OPERATION & MAINTENANCE MANUAL

DFI No. : D00236
Facility Type: Water Quality Bioflitration Swale

JUNE, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00236**
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) 26V-092
Location:	District: 1 (Old 2A)
	Highway No.: 092
	Mile Post: 29.28; 29.33 (beg./end)
	Description: This facility is located along the west side Hwy. 92, adjacent to the southbound travel lane, just south of the Liberty Hill/Deer Island Roads Intersection with Columbia River Highway (Hwy 092). Unobstructed access can be obtained from the right shoulder of the roadway.

2. Facility Contact Information

Contact the Engineer of Record, Region Technical Center, or Geo-Environmental's Senior Hydraulics Engineer for:

- Operational clarification
- Maintenance clarification
- Repair or restoration assistance

Engineering Contacts:

Region Technical Center Hydro Unit Manager

Or

Geo-Environmental Senior Hydraulics Engineer (503) 986-3365.

3. Construction

Engineer of Record: Consultant Designer - W&H Pacific, William Evans, P.E., (503) 362-4675

Facility construction: 1996
Contractor: N/A

4. Storm Drain System and Facility Overview

A water quality swale is a flat-bottomed open channel designed to treat stormwater runoff from highway pavement areas. This type of facility is lined with grass. Treatment by trapping sedimentation occurs when stormwater runoff flows through the grass.

This 290-ft water quality biofiltration swale facility is located south of the Liberty Hill/Deer Island Roads Intersection with Columbia River Highway (Hwy 092). The swale primarily receives stormwater runoff as it sheet flows from the southbound travel lane of the Columbia River Highway (Hwy 092). The swale also treats water that is conveyed from a drainage ditch after maneuvering overtop a reinforced concrete flow spreader, and a layer of riprap represented by points A and B, respectively, on the Operational Plan; Appendix A.

After treatment the swale directs the water quality flow into a 36-in culvert by way of a culvert entrance with paved-end slope near the middle of the swale (point C on the Operational Plan). The culvert receives stormwater from both the swale and a wetland area adjacent to the swale to the west (perpendicular to the swale), before crossing beneath the highway toward the east and being eventually discharged into the Columbia River.

A. Maintenance equipment access:
   The swale is accessible via the unobstructed access obtained from the right shoulder of the highway (Hwy 092).

B. Heavy equipment access into facility:

   ☒ Allowed (no limitations)
   ☐ Allowed (with limitations)
   ☐ Not allowed

C. Special Features:

   ☐ Amended Soils
   ☐ Porous Pavers
   ☐ Liners
   ☐ Underdrains

Photo 1: Looking south toward a culvert entrance to the swale with the swale being located on the opposite side of the driveway shown.

Photo 2: Looking north toward the beginning of the swale.

Photo 3: Looking south toward the end of the swale.

Photo 4: Looking south at the culvert entrance/paved-end slope near the middle of the swale.

Photo 5: Looking west toward the wetland water source and culvert entrance/paved-end slope near the middle of the swale.

Photo 6: Looking west toward the wetland water source near the middle of the swale.

5. Facility Haz Mat Spill Feature(s)

The water quality biofiltration swale can be used to store a volume of liquid by blocking the 36-inch diameter culvert outlet pipe located at the outlet of the swale. This pipe is noted as point C in Operational Plan; Appendix A.

6. Auxiliary Outlet (High Flow Bypass)

Auxiliary Outlets are provided if the primary outlet control structure can not safely pass the projected high flows. Broad-crested spillway weirs and over flow risers are the two most common auxiliary outlets used in stormwater treatment facility design. The auxiliary outlet feature is either a part of the facility or an additional storm drain feature/structure.

The auxiliary outlet feature for this facility is:

☐ Designed into facility

☒ Other, as noted below
There are no auxiliary outlet features for this facility.

7. Maintenance Requirements

Routine maintenance table for non-proprietary stormwater treatment and storage/detention facilities have been incorporated into ODOT's Maintenance Guide. These tables summarize the maintenance requirements for ponds, swales, filter strips, bioslopes, and detention tanks and vaults. Special maintenance requirements in addition to the routine requirements are noted below when applicable.

