OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: August 2017

DFI No. D00207

Figure 1: DFI No. D00207, looking Southeast

1. Identification

Drainage Facility ID (DFI):	D00207
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 40V-046
Location:	District: 4
	Highway No.: 091
	Mile Post: 102.74 to 102.75, Left

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: Southeast

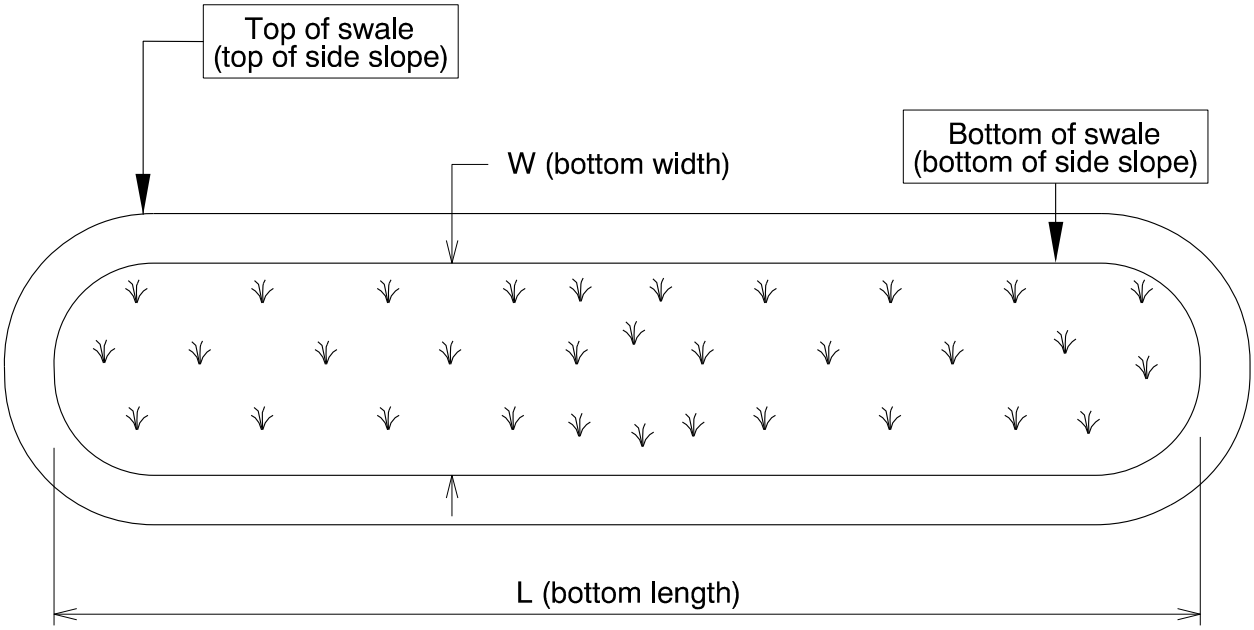
Figure 2: Facility location map

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:

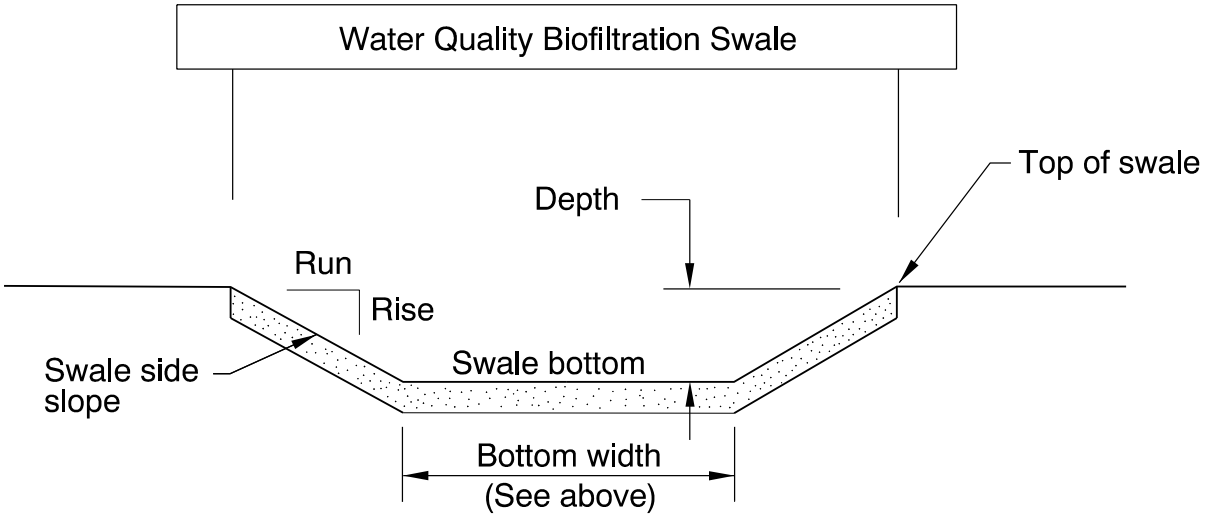
Bottom Length (feet)	Bottom Width (feet)
100	10



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)
varies	**1**	**4**



Site Specific Information: 12 inches of select topsoil was used for the swale water quality soil mixture within the treatment area. This swale serves bridge No. 20463.

