OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: November 2017

DFI No. D00344

Figure 1: DFI No. D00344, looking Northeast

1. Identification

Drainage Facility ID (DFI):	D00344
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 38V-097
Location:	District: 05
	Highway No.: 001
	Mile Post: 180.41 to 180.41, NB [right]

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.

Facility location type: Roadway shoulder

Flow direction: East

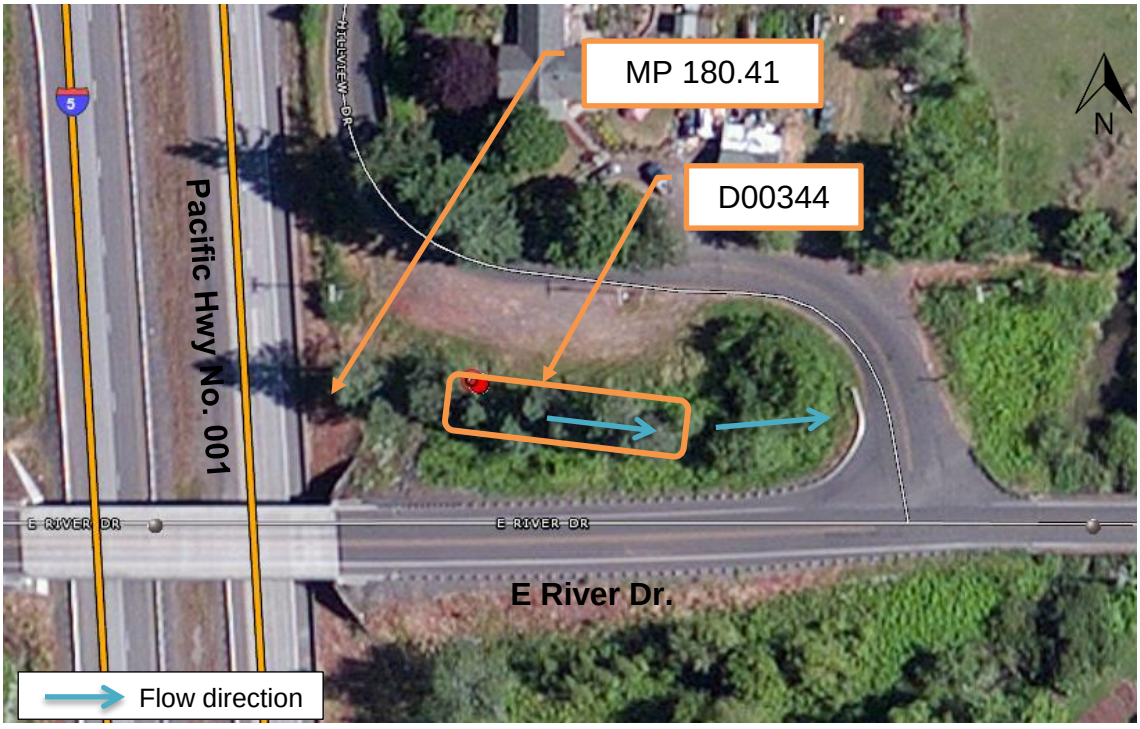


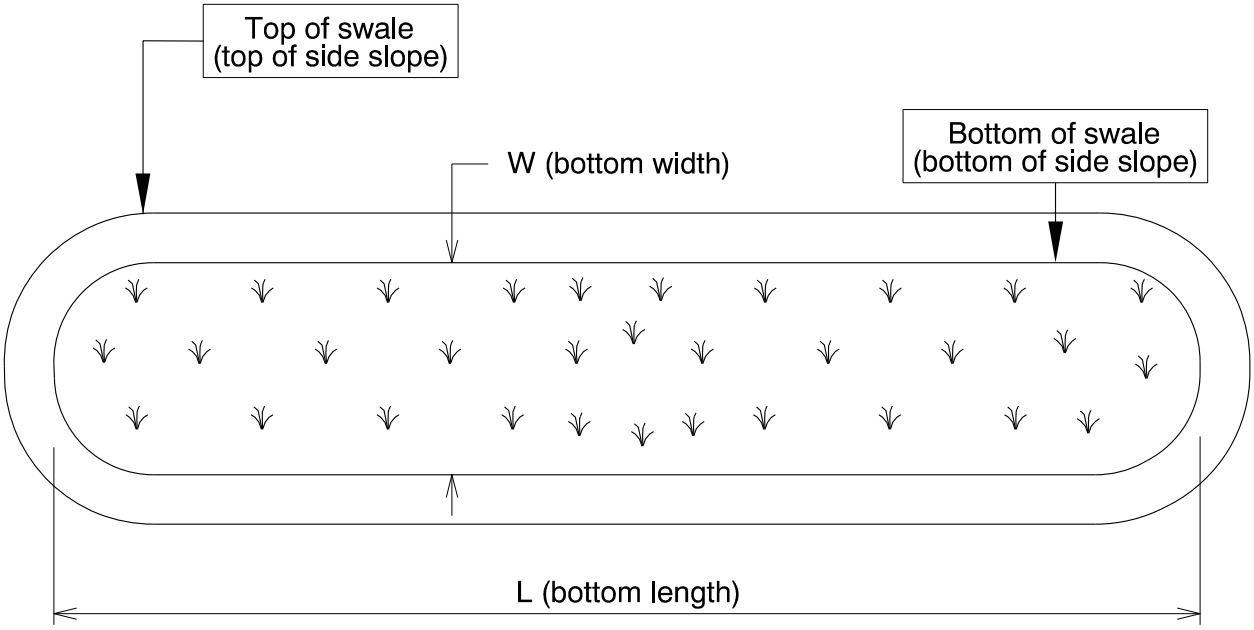
Figure 2: Facility location map

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:

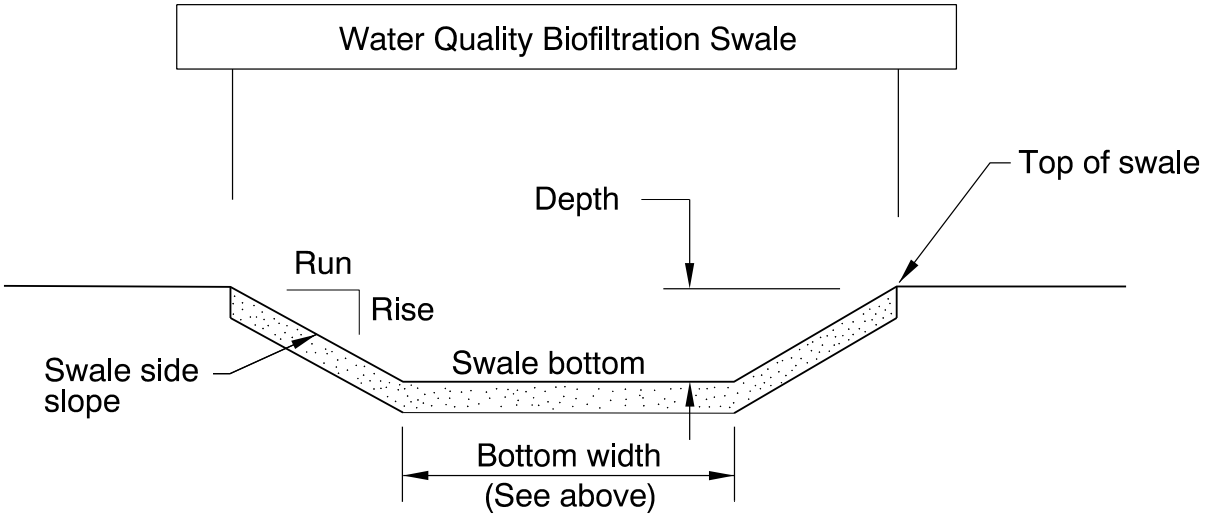
Bottom Length (feet)	Bottom Width (feet)
±120	2



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)
0.5	**1**	**4**



Site Specific Information: The facility is very shallow and it can be difficult to spot. Maintenance crews should use caution when driving vehicles around the area and avoid driving into the facility to prevent damage from occurring.

