OPERATION & MAINTENANCE MANUAL

DFI No. : D00238
Facility Type: Water Quality Biofiltration Swale

JUNE, 2011

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1. Identification

Drainage Facility ID (DFI):	**D00238**
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) 26V-092
Location:	District: 1 (Old 2A)
	Highway No.: 092
	Mile Post: 25.90; 25.95 (beg./end)
	Description: This facility is located along the west side the Columbia River Highway (Hwy. 092) adjacent to the southbound travel lane just south of Bay Hill Lane. 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 facility is located along the west side the Columbia River Highway (Hwy. 092) adjacent to the southbound travel lane just south of Bay Hill Lane. Unobstructed access can be obtained from the right shoulder of the roadway. The swale was constructed as part of an existing roadside ditch. Flows from both the roadway and ditch enter the swale from the south, overtopping riprap and a small 6-inch by 3-inch concrete knee wall flow spreader. As the water flows north it is treated as it slows and spreads out within the swale before entering a 15-inch culvert pipe just prior to Bay Hill Lane.

A. Maintenance equipment access:
   Unobstructed access can be obtained from the right shoulder of southbound Hwy. 92.

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 north at water quality swale. Hwy 92 is located to the right.

Photo 2: Looking north at water quality swale near the swale entrance. Hwy 92 is located to the right.

Photo 3: Looking at the concrete knee wall near the entrance to the swale. Hwy 92 is located to the right.

5. Facility Haz Mat Spill Feature(s)

The water quality biofiltration swale can be used to store a volume of liquid by blocking the 15-inch culvert outlet pipe located at the outlet of the swale on the south side of Bay Hill Lane. There is also a type “M-E” inlet located on the north side of Bay Hill Lane and a 24-inch pipe, conveying water to the east that could be used for the same purposes. Sandbags may be one way to best accomplish this.

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 is no auxiliary outlet feature 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:

- ☒ 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

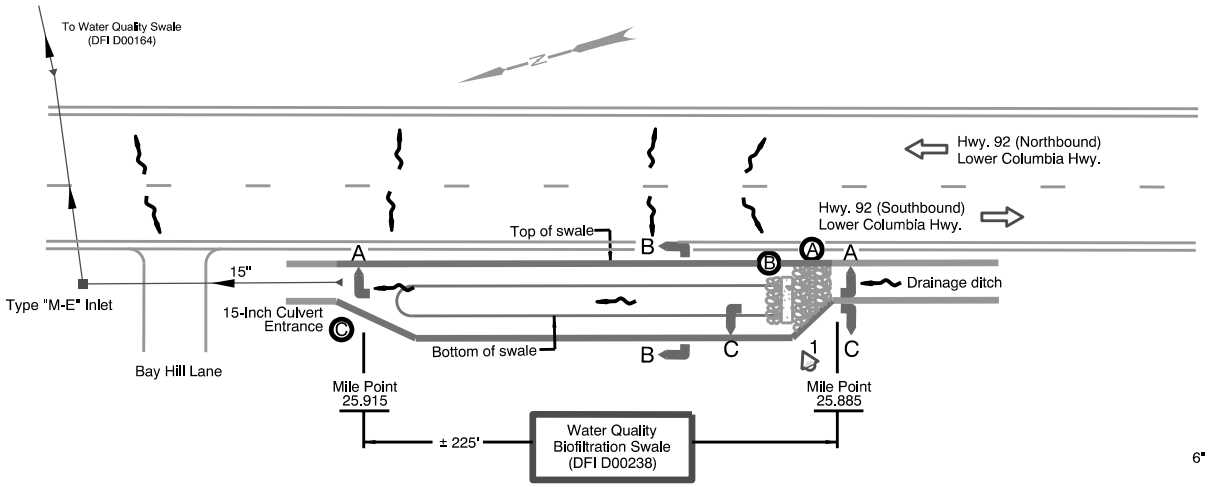
Contact any of the following for more detailed information about management of waste materials found on site:

