OPERATION & MAINTENANCE MANUAL

Water Quality Infiltration Swale

Manual prepared: April 2019

DFI No. D00540

Figure 1: DFI No. D00540, looking East

Identification

Drainage Facility ID (DFI):	D00540
Facility Type:	Water Quality Infiltration Swale
Construction Drawings:	(V-File Numbers) 44V-028
Location:	District: 2B Highway No.: 002 Mile Post: 16.93 to 17.21, I-84 East, NW Frontage Rd.

1. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions.

2. Facility Location

DFI D00540 replaces the existing water quality DFI's D01050 and D00282. The location map below details the 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 to West, Infiltration Swale

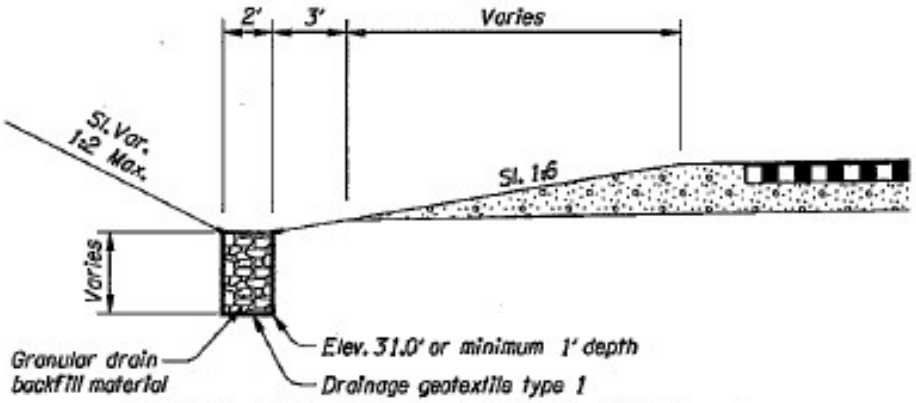
Figure 2: NW Frontage Rd. D00540

3. Facility Summary

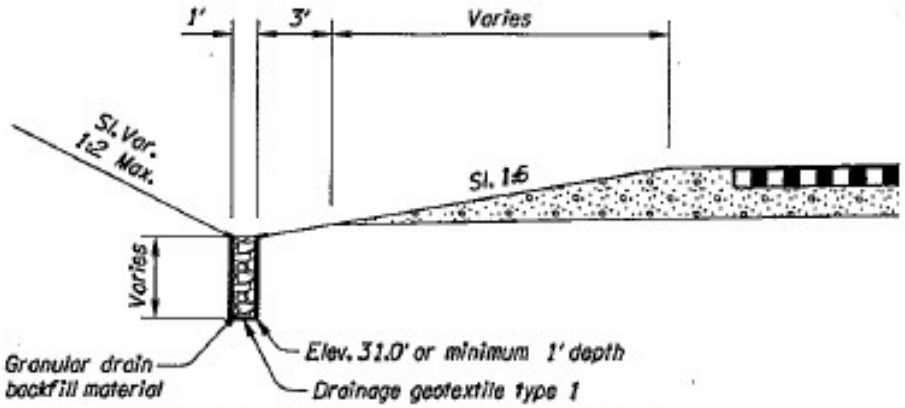
The length and width of a swale is based on the bottom dimensions.

The bottom length and bottom width of the swale is:

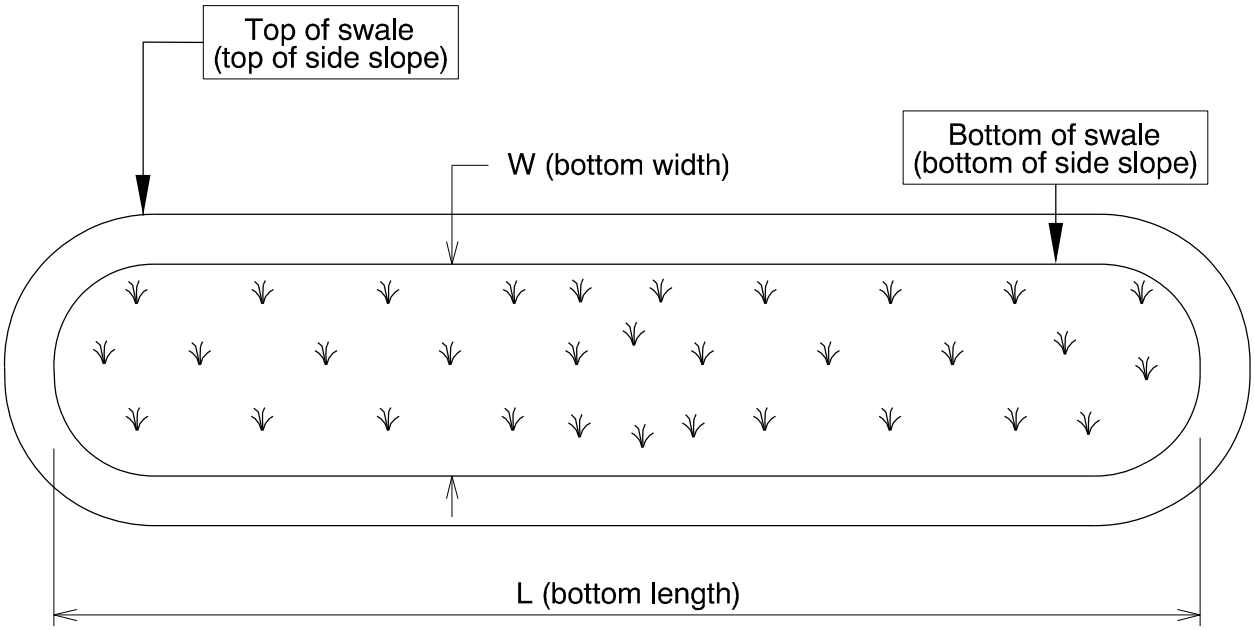
Component	Length (feet)	Width (feet)	Type
Infiltration Swale			
"EB" 472+65 to 475+50	**285**	**2**	**A**
"EB" 475+50 to 480+75	**525**	**1**	**D**
"EB" 480+75 to 488+68	**793**	**2**	**A**



