OPERATION & MAINTENANCE MANUAL

DFI No. : D00187
Facility Type: Water Quality Biofiltration Swale

JUNE, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00187**
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) 26V-092
Location:	District: 1 (Old 2A)
	Highway No.: 092
	Mile Post: 26.66; 26.74 (beg./end)
	Description: This facility is located along the east side Hwy. 92 between Millard Road and Wilson Lane. It is adjacent to the northbound travel lanes and railroad tracks. Unobstructed access can be obtained from the right shoulder of Hwy. 92.

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 405-ft water quality biofiltration swale facility is located along the east side Hwy. 92 between Millard Road and Wilson Lane and adjacent to both the northbound travel lanes and railroad tracks. The swale primarily receives stormwater runoff as it sheet flows from the northbound travel lane of the Columbia River Highway (Hwy 092). The swale also treats water from other sources such as what is conveyed from the drainage ditch alignment it is a part of, and one 12-inch pipe directed from a localized storm drain system; see Points A and B, respectively, on the Operational Plan; Appendix A. Water, reaching the swale when flowing along the ditch, overtops a reinforced concrete flow spreader, and a layer of riprap represented by Point C. Points B indicates the culvert pipe inlet.

After treatment the swale directs the water quality flow into an 18-inch or larger-sized culvert pipe at the middle-third of the swale (Point D on the Operational Plan). The culvert collects water before being redirected beneath the railroad tracks and later discharged toward the Columbia River.

A. Maintenance equipment access:
   Unobstructed access can be obtained from the right shoulder of 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: Winter season, looking south toward the middle of the swale.

Photo 2: Winter season, looking west at one of the riprap/culvert flow spreaders; Point C.

Photo 3: Looking north toward the middle of the swale and a facility inlet, Point B.

Photo 4: Looking down at the facility outlet pipe, Point D, from railroad grade.

5. Facility Haz Mat Spill Feature(s)

The water quality biofiltration swale can be used to store a volume of liquid by blocking the 18-inch or larger-sized diameter outlet pipe serving as an

outlet to the swale. This pipe is noted as point D 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

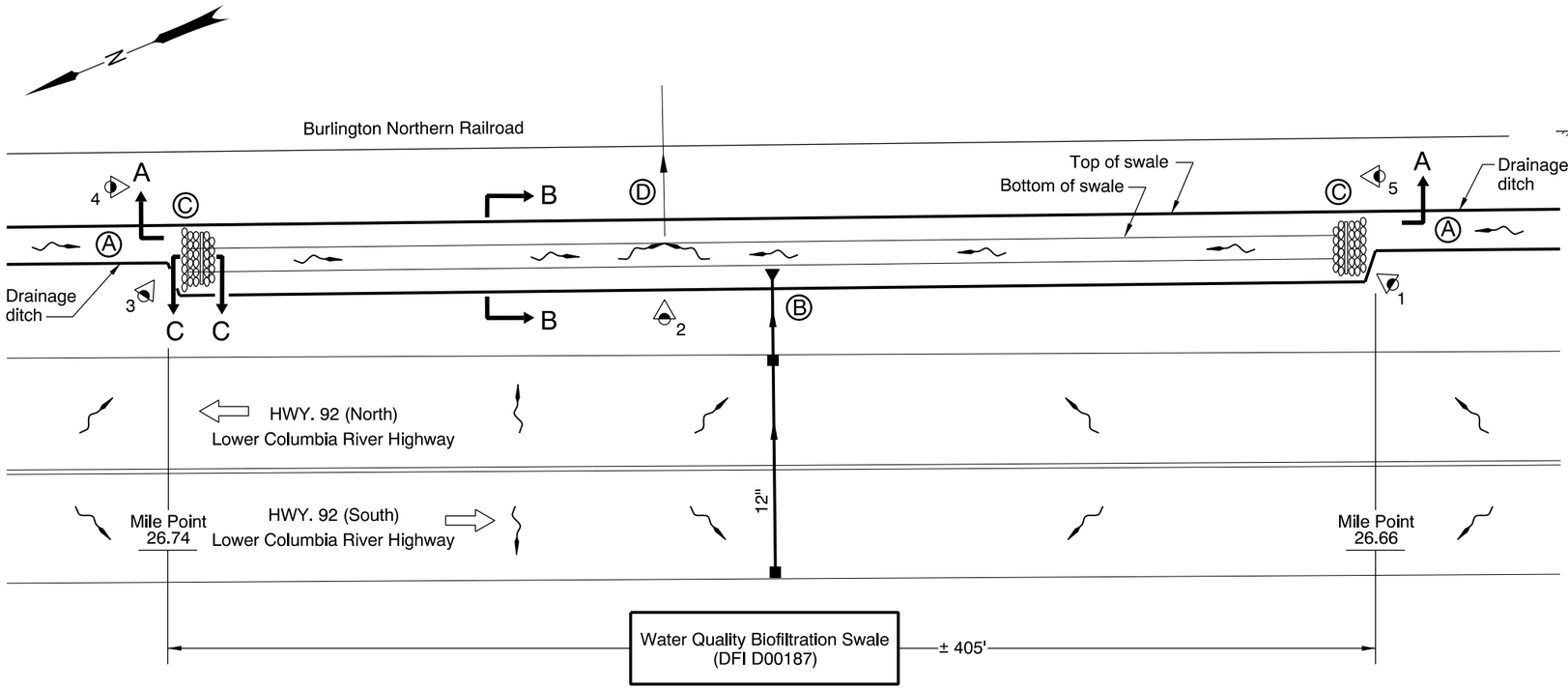
Contact any of the following for more detailed information about management of waste materials found on site:

