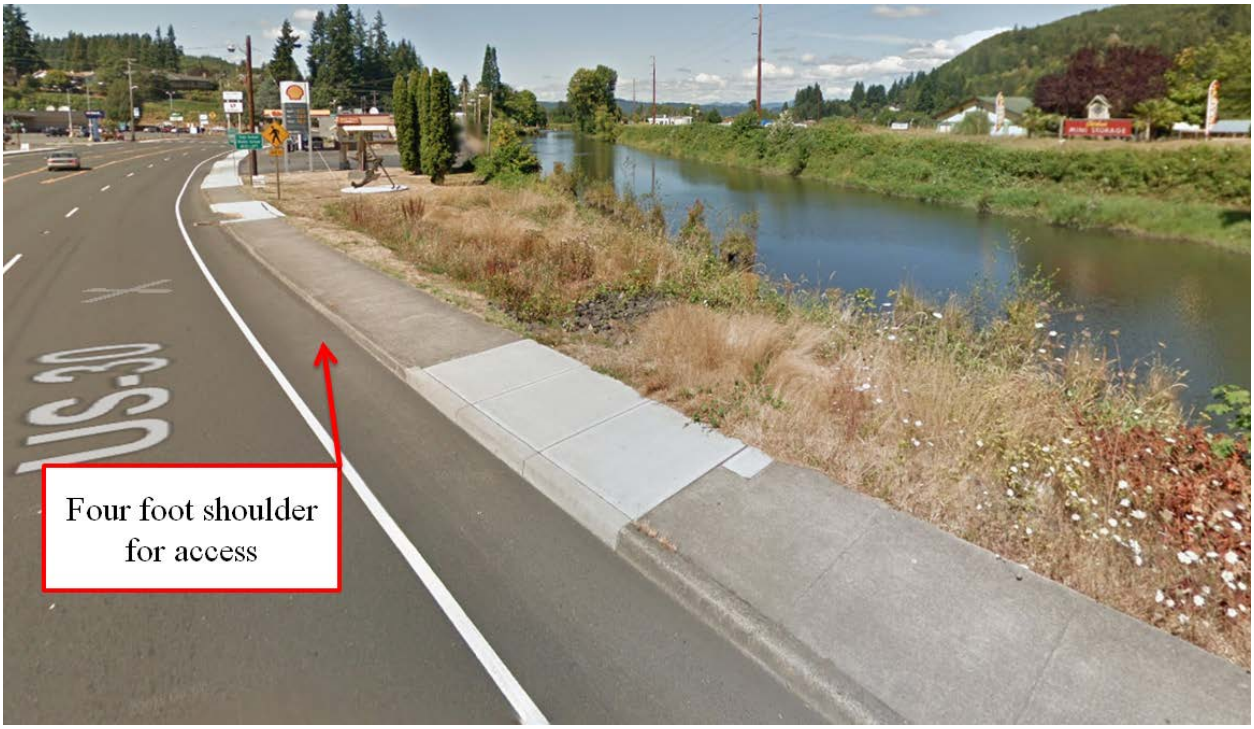


Figure 3: Four foot shoulder, facing northeast from US30

5. 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 in Table 1.

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**
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: describe type	☐	**S19**
Swale Outlet		
Catch basin with grate	☐	**S20**
Outlet Pipe (s)	☐	**S21**
Open channel outlet	☐	**S22**
Check dam (riprap)	☒	**S23**
Outfall Type		
Waterbody (River/**L**ake/**O**cean)	☒ **R** ☐ **L** ☐**O**	**S24**
Ditch	☐	**S25**
Storm drain system	☐	**S26**
Outfall Components		
Riprap pad	☒	**S27**
Riprap bank protection	☐	**S28**

Photo 1: A view of swale and outlet into Clatskanie River, looking northwest along US30

Photo 2: Swale outlet into Clatskanie River, looking west

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:

☒ No	☐ Yes

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

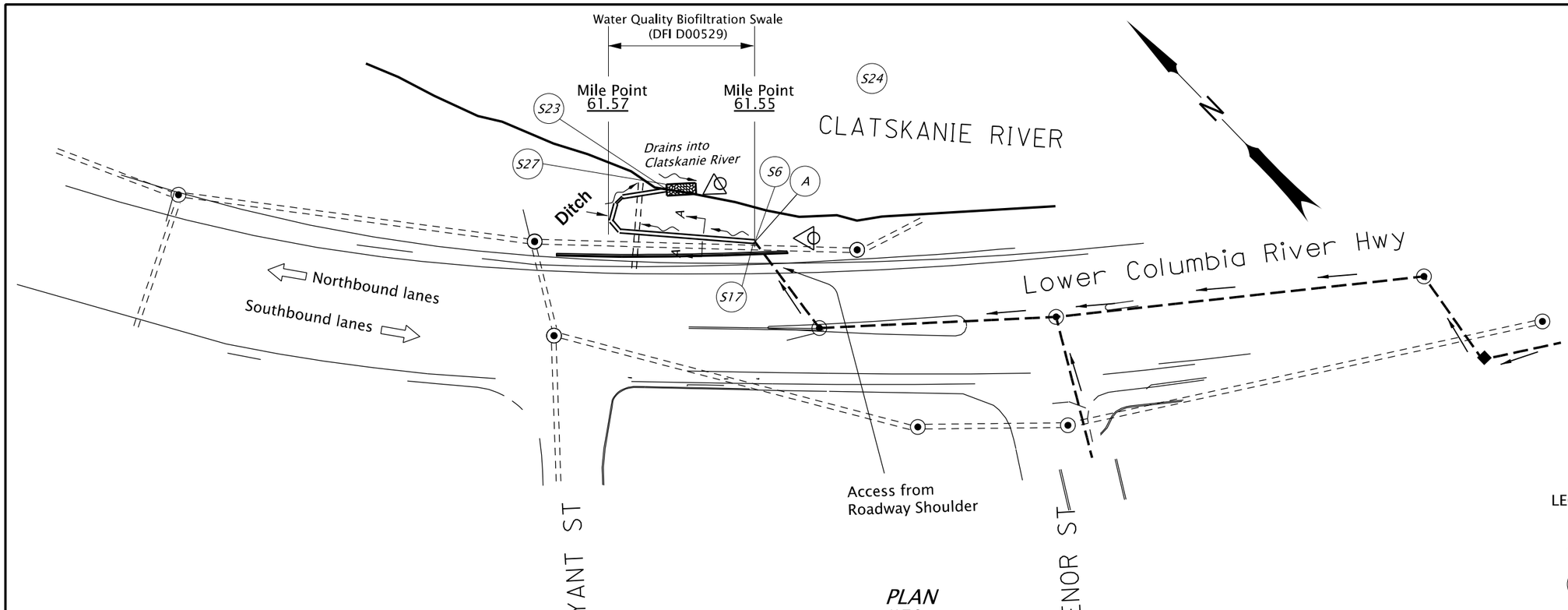
Contact any of the following for more detailed information about management of waste materials found on site:

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

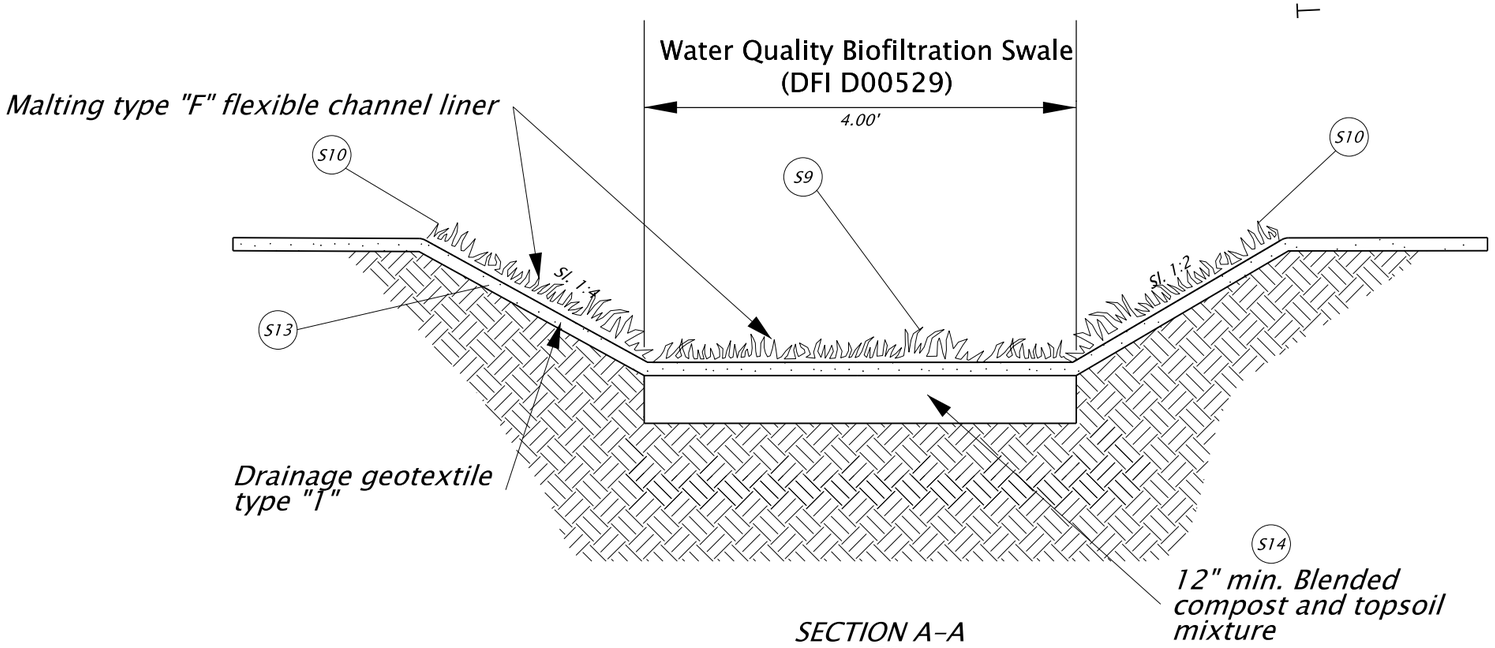
A Appendix A – Site Specific Operational Plan

Contents:

Operational Plan: DFI D00529



PLAN
N.T.S.



SECTION A-A
N.T.S.

LEGEND:

- Photograph location/Direction
- A — 24" Outlet Pipe
- Rip Rap Basin
- Manhole
- Inlet
- Storm Pipe (Facility)
- Storm Pipe (Not Connected to Facility)
- Water Flow Direction
- Pipe Flow Direction
- Traffic Flow Direction

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 01 of 01

Prepared By: Katrina Sepulveda

Drafted By: Katrina Sepulveda

DFI D00529
MAINTENANCE DISTRICT 1 HWY 092
Water Quality Biofiltration Swale
HIGHWAY MP 61.55 - 61.57
Columbia County

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 44V-016

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

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, STRUCTURE, PAVING, SIGNING & SIGNALS

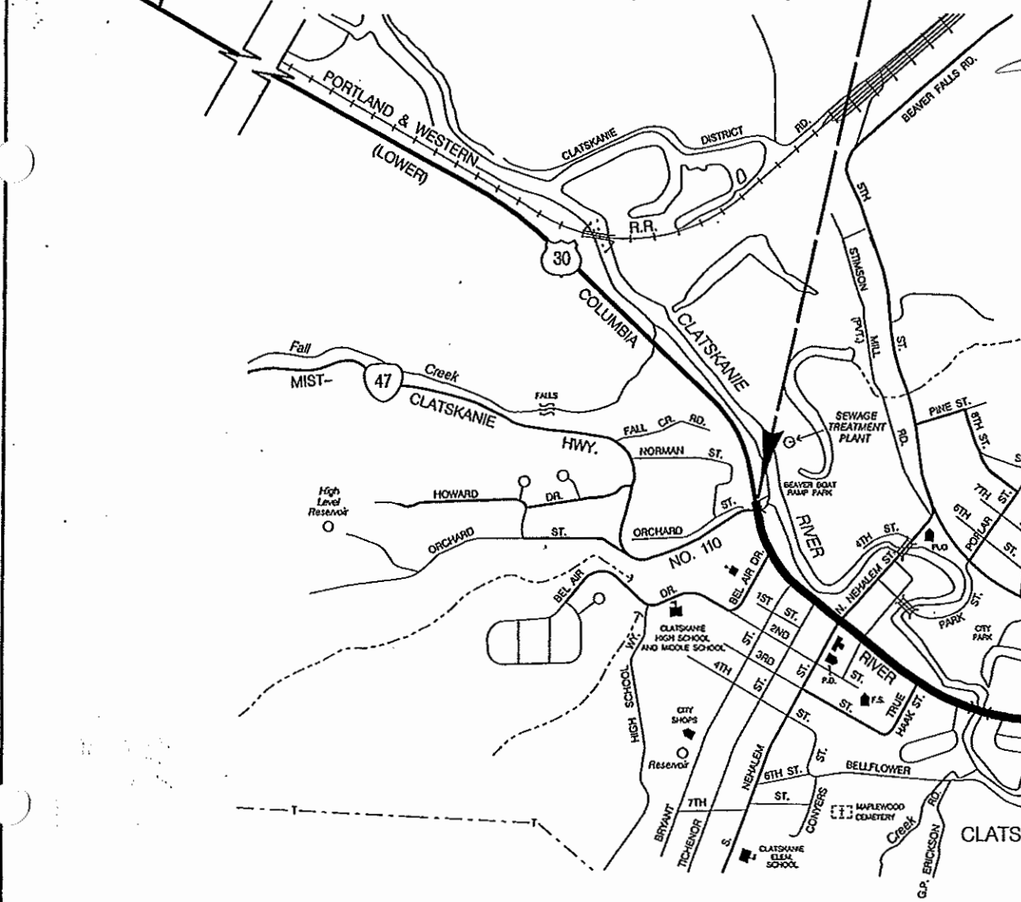
US30: SWEDETOWN ROAD - JCT OR-47 SEC.