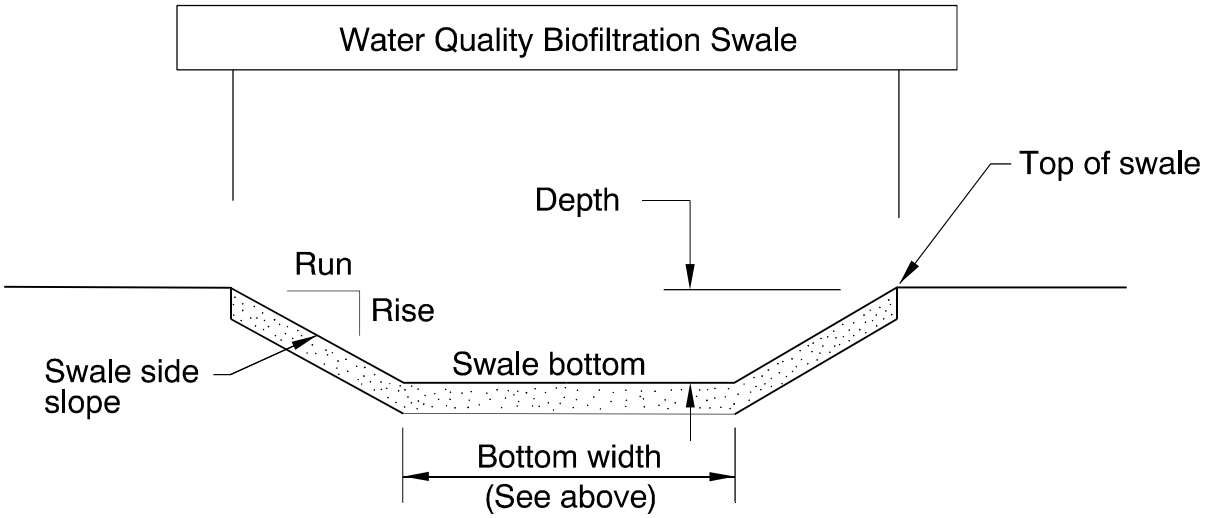
INFILTRATION SWALE TYPE A



INFILTRATION SWALE TYPE D



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).



Site Specific Information: NW Frontage Rd. is a one way road, traveling east to west. The infiltration swale is similar to a Biofiltration Swale, it is long and linearly constructed into the existing slope. The treatment is provided and pollutants are removed by infiltration processes. The water is stored in the voids in the trench gravels until it percolates into the surrounding soil. There are no subsurface drain pipes in this facility.

The water generally is conveyed into the ground during routine storms and the facility can act as a roadside ditch during the more severe storms.

4. Facility Access

Maintenance access to the facility:

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

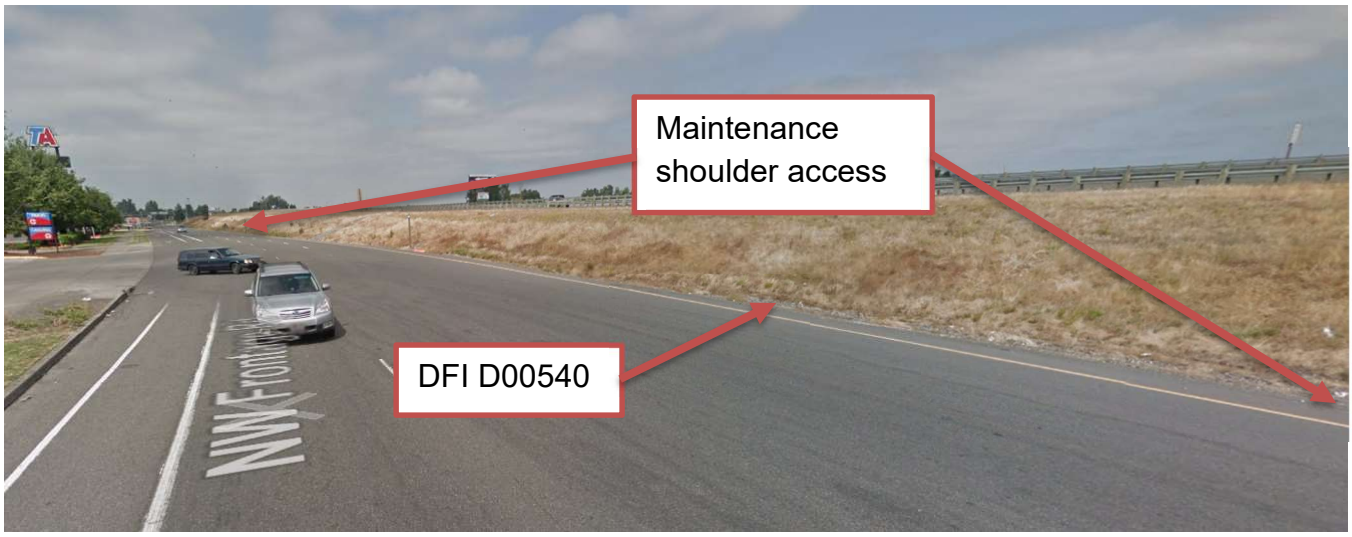


Figure 3: Looking west at Infiltration Swale

5. 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
An on-line swale with roadside ditches	An on-line swale with piped inlets and outlets	An off-line swale with a piped high flow bypass
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	☐	**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: Infiltration Swale	☒	**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)	☐ **C** ☐ **L** ☐ **O**	**S24**
Ditch	☐	**S25**
Storm drain system	☐	**S26**
Outfall Components		
Riprap pad	☐	**S27**
Riprap bank protection	☐	**S28**

6. 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

7. Limitations

Access grid installed:

☒ No	☐ Yes
There are no duty 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.

8. 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

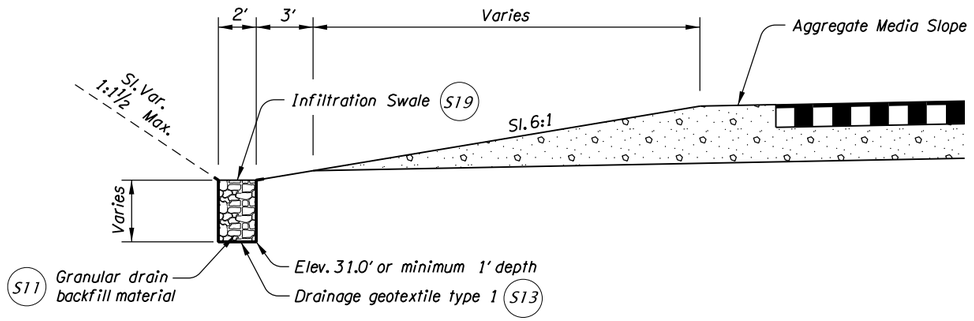
Contact any of the following for more detailed information about management of waste materials found on site:

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

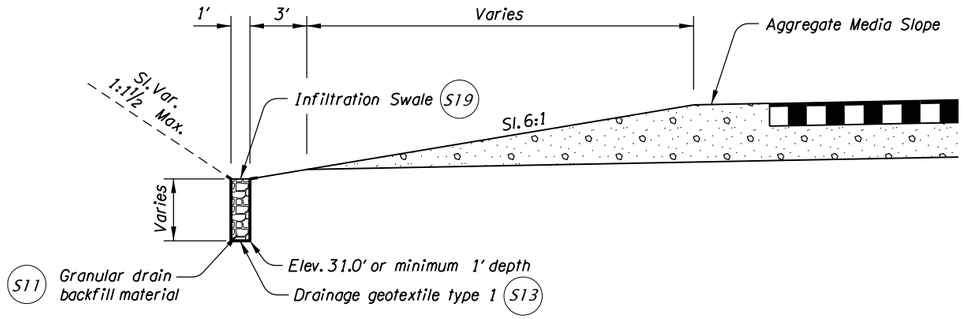
A Appendix A – Site Specific Operational Plan

Contents: Appendix A plan sheets include raster images of the as-built plans. The original drawings were not located.

Operational Plan: DFI D00540



INFILTRATION SWALE TYPE A



INFILTRATION SWALE TYPE D

TYPICAL SECTION
N.T.S.

LEGEND:

- X# — *Facility Component (see table 1 in O&M Manual)*
- and/or — *Manhole*
- and/or — *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