5. Facility Access

Maintenance access to the facility:

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

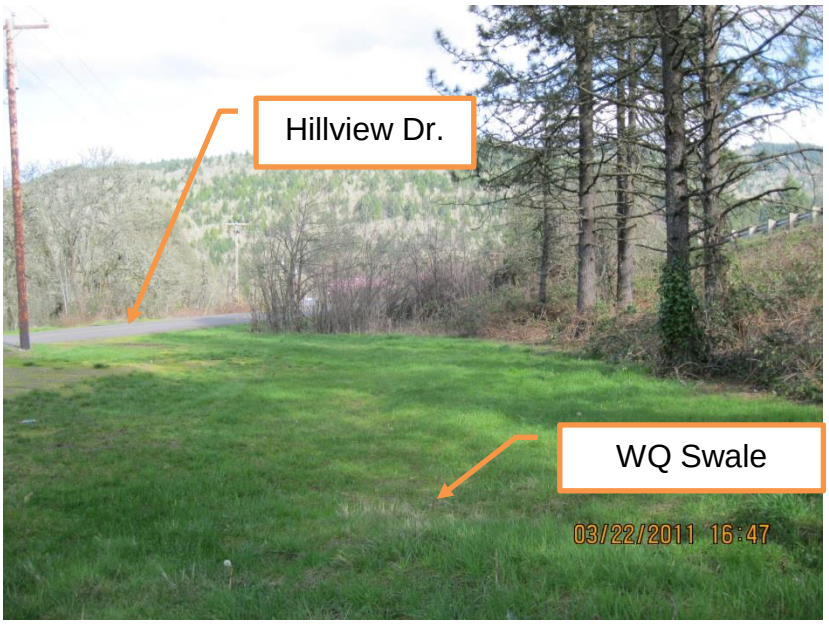


Figure 3: Facility access from Hillview Dr.

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 (Amended native soil)	☒	**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) Note: Outfall to wetland area	☒ **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 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.

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

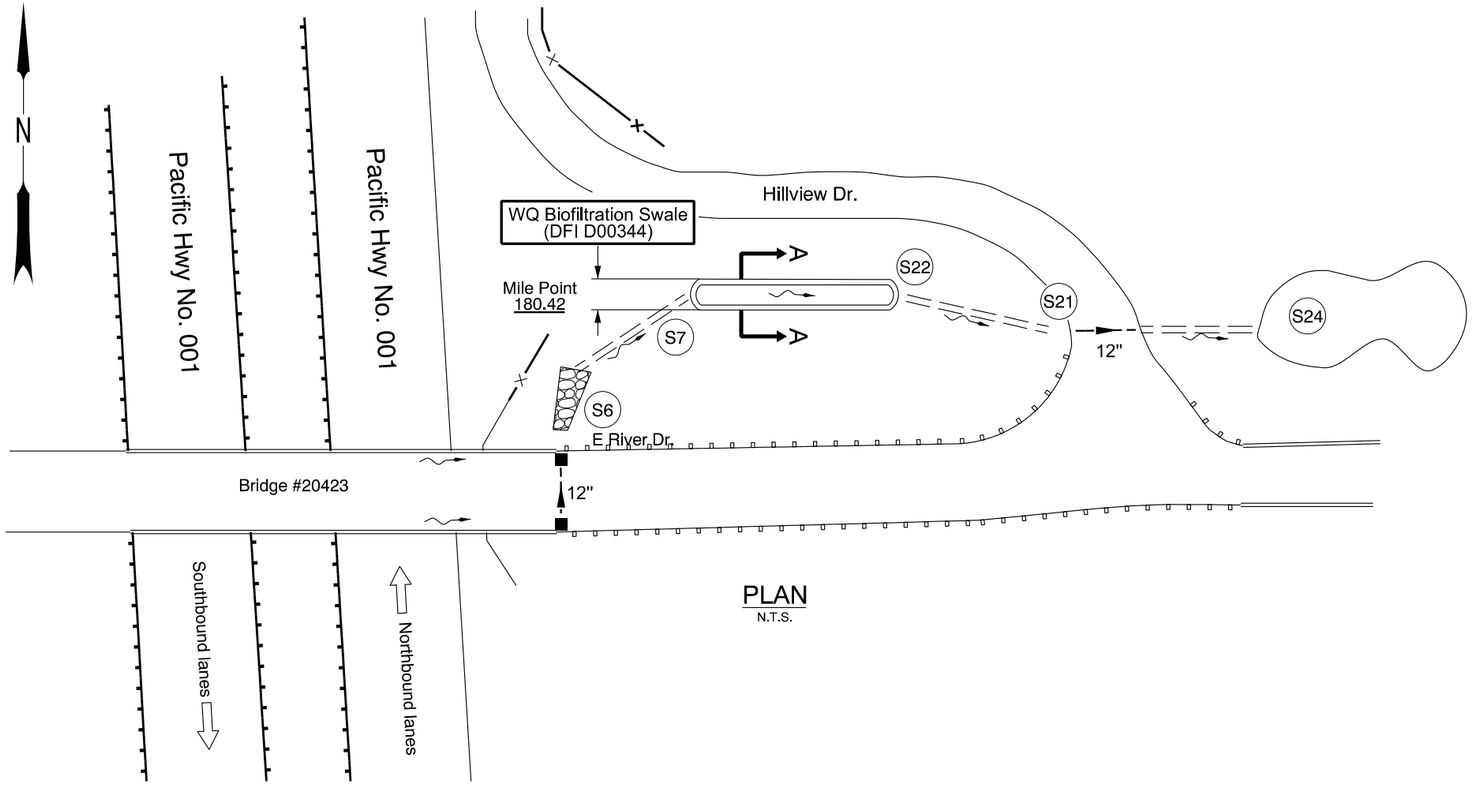
Contact any of the following for more detailed information about management of waste materials found on site:

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

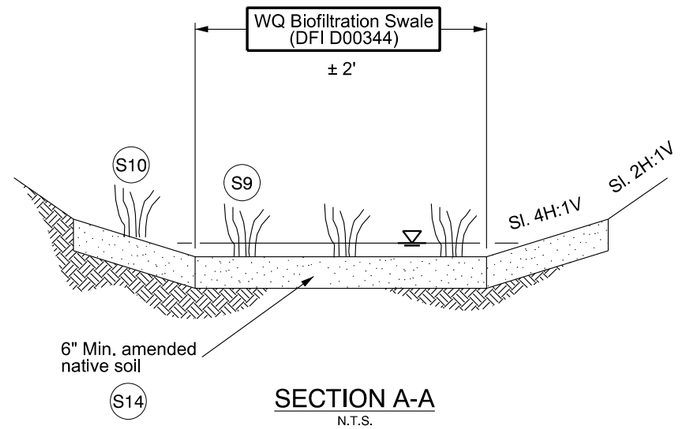
A Appendix A – Site Specific Operational Plan

Contents:

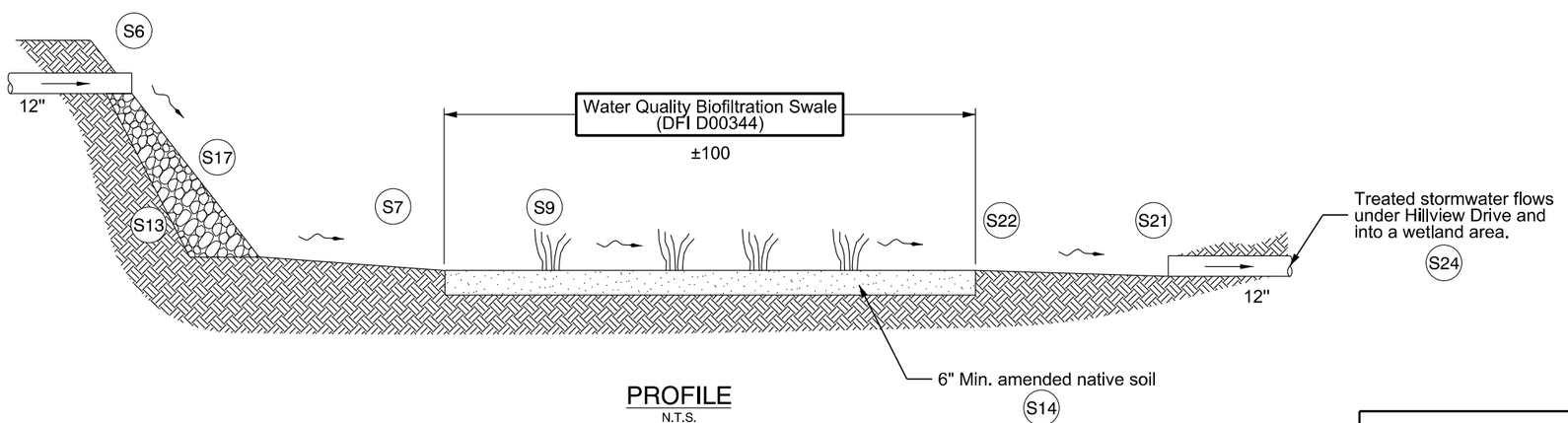
Operational Plan: DFI D00344



PLAN
N.T.S.



SECTION A-A
N.T.S.



PROFILE
N.T.S.

LEGEND

- Stormwater Flow Path
- Catch Basin
- Traffic Flow Direction
- Storm Pipe Flow Direction
- Flow Direction
- S# Swale Component (Table 1)

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Christina Pack

Drafted By: Chabeli Arreola

DFI D00344
MAINTENANCE DISTRICT 05 HWY 001
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 180.42
LANE COUNTY

DFI_D00344.dgn

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 38V-097

Index Of Roadway Drawings On Sheet 1A

Standard Drg. Nos.

BR150	Double Strip Seal Expansion Joint
BR155	Bridge Joint Details
BR203	Standard Transition Concrete Bridge Rail to Guardrail
BR236	Trailing End Br. Connection Concrete Br. Rail to Guardrail
BR240	Protective Fencing
BR241	Protective Fencing
BR350	Temp. Diaphragm Beam for Prestressed Concrete Beams
RD364	Concrete Inlets Types G-1, G-2 & G-2M
RD376	Misc. Drainage Structures, Siphon Box & Inlet Adj. Cap
RD400	Guardrail and Metal Median Barrier
RD405	Guardrail and Metal Median Barrier Parts
RD415	Guardrail and Metal Median Barrier Parts
RD425	2'6" - 4'0" Flared Terminal
RD440	Guardrail Installation at Bridge Ends
RD450	Guardrail Anchors (Steel)
RD470	Guardrail Over Low-Fill Culverts
RD500	Precast Concrete Barrier Pin and Loop Assembly
RD515	Median Barrier Anchoring Details
RD516	Securing Concrete Barrier To Roadway
RD530	Guardrail Transition to Concrete Barrier
RD545	Precast Tall (42") Concrete Barrier
RD550	Cast-In-Place Concrete Barrier Transition To Bridge Rail
RD560	Cast-In-Place Barrier Transition To Standard Concrete Barrier
RD570	Guardrail Transition to Tall Concrete Barrier
RD600	Portland Cement Concrete Pavement
RD605	Continuously Reinforced Concrete Pavement
RD610	Asphalt Pavement Details
RD700	Curbs
RD810	Barbed And Woven Wire Fences
RD900	Traffic Control Plans Details
RD920	Traffic Control Plans Freeway Sections
RD945	Traffic Control Plans Details
RD950	Temporary Barricades
RD955	Temporary Impact Attenuators
RD960	Temporary Impact Attenuators