LOWER COLUMBIA RIVER HIGHWAY

COLUMBIA COUNTY
JANUARY 2011

BEGINNING OF CONTRACT
STA. "L" 362+85 (M.P. 69.95)

BEGINNING OF PROJECT
X-STP-HSIP-S092(038)
STA. "L" 1665+93 (M.P. 61.72)



FOR "AS-CONSTRUCTED"

REGISTERED PROFESSIONAL ENGINEER
14932
OREGON
JULY 25, 1970
PAUL DOUGLAS CHRISTIANSEN

EXPIRES: 12-31-2013

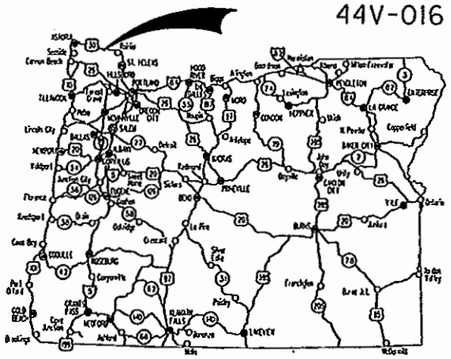
NOT REVISED AS CONSTRUCTED
6/11/12 CONTRACT 14305

END OF PROJECT
X-STP-HSIP-S092(038)
STA. "L" 1709+90 (M.P. 60.89)

END OF CONTRACT
STA. "L" 1718+00 (M.P. 60.74)

T. 7 N., R. 4 W., W.M.

44V-016



Overall Length Of Project - 0.83 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.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

OREGON TRANSPORTATION COMMISSION

Gail Achterman	CHAIR
Michael Nelson	VICE-CHAIR
Mary Olson	COMMISSIONER
Alan Brown	COMMISSIONER
David Lohman	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, P.E.
Project Delivery Manager, Region 1

Concurrence by ODOT Chief Engineer

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
COLUMBIA COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-STP-HSIP-S092(038)	1

PE45911001

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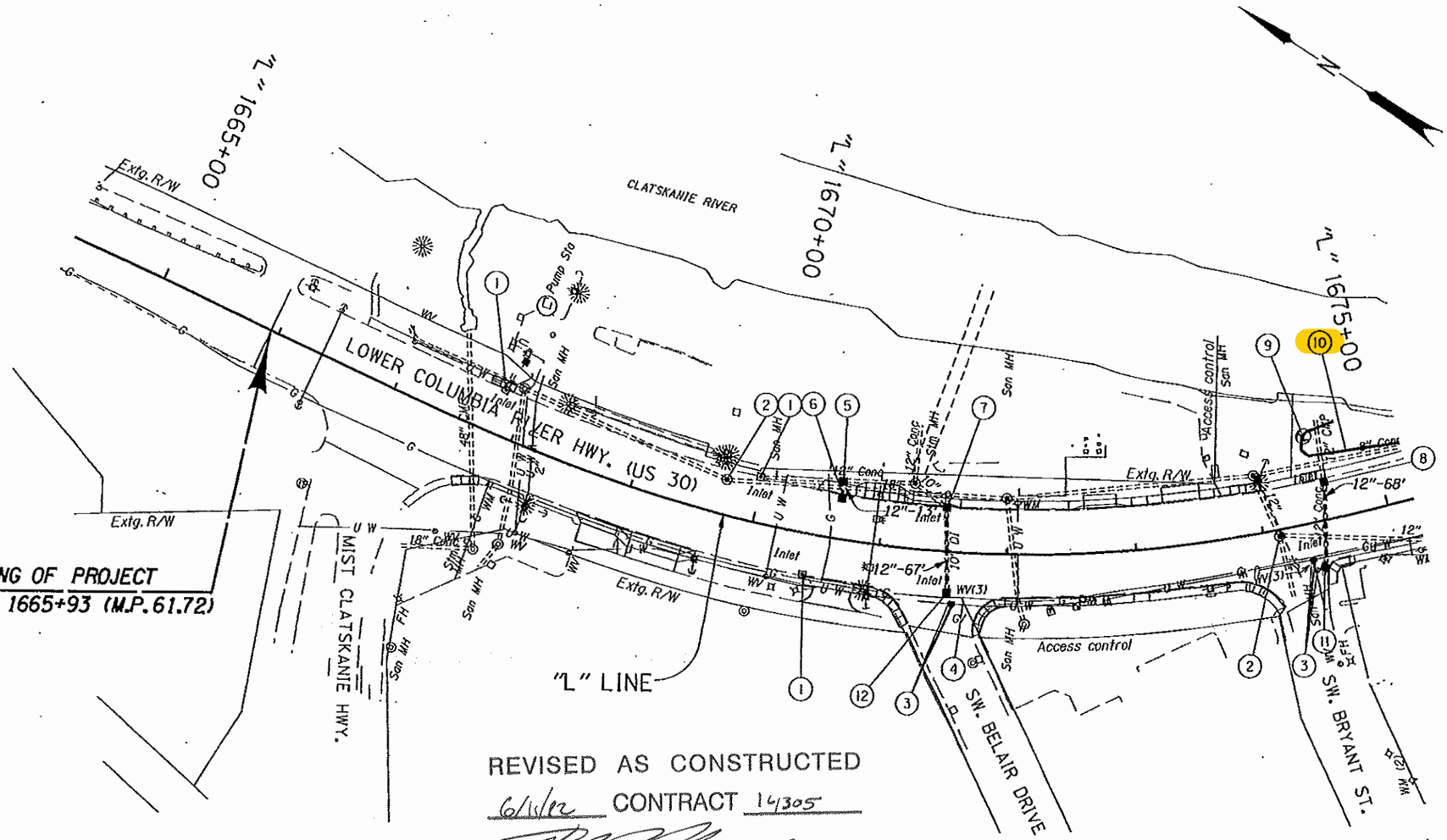
Sec. 8, T. 7 N., R. 4 W., W.M.