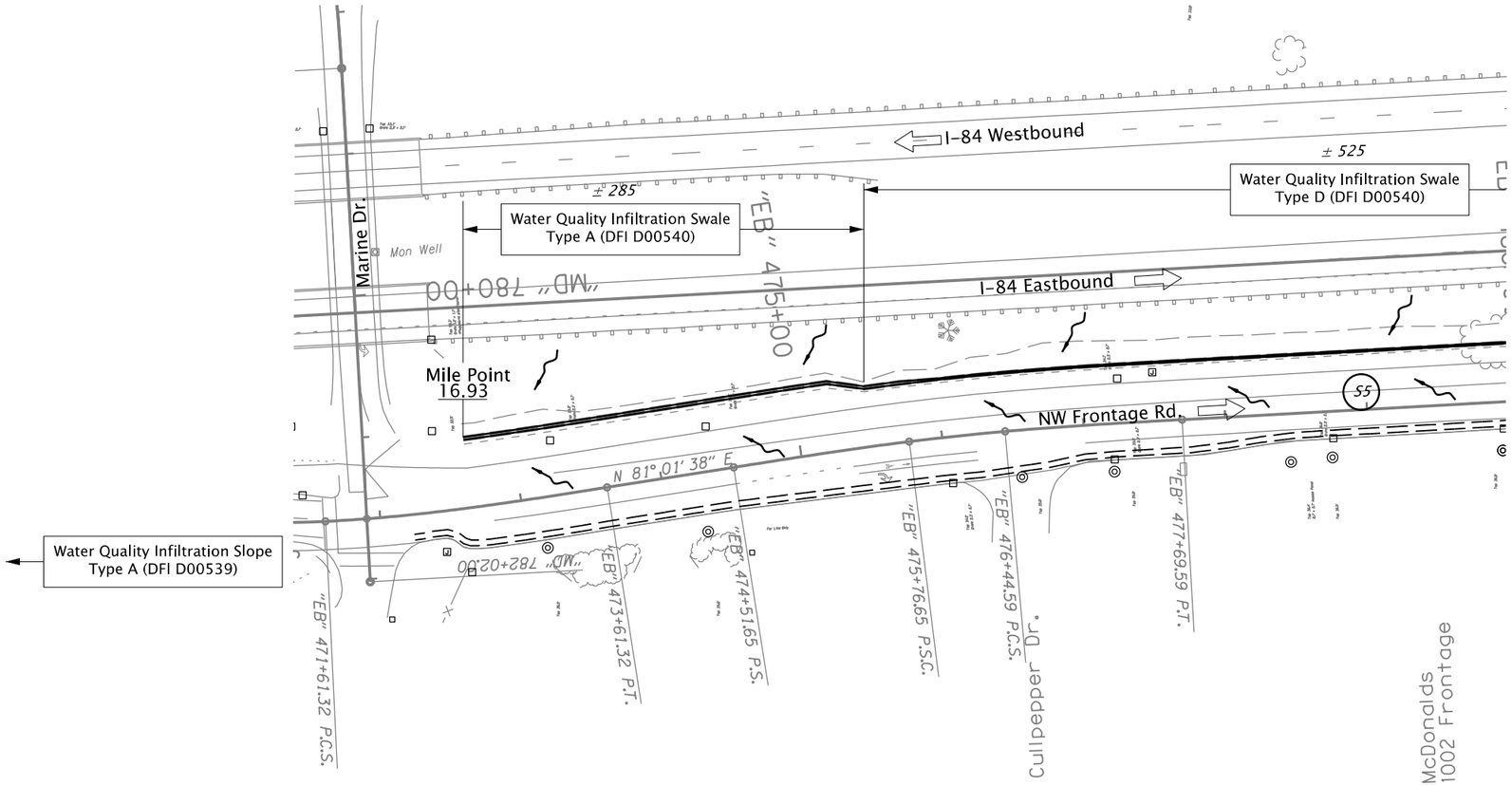
OREGON DEPARTMENT OF TRANSPORTATION

Sht. 1 of 3

Prepared By: Alan Babicky

Drafted By: Alan Babicky

DFI D00540
MAINTENANCE DISTRICT 2B HWY 002
INFILTRATION SWALE
HIGHWAY MP 16.93 - 17.21
MULTNOMAH COUNTY



PLAN
N.T.S.

N

LEGEND:

- *X#* — *Facility Component (see table 1 in O&M Manual)*
- and/or — *Manhole*
- and/or — *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