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

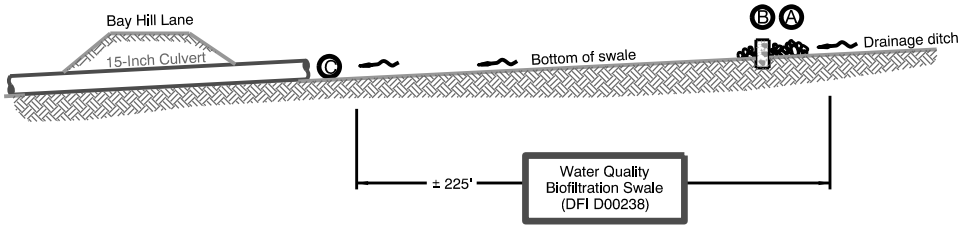
Appendix A

Content:

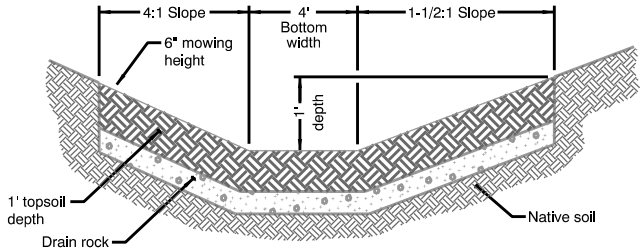
- **Operational Plan and Profile Drawing(s)**



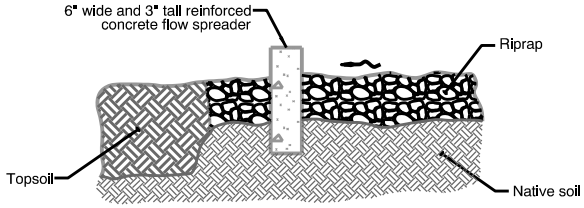
PLAN
N.T.S.



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 at Inlet
- (C) Water Quality Swale Outlet to 15-Inch Culvert
- Manhole
- Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path
- Traffic Direction / Flow

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Bob Knorr

Drafted By: Bob Knorr

DFI D00238
MAINTENANCE DISTRICT 1 HWY 92
WATER QUALITY BIOFILTRATION SWALE
COLUMBIA HIGHWAY MP 25.90-25.95
COLUMBIA COUNTY