5. Facility Access

Maintenance access to the facility:

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

Figure 3: Facility access via roadside shoulder, looking Northwest

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: 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:	☐	**S19**
Swale Outlet		
Catch basin with grate	☐	**S20**
Outlet Pipe (s)	☐	**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 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

8. Limitations

Access grid installed:

☒ No	☐ Yes
There are (Choose applicable weight: no, 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, 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

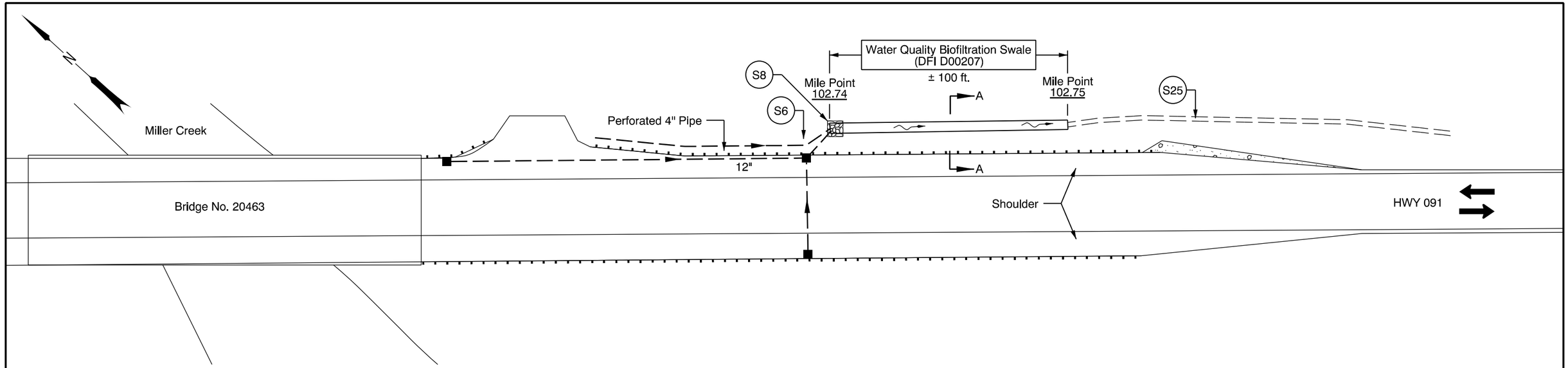
Contact any of the following for more detailed information about management of waste materials found on site:

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

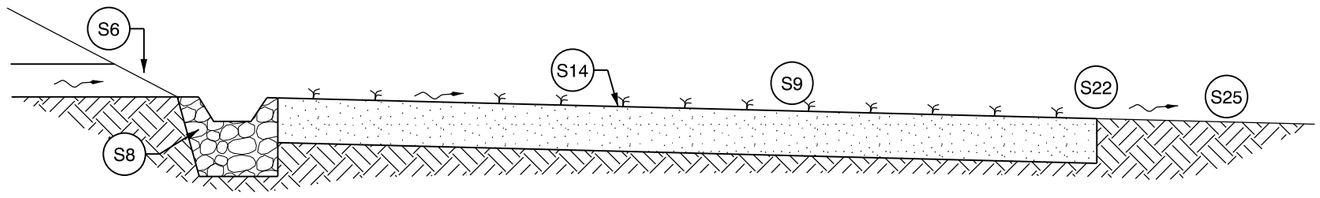
A Appendix A – Site Specific Operational Plan

Contents:

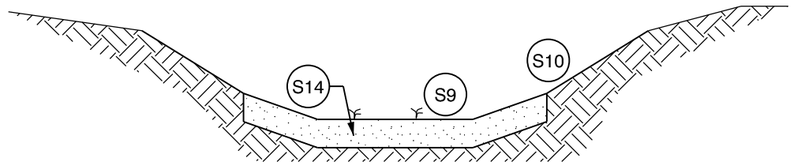
Operational Plan: DFI D00207



PLAN
N.T.S.



PROFILE
N.T.S.



SECTION A-A
N.T.S.