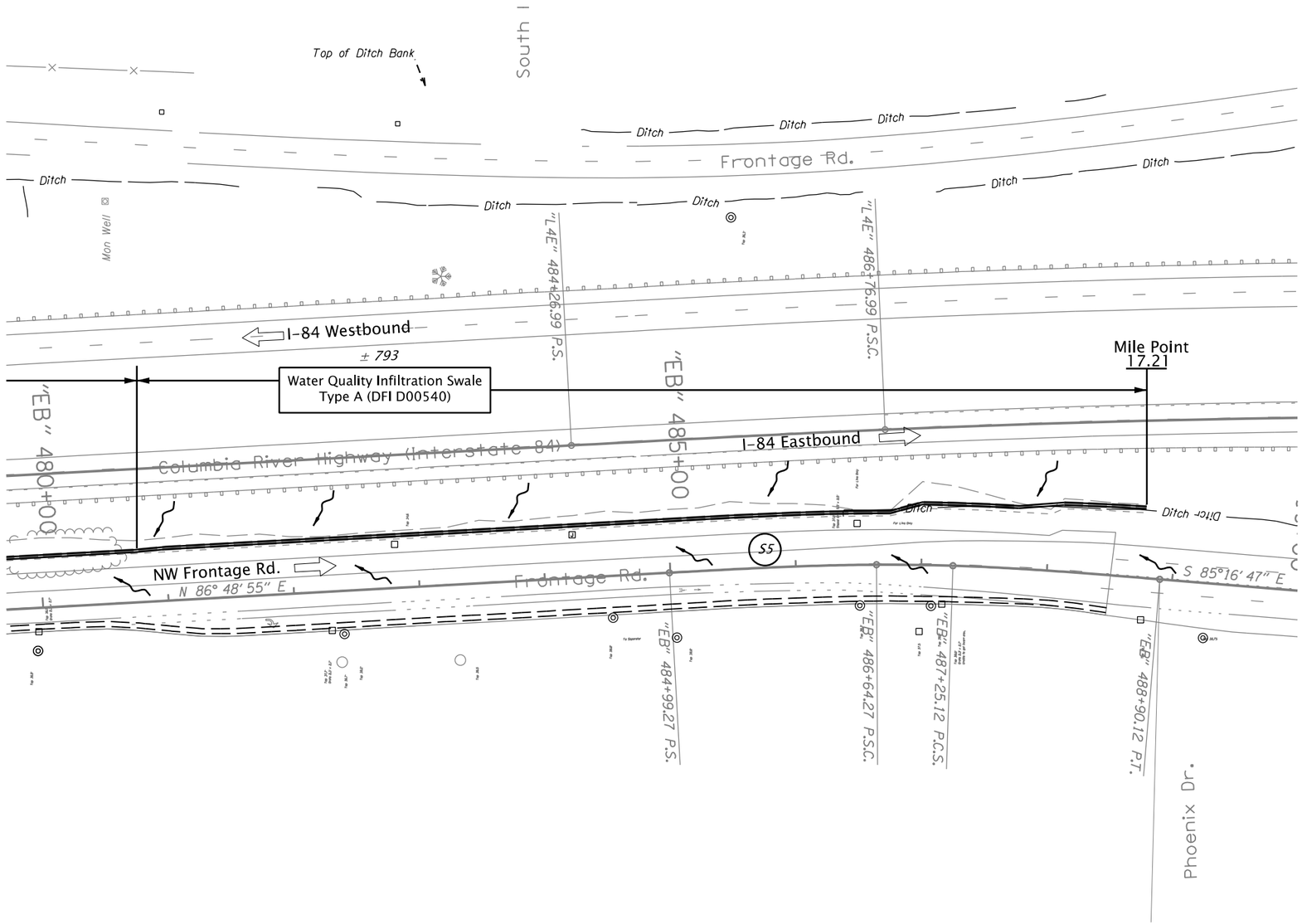
OREGON DEPARTMENT OF TRANSPORTATION

Sht. 2 of 3

Prepared By: Alan Babicky

Drafted By: Alan Babicky

DFI D00540
MAINTENANCE DISTRICT 2B HWY 002
INFILTRATION SWALE
HIGHWAY MP 16.93 - 17.21
MULTNOMAH COUNTY



N

LEGEND:

- X# — *Facility Component (see table 1 in O&M Manual)*
- and/or — *Manhole*
- and/or — *Inlet*
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

PLAN
N.T.S.

Sht. 3 of 3

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Alan Babicky

Drafted By: Alan Babicky

DFI D00540
MAINTENANCE DISTRICT 2B HWY 002
INFILTRATION SWALE
HIGHWAY MP 16.93 - 17.21
MULTNOMAH COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 44V-028

44V-028

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

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

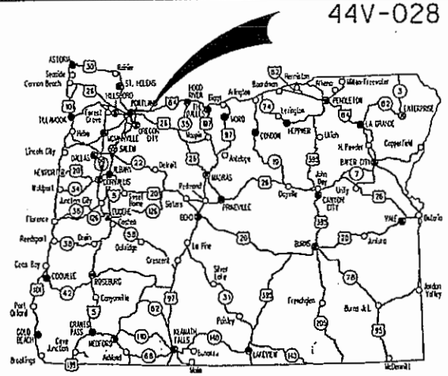
PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, PAVING, PAVEMENT MARKERS, SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.

COLUMBIA RIVER HIGHWAY

MULTNOMAH COUNTY
MARCH 2011



Overall Length Of Project – 0.85 Miles

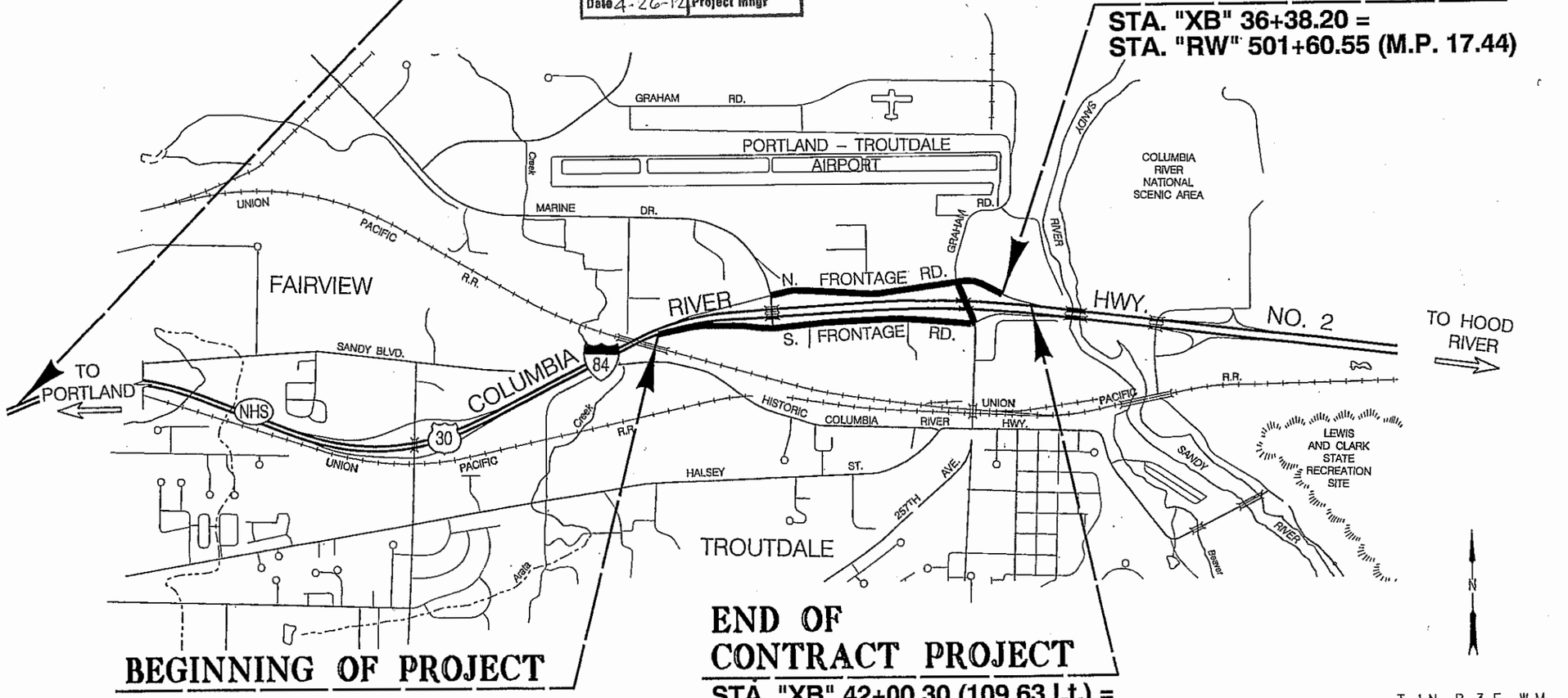
ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