REVISED AS CONSTRUCTED

6/15/12 CONTRACT 14305

Paul Christiansen Project Manager DATE 6-14-12

(1) Adjust inlet - 3

(2) Adjust manhole - 2

(3) Adjust water valve box - 7

(4) Adjust gas valve
(By others)

(5) Sta. "L" 1670+64.5, 45.3' Lt.
Const. type "G-2" inlet
Connect to extg. pipe
Inst. 12" storm sew. pipe - 13'
5' depth
Trench resurf. - 7 sq.yd.
(See drg. nos. RD300, RD302, RD364, RD380, RD384 & RD386)
(For profiles, see sht. GJ-2)

(6) Sta. "L" 1670+65.6, Lt.
Const. type "CG-2" inlet
(See drg. no. RD366)
(For profiles, see sht. GJ-2)

(7) Sta. "L" 1671+50.6, Lt.
Remove inlet
Const. type "CG-2" inlet
Connect to extg. storm sew. pipe
Remove storm sew. pipe - 67'
Inst. 12" storm sew. pipe - 67'
5' depth
Trench resurf. - 53 sq.yd.
(For profiles, see sht. GJ)

(8) Sta. "L" 1674+54.9, 29.4' Lt.
Remove inlet
Const. type "CG-2" inlet
Connect extg. storm sew. pipe
Remove storm sew. pipe - 68'
Inst. 12" storm sew. pipe - 68'
5' depth
(1) Trench resurf. - 53 sq.yd.
(For profiles, see sht. GJ)

NOTE:
1. Protect and preserve existing sanitary system and water system.

No.	DATE	REVISIONS	BY
(1)	01-11-11	Revised pipe depth	E.P.F.

(11) Sta. "L" 1674+43.2, 35.7' Rt.
Remove inlet
Const. type "CG-2" inlet
Connect to extg. pipe
(Contractor to verify F.L. and size of extg. incoming storm sew. pipes)
(For profiles, see sht. GJ)

(12) Sta. "L" 1671+55.4, 32.1' Rt.
Remove inlet
Const. type "G-2" inlet
Connect to extg. pipe
(Contractor to verify F.L. and size of extg. incoming storm sew. pipes)
(For profiles, see sht. GJ)

(10) Sta. "L" 1674+72.9, 72.6' Lt.
Const. water quality swale
Riprap basin (Class 50) - 15 cu.yd.
Riprap geotextile type "1" - 50 sq.yd.
Inst. blended compost and topsoil mixture - 15 cu.yd.
Drainage geotextile type "1" - 95 sq.yd.
Permanent seeding, mix no. "1" - 0.03 ac.
Matting type "F" flexible channel liner - 95 sq.yd.
Ditch exc. - 31 cu.yd.
Check dam, type "1" - 1
Flow spreader, 2x12 - 16 lf.
(For details, see shts. GJ & GJ-3)

(9) Remove and move roadside ship anchor statue
As directed by engineer
General exc. - 5 cu.yd.
Commercial grade concrete - 4.2 cu.yd.
Reinforcing steel - 140 lb.
Remove and store extg. ship anchor for later installation - 1
Topsoil 4" depth - 20 cu.yd.
Permanent seeding, mix no. "1" - 0.05 ac.
Placement of extg. ship anchor at new location - 1
(For slab details, see sht. GJ-3)

REGISTERED PROFESSIONAL ENGINEER
78814PE
OREGON
JAN 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
COLUMBIA COUNTY

Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

DRAINAGE & UTILITIES

SHEET NO. 3A

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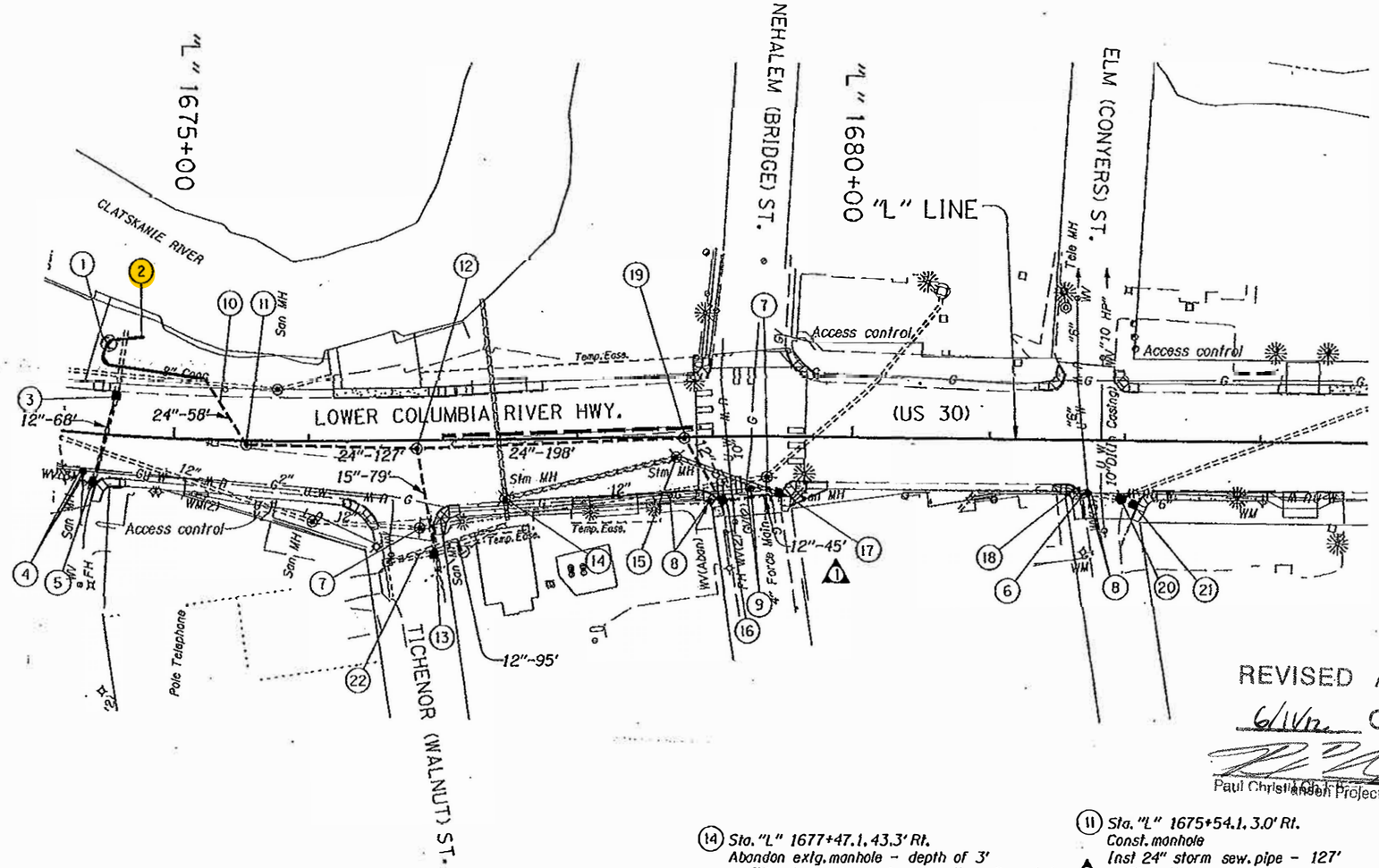
44V-016