The ODOT Maintenance Guide can be viewed at the following website:

http://www.oregon.gov/ODOT/HWY/OOM/MGuide.shtml

Maintenance requirements for proprietary structures, such as underground water quality manholes and/or vaults with filter media are noted in Appendix C when applicable.

The following stormwater facility maintenance table (See ODOT Maintenance Guide) should be used to maintain the facility outlined in this Operation and Maintenance Manual or follow the Maintenance requirements outlined in Appendix C when proprietary structure is selected below:

Mark as Required and always include Table 1:

- ☒ Table 1 (general maintenance)
- ☐ Table 2 (stormwater ponds)
- ☒ Table 3 (water quality biofiltration swales)
- ☐ Table 4 (water quality filter strips)
- ☐ Table 5 (water quality bioslopes)
- ☐ Table 6 (detention tank)
- ☐ Table 7 (detention vault)
- ☐ Appendix C (proprietary structure)
- ☐ Special Maintenance requirements:

Note: Special maintenance Requirements Require Concurrence from ODOT SR Hydraulics Engineer.

8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the roadwaste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:
http://egov.oregon.gov/ODOT/HWY/OOM/EMS.shtml

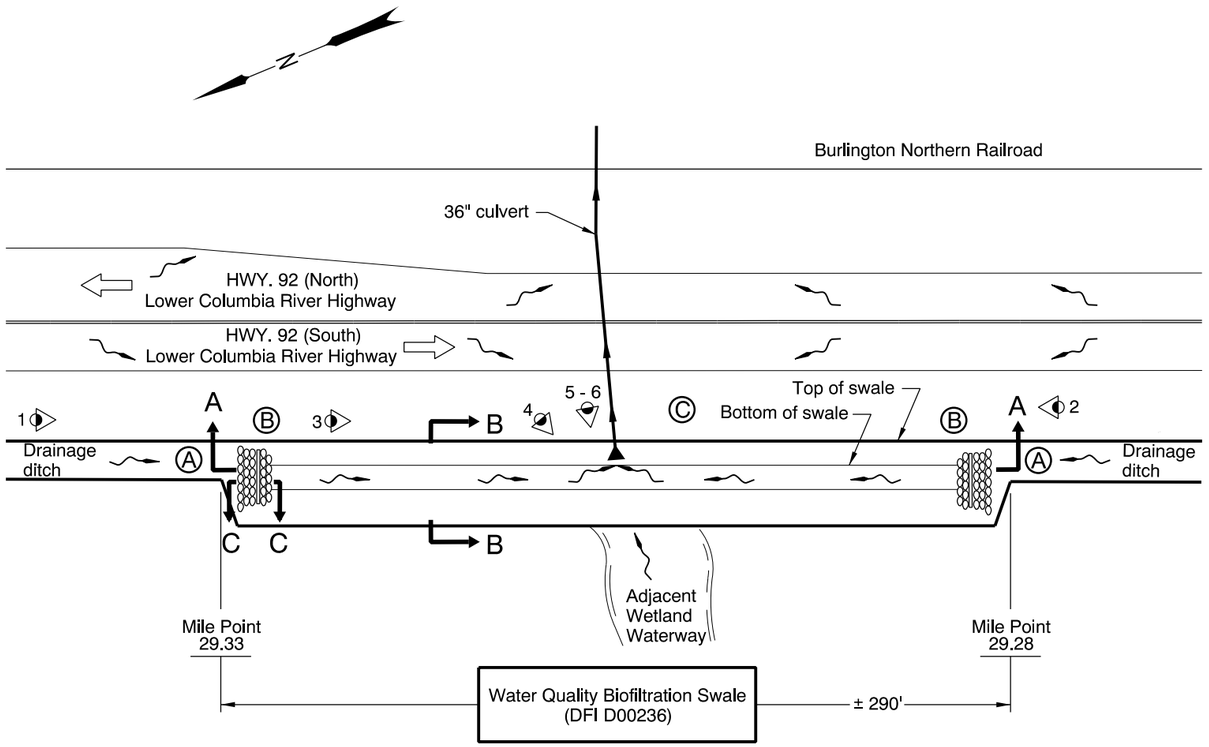
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129
ODOT Region Hazmat Coordinator	(503) 731-8304
ODEQ Northwest Region Office	(503) 229-5263