"AS CONSTRUCTED"
Mark Bean
Date 4-26-12 Project Mngr

BEGINNING OF CONTRACT PROJECT
STA. "RW" 317+09 (M.P. 13.96)

END OF PROJECT
STA. "XB" 36+38.20 =
STA. "RW" 501+60.55 (M.P. 17.44)



BEGINNING OF PROJECT
STA. "L4E" 455+91.00
STA. "RW" 455+94.16 (M.P. 16.59)

END OF CONTRACT PROJECT
STA. "XB" 42+00.30 (109.63 Lt.) =
STA. "RW" 507+19.70 (M.P. 17.54)

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

OREGON TRANSPORTATION COMMISSION

Gail Achterman	CHAIR
Michael Nelson	VICE-CHAIR
Mary Olson	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 G. Chandra, P.E.
Project Delivery Manager, Region 1

Concurrence by ODOT Chief Engineer

1-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	STATE	1

PE001770 000 J13

INDEX OF SHEETS, CONT'D.	
SHEET NO.	DESCRIPTION
2, 2A, 2A-2 thru 2A-13, Incl.	Typical Sections
2B, 2B-2 thru 2B-4, Incl.	Details Added Sht 2B-3A
2C, 2C-2 & 2C-3	Detour
2C-4 thru 2C-16, Incl.	Traffic Control Plans
2D	Pipe Data Sheet
3	Alignment
3A	General Construction
3B	Drainage & Utilities
3C	Profiles
4	Alignment
4A	General Construction
4B	Drainage & Utilities
4B-2	Drainage & Utilities
4C	Profiles
4D	Drainage Profiles
5	Alignment
5A	General Construction
5B	Drainage & Utilities
5B-2	Drainage & Utilities
5C	Profiles
5D	Drainage Profiles
6	Alignment
6A	General Construction
6B	Drainage & Utilities
6B-2	Drainage & Utilities
6C	Profiles
6D	Drainage Profiles
7	Alignment
7A	General Construction
7C	Profiles
8	Alignment
8A	General Construction
GEO/HYDRO	
GA	Erosion Control Details
GA-2 thru GA-8	Erosion Control Plans
GB, GB-2 & GB-3	Geotechnical Data
GJ	Drainage Details
GJ-2, GJ-3, GJ-4	Stormwater Treatment and Storage Facility Field Markers
DRAWING NO.	DESCRIPTION
BRIDGE STRUCTURE 17365	
85233	Bridge General Layout
85235	Structural Mount
85236	Structure Mount Details
PERMANENT PAVEMENT MARKINGS	
ST, ST-2 thru ST-7, Incl.	Pavement Marking Plan
PERMANENT SIGNING	
S-12500 thru S-12517, Incl.	Permanent Signing
BRIDGE STRUCTURE 21529	
S-12518	Cantilever Sign Support, Sta. "EB" 458+80

INDEX OF SHEETS, CONT'D.	
DRAWING NO.	DESCRIPTION
ILLUMINATION	
I-1827	Illumination Legend
I-1828 & I-1829	Illumination Removal Plan
I-1830 & I-1831	Illumination Plan
I-1832	Illumination Details
TRAFFIC SIGNALS	
15969	Signal and Detector Plan Legend
15970	Detector Plan
15971	Signal Removal Plan
15972	Temporary Signal Plan
15973	Signal Plan
15974	Detector Plan
15975	Existing Utility Plan
15976	Signal Removal Plan
15977	Temporary Signal Plan
15978	Signal Plan
15979	Detector Plan
15980	Existing Utility Plan
15981	Temporary Pole Entrance Chart
15982	Pole Entrance Chart
ITS	
ITS-1044	ITS Legend & Symbols
ITS-1045 thru ITS-1049, Incl.	ITS Plan
ITS-1050 thru ITS-1055, Incl.	ITS Details

Added 15978A Grading For Signal Pole # 18

Standard Drg. Nos.

RD140 - Roadway Cross Slopes Superelevated Sections
RD150 - Slope Rounding

RD300 - Trench Backfill, Bedding, Pipe Zone And Mult. Installations
RD302 - Street Cut
RD316 - Sloped Ends For Metal Pipe
RD318 - Sloped Ends For Concrete Pipe
RD320 - Paved End Slope For Culverts 60" Maximum Pipe Size
RD326 - Coupling Bands For Corrugated Metal Pipe
RD336, RD342, RD344, RD346 - Manholes
RD356 - Manhole Cover & Frames
RD358 - Manhole Slope Protectors
RD364, RD370, RD376 - Concrete Inlets
RD380, RD384, RD386 - Pipe Fill Height Tables

RD400, RD405, RD415, RD420, RD450 - Guardrail

RD500 - Precast Concrete Barrier Pin And Loop Assembly
RD510 - Concrete Barrier Terminal