LEGEND

- Catch Basin
- Storm Pipe
- Guardrail
- Traffic Flow Direction
- Stormwater Flow Path

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Brooklyn Scholz

Drafted By: Brooklyn Scholz

DFI D00207
MAINTENANCE DISTRICT 4 HWY 091
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 102.75, 102.75
BENTON

DFI_D00207.dgn

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 40V-046

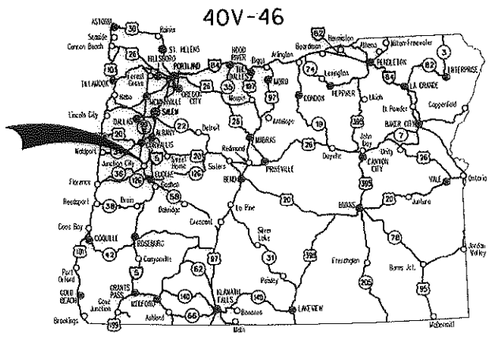
INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd. & Std. Drg. Nos.

STATE OF OREGON
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT

GRADING, STRUCTURES, PAVING, SIGNALS AND ROADSIDE DEVELOPMENT

OR 99W: MILLER CREEK BRIDGE

PACIFIC HIGHWAY WEST
BENTON COUNTY
MAY 2007

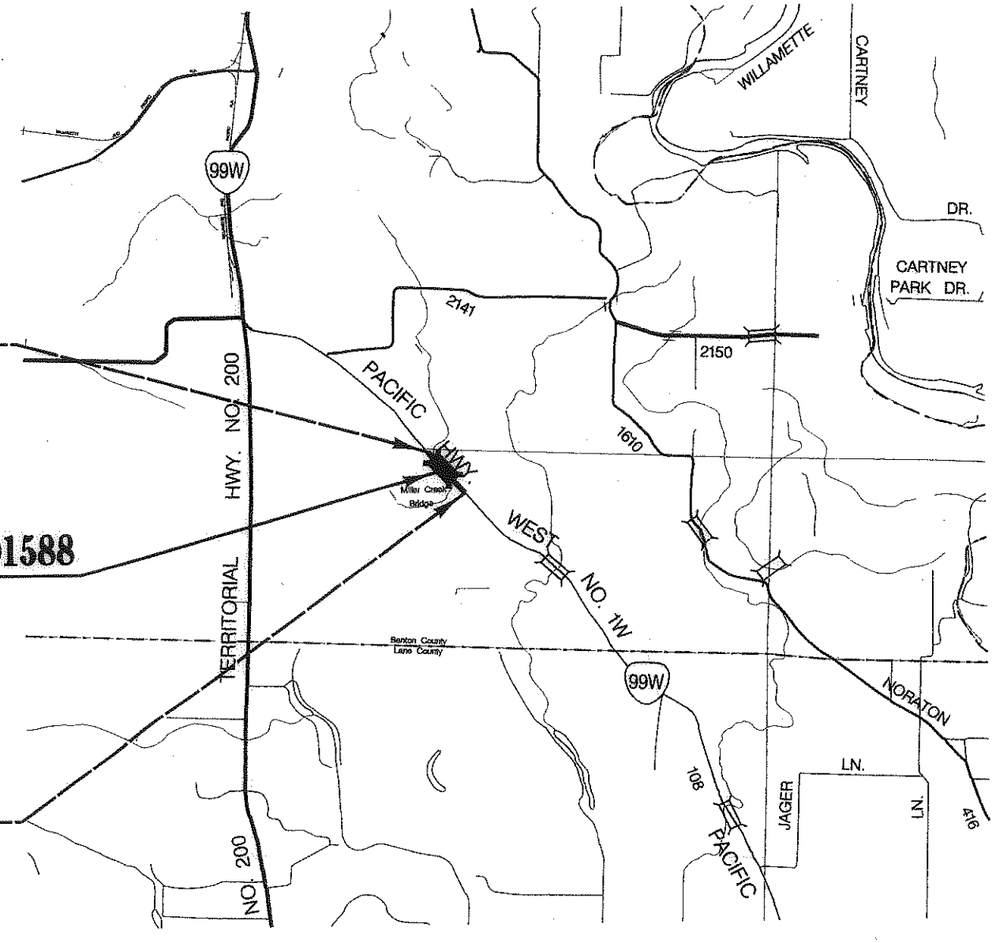


Overall Length Of Project - 0.18 Miles

BEGINNING OF PROJECT
X-STP-S091(019)
STA. 78+24.67 (M.P. 102.63)

PROJECT SITE: BRIDGE #01588
STA. 83+02.50 (M.P. 102.72)

END OF PROJECT
X-STP-S091(019)
STA. 87+85.43 (M.P. 102.81)



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

REVISED AS CONSTRUCTED
16/10/08 CONTRACT 13381
PROJ. MGR. CURT VANDERZANDEN

N

T. 15 S., R. 5 W., W.M.

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Papé	COMMISSIONER
Janice Wilson	COMMISSIONER
Matthew L. Garrett	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
67079PE
OREGON
JULY. 15, 2008
CURTIS C. VANDERZANDEN