THIS IS THE FILENAME LOCATION ********** DD-MMM-YYYY HH:MM USERNAME

DFI_D00056.dgn

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

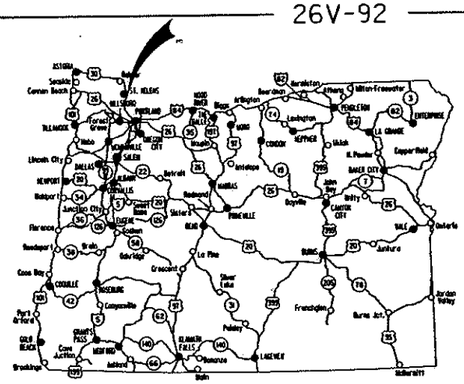
CONT'D. ON SHT. 1A

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

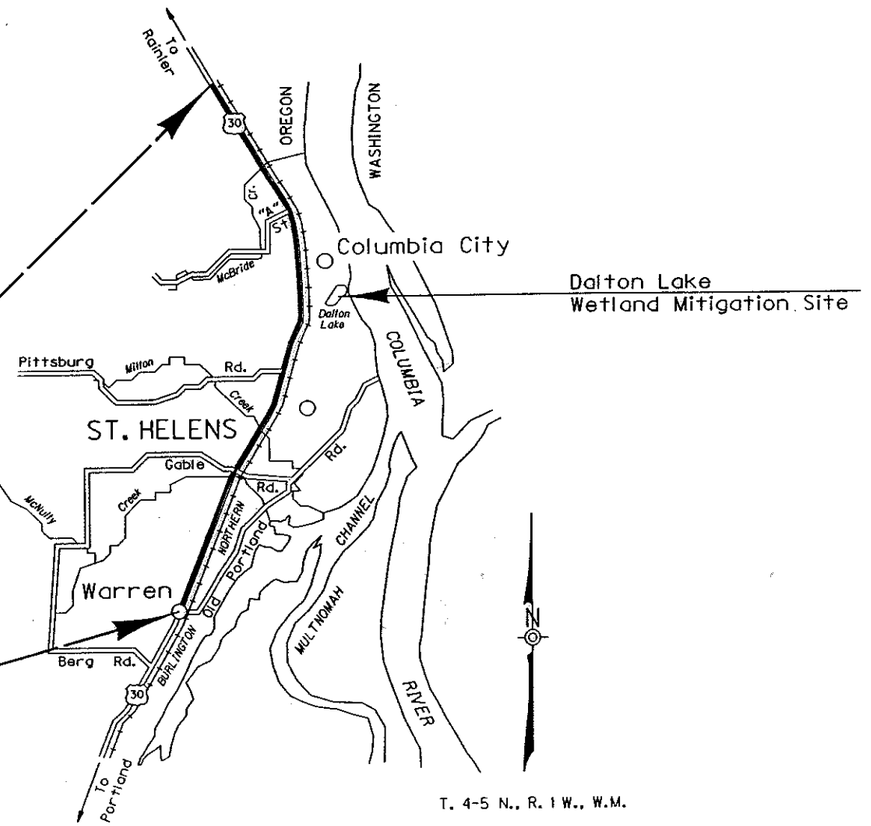
GRADING, STRUCTURES, PAVING, SIGNING, SIGNALS, & LANDSCAPING

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
6405 S.W. Nimbus Avenue
BEAVERTON, OREGON 97005
(503) 626-0455

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

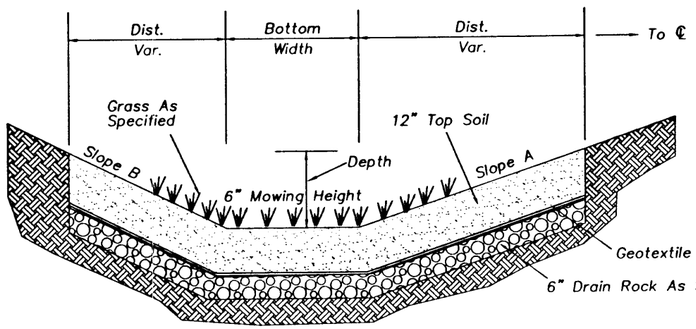
27-NOV-1995 10:48
/usr/td/00981cs.tsl
VIEW B3 C005-1802