(1) See sht. 3A, note 9
Remove and move roadside ship anchor

(2) See sht. 3A, note 10
Const. water quality swale
Riprap basin
Riprap geotextile
Inst. soil
Ditch exc.

(3) See sht. 3A, note 8
Remove inlet
Const. inlet
Connect extg. pipe
Remove pipe
Inst. pipe
Trench resurf.
(For profiles, see sht. GJ)

(4) See sht. 3A, note 3
Adjust water valve box

(5) See sht. 3A, note 11
Remove inlet
Const. inlet

(6) Adjust inlet - 1

(7) Adjust manhole - 2

(8) Adjust water valve box - 5

(9) Adjust gas valve - 2
(By others)

(10) Sta. "L" 1675+21.4, 44.7' Lt.
Inst. 24" ductile iron pipe - 58'
5' depth
Trench resurf. - 52 sq.yd.
(For profiles, see sht. GJ)

(11) Sta. "L" 1675+54.1, 3.0' Rt.
Const. manhole
(2) Inst 24" storm sew. pipe - 127'
5' depth
Trench resurf. - 113 sq.yd.
(For profiles, see sht. GJ)

(12) Sta. "L" 1676+80.8, 6.0' Rt.
Const. manhole
Inst. 24" storm sew. pipe - 198'
5' depth
Inst. 15" storm sew. pipe - 79'
5' depth
Trench resurf. - 237 sq.yd.
(For profiles, see sht. GJ)

(13) Sta. "L" 1676+92.6, 84' Rt.
Remove inlet
Const. type "CG-2" inlet
Connect to extg. pipe
Trench resurfacing - 10 sq.yd.
(For profiles, see sht. GJ)

(14) Sta. "L" 1677+47.1, 43.3' Rt.
Abandon extg. manhole - depth of 3'
fill and abandon - lower portion of manhole
Fill and abandon extg. 24" storm sew. pipe (~20' deep) - 146'
Fill and abandon extg. 12" sew. pipe - 129'
Fill and abandon extg. 8" sew. pipe - 16'
Trench resurfacing - 10 sq.yd.

(15) Sta. "L" 1678+72.9, 14.6' Rt.
Abandon extg. manhole - depth of 3'
fill and abandon - lower portion of manhole
Fill and abandon extg. 8" storm sew. pipe - 78'
Trench resurfacing - 10 sq.yd.

(16) Sta. "L" 1679+06.7, Rt.
Const. "CG-2" inlet
(2) Inst. 12" storm sew. pipe - 45'
5' depth
Trench resurfacing - 33 sq.yd.
(For profiles, see sht. GJ)

(17) Sta. "L" 1679+46.7, Rt.
Remove inlet
Const. type "CG-2" inlet
Trench resurf. - 10 sq.yd.
(For profiles, see sht. GJ)

(18) Relocate power pole and guy wire (By others)

(19) Sta. "L" 1678+78.8, 0.8' Rt.
Const. manhole
Inst. 12" storm sew. pipe - 55'
5' depth
Trench resurf. - 42 sq.yd.
(For profiles, see sht. GJ)

(20) Sta. "L" 1681+97.8, 43.1' Rt.
Remove inlet
Const. manhole
Connect to extg. pipes
Inst. 12" storm sew. pipe - 12'
5' depth
Trench resurf. - 10 sq.yd.
(For profiles, see sht. GJ-2)

(21) Sta. "L" 1682+07.0, 46.8' Rt.
Const. type "CG-2" inlet
(For profiles, see sht. GJ-2)

(22) Fill and abandon extg. 8" sew. pipe - 87'

REVISED AS CONSTRUCTED
6/1/12 CONTRACT 14305
Paul Christiansen Project Manager DATE: 6/1/12

NOTE:
1. Protect and preserve existing sanitary system and water system.

No.	DATE	REVISIONS	BY
1	01-06-11	Edited pipe length	E.P.F.
2	01-11-11	Revised pipe depth	E.P.F.