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

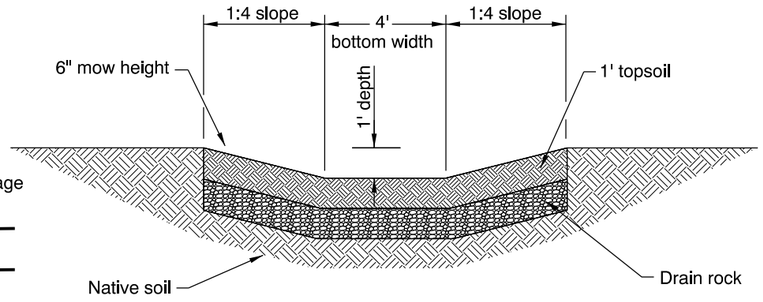
Appendix A

Content:

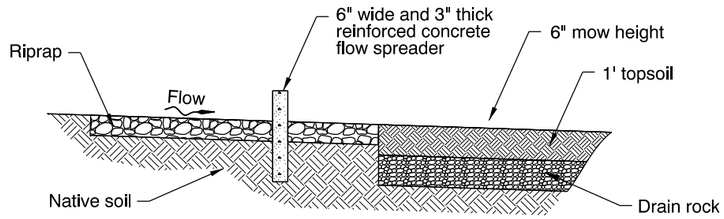
- **Operational Plan and Profile Drawing(s)**



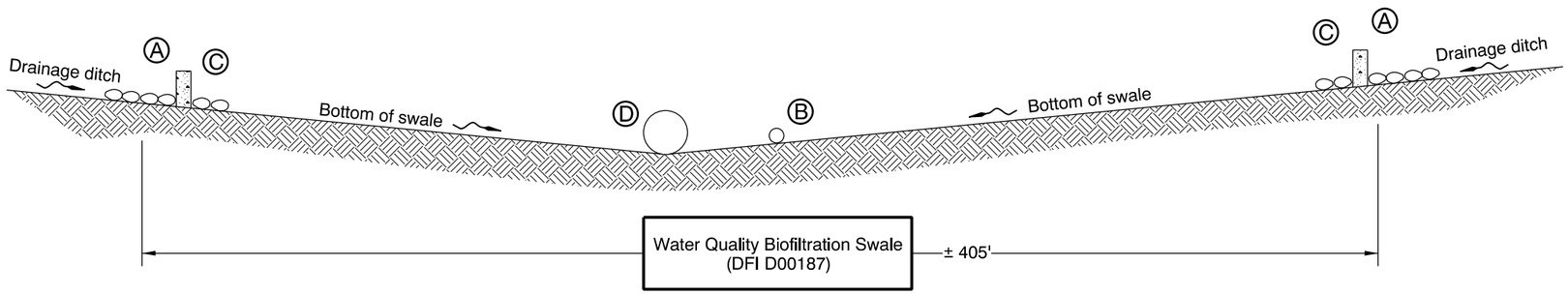
PLAN
N.T.S.



SECTION B-B
N.T.S.



SECTION C-C
N.T.S.



SECTION A-A
N.T.S.