NOT REVISED AS CONSTRUCTED
10/98 CONTRACT 11695

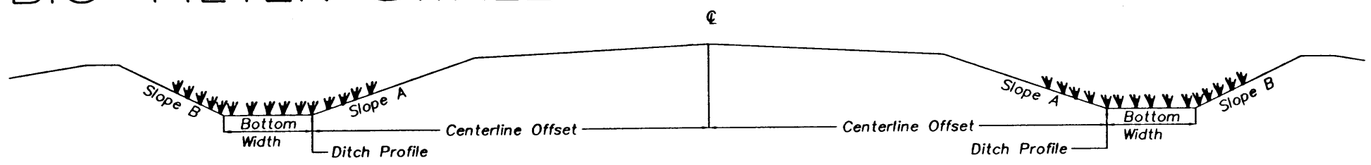
BIO-FILTER SWALE

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



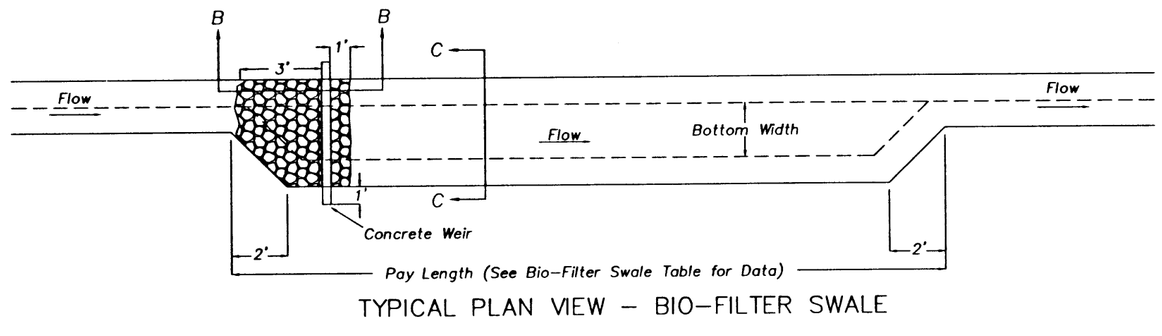
TYPICAL SECTION C–C



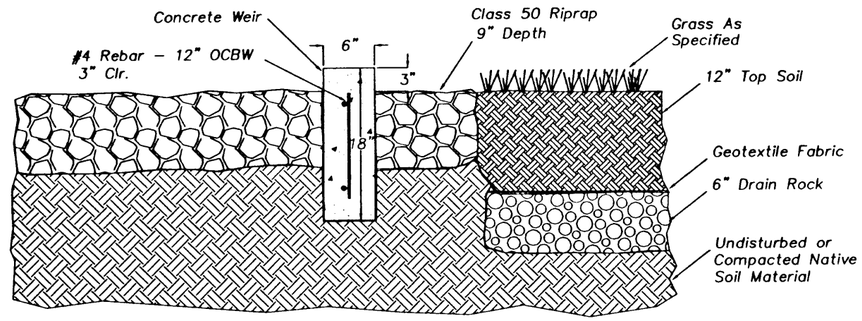
Swale On Left Side

BIO-FILTER SWALE CROSS SECTION
(See Bio-Filter Swale Table For Data)

