OPERATION & MAINTENANCE MANUAL

DFI No. : D00282
Facility Type: Water Quality Biofiltration Swale

August, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00282**
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) [42V-106]
Location:	District: 2B
	Highway No.: 002
	Mile Post: [17.17; 17.37 (beg./end)]
	Description: This facility is located south of I-84 (Hwy 002) along the left side of NW Frontage Road just prior to NW Graham Road (NW 257th Avenue) in Troutdale, Oregon. Access via NW Frontage Road.

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:	ODOT Designer – Region 1 Tech. Center, Dan Gunther, P.E., (503) 731-8299
Facility construction:	2009
Contractor:	Coral Construction Company.

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 south of I-84 (Hwy 002) along the left side of NW Frontage Road just prior to NW Graham Road (NW 257th Avenue) in Troutdale, Oregon. Access via NW Frontage Road.

Stormwater and sheet flow runoff accumulates along the adjoining roadway surfaces, near the intersection of NW Frontage and NW Graham Roads, and is conveyed overtop grass-lined shoulders and a media filter strip before settling along the swale/ditch bottom. There is one additional small culvert/paved-end slope, conveying water to the swale, and acting as a facility inlet at the northwest corner of the Frontage/Graham Road intersection; see Point D of the Operational Plan, Appendix A.

This swale may look and act more like a ditch, but specialized amended soils have been added to enhance its ability to treat the stormwater to some degree, prior to its being released to the outlet structures and a localized storm drain system; see Points A, B and C on the Operational Plan, Appendix A

A. Maintenance equipment access:
   Access may be obtained from the left shoulder to NW Frontage Road just prior to NW Graham Road (NW 257th Avenue).

B. Heavy equipment access into facility:

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

C. Special Features:

   ☒ Amended Soils; Media filter strip and compost top-soil blend
   ☐ Porous Pavers
   ☐ Liners
   ☐ Underdrains

Photo 1: Water Quality Biofiltration Swale, looking east. I-84 is located to the left; NW Frontage Road to the right.

Photo 2: Outlet structure at Point B, looking south.

Photo 3: Culvert paved-end slope facility inlet at Point D, looking northeast while at the intersection of NW Frontage and Graham Roads.

Photo 4: Outlet structure at Point A, looking south.

Photo 5: Looking south at outlet structure from the facility's furthest-most point west. This Type M-E inlet/outlet at Point C replaced an existing inlet and ties to an existing system, flowing eastward.

5. Facility Haz Mat Spill Feature(s)

The water quality biofiltration swale can be used to store a volume of liquid by blocking the 12-inch diameter outlet pipes located at the Type M-E inlet/outlet structures of the water quality biofiltration swale. These structures are noted as Points A, B and C on the Operational Plan, Appendix A. The use of sandbags or plates placed overtop the grated inlets is suggested as one possible way to 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

Aside from there being three outlet structures, no auxiliary outlets are present in 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

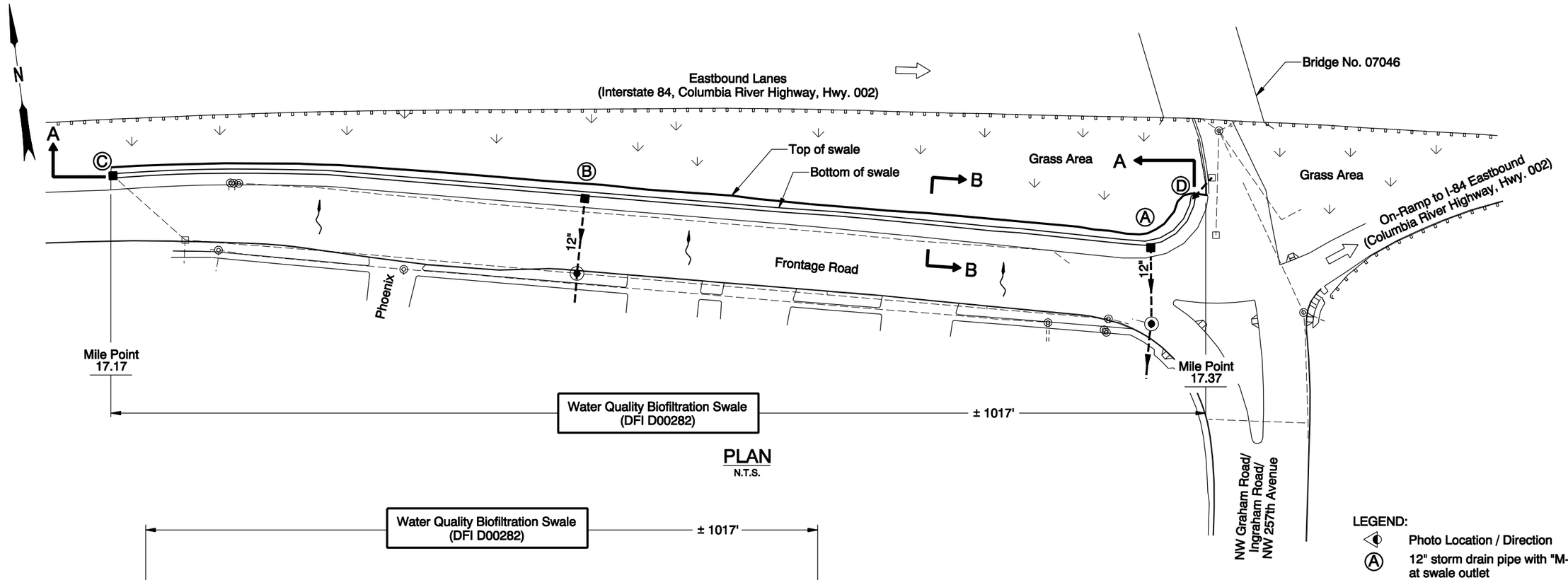
Contact any of the following for more detailed information about management of waste materials found on site:

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

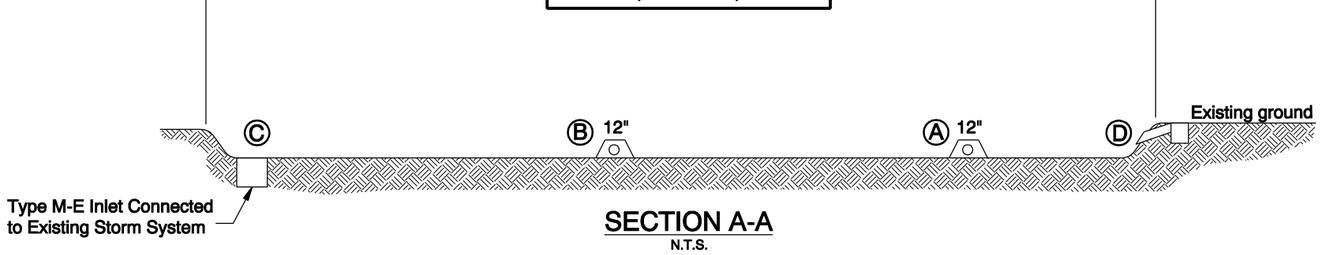
Appendix A

Content:

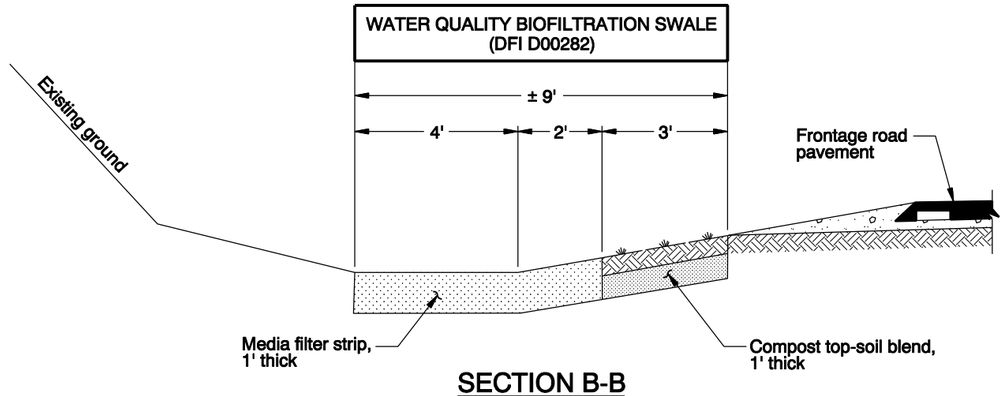
- **Operational Plan and Profile Drawing(s)**



PLAN
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

LEGEND:

- Ⓐ 12" storm drain pipe with "M-E" structure at swale outlet
- Ⓑ 12" storm drain pipe with "M-E" structure at swale outlet
- Ⓒ "M-E" structure swale outlet tied to existing local storm system
- Ⓓ Small culvert paved-end slope facility inlet
- Manhole
- Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Traffic Flow/Direction
- Conveyance Direction
- Pavement / Facility Flow Path
- Guard Rail
- Concrete Barrier

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Wynee Hu

Drafted By: Mathew Bunde

DFI D00282
MAINTENANCE DISTRICT 2B HWY 002
WATER QUALITY BIOFILTRATION SWALE
COLUMBIA RIVER HIGHWAY MP 17.17-17.37
MULTNOMAH COUNTY

Appendix B

Content:

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

42V-106

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

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

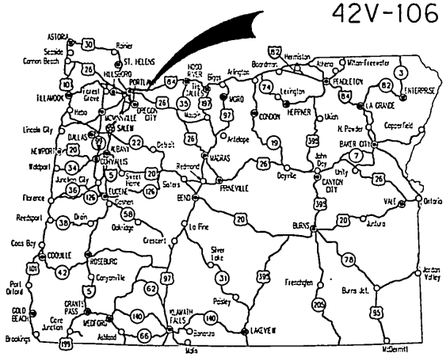
PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, & SIGNALS

I-84: RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.

COLUMBIA RIVER HIGHWAY

MULTNOMAH COUNTY
MAY 2009



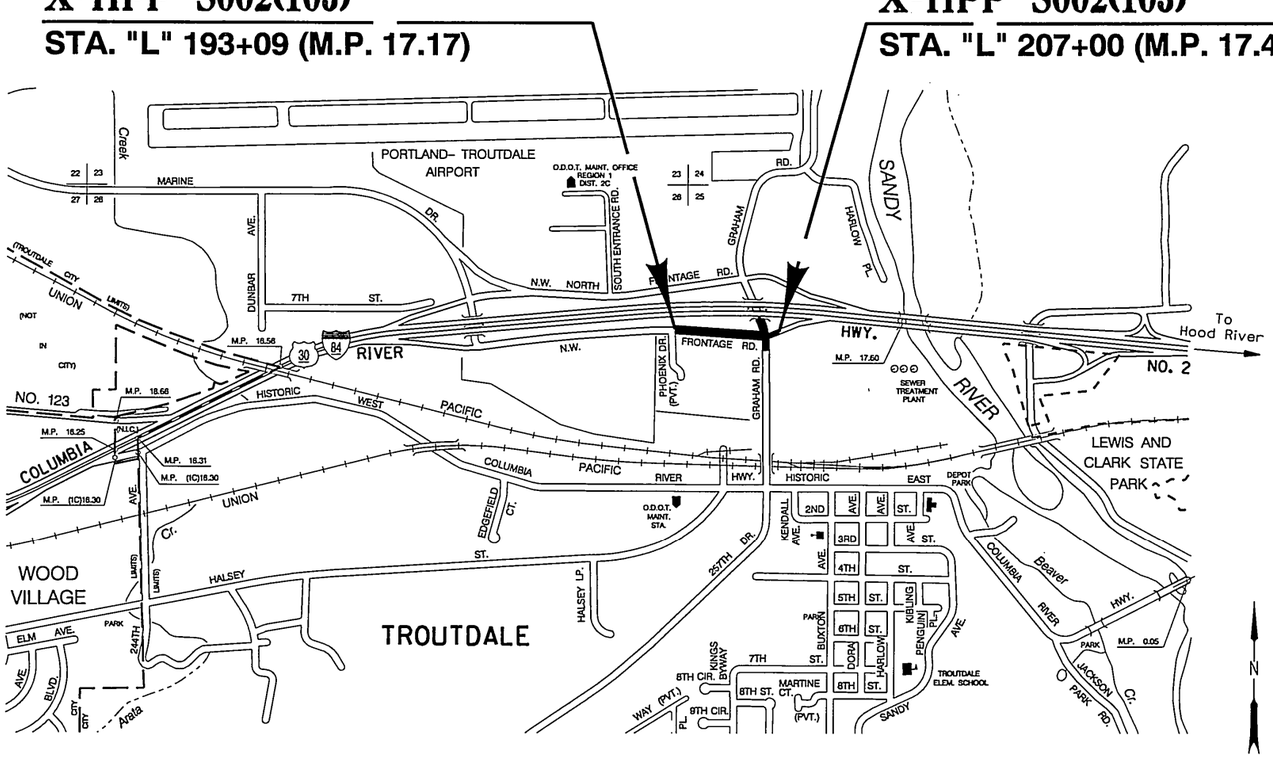
Overall Length Of Project - 0.27 Miles

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

BEGINNING OF PROJECT
X-HPP S002(103)
STA. "L" 193+09 (M.P. 17.17)

END OF PROJECT
X-HPP S002(103)
STA. "L" 207+00 (M.P. 17.44)



T. 1 N., R. 3 E., W.M.

OREGON TRANSPORTATION COMMISSION

Gail Achterman	CHAIR
Michael Nelson	VICE-CHAIR
Janice Wilson	COMMISSIONER
Alan Brown	COMMISSIONER
David Lohman	COMMISSIONER
Matthew L. Garrett	DIRECTOR OF TRANSPORTATION

These plans were developed using ODOT design standards. Exceptions to these standards, if any, have been submitted and approved by the ODOT Chief Engineer or their delegated authority.