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

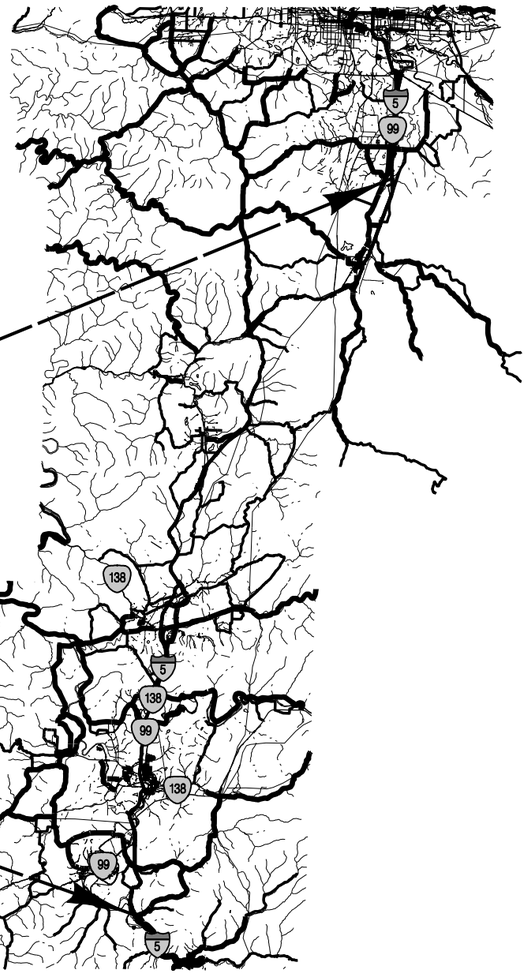
GRADING, DRAINAGE, STRUCTURES & PAVING

I-5: CLARKS BRANCH TUNNEL MILL RACE SEC. DESIGN-BUILD PROJECT

PACIFIC HIGHWAY

DOUGLAS AND LANE COUNTIES

April 11, 2007



BEGINNING OF PROJECT

M.P. 180.49

END OF PROJECT

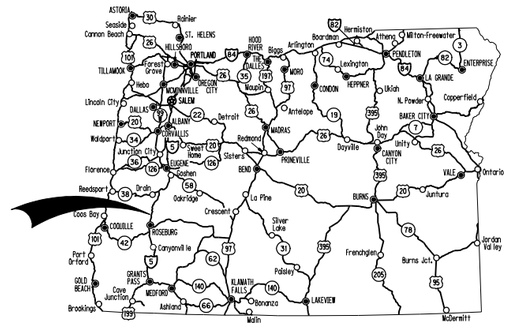
M.P. 113.44

REVISED AS CONSTRUCTED
04/07 CONTRACT 13111
DESIGN MGR. JAMES BAUMAN

N

Sec. 26, T. 19 S., R. 3 W., W.M.
Sec. 35, T. 19 S., R. 3 W., W.M.
Sec. 2, T. 20 S., R. 3 W., W.M.
Sec. 11, T. 20 S., R. 3 W., W.M.
Sec. 1, T. 28 S., R. 6 W., W.M.
Sec. 2, T. 28 S., R. 6 W., W.M.
Sec. 11, T. 28 S., R. 6 W., W.M.
Sec. 12, T. 28 S., R. 6 W., W.M.
Sec. 13, T. 28 S., R. 6 W., W.M.
Sec. 14, T. 28 S., R. 6 W., W.M.
Sec. 23, T. 28 S., R. 6 W., W.M.
Sec. 24, T. 28 S., R. 6 W., W.M.

Rev. No.	Date	Revision
1	4/11/07	As Constructed



Overall Length Of Project - 67.05 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

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Pape	COMMISSIONER
Janice J. Wilson	COMMISSIONER
Matt Garrett	DIRECTOR OF TRANSPORTATION

PLANS PREPARED FOR
ODOT
BY:
CH2MHILL

REGISTERED PROFESSIONAL ENGINEER
ORIGINAL
16,901
DESIGN
OREGON
SEALED
JAMES F. BAUMAN

EXPIRES: 12/31/07

OREGON DEPARTMENT OF TRANSPORTATION
CONCURRENCE

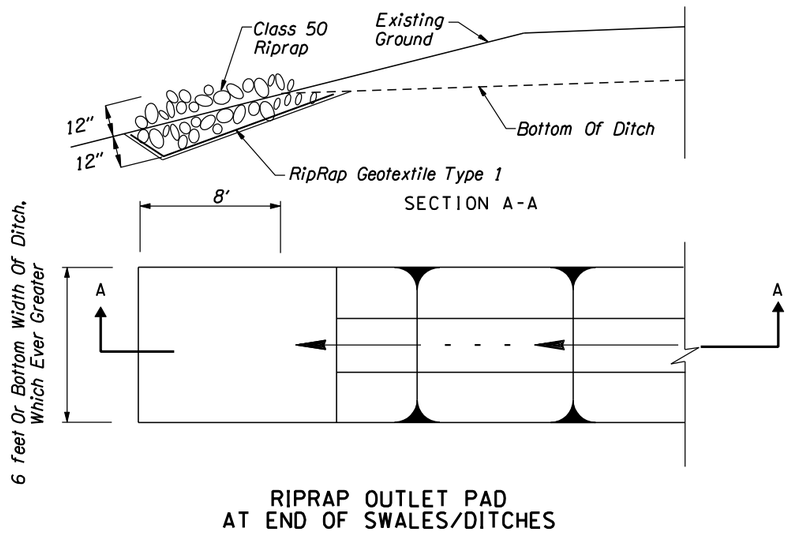
TECHNICAL SERVICES MANAGING ENGINEER _____ DATE _____

I-5: CLARKS BRANCH TO TUNNEL MILL RACE SEC. DESIGN-BUILD PROJECT
PACIFIC HIGHWAY
LANE AND DOUGLAS COUNTIES

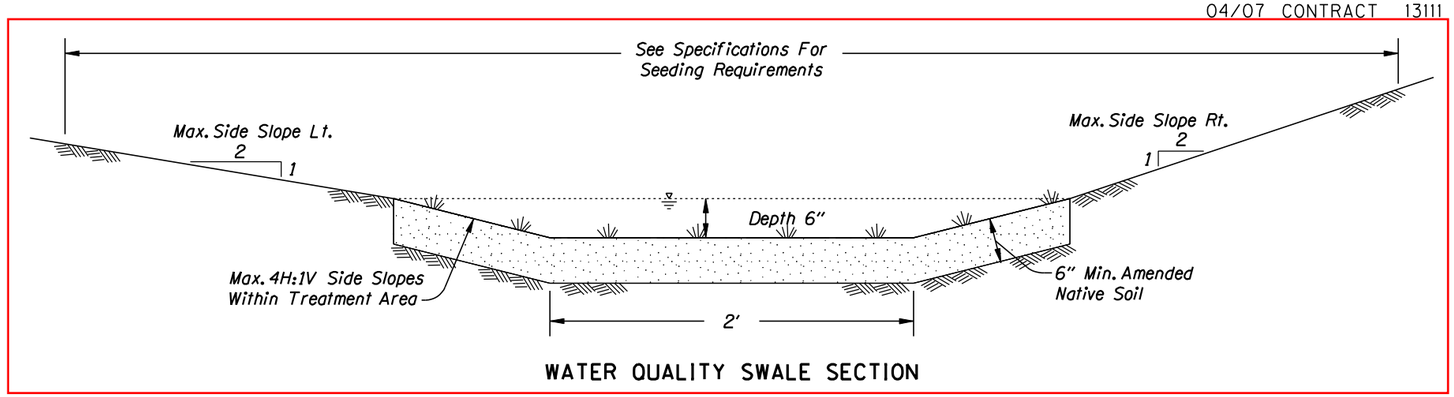
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	OTIA-SO-S001(197)	1

CH2MHILL

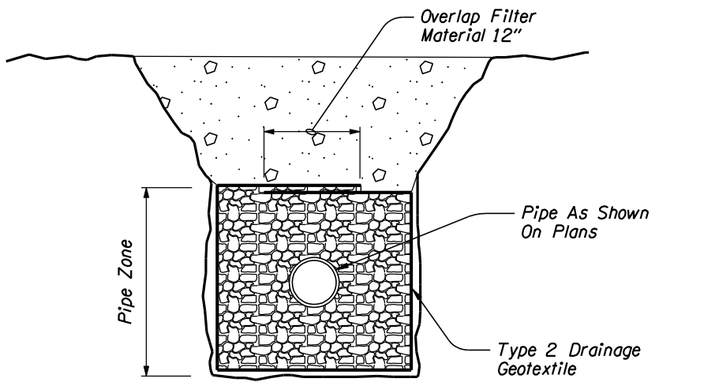
REVISED AS CONSTRUCTED
04/07 CONTRACT 13111