LEGEND:

- Photo Location / Direction
- (A) Swale Inlet from Drainage Ditch
- (B) Swale Inlet is 12" Diameter Pipe
- (C) Riprap and Concrete Flow Spreader at Inlet
- (D) Swale Outlet Pipe, diameter unknown
- Manhole
- Inlet
- 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 D00187
MAINTENANCE DISTRICT 1 HWY 92
WATER QUALITY BIOFILTRATION SWALE
LOWER COLUMBIA R. HWY. MP 26.66-26.74
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

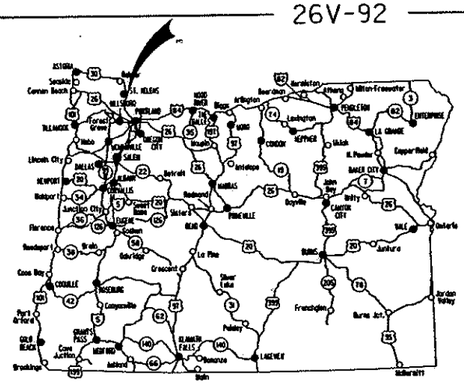
CONT'D. ON SHT. 1A

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

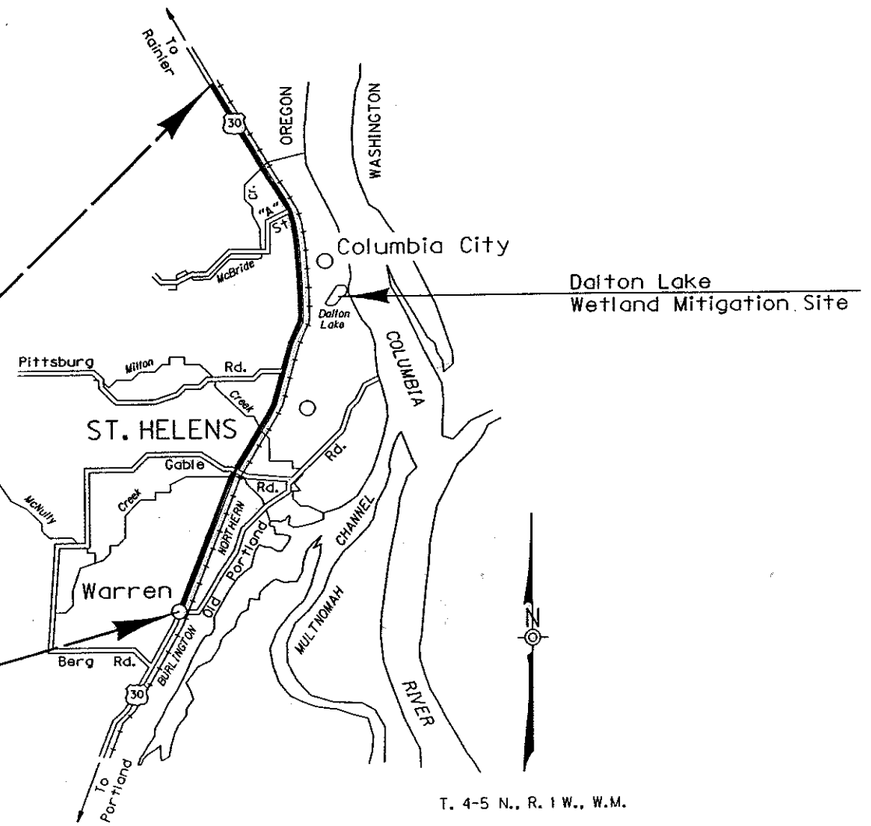
COLUMBIA CITY N.C.L. - WARREN SEC.

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
9450 S.W. Nimbus Avenue
BEAVERTON, OREGON 97005
(503) 626-0455

REGISTERED PROFESSIONAL ENGINEER
M.947
OREGON
MAY 25, 1990
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

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NOT REVISED AS CONSTRACTED
10/1998 CONTRACT C11695

INDEX OF SHEETS CONT'D.