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
COLUMBIA COUNTY

Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

DRAINAGE & UTILITIES

SHEET NO. 4A

REGISTERED PROFESSIONAL ENGINEER
78818PE
OREGON
JAN 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011

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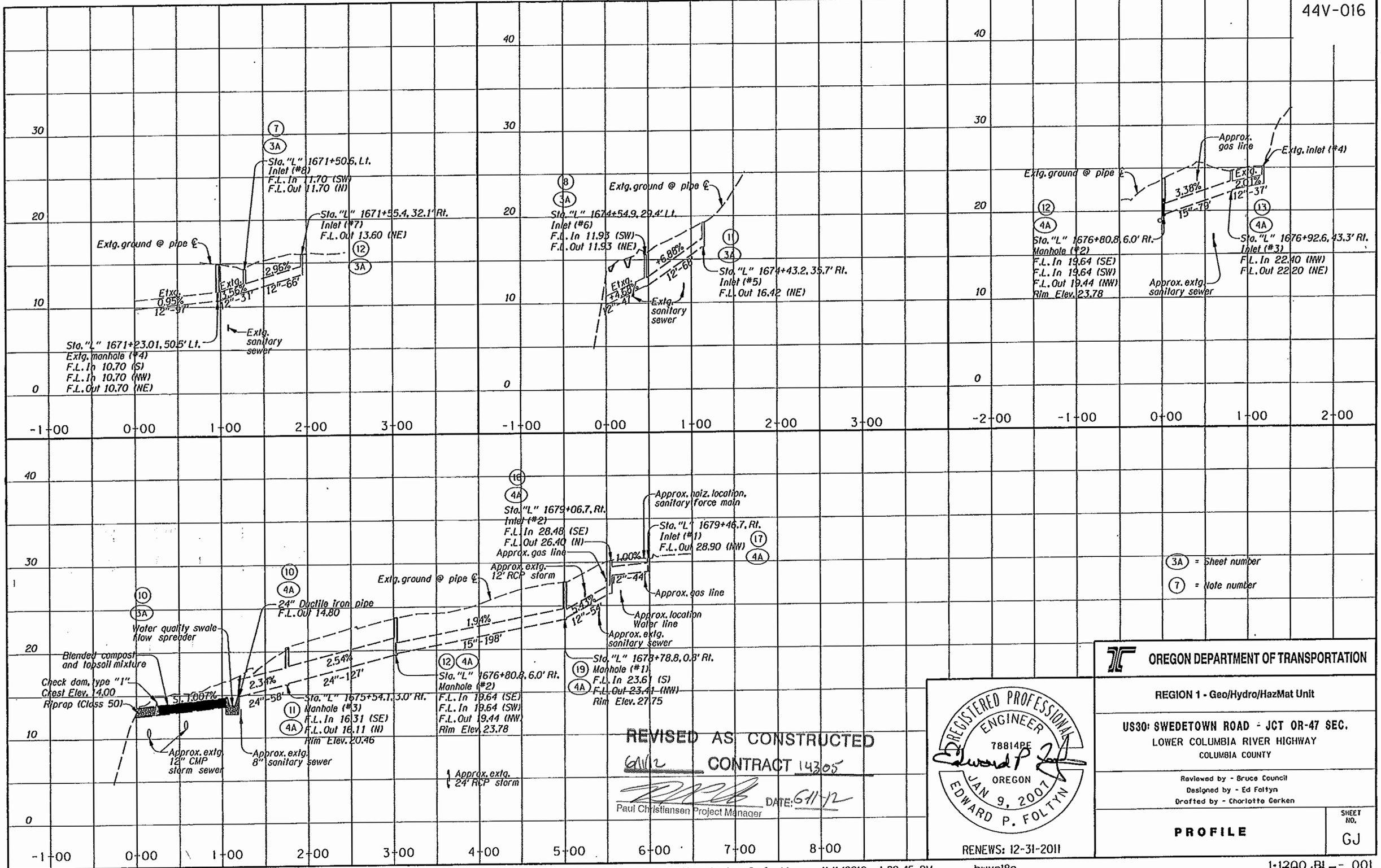

3A = Sheet number

7 = Note number

REVISED AS CONSTRUCTED

6/1/12 CONTRACT 14305

Paul Christiansen Project Manager DATE: 6/1/12

REGISTERED PROFESSIONAL ENGINEER 78814PE OREGON JAN 9, 2007 EDWARD P. FOLTYN

RENEWS: 12-31-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
COLUMBIA COUNTY

Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

PROFILE

SHEET NO. GJ

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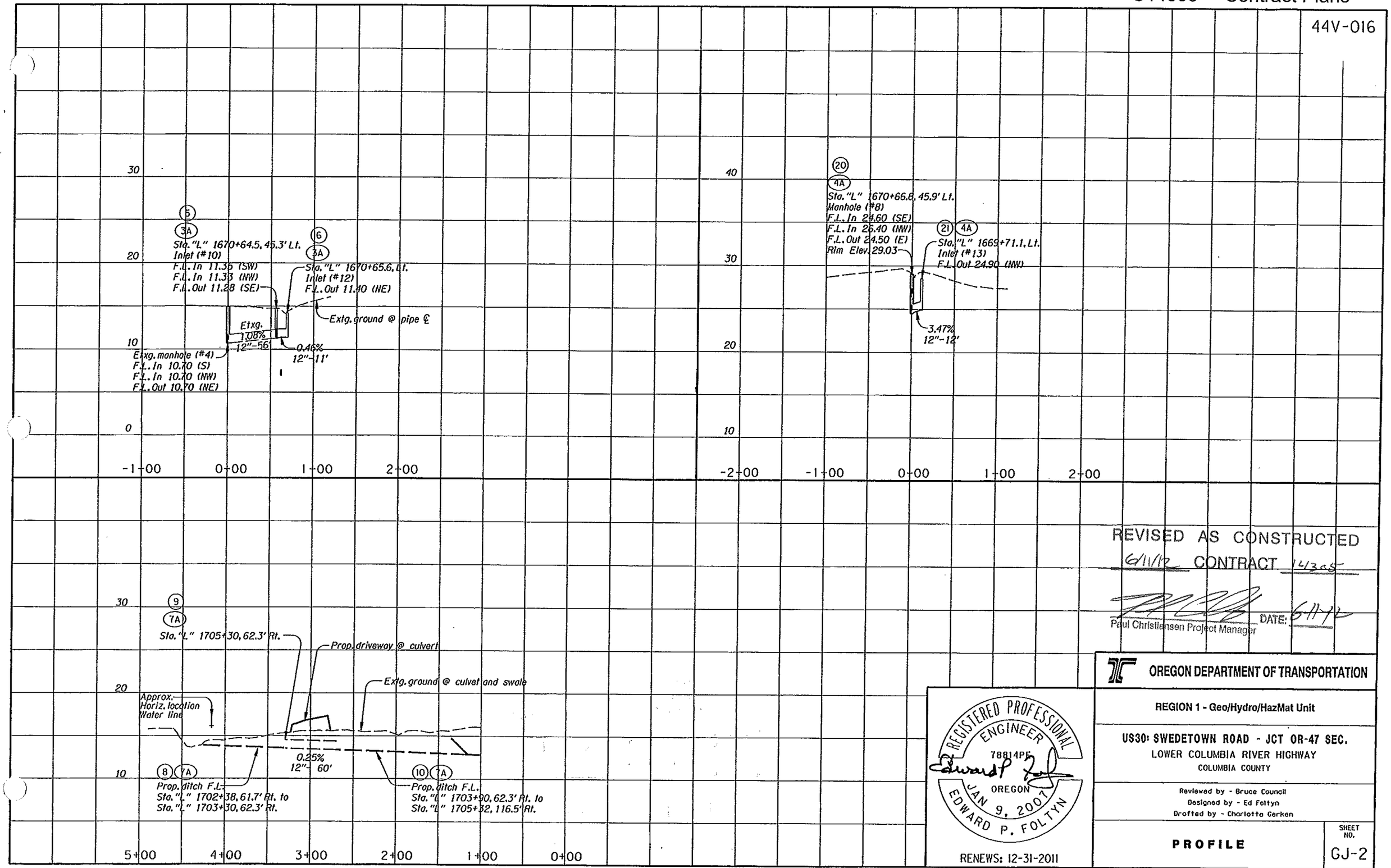