RIPRAP OUTLET PAD
AT END OF SWALES/DITCHES

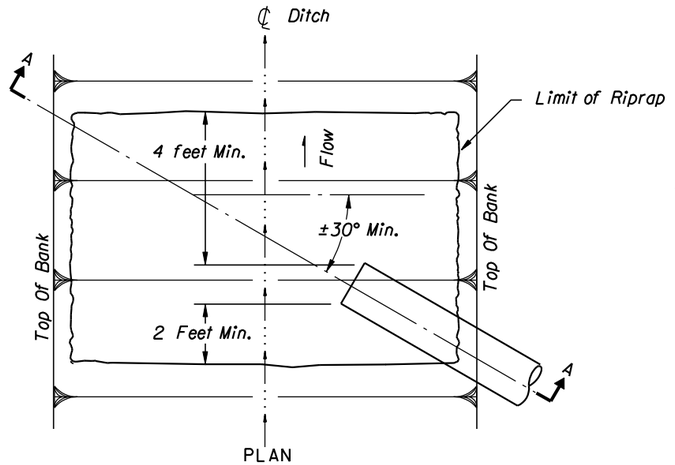


WATER QUALITY SWALE SECTION

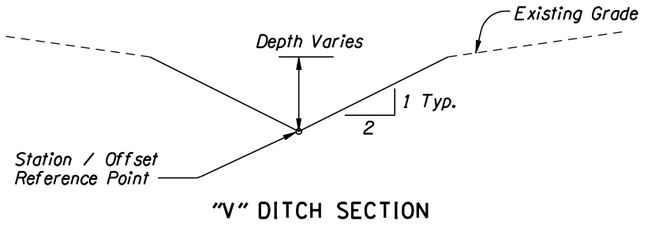


LINED PIPE
TRENCH DETAIL

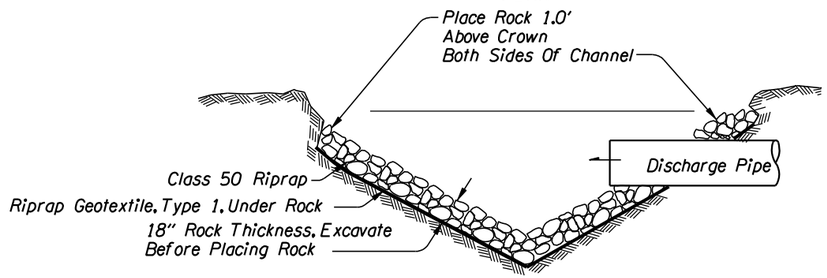
Note:
For Additional Trench Details, See Drg. No. RD300.



PLAN



"V" DITCH SECTION



SECTION A-A

RIPRAP OUTLET PAD
AT END OF PIPE

Rev. No.	Date	Revision
2	4/11/2007	As Constructed
1	6/20/2006	Added Pipe Trench Detail

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: CLARKS BRANCH TO TUNNEL MILL RACE SEC. DESIGN-BUILD PROJECT

PACIFIC HIGHWAY

LANE AND DOUGLAS COUNTIES

Reviewed By - Steve Katko

Designed By - Mark Anderson

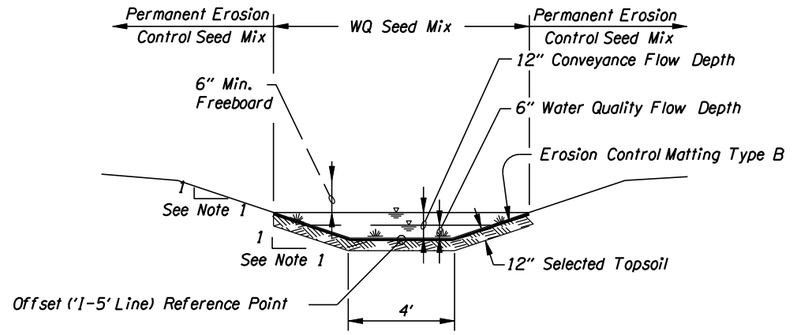
Drafted By - Robert Luke

DRAINAGE DETAILS

SHEET NO. 2B-4

CH2MHILL

REVISED AS CONSTRUCTED
04/07 CONTRACT 13111



Notes:

1. Sideslopes In The Water Quality Section Of The Swale Shall Be 4H:1V Maximum. Sideslopes In the Conveyance Flow Depth Section Above The Water Quality Flow Depth Shall Match Embankment Slopes, Not To Exceed 3H:1V.
2. Erosion Control Matting Materials And Installation Per ODOT Std. Spec. Section 280.

TYPICAL BIOSWALE SECTION

Rev. No.	Date	Revision
1	4/11/2007	As Constructed

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: CLARKS BRANCH TO TUNNEL MILL RACE SEC.
DESIGN-BUILD PROJECT
PACIFIC HIGHWAY
LANE AND DOUGLAS COUNTIES