DRAWING NO.	DESCRIPTION
38, 38A, 38B, 38C, 38D, 38E, 38F, 38G, 38H, 38J, 38K, 38L, 38M, 38N, 38P, 38Q, 38R, 38R-2, 38S, 38T, 38U, 38V, 38V-2, 38V-3, 38V-4, 38V-5, 38V-6, 38W	St. Helens Utility Relocation
39, 39A, 39B, 39C, 39D	Columbia City Water Main
40, 40A, 40B, 40C, 40D, 40D-2, 40E, 40F, 40F-2, 40G, 40G-2, 40H, 40H-2, 40J, 40K, 40L, 40L-2, 40M, 40N, 40N-2, 40P, 40Q, 40Q-2, 40R, 40S, 40T, 40T-2, 40U, 40V	US Sprint Fiber Optic Conduit
	MILTON CREEK BRIDGE NO. 17434
51043	Plan & Elevation
51044	Stage Construction Details
51045	Deck Sections
51046	Bent 2 Plan & Elevation
51047	Bent 2 & 3 Details
51048	Bent 1 Plan & Elevation
51049	Bent 1 & 4 Details
51050	Wingwall Details
51051	Pedestrian/Bridge Rail Details
51052	Retaining Wall Details
	McNULTY CREEK BRIDGE NO. 17435
51053	Plan & Elevation
51054	Stage Construction Details
51055	Deck Sections
51056	Bent 1 Plan & Elevation
51057	Bent 1 & 2 Details
51058	Wingwall Details
51059	Pedestrian/Bridge Rail Details
	SOUNDWALL BRIDGE NO. 17432
51061	Plan, Elevatrion, & Details
	PERMANENT SIGNING
S-2424 Thru S-2445 Incl.	Signing Installation
	TRAFFIC SIGNALS
TE-10788, TE-10804	Signal Installation

Standard Drg. Nos.

2050, 2050A	- Miscellaneous Structures
2070	- Portland Cement Concrete Pavement
2077	- Curbs
2077A	- Islands & Traffic Separators
2077B	- Driveways & Approaches
2085	- Barbed & Woven Wire Fences
2091	- Metal Pipe Slope Anchors
2091A	- Pipe Backfill/Compaction
2091B	- Coupling Bands
2104, 2104A	- Channelization & Intersection Details
2105, 2105A	- Concrete Inlets
2112, 2121	- Sloped Ends
2115	- R.R. Grade Crossings
2117	- Chain Link Fence
2123	- Paved End Slope
2126, 2126A, 2126B, 2126C, 2126D, 2126E, 2126F, 2126G, 2126H	- Guard Rail
2127	- Precast Concrete Barrier
2128	- Barricades
2129, 2130	- Traffic Delineators
2133, 2133A	- Safety End Section
2134	- Concrete Barrier Poured In Place
2135	- Concrete Barrier Terminal
2136	- Mailbox Installation
2137	- Large Precast Manhole
2200, 2201, 2202, 2203 2204, 2205, 2206	- Temporary Protection & Direction Of Traffic
40562, 40570, 43422, 43495, 43496, 46610, 47168	- Bridge
S-1 Thru S-8 Incl., S-11, S-13, S-14	- Signing
TS-120 Thru TS-133 Incl., 47228 Thru 47231 Incl.	- Traffic Signals
46674	- Soundwall

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

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		1A

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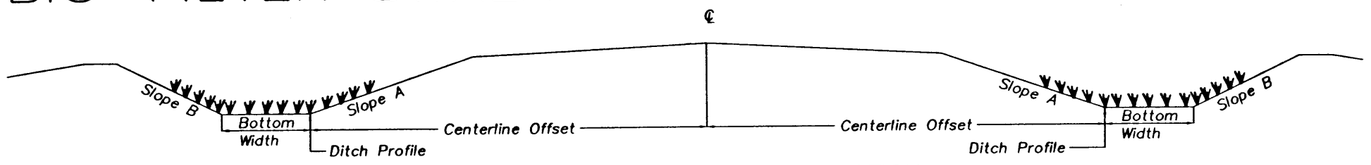
NOT REVISED AS CONSTRUCTED
10/98 CONTRACT 11695