RD700 - Curbs
RD705 - Islands
RD710 - Accessible Route Islands
RD715 - Approaches And Non-Sidewalk Driveways
RD720 - Sidewalks
RD755 - Sidewalk Ramp Details
RD759 - Truncated Dome Detectable Warning Surface Details And Locations

RD1000 - Construction Entrances
RD1005 - Check Dams
RD1010, RD1015 - Inlet Protection
RD1040 - Sediment Fence

TM200 - Sign Installation Details
TM201 - Miscellaneous Sign Placement Details
TM204 - Flag Board Mounting Details
TM211 - Signing Details
TM223, TM224 - Directional Sign Layout
TM225 - Exit Number & Gore Signing Details
TM230, TM231, TM232, TM233 - Mounting Details For Removable Legend

TM300, TM301 - Illumination Control Cabinets

TM450 - Mast Arm Pole Details
TM452 - Strain Pole Details
TM455 - Temporary Signal Details
TM457 - Vehicle, Ped. Signal & Push Button Mounting Details
TM458 - Pedestrian Ramp Placement Details
TM460 - Vehicle Signal Details
TM462 - Adjustable Signal Head Mounting Details
TM463 - Spanwire Mounting Details
TM465 - Overhead Sign, Fire Preemption & Photoelectronic Details
TM467 - Ped. Signal And Ped. Push Button Details
TM470 - Color Code Charts
TM472 - Traffic Signal Junction Boxes
TM475 - Loop Details
TM480 - Loop Entrance Details
TM482 - Controller Cabinet And Foundation Details
TM485 - Service Cabinets And Service Cabinet Wiring Details
TM488 - Terminal Cabinet Detail
TM490 - Crosswalk Closure Detail

"AS CONSTRUCTED"
Mark Bean
Date 4-26-12 | Project Mngr

Standard Drawings located on the web at:
http://www.oregon.gov/ODOT/HWY/ENGSERVICES/standard drawings home.shtml

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MUTNOMAH COUNTY

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

Standard Drg. Nos. (contd.)

TM500, TM501, TM503	- Pavement Marking Standard Details
TM525	- Turn Arrow Marking Details
TM530	- Intersection Pavement Markings
TM551	- Freeway Exit Ramp Pavement Markings
TM560, TM561	- Alignment Layout
TM570	- Traffic Delineators
TM571	- Traffic Delineators Steel Post Details
TM575	- Traffic Delineator Installation
TM600, TM601	- Multi-Post Breakaway Sign Supports
TM602	- Triangular Base Breakaway Multi-Direction Slip Base
TN618	- Truss Type Sign Bridge
TM622, TM623, TM624, TM625, TM626, TM627	- Monotube Cantilever Sign Support
TM629, TM630	- Slip Base & Fixed Base Luminaire Supports
TM635	- Breakaway Sign & Luminaire Supports
TM650, TM651, TM652, TM653	- Traffic Signal Supports
TM670	- Wood Post Sign Supports
TM671	- 3 Second Gust Wind Speed Isotach
TM675	- Extruded Aluminum Panels
TM676	- Sign Attachments
TM677	- Sign Mounts
TM678	- Secondary Sign Mounting Details
TM679	- Signal Mast Arm Street Name Sign Mounts
TM680	- Signal Pole Mounts
TM681, TM687, TM688	- Square Tube Sign Supports
TM800	- Tables, Abrupt Edge And PCMS Details
TM810	- Temporary Reflective Pavement Markers
TM820	- Temporary Barricades
TM821	- Temporary Sign Supports
TM830	- Temporary Concrete Barrier And Rumble Strips
TM831, TM832	- Temporary Impact Attenuators
TM840	- Closure Details
TM841	- Intersection Work Zone Details
TM842	- Signalized Intersection Details
TM843	- Intersection Details
TM851	- 2-Lane, 2-Way Roadways
TM860	- Freeway Sections

R/W Map Nos. 6B-15-13, 1A-22-7, 1R-3-1477 and 1R-3-1477

"AS CONSTRUCTED"

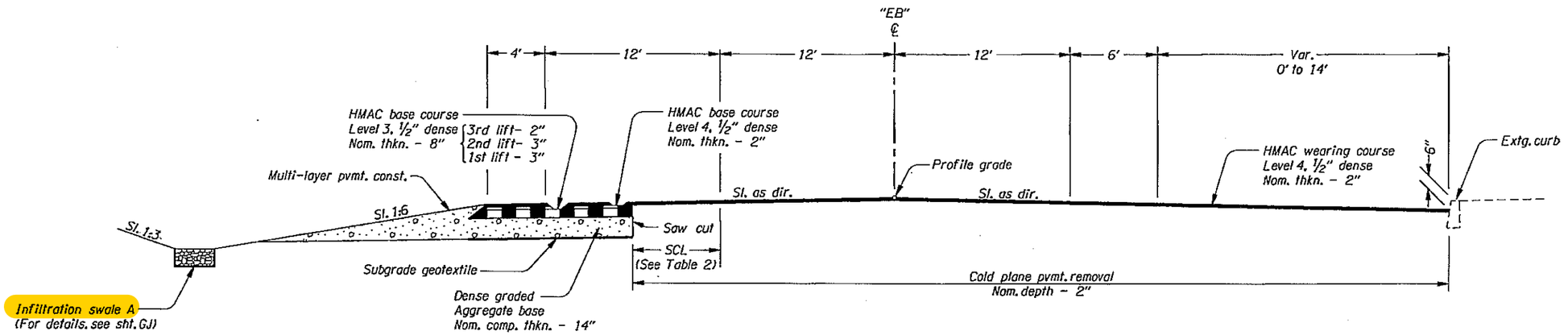
Mark Reese

Date 4-26-12 | Project Mngr

Standard Drawings located on the web at: http://www.oregon.gov/ODOT/HWY/ENGSERVICES/standard drawings home.shtml