Reviewed By - Tim Yamada
Designed By - Chris Allen
Drafted By - Robert Luke

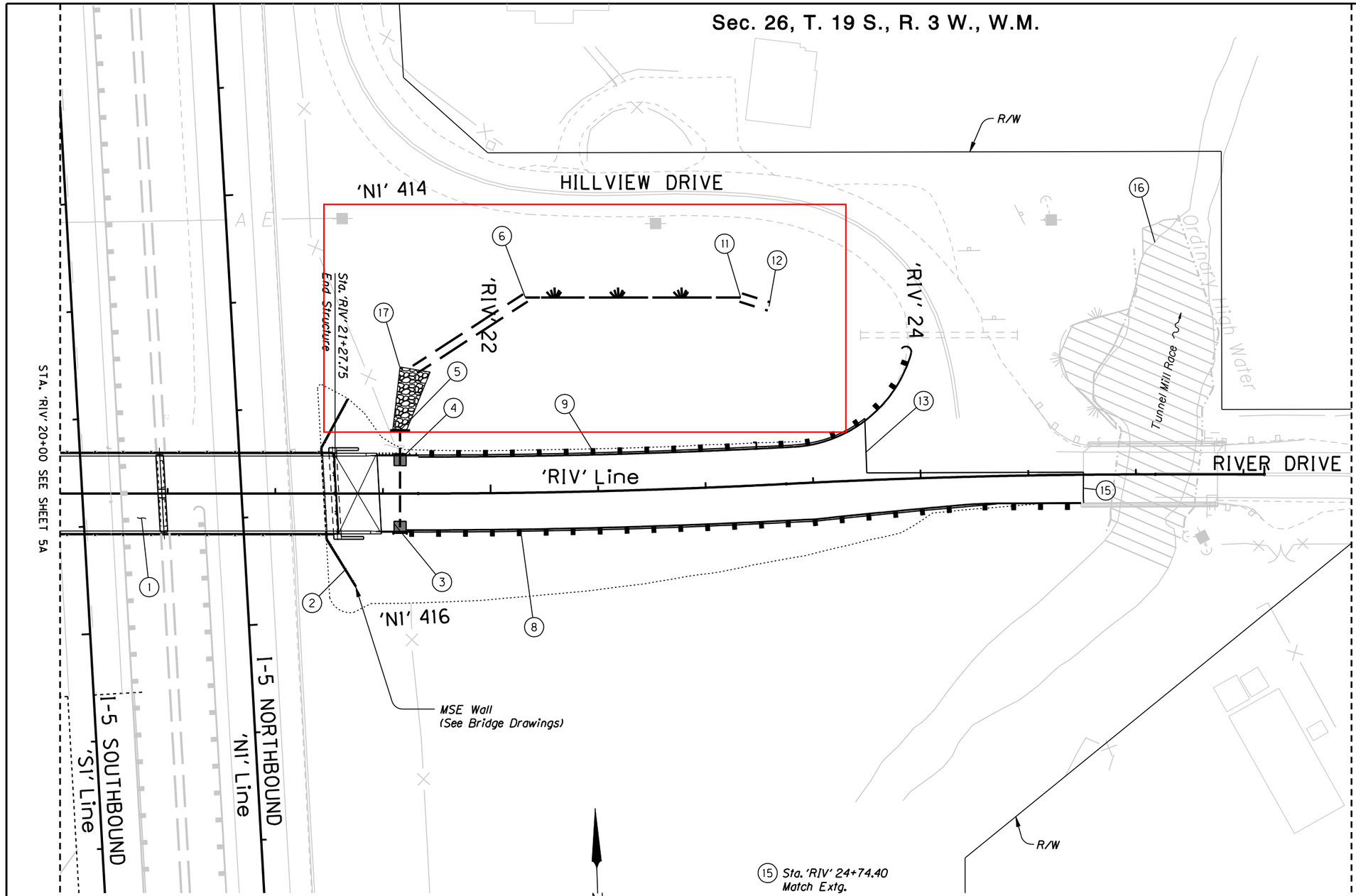
DRAINAGE DETAILS

SHEET NO. 2B-5

CH2MHILL

REVISED AS CONSTRUCTED
04/07 CONTRACT 13111

Sec. 26, T. 19 S., R. 3 W., W.M.



(1) Const. Structure
(See Sht. 5A, Note 16)

(2) Install Type 2 Fence - 94'
(See Drg. No. RD810)

(3) Sta. 'RIV' 21+57.92, 15.74' Rt.
Const. Type "G-2" Inlet
Grate Elev. 586.71
I.E. 583.71 N.
Inst. Drainage Curb - 11'

(4) Sta. 'RIV' 21+57.92, 15.73' Lt.
Const. Type "G-2" Inlet
Grate Elev. 586.71
I.E. 583.20 N.
Inst. 12" Storm Sew. Pipe, CPEP - 31'
I.E. 583.40 S.
Inst. Drainage Curb - 13'

(5) Sta. 'RIV' 21+57.92, 29.37' Lt.
Inst. 12" Storm Sew. Pipe, CPEP - 14'
I.E. 583.06

(6) Sta. 'RIV' 22+17.58, 90.70' Lt.
Const. Ditch 2' Bottom, 2:1 Slopes
F.L. 564.30

(8) Sta. 'RIV' 21+49.24 To
Sta. 'RIV' 24+73.64
Const. Guardrail Transition - 1
Const. Bridge Rail To Guardrail Connection - 1
Const. Guardrail (Type 3) - 12.5'
Const. Guardrail (Type 2A) - 281.85'
(See Drg. Nos. RD400, RD405, RD415, RD440, BR203, BR236)

(9) Sta. 'RIV' 21+47.18 To
Sta. 'RIV' 23+97.60
Const. Guardrail Transition - 1
Const. Guardrail (Type 3) - 25'
Const. Guardrail (Type 2A) - 175'
Const. Weak Post W Beam - 50'
Const. Type 1 Anchor
(For Details, See Sht. 2B-8 And Drg. Nos. RD400, RD405, RD415, RD420, RD440, BR203)

(11) Sta. 'RIV' 23+20.34, 87.58' Lt.
Const. Bioswale - 100'
(For Details, See Sht. 2B-4)
F.L. 563.80

(12) Sta. 'RIV' 23+33.64, 82.79' Lt.
Const. Ditch 4' Bottom, 2:1 Slopes
F.L. 563.74 (Match Extg.)

(13) Sta. 'RIV' 23+75.00
Match Extg. (Westbound Lane)
Begin Inlay (Eastbound Lane)

(15) Sta. 'RIV' 24+74.40
Match Extg.

(16) Protect Extg. Wetland
And Water

(17) Sta. 'RIV' 21+64.92, 57.65' Lt.
F.L. 564.61
Const. Riprap Pad (Class 50)
7' (Top) x 10' (Bottom) x 29'x2'
Underlay W/Riprap
Geotextile - Type 1

Rev. No.	Date	Revision
1	4/11/2007	As Constructed

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: CLARKS BRANCH TO TUNNEL MILL RACE SEC. DESIGN-BUILD PROJECT

PACIFIC HIGHWAY

LANE AND DOUGLAS COUNTIES

Reviewed By - Shari Munroe

Designed By - Scott Christopherson

Drafted By - Lewis Demitroff

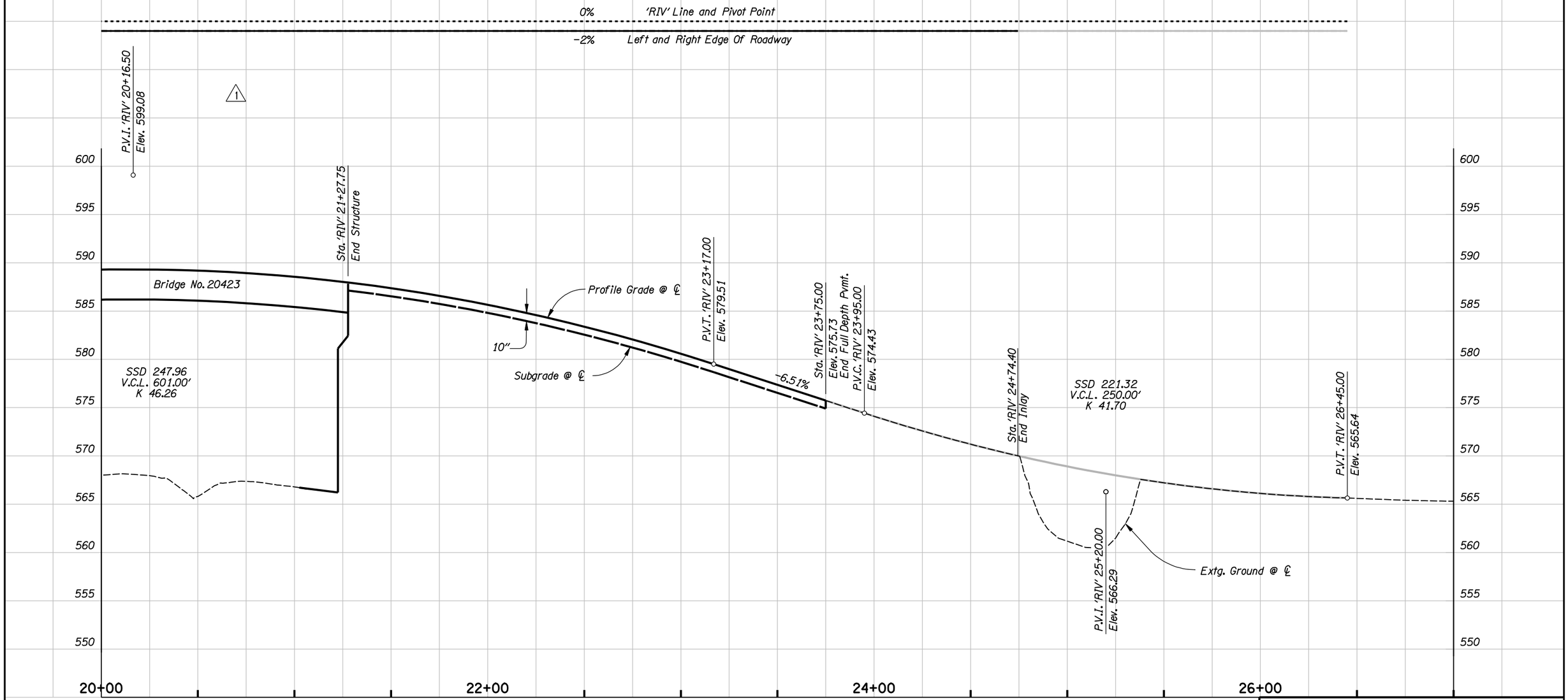
STA. 'RIV' 20+00 TO STA. 'RIV' 26+00 ROADWAY PLAN