Approving Authority: Naveen Chandra, P.E. April 2009
Region 1 Project Delivery Manager

Concurrence by ODOT Chief Engineer

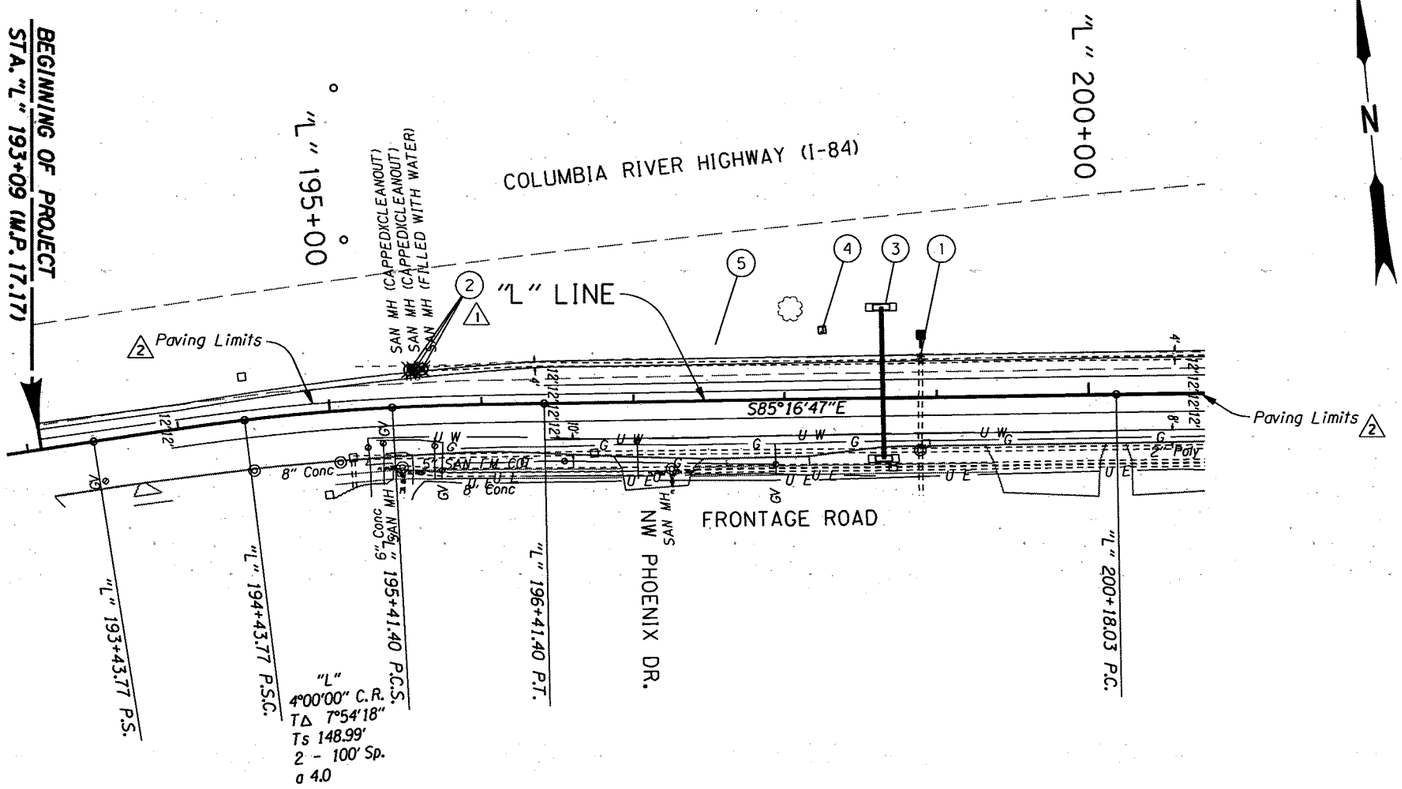
I-84: RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-HPP S002(103)	1

PE001426 000

Sec. 25, T. 1N., R. 3E., W.M.

42V-106



1. Sta. "L" 198+90, 36.6' Lt.
   Remove paved end slope
   Const. type "M-E" inlet
   F.L. 36.7'
   Extend 12" sewer pipe - 12'
   5' depth
   (See drg. nos. RD300, RD368, RD386, RD388 & RD390)

2. Minor adjust manhole - 3
   (See drg. no. RD360)

3. Const. sign bridge
   (For drg. nos. see sht. 1A)

4. Adjust signal junction box

5. Seed all disturbed areas (approx. 2 ac.)
   Permanent seeding, mix no. 1

No.	REVISION	BY	DATE
1	Note changes and san. text on plan sheet.	LAK	05-15-09
2	Showing Paving Limit	LAK	05-15-09

REGISTERED PROFESSIONAL ENGINEER
14468
Lawrence A. Kretzler
OREGON
JULY 26, 1989
LAWRENCE A. KRETTLER
Expires 06-30-2009

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - TRAFFIC ENGINEERING SECTION