REVISED AS CONSTRUCTED
6/11/12 CONTRACT 14305

Paul Christiansen Project Manager DATE: 6/11/12

REGISTERED PROFESSIONAL ENGINEER
78814PE
OREGON
JAN 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
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Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

PROFILE

SHEET NO. GJ-2

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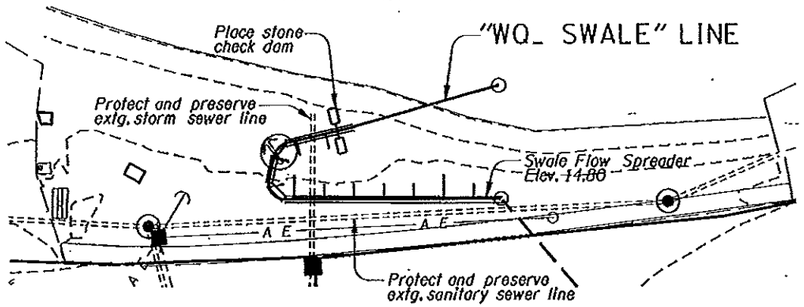
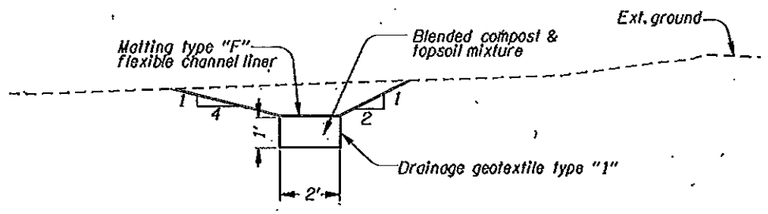
1:1200 BL - 002

WATER QUALITY SWALE



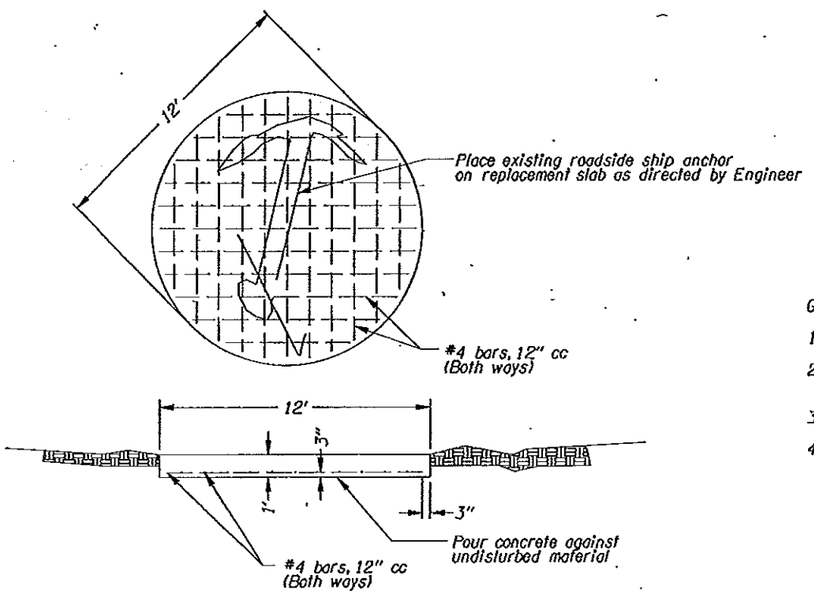
"WQ" SWALE PLAN

"L" 1674+72.9, 72.6' Lt.
(For profile, see sht. GJ) ⚠1



X-SECTION

X-SECTION



DETAIL

Move roadside ship anchor

GENERAL NOTES:

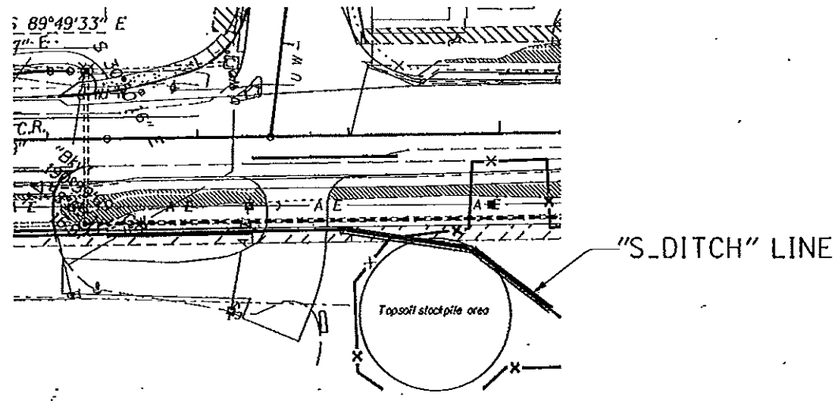
1. *All concrete shall be commercial grade concrete.*
2. *All reinforcement shall be 3" clear of nearest face of concrete unless otherwise shown.*
3. *Place 4" deep topsoil on all areas disturbed by construction.*
4. *Seed all disturbed areas with permanent seed mix.*

REVISED AS CONSTRUCTED
6/1/12
CONTRACT 14305
Paul Christiansen Project Manager
DATE: 6-1-12

No.	DATE	REVISIONS	BY
⚠1	01-03-11	Edited note	E.P.F.

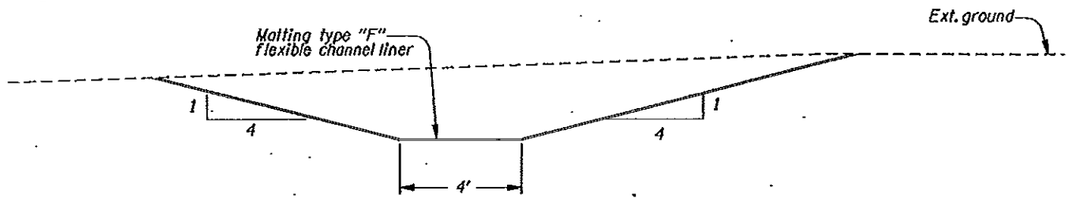
4' FLAT BOTTOM DITCH

44V-016



FLAT BOTTOM DITCH PLAN

"L" 1702+38, 61.7' Rt. to "L" 1703+30, 62.3' Rt.
"L" 1703+90, 62.3' Rt. to "L" 1705+32, 116.5' Rt.
(For profile, see sht. GJ-2)



X-SECTION

REGISTERED PROFESSIONAL ENGINEER
7881 PE
OREGON
JAN 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
COLUMBIA COUNTY