SHEET NO. 5C

RIV PROFILE

CH2MHILL

REVISED AS CONSTRUCTED
04/07 CONTRACT 13111



Rev. No.	Date	Revision
2	4/11/2007	As Constructed
1	2/12/2007	Profile Adjustment During Construction

0 25 50 75
Horizontal Scale In Feet

0 5 10 15
Vertical Scale In Feet

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: CLARKS BRANCH TO TUNNEL MILL RACE SEC.
DESIGN-BUILD PROJECT

PACIFIC HIGHWAY

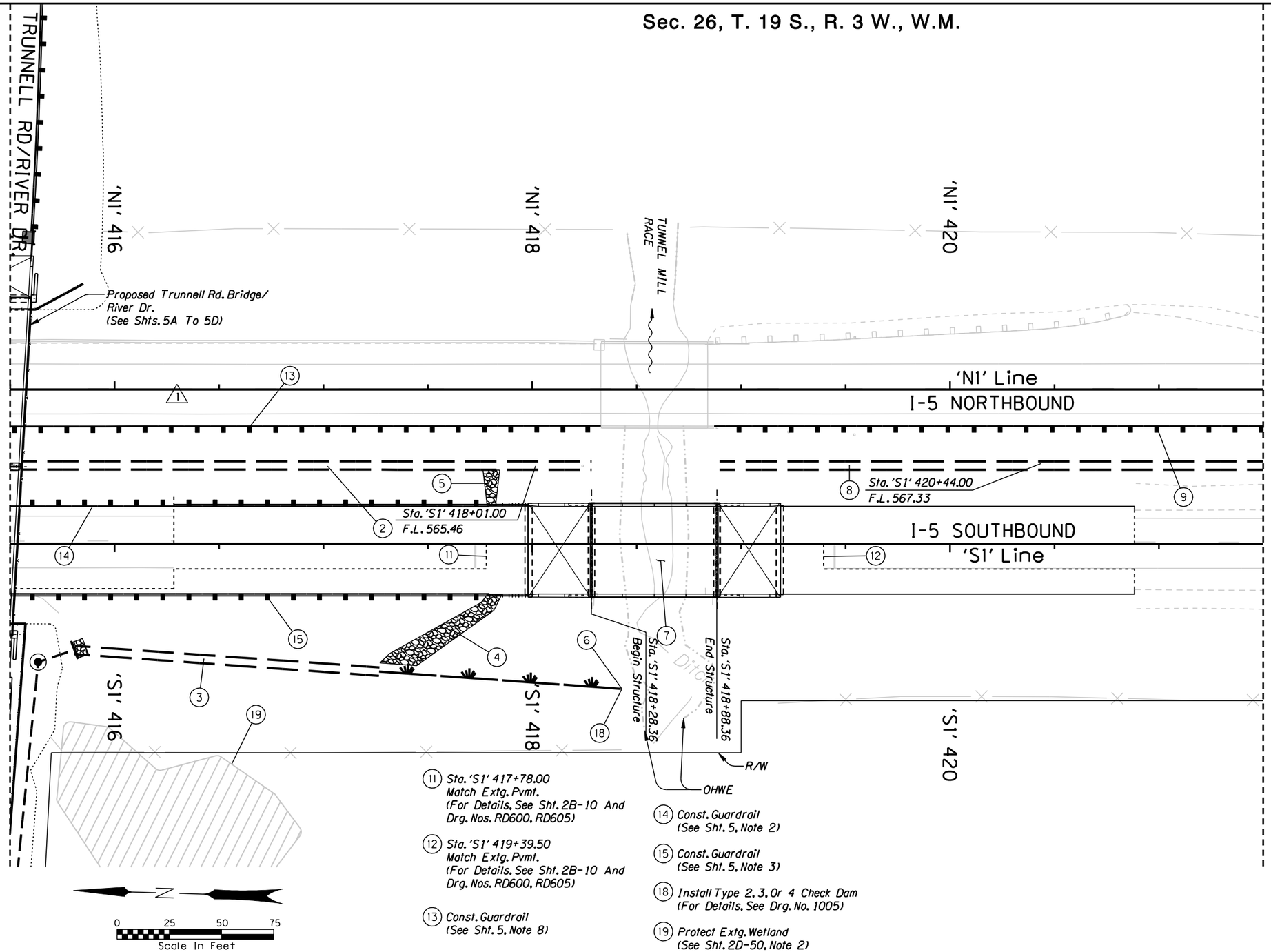
LANE AND DOUGLAS COUNTIES

Reviewed By - Shari Munroe
Designed By - Scott Christopherson
Drafted By - Lewis Demitroff

STA. 'RIV' 20+00 TO STA. 'RIV' 26+00
ROADWAY PROFILE

SHEET NO. 5D

Sec. 26, T. 19 S., R. 3 W., W.M.