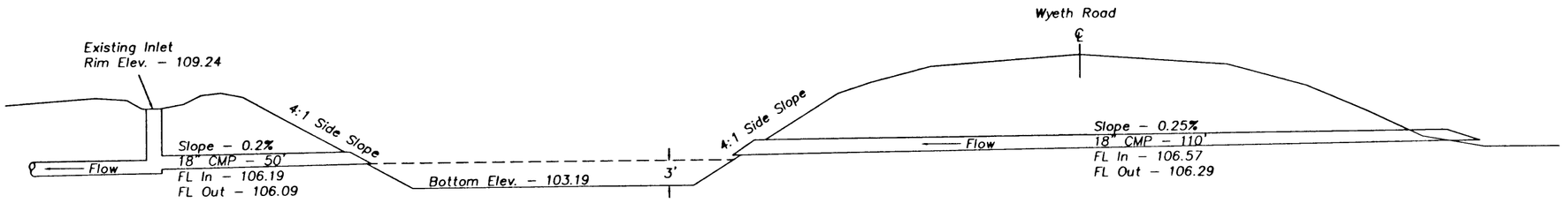
Swale On Right Side



TYPICAL PLAN VIEW – BIO-FILTER SWALE



SECTION B – B



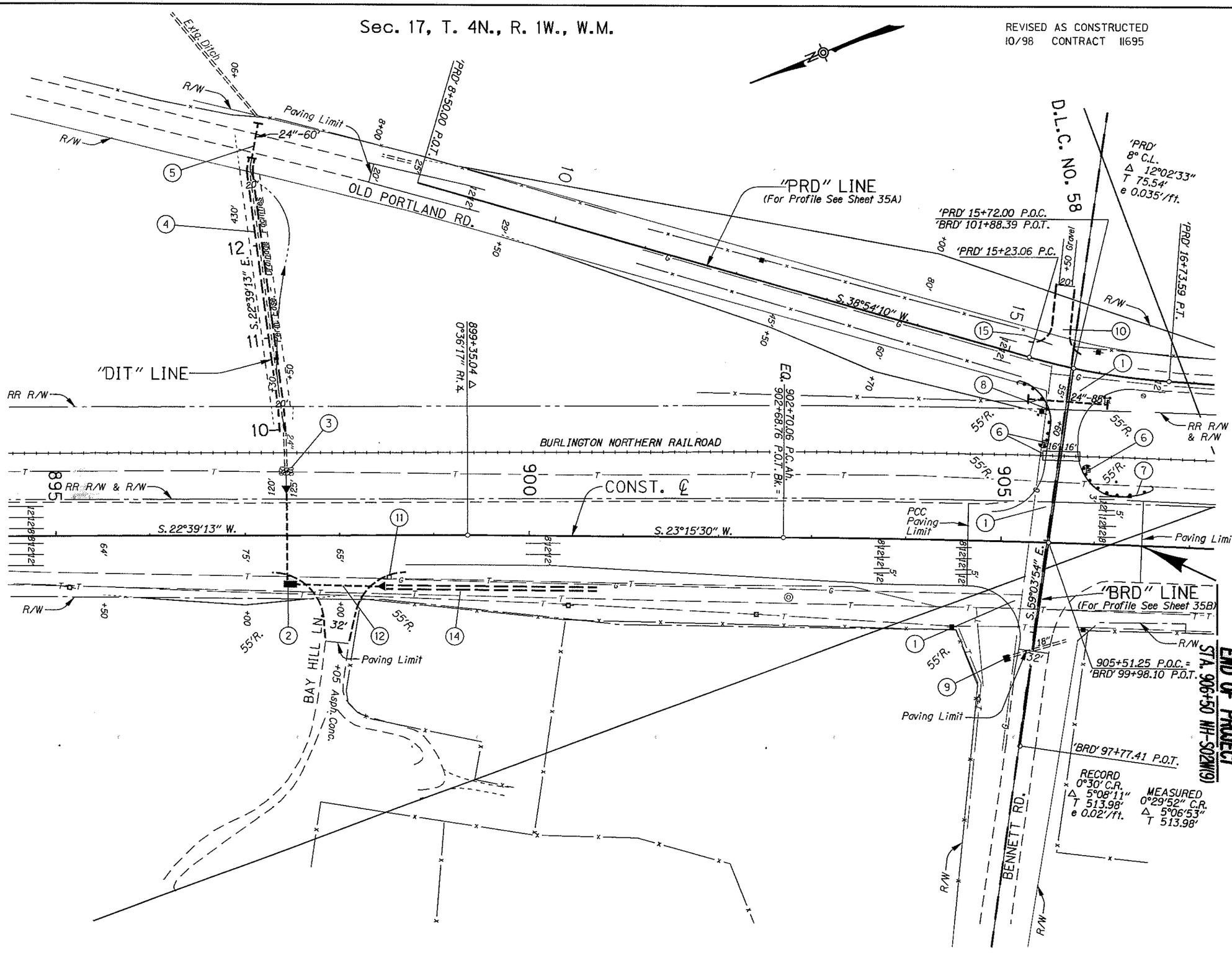
WYETH POND – SECTION A–A (FOR LOCATION SEE SHT 21)

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

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

Sec. 17, T. 4N., R. 1W., W.M.