EXPIRATION DATE: 6/30/08/10

CURTIS C. VANDERZANDEN
KPFF CONSULTING ENGINEERS - PROJECT MANAGER

OREGON DEPARTMENT OF TRANSPORTATION CONCURRENCE

TECHNICAL SERVICES MANAGING ENGINEER — DATE

OR99W: MILLER CREEK BRIDGE
PACIFIC HIGHWAY WEST
BENTON COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-STP-S091(019)	1

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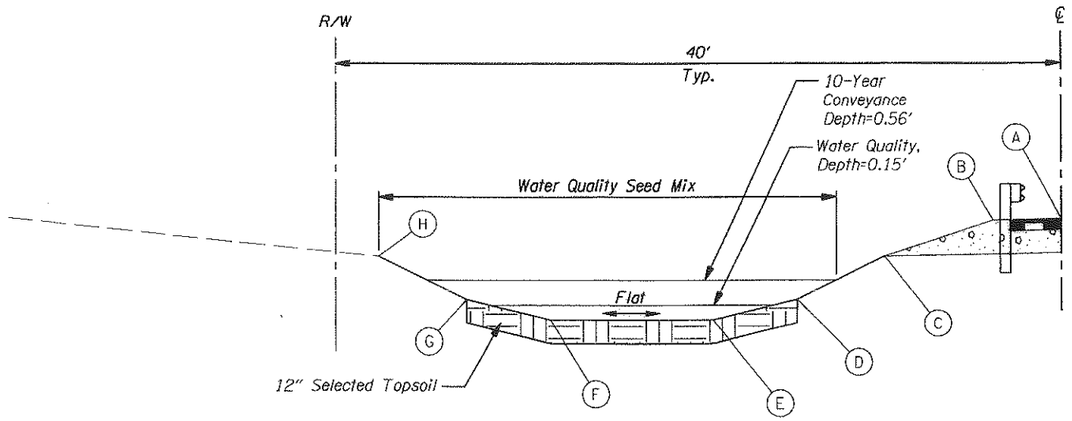
REVISED AS CONSTRUCTED
16/10/08 CONTRACT 13381

STATION / OFFSET / ELEVATION TABLE

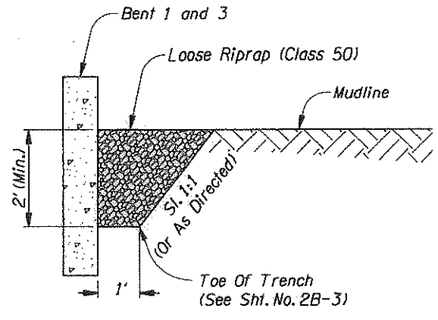
STA.	A	B		C		D		E		F		G		H	
	cl	Offset	Elev.	Offset	Elev.	Offset	Elev.	Offset	Elev.	Offset	Elev.	Offset	Elev.	Offset	Elev.
85+60	288.45	24.00	287.97	28.32	286.38	30.28	285.40	31.28	284.90	35.28	284.90	36.28	285.29	39.50	286.90
85+70	288.43	24.00	287.95	28.32	286.36	30.34	285.35	31.34	284.85	35.34	284.85	36.34	285.22	39.50	286.80
85+80	288.41	24.00	287.93	28.32	286.34	30.40	285.30	31.40	284.80	35.40	284.80	36.40	285.15	39.50	286.70
85+90	288.39	24.00	287.91	28.32	286.32	30.70	285.13	31.70	284.75	35.70	284.75	36.70	285.00	39.50	286.40
86+00	288.38	24.00	287.90	28.32	286.31	31.00	284.95	32.00	284.70	36.00	284.70	37.00	284.95	39.50	286.40
86+10	288.37	24.00	287.89	28.32	286.30	31.12	284.90	32.12	284.65	36.12	284.65	37.12	284.90	39.22	285.95
86+20	288.36	24.00	287.88	28.32	286.29	31.20	284.85	32.20	284.60	36.20	284.60	37.20	284.85	38.90	285.70
86+30	288.35	24.00	287.87	28.32	286.28	31.28	284.80	32.28	284.55	36.28	284.55	37.28	284.80	39.28	285.80
86+40	288.34	24.00	287.86	28.32	286.27	31.28	284.75	32.36	284.50	36.36	284.50	37.36	284.75	39.26	285.70
86+50	288.32	24.00	287.84	28.32	286.25	31.42	284.70	32.42	284.45	36.42	284.45	37.42	284.70	39.02	285.50
86+60	288.30	24.00	287.82	28.32	286.23	31.48	284.65	32.48	284.40	36.48	284.40	37.48	284.65	38.78	285.30



WATER QUALITY SWALE

STA. 85+60.00 To. STA. 86+60.00 Lt.