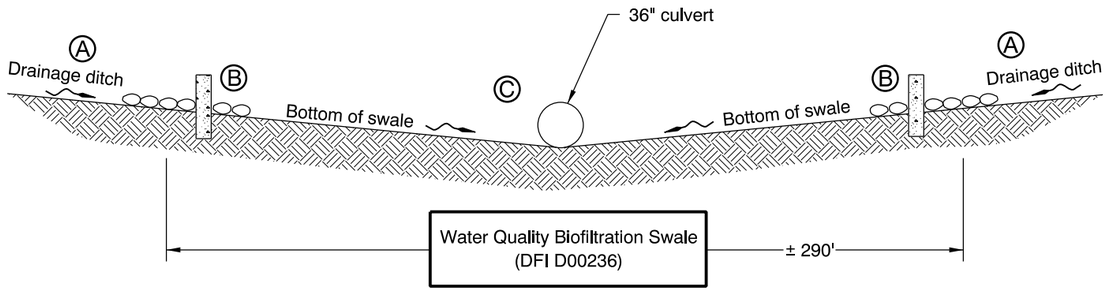
Appendix A

Content:

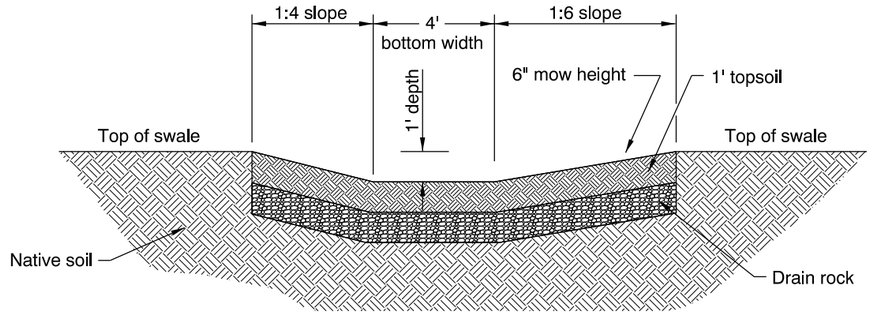
- **Operational Plan and Profile Drawing(s)**



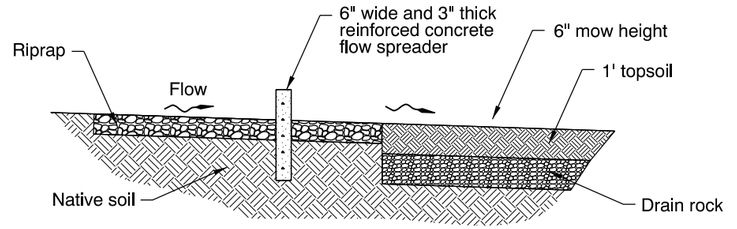
PLAN
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.



SECTION C-C
N.T.S.

LEGEND:

- Photo Location / Direction
- (A) Swale Inlet from Drainage Ditch
- (B) Riprap and Concrete Flow Spreader
- (C) Swale Outlet
- Manhole (and or)
- Inlet (and or)
- Traffic Flow / Direction
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Riprap

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: J.D. Koziol

Drafted By: Ed Gahan/HDR

DFI D00236
MAINTENANCE DISTRICT 1 HWY 92
WATER QUALITY BIOFILTRATION SWALE
LOWER COLUMBIA R. HWY. MP 29.28-29.33
COLUMBIA COUNTY

Appendix B

Content:

- **ODOT Project Plan Sheets**
  - ***Cover/Title Sheet***
  - ***Water Quality/Detention Plan Sheets***
  - ***Other Details***