I-84: RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

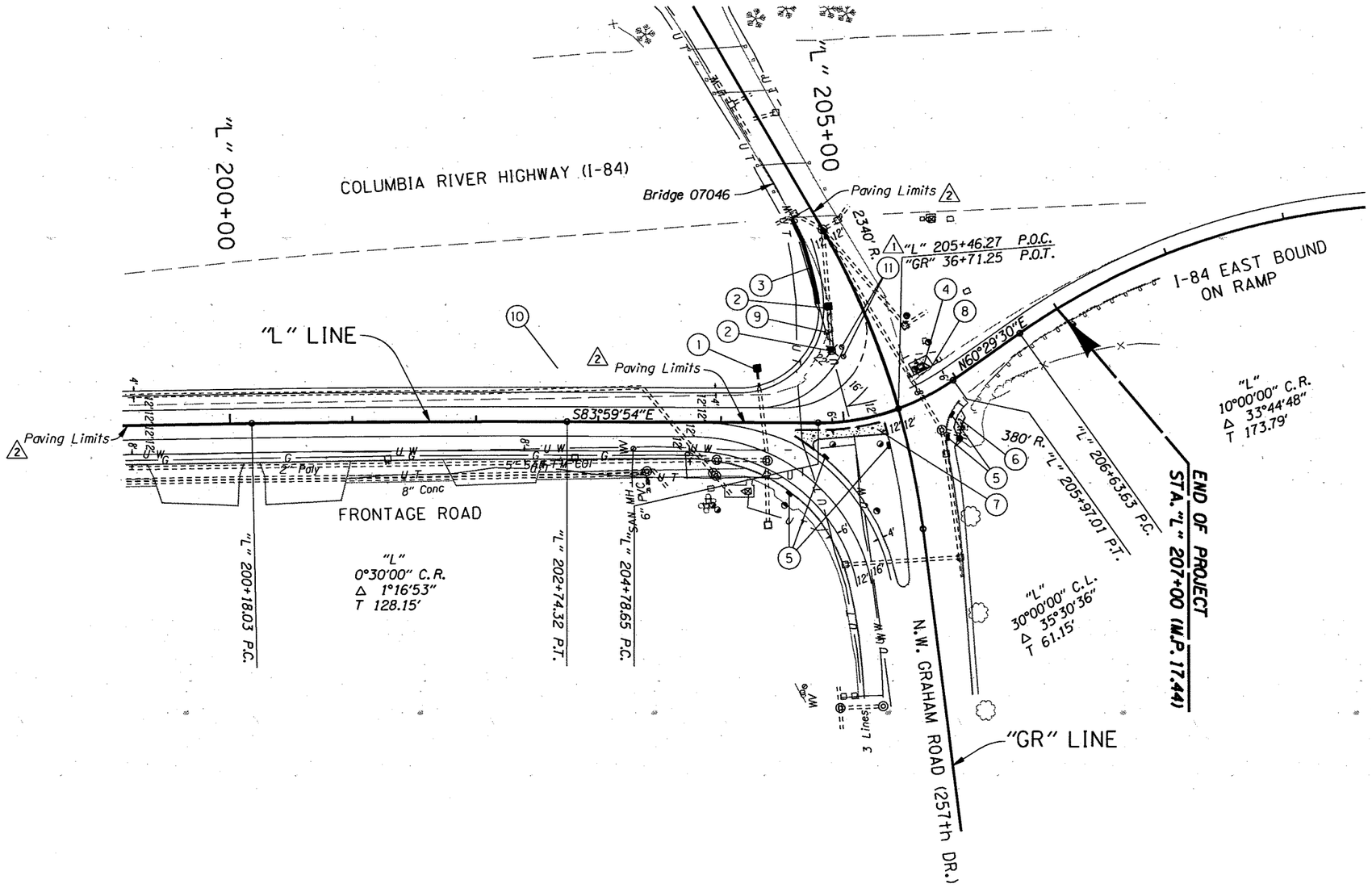
Design Team Leader - Robyn Bassett
Designed By - David Haase
Drafted By - David Haase

GENERAL CONSTRUCTION

SHEET NO. 3

Sec. 25, T. 1N., R. 3E., W.M.

42V-106



(1) Sta. "L" 204+31, 44.35 Lt.
Const. type "M-E" inlet
F.L. 35.9
Extend 12" sewer pipe - 16'
5' depth

(2) Sta. "L" 204+95, 95' Lt.
Remove inlet
Const. type "G-2" inlet
Rim 37.5
F.L. 35.92
Remove 12" sewer pipe - 25'
(See drg. no. RD364)

(3) Sta. "GR" 34+91 to Sta. "GR" 34+91 Rt.
Remove extg. barrier - 77'
Const. conc. shoulder barrier - 77'
Const. conc. barrier terminal
(For details, see sht. 2B)
(See drg. nos. RD500, RD510, & RD526)

(4) Const. perpendicular sidewalk ramp
(For details, see sht. 2B-2)
(See drg. nos. RD755 & RD759)

(5) Const. truncated dome detectable warning device - 5

(6) Const. P.C. conc. sidewalk landing
(For details, see sht. 2B-2)
(See drg. no. RD720)

(7) Const. type "C" conc. island (Mountable)
(For details, see sht. 2B-3)
(See drg. no. RD705)

(8) Const. standard curb
Const. curb ending - 2
(See drg. no. RD700)

(9) Adjust traffic signal junction box

(10) See note 5, sheet 3

△1 (11) Adjust water valves - 2

Plug And Abandon Extg. Pipe Shown Thus: ≈≈≈≈

No.	REVISION	BY	DATE
△1	Adjust water valves	LAK	05-15-09
△2	Showing Paving Limit	LAK	05-15-09

REGISTERED PROFESSIONAL ENGINEER
14468
Lawrence A. Kretteler
OREGON
July 26, 1989
LAWRENCE A. KRETTELER
Expires 06-30-2009

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - TRAFFIC ENGINEERING SECTION

I-84: RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

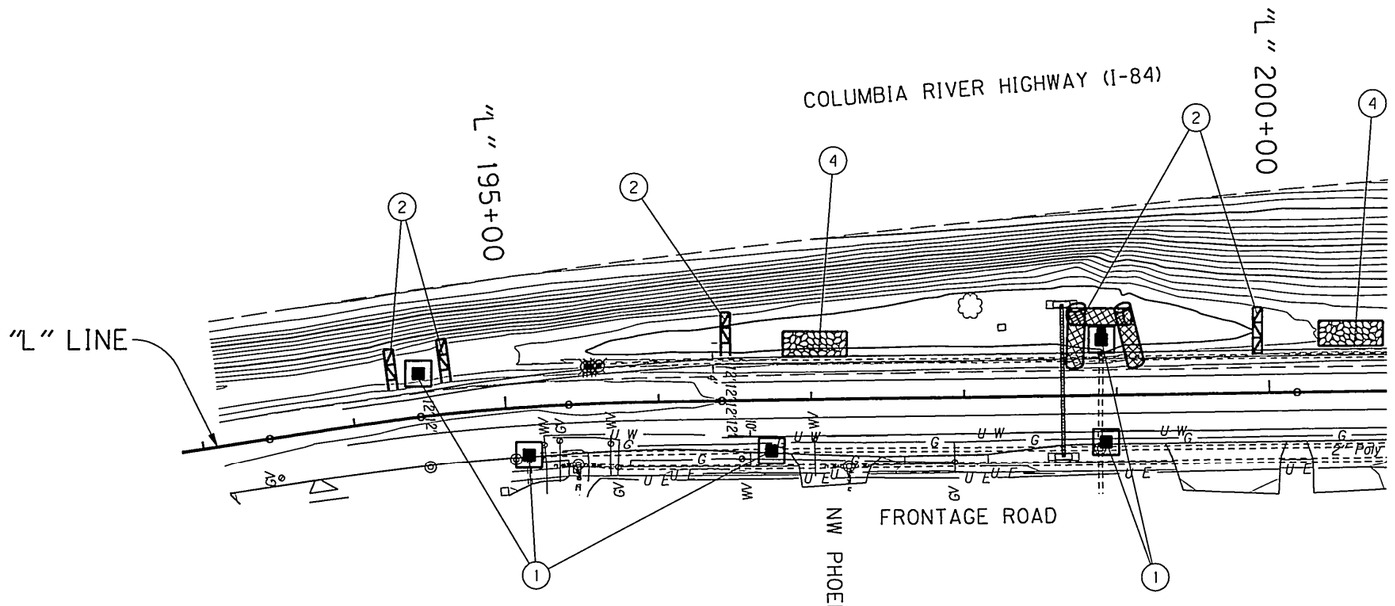
Design Team Leader - Robyn Bassett
Designed By - David Haase
Drafted By - David Haase