(11) Sta. 'S1' 417+78.00
Match Extg. Pvmt.
(For Details, See Sht. 2B-10 And Drg. Nos. RD600, RD605)

(12) Sta. 'S1' 419+39.50
Match Extg. Pvmt.
(For Details, See Sht. 2B-10 And Drg. Nos. RD600, RD605)

(13) Const. Guardrail
(See Sht. 5, Note 8)

(14) Const. Guardrail
(See Sht. 5, Note 2)

(15) Const. Guardrail
(See Sht. 5, Note 3)

(18) Install Type 2, 3, Or 4 Check Dam
(For Details, See Drg. No. 1005)

(19) Protect Extg. Wetland
(See Sht. 2D-50, Note 2)

(2) Sta. 'S1' 415+55.00, 37.50' Lt., F.L. 565.84 To
Sta. 'S1' 418+28.00, 37.50' Lt., F.L. 564.95
(Match Extg.)
Const. Ditch
"V" Bottom, Varying Slopes,
(See Plans For Intermediate
F.L. Elevations At Grade Breaks)

(3) Sta. 'S1' 415+80.80, 50.80' Rt., F.L. 563.55
Sta. 'S1' 417+26.66, 61.15' Rt., F.L. 562.82
Const. Ditch W/Berm
"V" Bottom, 3:1 Slopes
(For Details, See Sht. 2B)

(4) Sta. 'S1' 417+36.00, 60.00' Rt.
Sta. 'S1' 417+81.50. 24.00 Rt.
Const. Riprap Pad (Class 50)
4'(Top) x 12'(Bottom) x 60' x 2'
Underlay W/Riprap Geotextile - Type 1

(5) Sta. 'S1' 417+80.00, Lt.
Const. Riprap Pad (Class 50)
4'(Top) x 10'(Bottom) x 18' x 2'
Underlay W/Riprap Geotextile - Type 1

(6) Sta. 'S1' 417+26.66, 61.15' Rt., F.L. 562.82 To
Sta. 'S1' 418+42.86, 69.38' Rt., F.L. 562.23
(Match Extg.)
Const. Bioswale - 116'
At 0.5% Grade
(For Details, See Sht. 2B-5)

(7) Bridge No. 20413
Const. Structure - 60'
Rdwy. Width 42'
And Reinf. Panel At Bridge Ends
(For Details, See Sht. C8-101)

(8) Sta. 'S1' 418+90.00, 37.50' Lt., F.L. 566.23
(Match Extg.) To
Sta. 'S1' 424+39.00, 37.50' Lt., F.L. 568.81
(Match Extg.)
Const. Ditch
"V" Bottom, Varying Slopes,
(See Plans For Intermediate
F.L. Elevations At Grade Breaks)

(9) Sta. 'N1' 418+87.07 To
Sta. 'N1' 422+55.22
Const. Transition - 1
Const. Guardrail (Type 3) - 12.5'
Const. Guardrail (Type 2A) - 312.5
Const. Flared Terminal - 1
W=4', E=0'
(For Details, See Sht. 2A-31 And Drg. Nos. BR203, RD400, RD405, RD415, RD425 & RD440)

Rev. No.	Date	Revision
2	4/11/2007	As Constructed
1	6/26/2006	Replaced Roadside Barrier

CH2MHILL
REVISED AS CONSTRUCTED
04/07 CONTRACT 13111

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: CLARKS BRANCH TO TUNNEL MILL RACE SEC. DESIGN-BUILD PROJECT

PACIFIC HIGHWAY

LANE AND DOUGLAS COUNTIES

Reviewed By - Shari Munroe
Designed By - Scott Christopherson
Drafted By - Lewis Demitroff

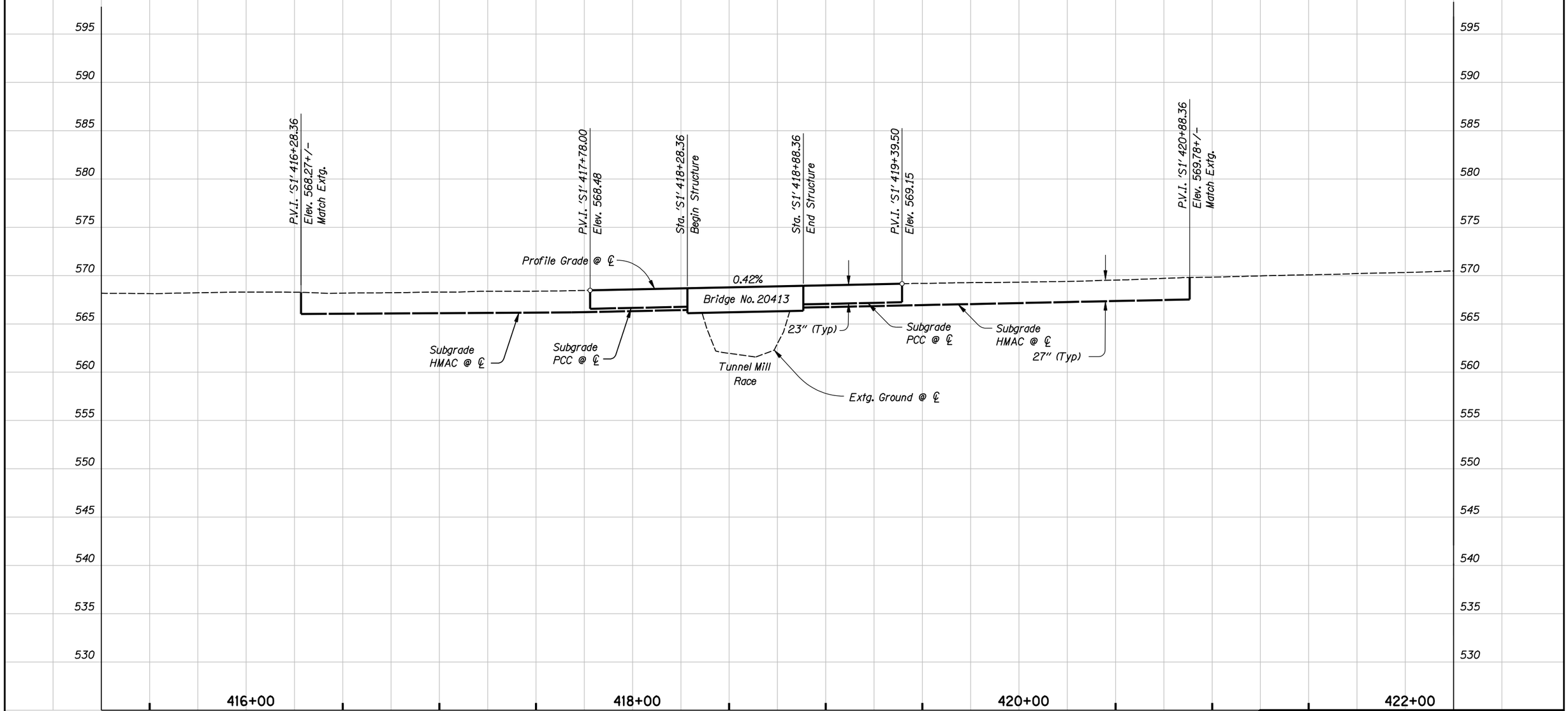
STA. 'S1' 415+50 TO STA. 'S1' 421+50 ROADWAY PLAN

SHEET NO. 6

CH2MHILL

REVISED AS CONSTRUCTED
04/07 CONTRACT 13111

S1 PROFILE



Rev. No.	Date	Revision
1	4/11/2007	As Constructed

0 25 50 75
Horizontal Scale In Feet

0 5 10 15
Vertical Scale In Feet

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

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PACIFIC HIGHWAY

LANE AND DOUGLAS COUNTIES

Reviewed By - Shari Munroe
Designed By - Scott Christopherson
Drafted By - Lewis Demitroff

STA. 'S1' 415+50 TO STA. 'S1' 421+50 ROADWAY PROFILE

SHEET NO. 6A