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd. & Standard Drawing Nos.
2, 2A Thru 2A-6 Incl.	Typical Sections
2B Thru 2B-8 Incl., 2B-8A, 2B-9, 2B-9A, 2B-10, 2B-11, 2B-12, 2B-13 Thru 2B-16 Incl., 2B-16A, 2B-17 Thru 2B-26 Incl.	Details
2C Thru 2C-19 Incl.	Temporary Protection & Direction Of Traffic
2D Thru 2D-9 Incl.	Pipe Data
2E, 2E-2, 2E-3	Summary
3, 3A, 3B, 4, 5, 6, 7, 7A, 7B, 8, 8A, 8B, 8C, 9, 9A, 10, 10A, 10B, 11, 12, 12A, 12B, 13, 14, 14A, 14B, 14C, 15, 16, 16A, 17, 18, 19, 19A, 20, 20A, 21, 21A, 21B, 22, 22A, 22B, 23, 23A, 23B, 23C, 24, 24A, 25, 26, 26A, 26B, 27, 27A, 28, 28A, 29, 30, 30A, 30B, 30C, 31, 32, 33, 33A, 34, 35, 35A, 35B, 36,	Plans & Profiles
37, 37A, 37B	Landscaping

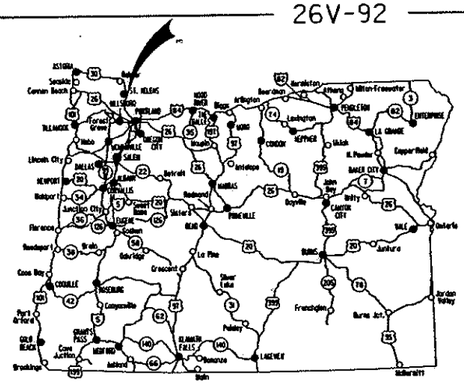
CONT'D. ON SHT. 1A

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

REVISED AS CONSTRACTED
10/1998 CONTRACT C11695
PROJ. MGR. _____



Overall Length Of Project - 7.25 Miles

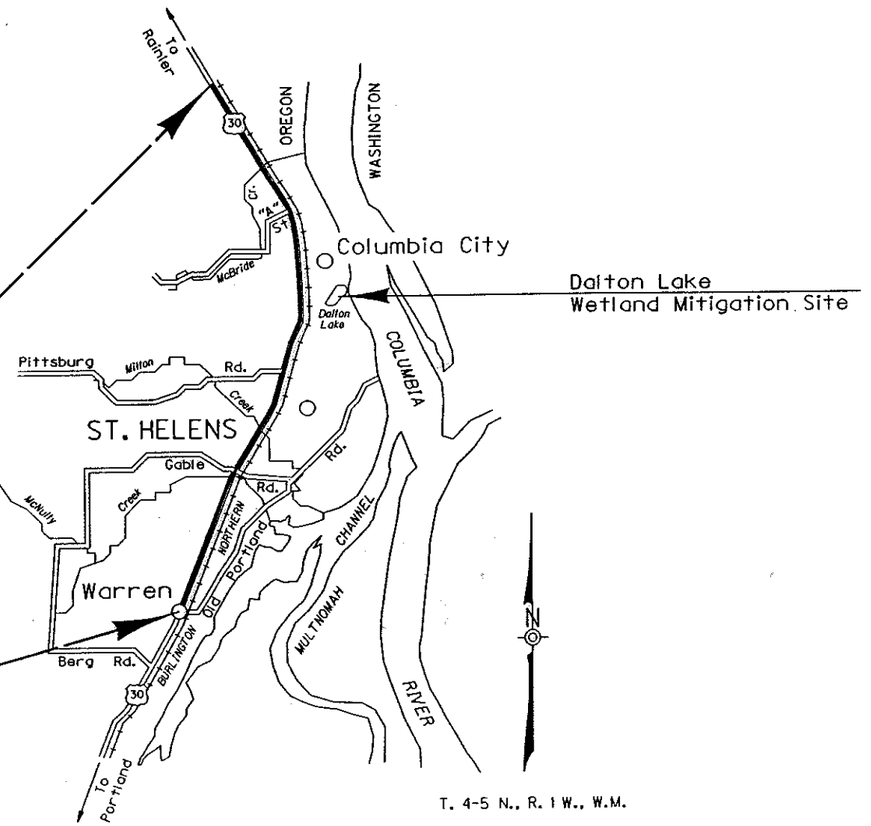
GRADING, STRUCTURES, PAVING, SIGNING, SIGNALS, & LANDSCAPING

COLUMBIA CITY N.C.L. - WARREN SEC.