GENERAL CONSTRUCTION

SHEET NO. 4

Sec. 25, T. 1N., R. 3E., W.M.

42V-106



(1) *Const. Inlet Protection - 4 (Type 3) (See Drg. No. RD1010)*

(2) *Install Sediment Barrier - 40 ft. (See Drg. No. RD1030, RD1035)*

(3) *Const. Construction Entrance - 2 (See Drg. No. RD1000)*

STANDARD DRAWINGS

- ■ *RD1000 Construction Entrance*
- □ *RD1005 Check Dam*
- ■ *RD1010 Inlet Protection Type 1,2,3*
- □ *RD1015 Inlet Protection Type 4*
- □ *RD1020 Inlet Protection Type 5*
- □ *RD1025 Sediment Barrier Type 1*
- ■ *RD1030 Sediment Barrier Type 2,4*
- ■ *RD1035 Sediment Barrier Type 3*
- ■ *RD1040 Sediment Fence Supported/Unsupported*
- □ *RD1045 Temporary Slope Drain*
- □ *RD1050 Temporary Scour Basin*
- □ *RD1055 Matting*
- □ *RD1060 Tire Wash Type 1*

LEGEND

- *Biofilter Bags*
- *Fill slope*
- *Cut slope*
- *Inlet Protection*
- *Sediment Fence, Unsupported*
- *Construction Entrance*
- *Sediment Barrier Type 3, Straw Wattle*

Graphic symbols are approximate. Place Erosion Control measures as required or directed.

GENERAL NOTES:

The construction, adjustment, maintenance, and upgrading of these Erosion Control measures is the responsibility of the contractor for the duration of the project.

Erosion Control measures shown on this plan are for anticipated site conditions. Adjust or upgrade these measures for unexpected storm events to ensure that sediment and sediment-laden water does not leave the site.

Develop a revised plan of the Erosion Control measures shown as required by Section 00280, Oregon Standard Specifications for Construction. Implement this plan for all clearing and grading activities and in segments applicable to each staging phase. Construct in such a manner so as to ensure that sediment and sediment-laden water does not enter the roadway or drainage system, or violate applicable water standards.

Install measures within the right-of-way unless directed otherwise.

Install stablilized construction entrances at the beginning of construction and maintain for the duration of the project. Additional measures may be required to insure that all paved areas are kept clean.

Construct sediment fence 5 feet downslope from the toe of fill slopes where sediment-laden water has a potential of entering waterways or leaving the R/W.

Protect all inlets during surface grinding, paving, and earthwork operations to prevent pollutants from entering storm water systems.

REGISTERED PROFESSIONAL ENGINEER
14468
OREGON
July 26, 1989
LAWERENCE A. KRETTLER
Expires 06-30-2009

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 ROADWAY ENGINEERING SECTION

I-84: RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

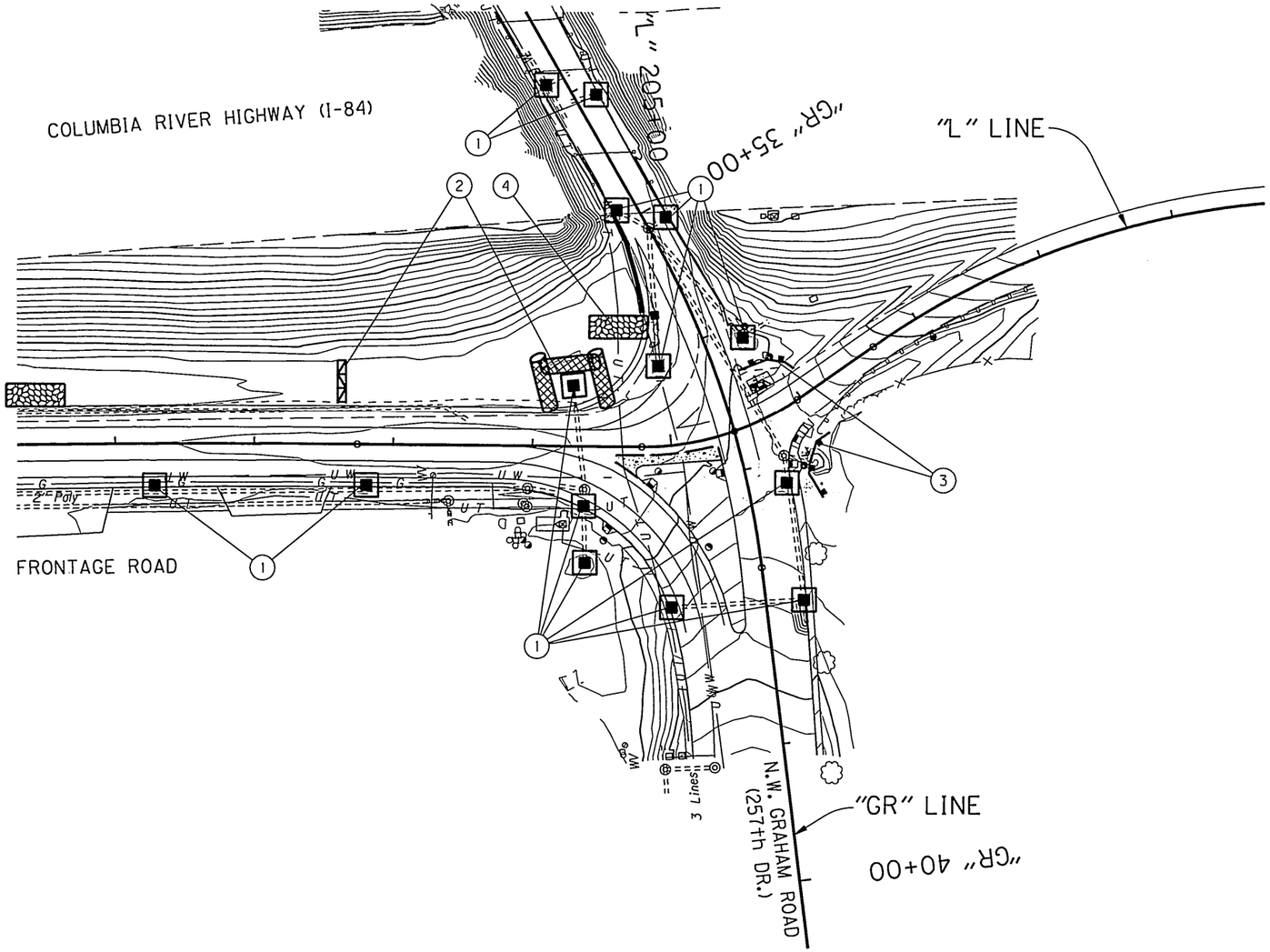
Design Team Leader - Larry Krettler
Designed By - David Haase
Drafted By - David Haase