BIO-FILTER SWALE

Bio-Filter Swale Table

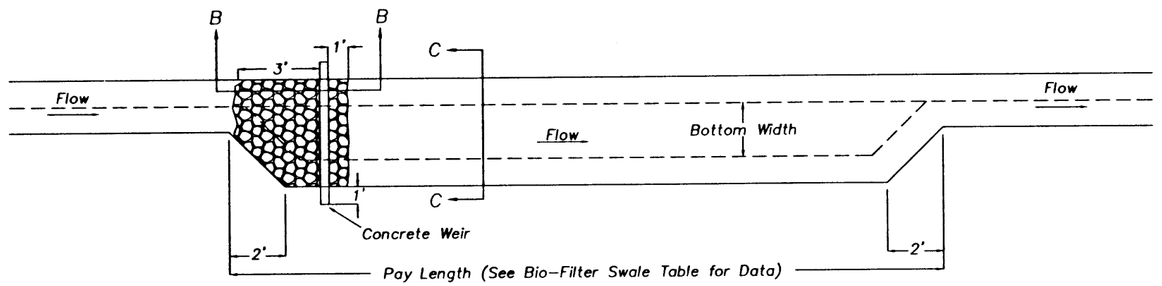
Station From	Station To	Left Or Right	Slope A	Slope B	Bottom Width (Ft)	Depth (Ft)	Length (Ft)	Channel Slope (%)
573+00	575+50	Rt	6:1	4:1	4	1	250	1.83
610+50	613+50	Rt	6:1	4:1	4	1	300	1.10
615+20	618+20	Rt	6:1	1½:1	4	1	300	0.57
719+70	720+90	Rt	6:1	4:1	4	1	120	1.57
720+90	722+60	Rt	6:1	4:1	4	1	170	1.33
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