COLUMBIA RIVER HIGHWAY (LOWER)

COLUMBIA COUNTY
JANUARY 1996

THE TRAFFIC CONTROL YOU PROVIDE PROTECTS YOU AS WELL AS THE PUBLIC. LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE.



NH-S02W(9)

BEGINNING OF PROJECT
STA. 525 + 00 M.P. 33.02)

END OF PROJECT NH-S02W(9)
STA. 906 + 50 M.P. 25.77)

OREGON TRANSPORTATION COMMISSION

Henry H. Hewitt	CHAIRMAN
Susan Brody	VICE CHAIRMAN
Cynthia J. Ford	COMMISSIONER
Steven H. Corey	COMMISSIONER
Stuart Foster	COMMISSIONER
Kenneth E. Husby	INTERIM DIRECTOR OF TRANSPORTATION

PLANS PREPARED BY:

W&H PACIFIC
6400 S.W. Nimbus Avenue
BEAVERTON, OREGON 97005
(503) 626-6444

REGISTERED PROFESSIONAL ENGINEER
M.947
OREGON
JULY 25, 1980
WILLIAM J. EVANS
Expires Dec. 31, 1995

OREGON DEPARTMENT OF TRANSPORTATION
CONCURRENCE

TECHNICAL SERVICES MANAGING ENGINEER — DATE 11/30/95

COLUMBIA CITY N.C.L. - WARREN SEC.
COLUMBIA RIVER HIGHWAY (LOWER)
COLUMBIA COUNTY

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION	NH-S02W(9)	1

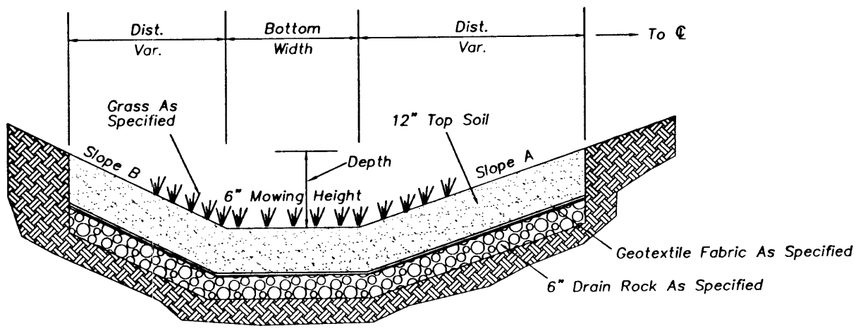
27-NOV-1995 10:48
/usr/td/00981ds.tsl
VIEW B3 C005-1802