EROSION CONTROL PLAN

SHEET NO. GA

Sec. 25, T. 1N., R. 3E., W.M.

42V-106



(1) *Const. Inlet Protection - 14 (Type 3)*

(2) *Install Sediment Barrier - 16 ft.*

(3) *Const. Sediment Fence - 90 ft. Unsupported (See Drg. No. RD1040)*

(4) *Const. Construction Entrance*

LEGEND

- *Biofilter Bags*
- *Fill slope*
- *Cut slope*
- *Inlet Protection*
- *Sediment Fence, Unsupported*
- *Construction Entrance*
- *Sediment Barrier Type 3, Straw Wattle*

Graphic symbols are approximate. Place Erosion Control measures as required or directed.

REGISTERED PROFESSIONAL ENGINEER
14468
OREGON
JULY 26, 1989
LAWRENCE A. KRETTLER
Expires 06-30-2009

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 ROADWAY ENGINEERING SECTION

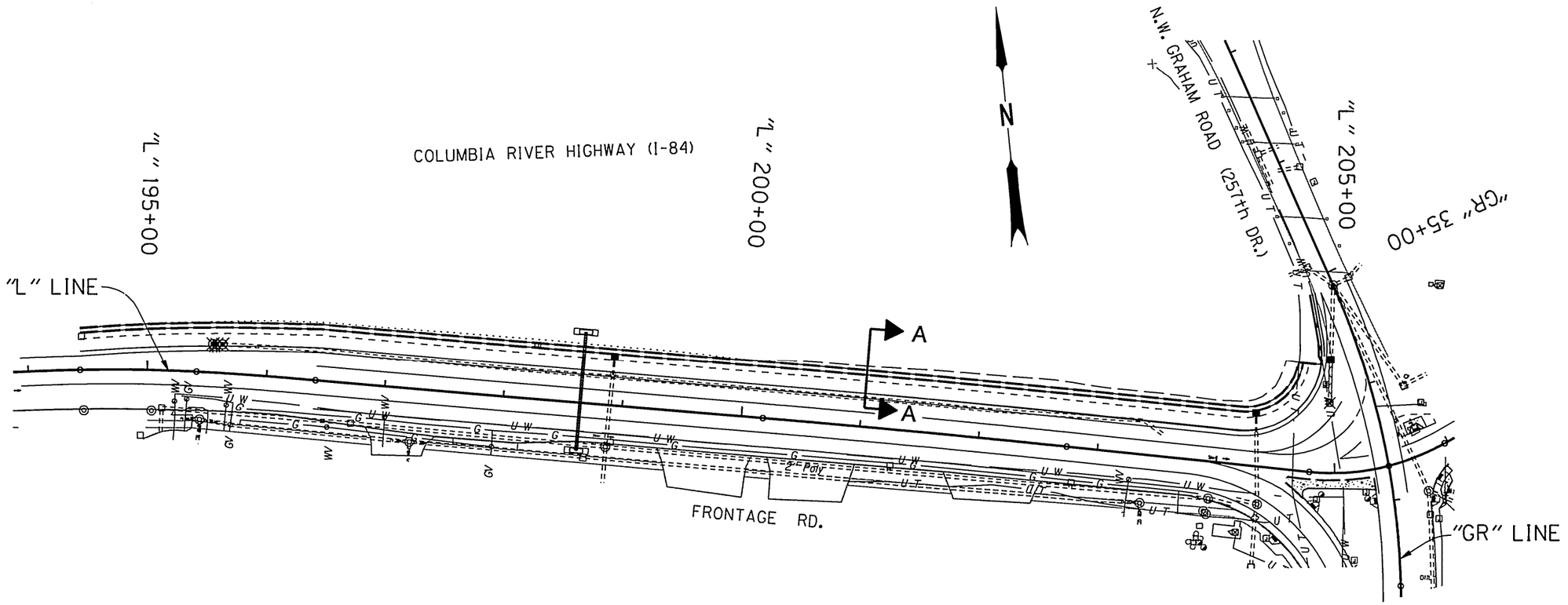
I-84: RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

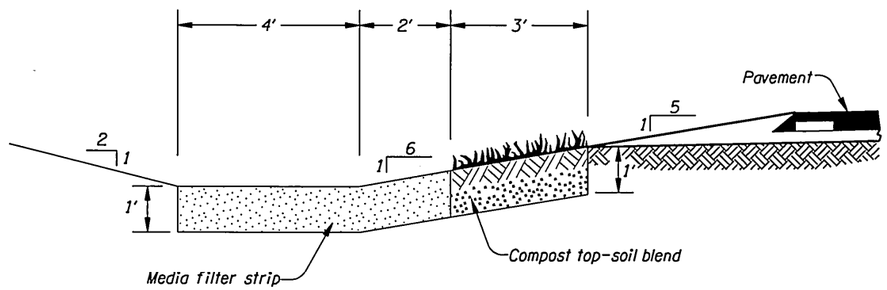
Design Team Leader - Larry Krettler
Designed By - David Haase
Drafted By - David Haase