REVISED AS CONSTRUCTED
10/98 CONTRACT 11695



1. Const. Road Conn. – 3
2. Sta. 897+43, Rt.
   Const. Type "M-E" Inlet
   Inst. 24" Culv. Pipe – 115'
   Const. Paved End Slope
   Tr. Exc. – 60 C.Y.
   (See Drg. No. 2105A)
3. Sta. 897+43, Lt.
   Const. Loose Riprap (Class 100) – 3 C.Y.
4. Sta. "DIT" 10+00 To Sta. "DIT" 12+95
   Const. Swale – 390 S.Y.
   Dt. Exc. – 690 C.Y.
   (For Profile, See Sheet 35B)
   (For Details, See Sheet 2B-17)
5. Sta. "PRD" 6+70
   Inst. 24" Culv. – 60'
   Under Pvmt. – 20'
   Tr. Exc. – 80 C.Y.
6. Const. Conc. R.R. Xing (By Others)
   Inst. R.R. Xing Gate Signals – 2 (By Others)
7. Const. Guard Rail – 50' (Type 2A)
   – 12.5' (Type 3)
   Flare Rate=9:1, W=10', E=0
   Const. Anchor (Type 1 Mod.)
   Inst. End Piece (Type B)
   Inst. SRT-100 End Terminal
8. Const. Guard Rail – 75' (Type 2A)
   – 12.5' (Type 3)
   Flare Rate=9:1, W=10', E=0
   Const. Anchor (Type 1)
   (Type 1 Mod.)
   Inst. End Piece (Type B)
   (Type C)
9. Const. Type "D" Inlet
10. Sta. "PRD" 15+50, Lt.
    Const. Appr.
11. Inst. Multiple Mailbox Support
    Const. Conc. Collar
12. Sta. 898+00, Rt.
    Const. Appr.
    Inst. 15" Culv. Pipe – 105'
    Const. Paved End Slope
    Const. Type "M-O" Inlet
    Tr. Exc. – 40 C.Y.
    (See Drg. No. 2105A)
14. Sta. 898+50 To Sta. 900+75, Rt.
    Const. Swale – 235 S.Y.
    Dt. Exc. – 120 C.Y.
    (For Details, See Sheet 2B-17)
15. Inst. 24" Culv. Pipe – 85'

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

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		35

03-OCT-1995 TJT
35_PLAN.DGN

REVISED AS CONSTRUCTED
10/98 CONTRACT 11695

Const. Swale Rt.

98.70'

32.36

400'V.C.

17"

-0.875

-0.87

Subgrade

Ditch Right

-1.07

Ditch Left

-1.06

+00

+40

+00 F.L. Rt. 31.6

Inlet F.L. Lt. 26.1
Inlet F.L. Rt. 29.0

+50 F.L. Lt. 28.9

Profile Grade 32' Rt.

+0.750

+0.99

+1.37

Ditch Right

Ditch Left

902+68.76 P.O.T. Bk. = EQU/A.
902+70.06 Ah.

39.35

200'V.C.

17"

+1.13

Subgrade

+00

+00 F.L. Lt. & Rt. 36.9

END OF PROJECT
STA. 906+50

STAGE I

Exc. 2,540

Emb. 440

STAGE II

Exc. 1,600

Emb. 580

895

900

905

'PRD' LINE

"PRD" 15+72.00
"BRD" 101+88.39

42.00

500'V.C.

+00

39.43

35.35

300'V.C.

+00

10"

Match Extg. Pvmt.

+1.53

Profile Grade @ ℄

Subgrade

27.30

300'V.C.

+50

10"

Match Extg. Pvmt.