NOT REVISED AS CONSTRUCTED
10/98 CONTRACT 11695

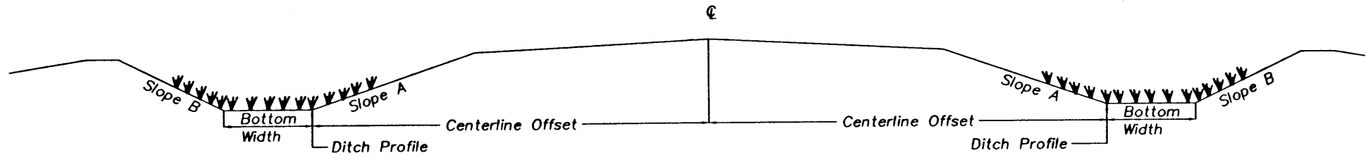
BIO-FILTER SWALE

Bio-Filter Swale Table

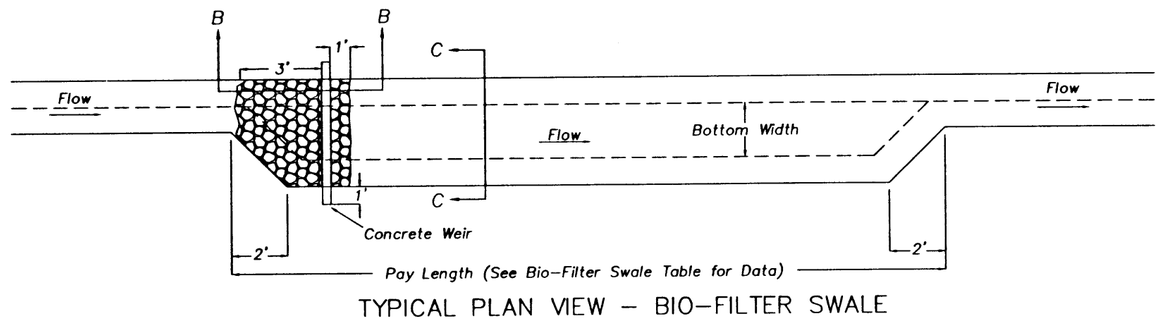
Station From	Station To	Left Or Right	Slope A	Slope B	Bottom Width (Ft)	Depth (Ft)	Length (Ft)	Channel Slope (%)
573+00	575+50	Rt	6:1	4:1	4	1	250	1.83
610+50	613+50	Rt	6:1	4:1	4	1	300	1.10
615+20	618+20	Rt	6:1	1½:1	4	1	300	0.57
719+70	720+90	Rt	6:1	4:1	4	1	120	1.57
720+90	722+60	Rt	6:1	4:1	4	1	170	1.33
797+90	800+08	Lt	3:1	2:1	4	1	218	0.83
839+45	–	Lt	2:1	2:1	10	1	160	3.12
856+70	860+75	Lt	4:1	4:1	4	1	405	0.75–2.0
897+37	–	Lt	3:1	3:1	6	1	290	1.20
898+50	900+75	Rt	4:1	1½:1	4	1	225	0.98



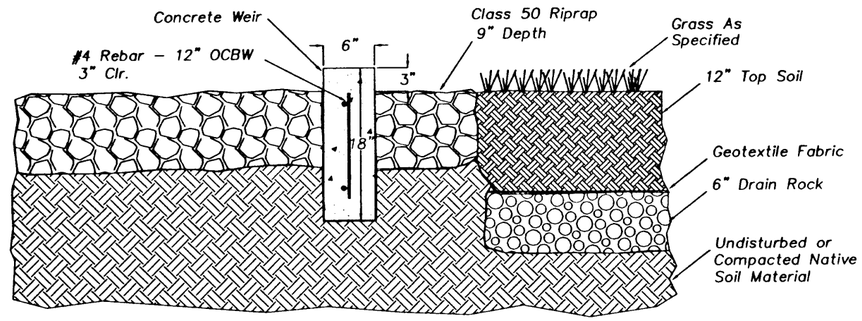
TYPICAL SECTION C–C



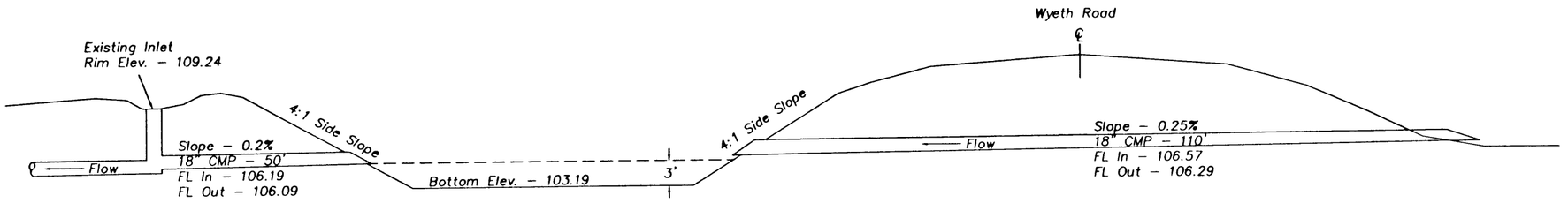
Swale On Left Side — BIO-FILTER SWALE CROSS SECTION (See Bio-Filter Swale Table For Data) — Swale On Right Side



TYPICAL PLAN VIEW – BIO-FILTER SWALE



SECTION B – B



WYETH POND – SECTION A–A (FOR LOCATION SEE SHT 21)