EROSION CONTROL PLAN

SHEET NO. GA-2

BIO-INFILTRATION DITCH - PLAN & DETAIL





Section A-A
BIO-INFILTRATION DITCH
NTS

REGISTERED PROFESSIONAL ENGINEER
17,573
OREGON
JAN 19, 1995
DANIEL C. GUNTHER
RENEWAL DATE: 06-30-2009

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

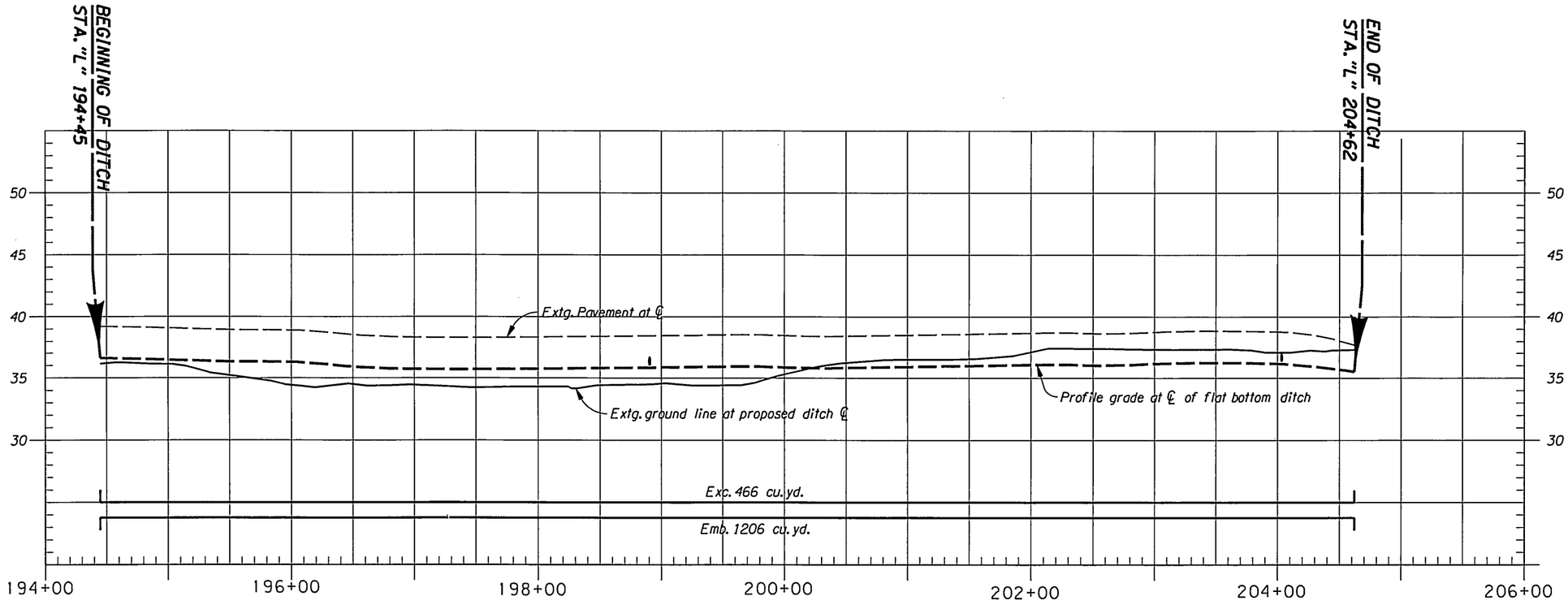
I-84 RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Ed Foltyn
Designed By - Dan Gunther
Drafted By - Dave Haase

WATER QUALITY PLAN

SHEET NO. GJ

BIO-INFILTRATION DITCH PROFILE



REGISTERED PROFESSIONAL ENGINEER
17,573
OREGON
JAN 19, 1995
DANIEL C. GUNTHER

RENEWAL DATE: 06-30-2009

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

I-84 RIGHT TURN LANE AT 257TH (TROUTDALE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

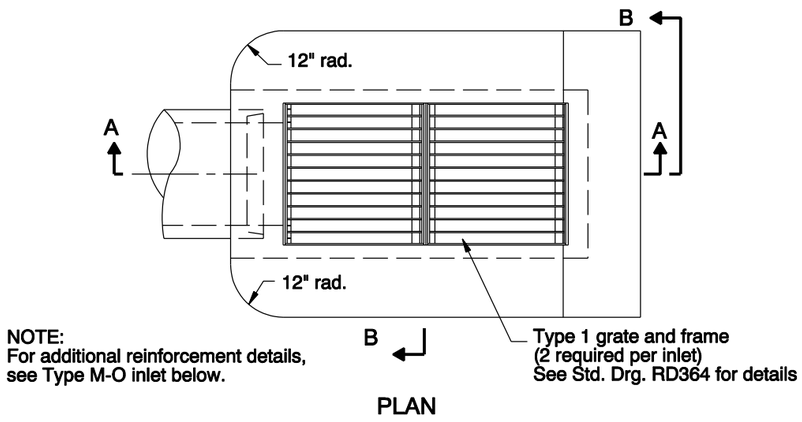
Reviewed By - Ed Foltyn
Designed By - Dan Gunther
Drafted By - Dave Haase

WATER QUALITY PROFILE

SHEET NO.
GJ-2

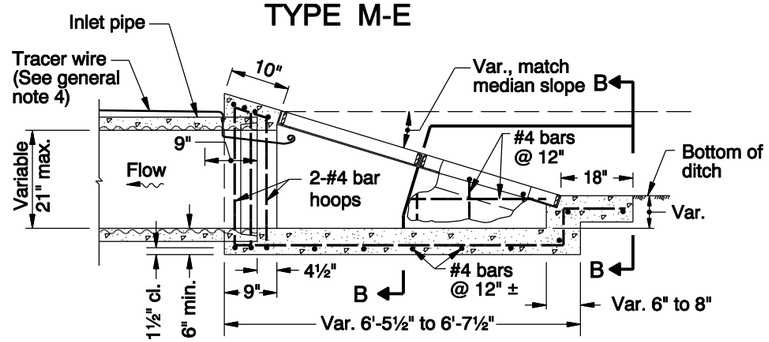
rd368.dgn 30-JUN-2009

TYPE M-E

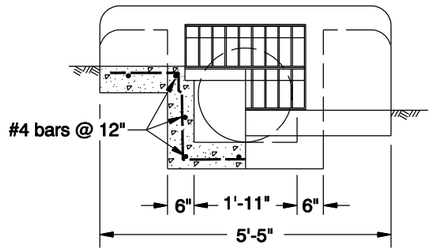


NOTE:
For additional reinforcement details, see Type M-O inlet below.