Notes:
1. Install Riprap Pad Where Pipe Enters Swale. (See Sht. No. 2B-2)



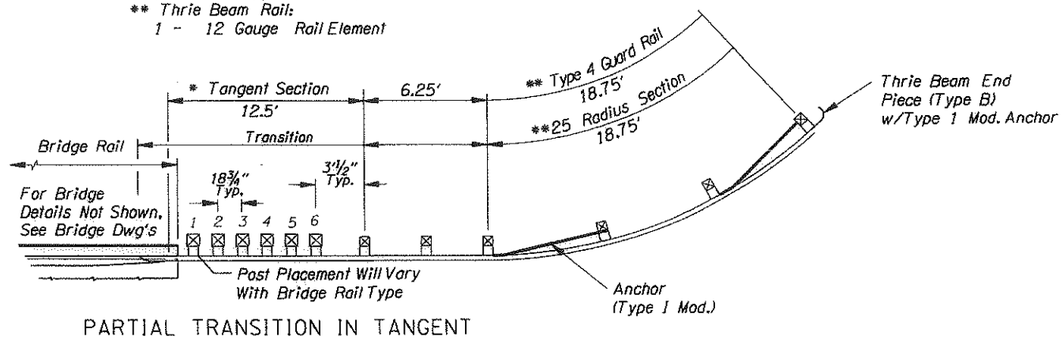
REVETMENT

Notes:
1. For Transition Details, See Appropriate Bridge Standard Drawings. Eliminate Thrie Beam To W-Beam Rail Element When Type 4 Rail Is Used.

2. Place Radius ID Plate (See Drg. RD415).

3. Shop Fabricate All Radius Rail To Dimensions Shown

4. Rail Elements:
   * Thrie Beam Rail:
     2 - 12 Gauge Rail Elements Or
     1 - 10 Gauge Rail Element
   ** Thrie Beam Rail:
     1 - 12 Gauge Rail Element



PARTIAL TRANSITION IN TANGENT
25' RADIUS

BRIDGE RAIL END PROTECTION (TYPE 4 RAIL)

REGISTERED PROFESSIONAL ENGINEER
67079PE
OREGON
JULY. 15, 2003
CURTIS C. VANDERZANDEN
EXPIRATION DATE: 6/30/08 10

OREGON DEPARTMENT OF TRANSPORTATION

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111 S.W. 5th Avenue, Suite 2500
Portland, OR 97204-3628
(503) 227-3251 Fax (503) 274-4681

kpff

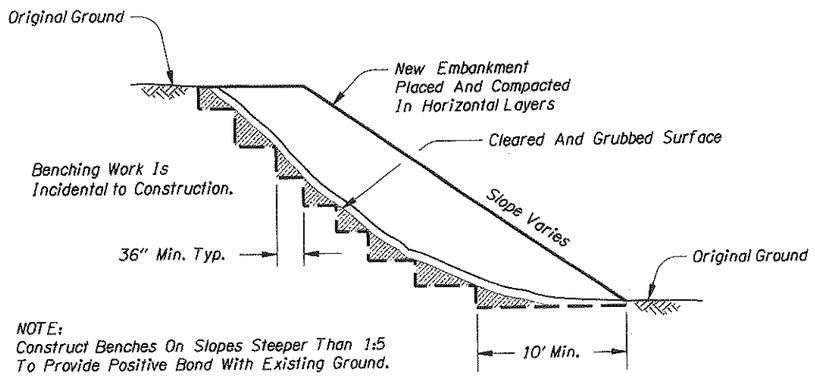
OR99W: MILLER CREEK BRIDGE
PACIFIC HIGHWAY WEST
BENTON COUNTY

Design Team Leader - Curt Vanderzanden
Designed By - Brad Cooper/Fred Maddox
Drafted By - Benjamin Eneas

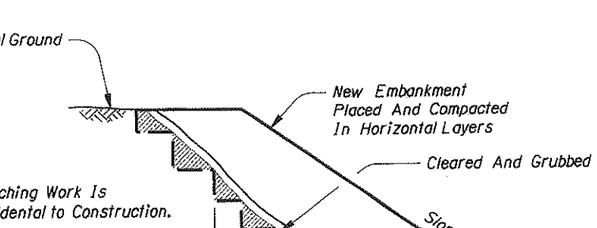
DETAILS

SHEET NO. 2B

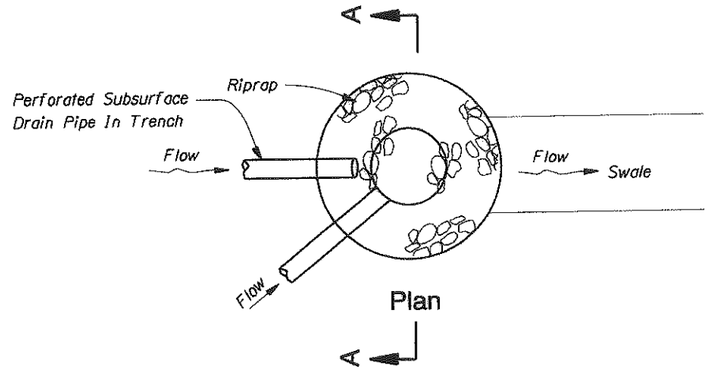
REVISED AS CONSTRUCTED
16/10/08 CONTRACT 13381