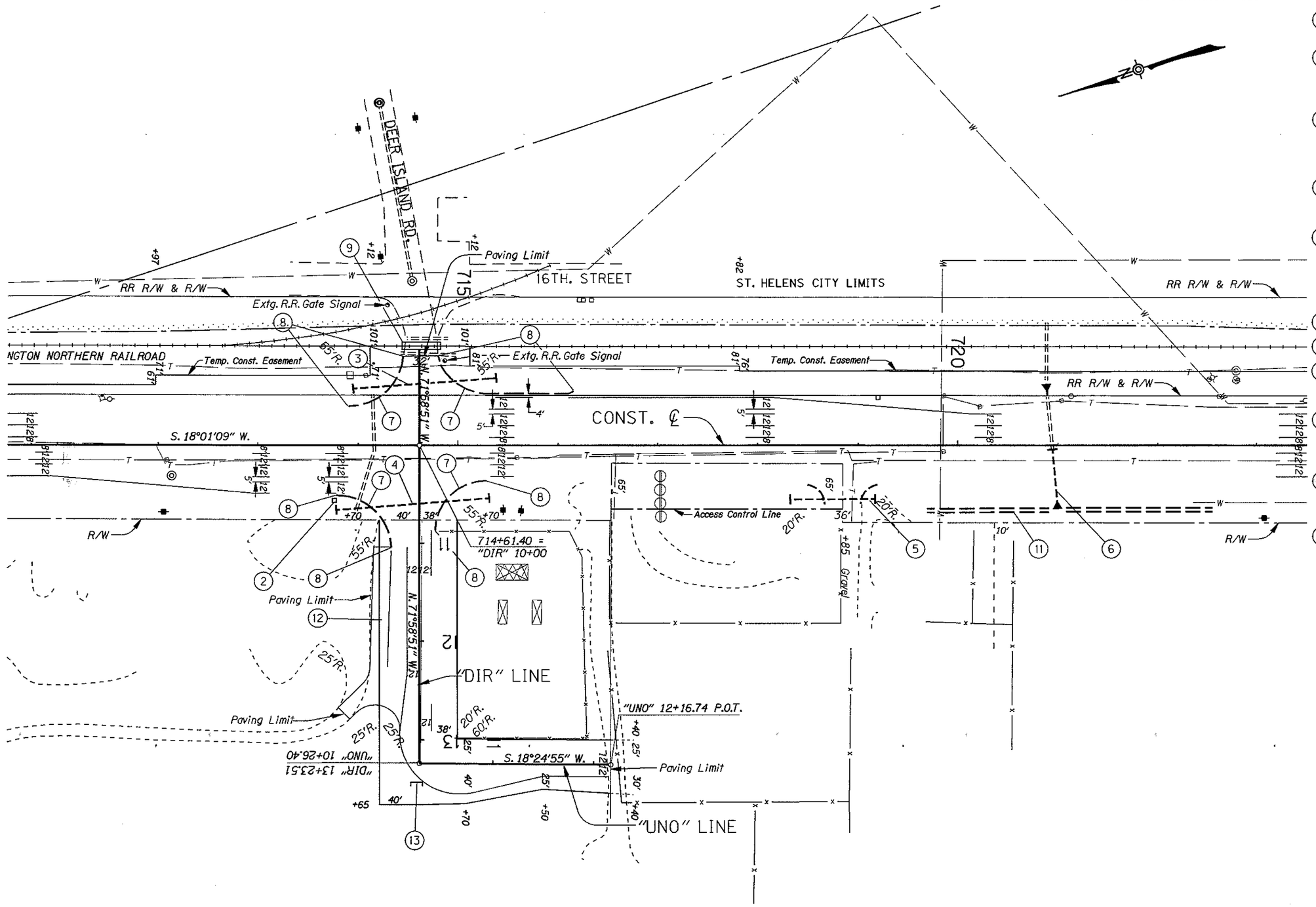
COLUMBIA CITY N.C.L. - WARREN SEC.
COLUMBIA RIVER HIGHWAY (LOWER)
COLUMBIA COUNTY

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		2B–17

2B-17.DWG 05-OCT-1995 WOM

Sec. 33, T. 5N., R 1W., W.M.