+0.22

Subgrade

+2.673

Exc. 280

Emb. 10,600

Exc. 120

10

15

20

14-OCT-1995 TJT

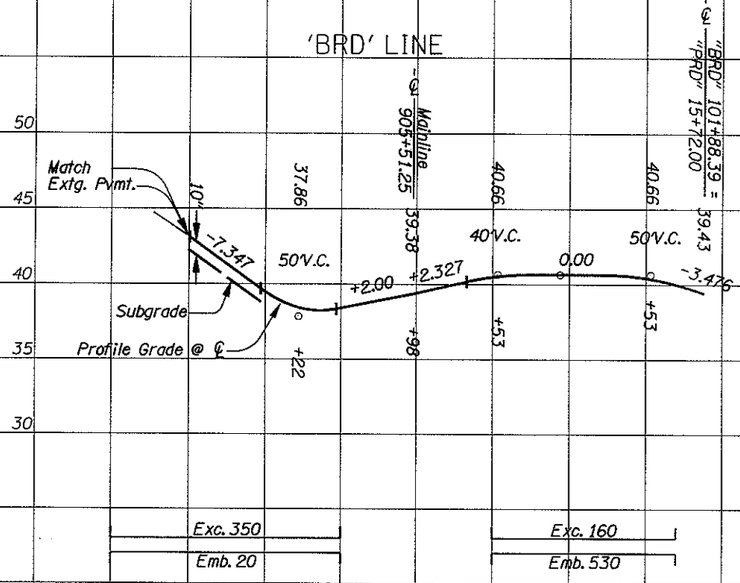
35A_PRO.DGN

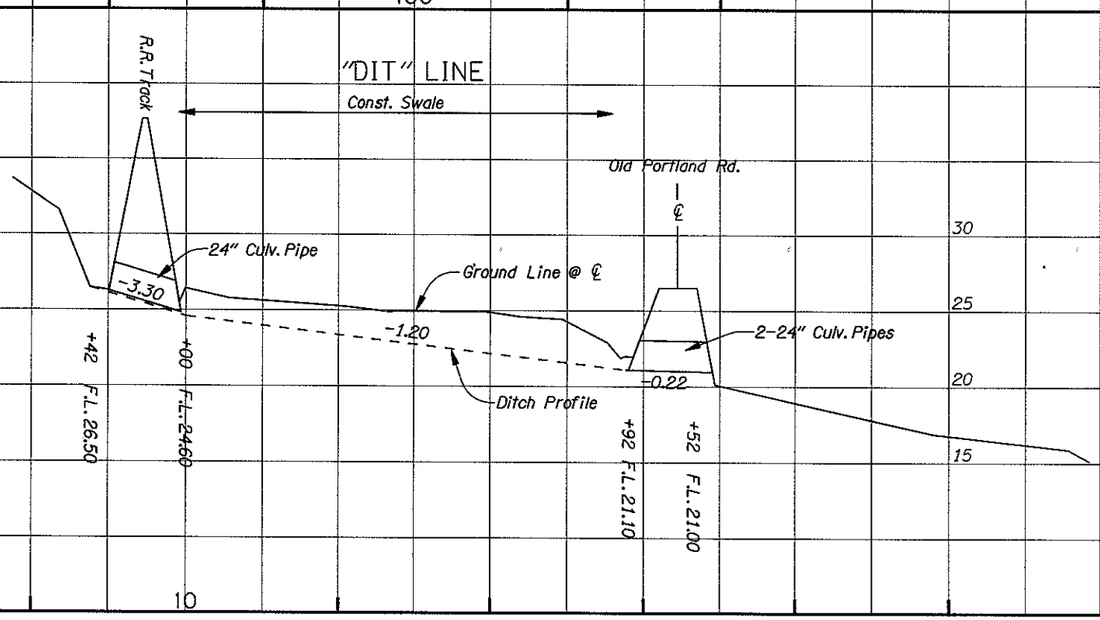
COLUMBIA CITY N.C.L. - WARREN SEC.
COLUMBIA RIVER HIGHWAY (LOWER)
COLUMBIA COUNTY

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		35A

REVISED AS CONSTRUCTED
10/98 CONTRACT 11695

'BRD' LINE





26-JUL-1995 TJT
35B_PROJDN

COLUMBIA CITY N.C.L. - WARREN SEC.			
COLUMBIA RIVER HIGHWAY (LOWER)			
COLUMBIA COUNTY			
FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		35B