PLAN

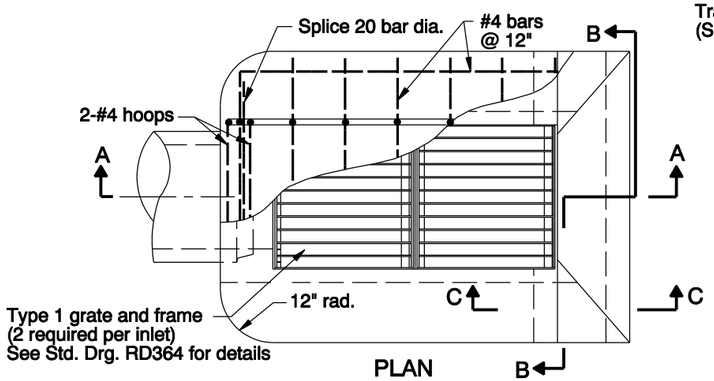


SECTION A-A

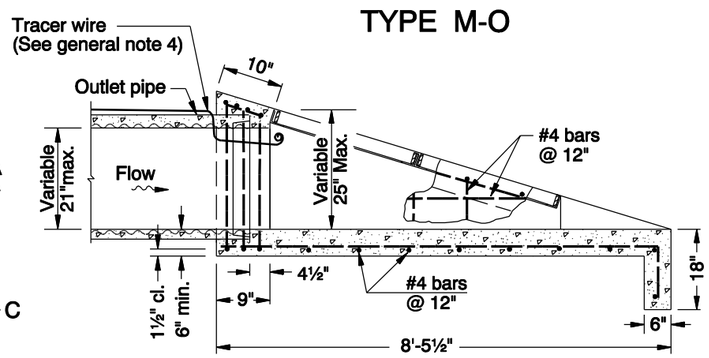


SECTION B-B

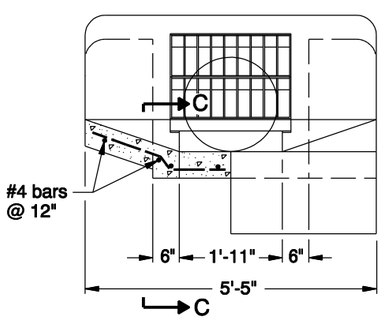
TYPE M-O



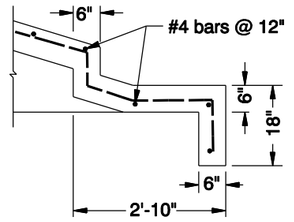
PLAN



SECTION A-A



SECTION B-B

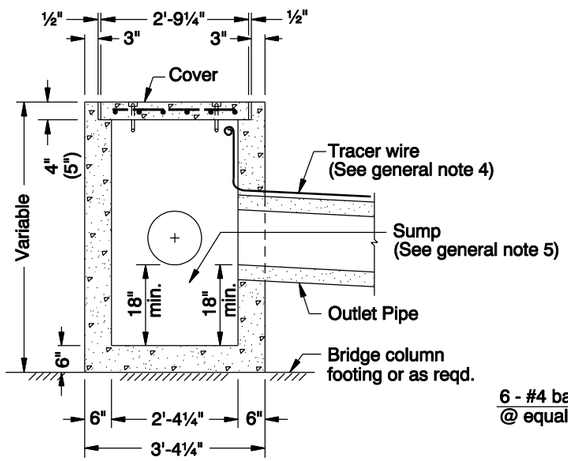


SECTION C-C

GENERAL NOTES FOR ALL DETAILS:

1. Maximum pipe sizes for use with type M-E and M-O inlets are 21" round and 21" x 15" arch pipe.
2. All reinforcement to be placed a minimum of 2" clear of nearest face of concrete unless otherwise shown or noted. Reinforcement to be lapped 20 bar diameters at splices.
3. When uncoated metal pipe or arch pipe are used, an asphaltic or similar type protective coating shall be applied to the exterior surface.
4. See Std. Drg. RD336 for tracer wire details, or approved alternate.
5. Provide sump only where shown on plans, and allowed by jurisdiction.
   For sump details, see Std. Drg. RD364.

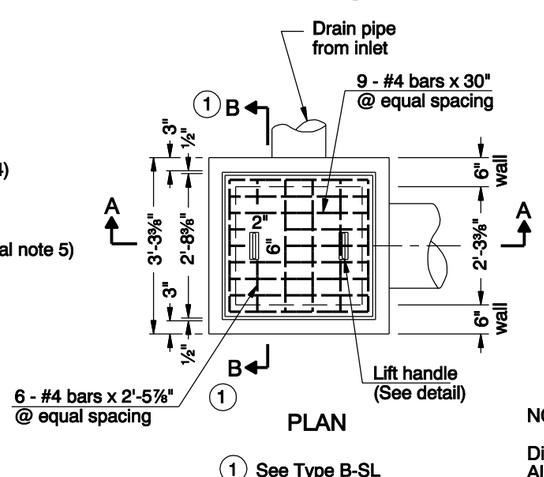
TYPE B



SECTION A-A

* All cover bars for Type B & B-SL inlets to be placed 1½" clear of nearest face of concrete unless shown or noted otherwise.

TYPE B-SL

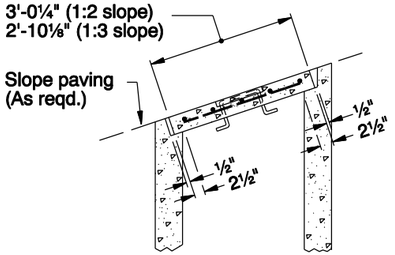


PLAN

1 See Type B-SL

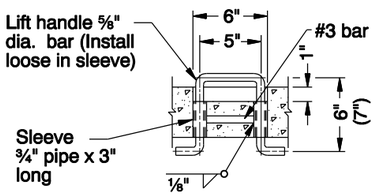
SLOPE INSTALLATION

(For details not shown, see Type B)



SECTION B-B

LIFT HANDLE



NOTE: ("TYPE B" MODIFIED INLET)

Dimensions shown in parenthesis are for Type B Modified inlet. All cover bars for "Type B" Modified inlet are to be placed 1" min. clear of bottom face of concrete and 2½" min. clear of top face of concrete. "Type B" modified inlet to be used if B inlet is under traffic.

CALC. BOOK NO. _____

BASELINE REPORT DATE _____

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

CONCRETE INLETS
TYPE M-E, M-O, B AND B-SL

2008

DATE	REVISION DESCRIPTION
06-2009	REVISED & ADDED NOTES

RD368