REVISED AS CONSTRUCTED
10/98 CONTRACT 1169



(2) *Inst. Multiple Mailbox Support Const. Conc. Collar*

(3) *Sta. 714+61, Lt.*
Const. Road Conn.
Inst. 18" Culv. Pipe - 145'
Tr. Rock Exc. - 76 C.Y.

(4) *Sta. 714+61, Rt.*
Const. Road Conn.
Inst. 24" Culv. Pipe - 150'
Tr. Rock Exc. - 100 C.Y.

(5) *Const. Appr.*
Inst. 24" Culv. Pipe - 85'
Tr. Exc. - 48 C.Y.

(6) *Sta. 720+95*
36" Culv. Pipe - 55' (In Pl.)
Extend - 58' Rt.
Extend - 12' Lt.
Const. Paved End Slope - 2
Tr. Exc. - 35 C.Y.

(7) *Const. Type "C" Curb*

(8) *Const. Curb Ending - 8*

(9) *Const. Conc. R.R. Xing - 40' (By Others)*

(11) *Sta. 719+70 To Sta. 722+60, Rt.*
Const. Swale - 450 S.Y.
Dt. Exc. - 225 C.Y.
(For Details, See Sheet 2B-17)

(12) *Sta. "DIR" 11+04 To Sta. "DIR" 12+25, Rt.*
Const. Asph. Ditch Lining - 403 Sq. Yd.
(For Detail, See Sheet 2B-10)

(13) *Const. Perm Type III Barricade*
(For Detail, See Sheet 2B-3)

COLUMBIA CITY N.C.L. - WARREN SEC.
COLUMBIA RIVER HIGHWAY (LOWER)
COLUMBIA COUNTY

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		19

13-OCT-1995 TJT
##########################
19_PLAN.DGN

REVISED AS CONSTRUCTED
10/98 CONTRACT 11695

"DIR" LINE

RR ℄ "DIR" 8+98.37 = 714+64.00

+20 113.10 10"

+43.36 111.87 20'V.C. +2.00

Mainline ℄ 714+61.40 17" -2.00

+64.55 111.70 40'V.C. 13½" +4.21

+50 115.30 60'V.C.

+50 118.20 +2.90

"UNO" 10+26.40 = "DIR" 13+23.51 13½" +1.96 60'V.C. Subgrade

20'V.C. Subgrade Subgrade

Exc. 930

"UNO" LINE

See "UNO" Profile

See "DIR" Profile

"UNO" 10+26.40 = "DIR" 13+23.51

10" -2.11 Subgrade

118.30 Profile Grade @ ℄ -4.62 30'V.C. +90

10" +16.74 Match Extg. Subgrade

Exc. 380

Emb. 30

"PIT" LINE

118.94 50'V.C. -2.00 13½" Subgrade +75

Profile Grade @ ℄ -0.709

117.70 13½" -0.486 +50 Subgrade

Match Extg.

Earthwork Incl. In Main Rdwy. Distribution

"CONST" LINE

Const. Swale Rt.

Const. Swale Rt.

17" Subgrade -1.492

-2.33 Ditch Left

Ditch Right -1.53

-1.57 Profile Grade 32' Lt. & Rt.

Ditch Left

103.25 550'V.C.

Ditch Right

Ditch Left 17"

Subgrade +2.57

+1.33

+00 F.L. Rt. 115.5

+00 F.L. Lt. 114.0

+00 F.L. Lt. 111.67

+75 +90 F.L. Lt. 99.6 F.L. Rt. 100.0

+60 F.L. Rt. 102.3

+00 F.L. Lt. 105.0

Exc. 50

Exc. 70

Exc. 3,370 (Rock)

STAGE I

Emb. 20

Emb. 850

Exc. 2,400 Exc. 1,570 (Rock)

STAGE II

Emb. 170

01-NOV-1995 TJT

19A_PROLOGN

COLUMBIA CITY N.C.L. - WARREN SEC.
COLUMBIA RIVER HIGHWAY (LOWER)
COLUMBIA COUNTY

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		19A