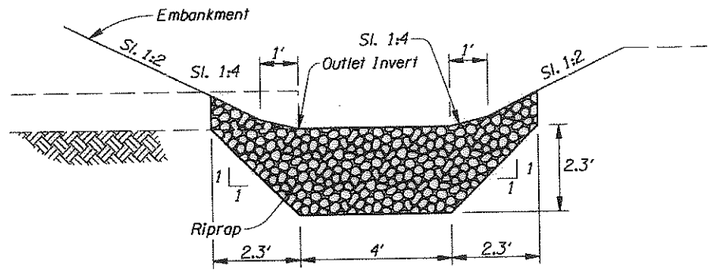


STANDARD EMBANKMENT CONSTRUCTION



FOUNDATION EXCAVATION
(Locations As Directed)





Section A-A
RIPRAP PAD

OREGON DEPARTMENT OF TRANSPORTATION

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kpff

REGISTERED PROFESSIONAL ENGINEER
67079PE
OREGON
JULY. 15, 2003
CURTIS C. VANDERZANDEN

EXPIRATION DATE: 6/30/08 10

OR99W: MILLER CREEK BRIDGE
PACIFIC HIGHWAY WEST
BENTON COUNTY

Design Team Leader - Curt Vanderzanden
Designed By - Brad Cooper/Fred Maddox
Drafted By - Benjamin Eneas