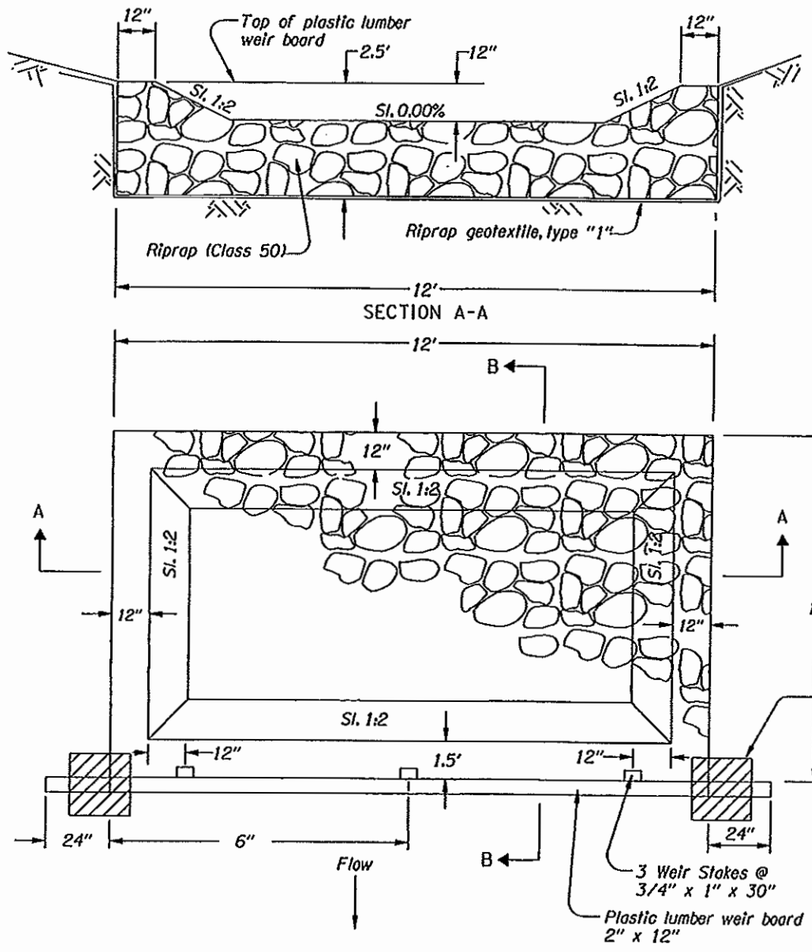
Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Garken

PLAN & DETAILS

SHEET NO. GJ-3

WATER QUALITY SWALE FLOW SPREADER

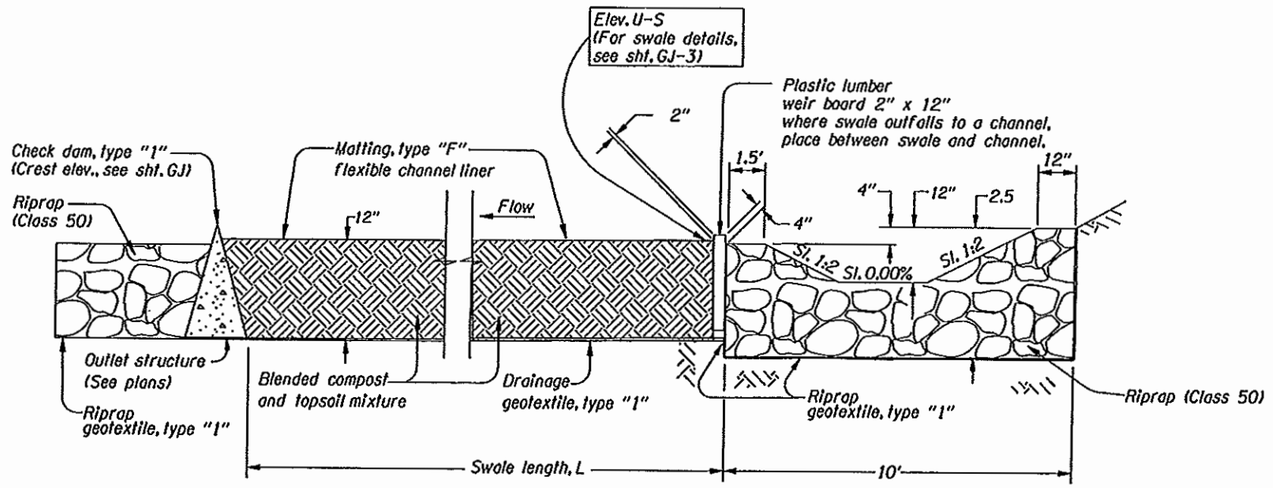
44V-016



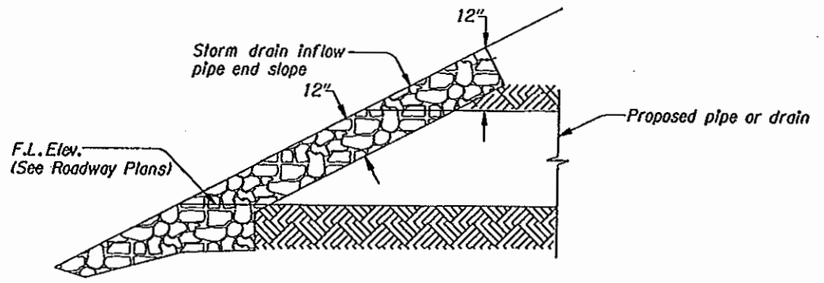
Note:
See 01040 for compost and topsoil mixture

PLAN

SWALE FLOW SPREADER

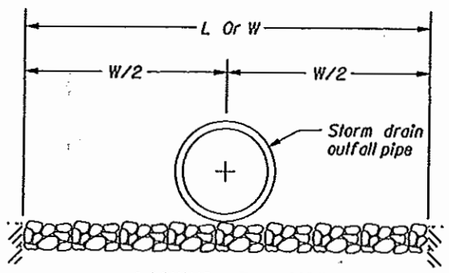


SECTION B-B



Note:
Pipe F.L. elev. and top of weir board elev. are the same.

SECTION THROUGH SIDE PIPE OUTLET



LOOKING AT A SIDE

All dimensions are in feet (') unless otherwise noted.

REVISED AS CONSTRUCTED
6/11/12 CONTRACT 14305
Paul Christiansen Project Manager DATE: 6/11/12

REGISTERED PROFESSIONAL ENGINEER
78814PE
OREGON
JAN 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

US30: SWEDETOWN ROAD - JCT OR-47 SEC.
LOWER COLUMBIA RIVER HIGHWAY
COLUMBIA COUNTY

Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

DETAILS

SHEET NO. GJ-4