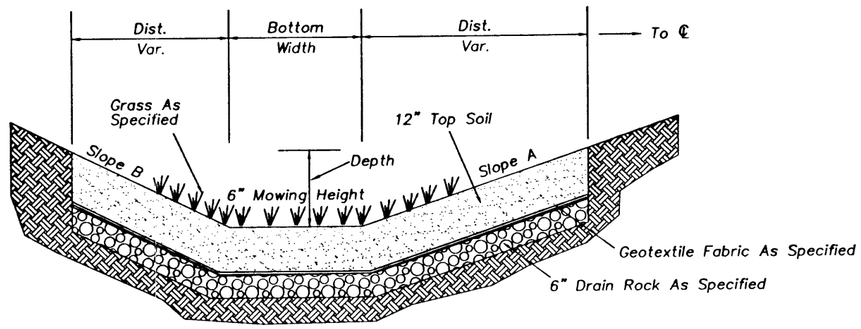
Swale On Left Side

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

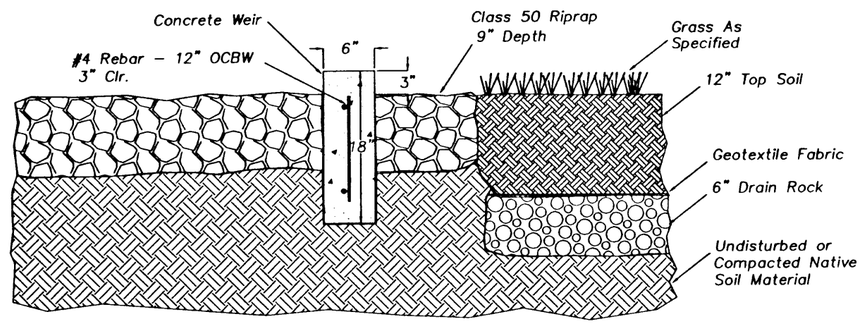
Swale On Right Side



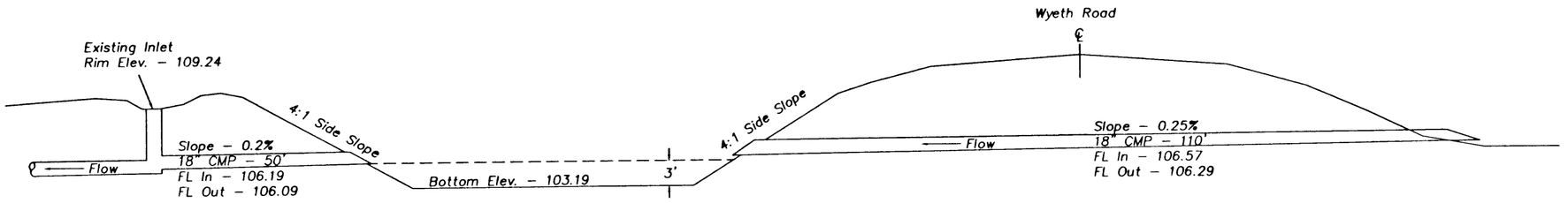
TYPICAL PLAN VIEW – BIO-FILTER SWALE



TYPICAL SECTION C–C



SECTION B – B



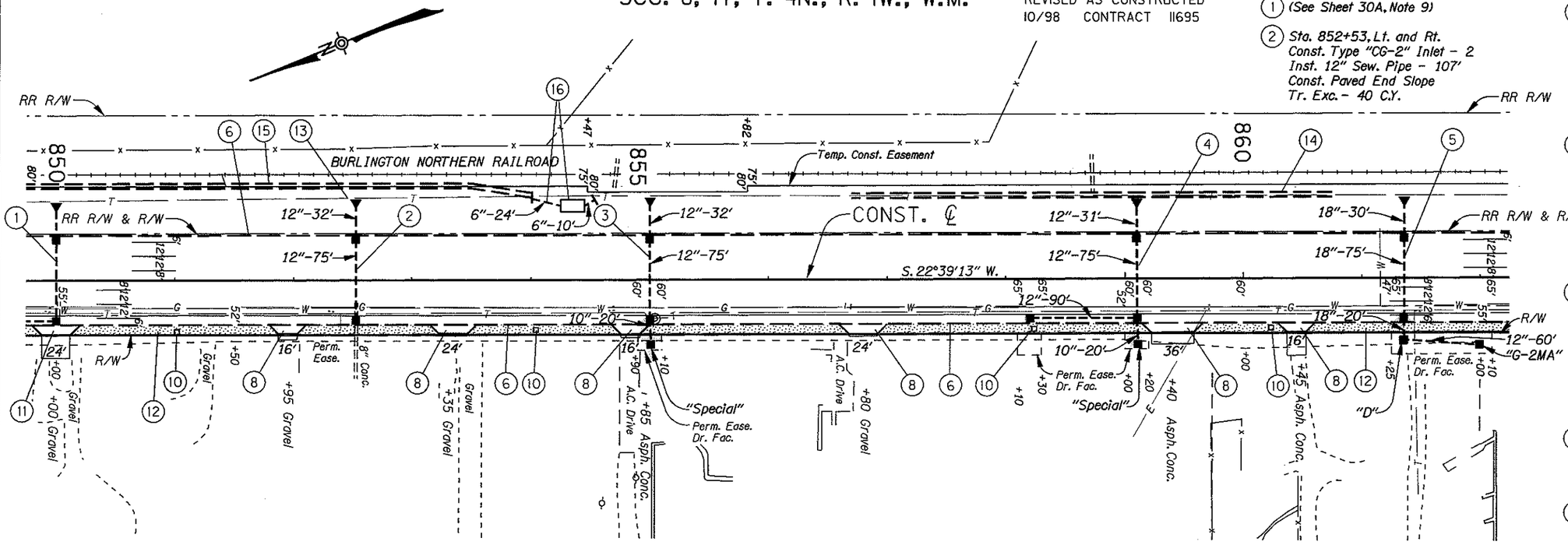
WYETH POND – SECTION A–A (FOR LOCATION SEE SHT 21)

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. 8, 17, T. 4N., R. 1W., W.M.

REVISED AS CONSTRUCTED
10/98 CONTRACT 11695



(1) *(See Sheet 30A, Note 9)*

(2) *Sta. 852+53, Lt. and Rt.*
Const. Type "CG-2" Inlet - 2
Inst. 12" Sew. Pipe - 107'
Const. Paved End Slope
Tr. Exc. - 40 C.Y.