DETAILS

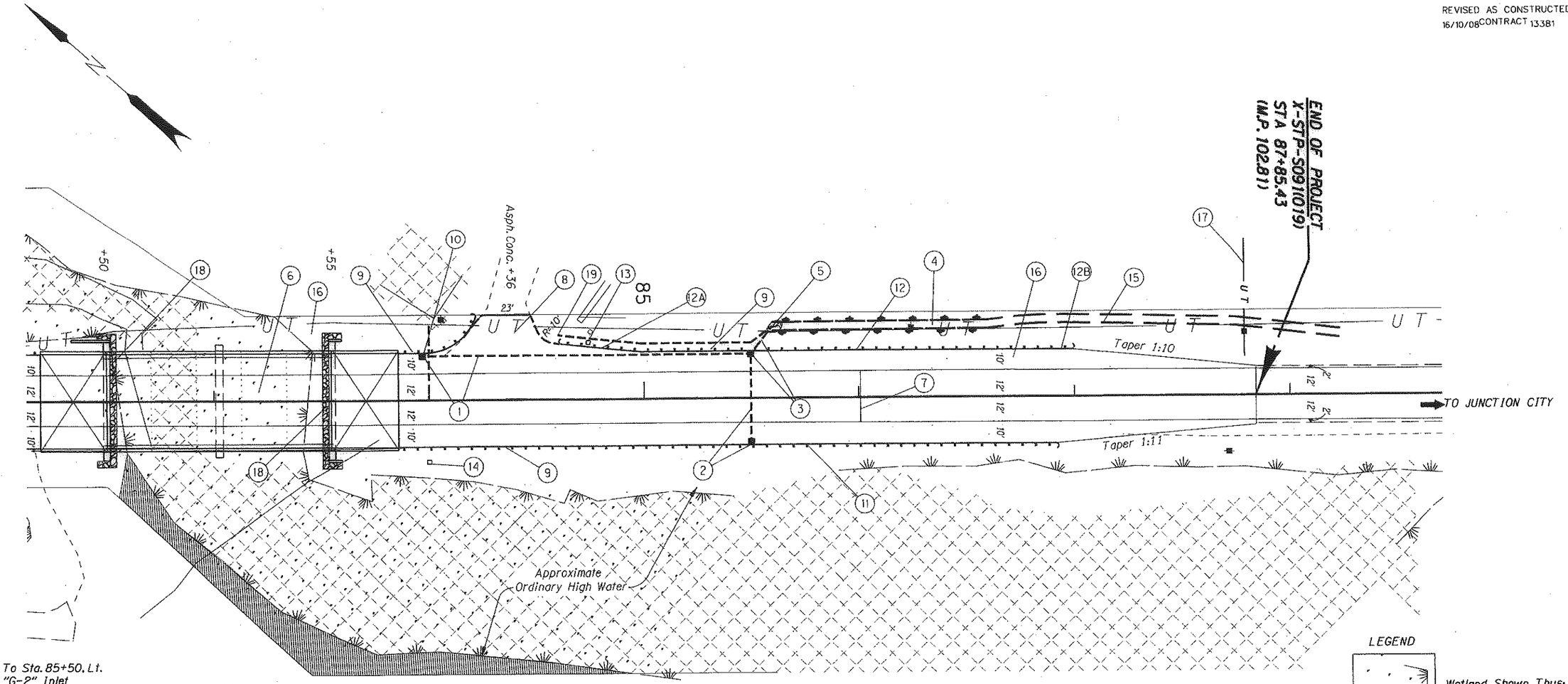
SHEET NO. 2B-2

1:1200 - 002

Sec. 3, T. 15 S, R. 5 W, W.M.

40V-46

REVISED AS CONSTRUCTED
16/10/08 CONTRACT 13381



(1) Sta. 83+97 To Sta. 85+50, Lt.
Const. Type "G-2" Inlet
Inst. 12" Sew. Pipe - 153'
5' Depth
(See Drg. Nos. RD300 & RD364)

(2) Sta. 85+50.00, Rt.
Const. Type "G-2" Inlet
Inst. 12" Sew. Pipe - 41'
5' Depth
S=0.0050'/FT
I.E. (12" Out)-285.19

(3) Sta. 85+60, Lt.
Const. Type "G-2" Inlet
Inst. 12" Sew. Pipe - 16'
5' Depth

(4) Sta. 85+60 (33.5' Lt.) To Sta. 86+60 (34.0' Lt.)
Const. Water Quality Swale
Di. Exc. -70 Cu. Yd.
(For Details, See Sht. 2B)

(5) Const. Riprap Pad
(Class 50) - 5 Cu. Yd.
(For Details, See Sht. 2B-2)

(6) Structure No. 20463
Const. Structure - 105'
Rdwy. Width 44'-8"
And Reinf. Panel At Bridge Ends
(For Drg. Nos., See Sht. 1A)

(7) Construct AC Pavement Match

(8) Const. Appr.

(9) Const. Drainage Curb
Sta. 83+86 To Sta. 83+98, Lt.
Sta. 84+61 To Sta. 85+55, Lt.
Sta. 83+86 To Sta. 85+55, Rt.
(See Drg's. No's. RD400 & RD700)

(10) Sta. 83+86 To Sta. 84+22, Lt.
Const. Guardrail - 25' (Type 4)
(25' Radius)
Const. Guardrail Transition
Flare Rate=0, W=0, E=2'
Const. Anchor (Type 1 Mod.) -2
Inst. End Piece (Type B)
(For Details, See Sht. 2B)

(11) Sta. 83+86 To Sta. 86+91, Rt.
Const. Guardrail - 237.5' (Type 2A)
- 12.5' (Type 3)
Const. Guardrail Transition
Const. Guardrail Terminal, Non-Flared, (Test Level 3)
Flare Rate=0, W=0, E=2'

(12) Sta. 84+61 To Sta. 86+99, Lt.
Const. Guardrail - 162.5' (Type 2A)
(12A) Const. Guardrail Terminal, Flared, (Test Level 3)
Flare Rate=0, W=4', E=2'
(12B) Const. Guardrail Terminal, Non-Flared, (Test Level 3)
Flare Rate=0, W=0, E=2'

(13) Install Single Mailbox Support
Const. Conc. Collar
(Locate As Dir.)
(See Drg. No's. RD100 & RD101)

(14) Install Bat Housing
(Locate As. Dir.)

(15) Const. Ditch
"V" Bottom, 1:2 Slopes
S=0.0020'/FT
Di. Exc. - 11 Cu. Yd.

(16) See Sht. 3, Note 5

(17) Approx. Location of Relocated
Monroe Telephone Line
(By Others)

(18) Const. Revetment
(For Details, See Sht. 2B-3)

(19) Sta. 84+60, Lt. To Sta. 85+55, Lt.
Inst. 4" Subsurface Drain
I.E. = 285.68
S = 0.0050'/Ft Min.
Const. Outlet To Riprap Pad
(See Drg. No. RD312)

LEGEND

Wetland Shown Thus:

No Work Area

REGISTERED PROFESSIONAL ENGINEER
67079PE
OREGON
JULY. 15, 2003
CURTIS C. VANDERZANDEN

EXPIRATION DATE: 6/30/08 10

OREGON DEPARTMENT OF TRANSPORTATION

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OR99W: MILLER CREEK BRIDGE
PACIFIC HIGHWAY WEST
BENTON COUNTY

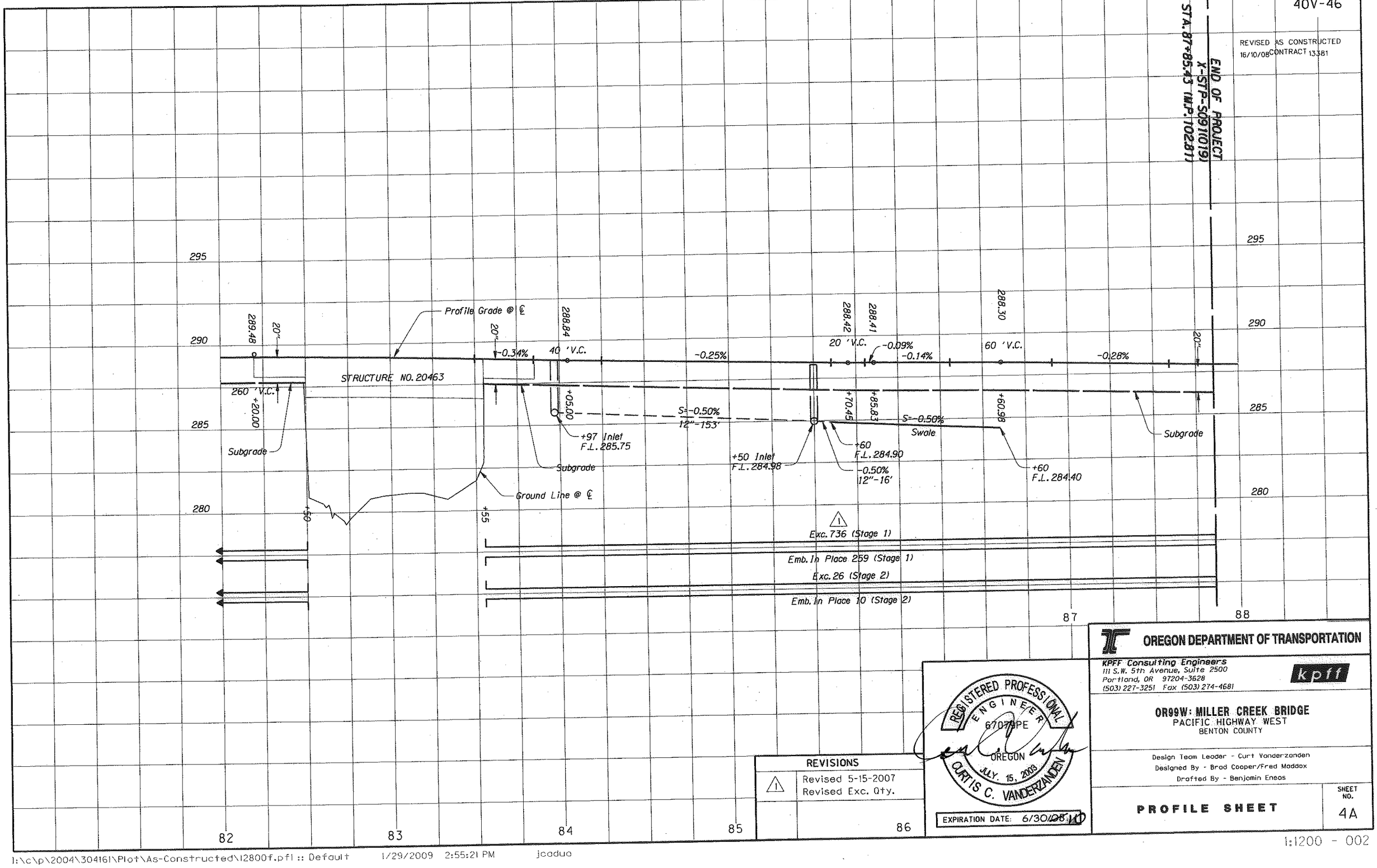
Design Team Leader - Curt Vanderzanden
Designed By - Brad Cooper/Fred Maddox
Drafted By - Benjamin Eneas

GENERAL CONSTRUCTION

SHEET NO. 4

REVISED AS CONSTRUCTED
16/10/08 CONTRACT 13381

END OF PROJECT
X-STP-S091(019)
STA. 87+85.43 (M.P. 102.81)



REVISIONS	
1	Revised 5-15-2007 Revised Exc. Qty.

REGISTERED PROFESSIONAL ENGINEER
67078PE
OREGON
JULY. 15, 2003
CURTIS C. VANDERZANDEN
EXPIRATION DATE: 6/30/08

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OR99W: MILLER CREEK BRIDGE
PACIFIC HIGHWAY WEST
BENTON COUNTY

Design Team Leader - Curt Vanderzanden
Designed By - Brad Cooper/Fred Maddox
Drafted By - Benjamin Eneas

PROFILE SHEET

SHEET NO. 4A

1:1200 - 002