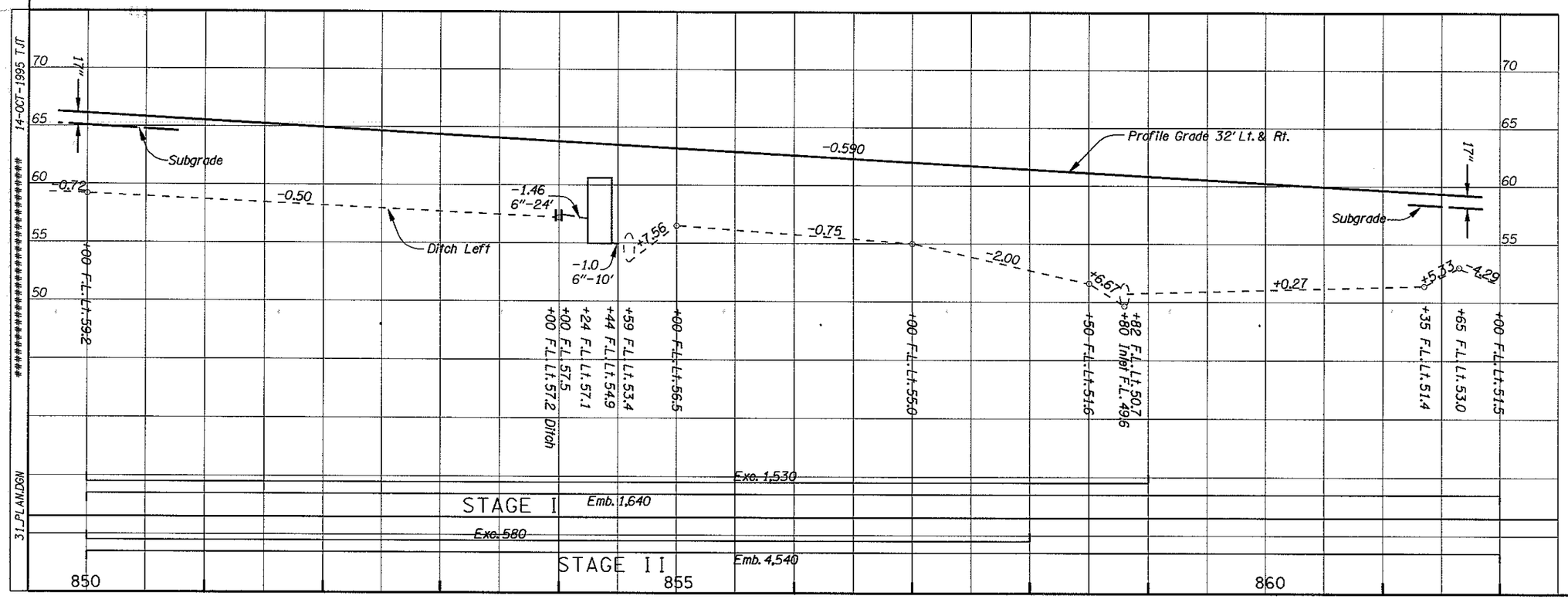
(3) *Sta. 855+00, Lt. and Rt.*
Const. Type "CG-2" Inlet - 2
Const. Special Inlet
Inst. 10" Sew. Pipe - 20'
Inst. 12" Sew. Pipe - 107'
Const. Paved End Slope
Tr. Exc. - 56 C.Y.
(For Details, See Sheet 2B-3)

(4) *Sta. 859+10, Lt. and Rt.*
Const. Type "CG-2" Inlet - 3
Const. Special Inlet
Inst. 10" Sew. Pipe - 20'
Inst. 12" Sew. Pipe - 196'
Const. Paved End Slope
Tr. Exc. - 76 C.Y.
(For Details, See Sheet 2B-3)

(5) *Sta. 861+35, Lt. and Rt.*
Const. Type "D" Inlet
Const. Type "CG-2" Inlet - 2
Const. Type "G-2MA" Inlet
Inst. 12" Sew. Pipe - 60'
Inst. 18" Sew Pipe - 125'
Const. Paved End Slope
Tr. Exc. - 88 C.Y.

(6) *Const. Type "D" Mod. Curb*
(For Detail, See Sht. 2B-5)

(8) *Const. P.C. Conc. Dwy. Type "A" - 6*
Const. Asph. Conc. Dwy. Connection - 6
(For Detail, See Sht. 2B-6)



(10) *Inst. Multiple Mailbox Support - 4*
Const. Conc. Collar - 4

(11) *(See Sheet 30A, Note 15)*

(12) *Const. P.C. Conc. Walk*
(For Planting Detail, See Sheets 37, 37A & 37B)

(13) *Sta. 852+25 To Sta. 852+75*
Lower Tel. Conduit - 50'
Inst. BSP Tel. Conduit Protection - 20'
(For Details, See Sheet 2B-26)

(14) *Sta. 856+70 To Sta. 860+75*
Const. Swale - 535 S.Y.
Dt. Exc. - 270 C.Y.
(For Details, See Sheet 2B-17)

(15) *See Sheet 30A, Note 33*

(16) *Sta. 854+00 To Sta. 854+45*
Inst. Compost Stormwater Filter
Drop-In Unit With Weir
Inst. 6" Sew. Pipe - 34'
Tr. Exc. - 18 C.Y.
(For Details, See Sheet 2B-16A)

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

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION		31