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MUTNOMAH COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	STATE	1B



STA. "EB" 472+25.00 To STA. "EB" 474+30.36
"EB" 486+25.00 To "EB" 488+68.12

See As Built Saw Cut Table on Sheet 2A-5

TABLE 2

STA.	To STA.	SCL (Ft.)
472+25.00	474+30.36	6
486+25.00	487+03.00	6 to 15
487+03.00	488+68.12	15 to 22

"AS CONSTRUCTED"
Mark Bean
Date 4-26-12 | Project Mngr

NOTE:
1. Side-slopes are shown as vert. to horiz.
2. For standard superelevation, see drg. no. RD140.
3. For slope rounding, see drg. no. RD150.

REGISTERED PROFESSIONAL ENGINEER
14468
Lawrence A. Kretzler
OREGON
JULY 26, 1989
LAWRENCE A. KRETTLER
EXPIRATION DATE: 6-30-2011

OREGON DEPARTMENT OF TRANSPORTATION

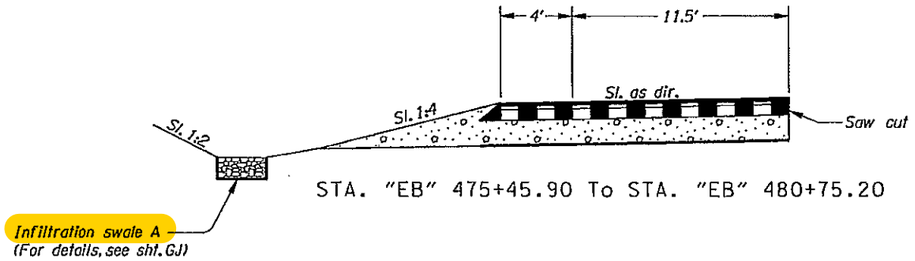
REGION 1 - ROADWAY ENGINEERING SECTION

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

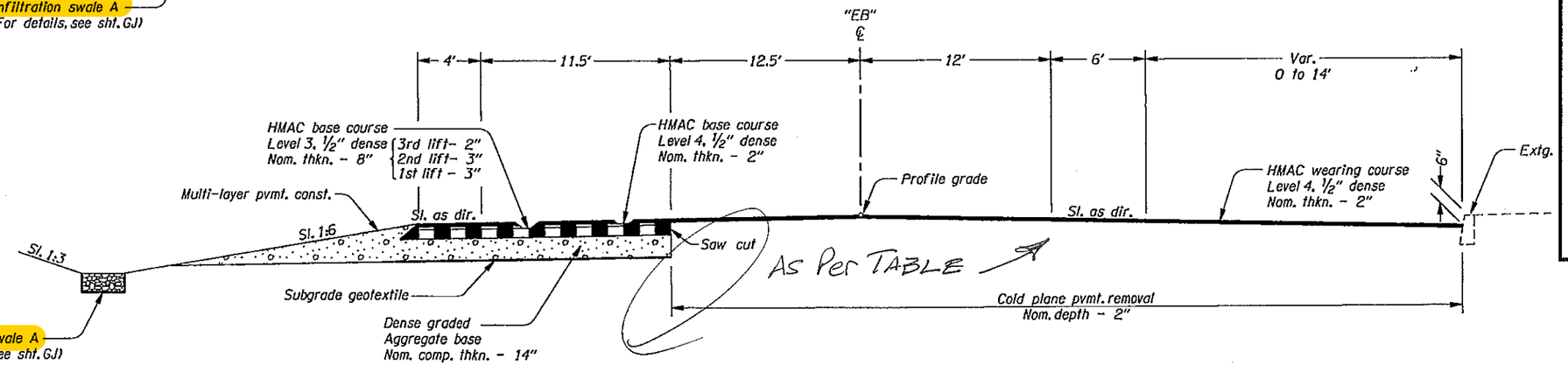
Design Team Leader - Lawrence Krettler
Designed By - Marco Singer & Dave Haase
Drafted By - Carolyn Allen

TYPICAL SECTIONS

SHEET NO. 2A-4



STA. "EB" 475+45.90 To STA. "EB" 480+75.20



STA. "EB" 474+30.36 To STA. "EB" 486+25.00

EB ALIGNMENT As Built Saw Cuts	
EB STATION	Sawcut Left
Sta 472+71.95	-24.9
Sta 473+00.69	-19.9
Sta 473+48.74	-18.0
Sta 475+47.35	-15.9
Sta 475+84.28	-14.8
Sta 477+07.56	-15.4
Sta 477+81.69	-15.1
Sta 477+81.69	-15.8
Sta 480+44.51	-16.1
Sta 485+95.74	-16.2
Sta 487+26.52	-24.1
Sta 487+54.49	-24.5
Sta 487+56.94	-23.3
Sta 487+65.45	-23.5
Sta 487+68.91	-24.9
Sta 488+68.09	-28.5

NOTE:
1. *Side-slopes are shown as vert. to horiz.*
2. *For standard superelevation, see drg. no. RD140.*
3. *For slope rounding, see drg. no. RD150.*

"AS CONSTRUCTED"

Mark Bein

Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER
14468
OREGON
July 26, 1989
LAWERENCE A. KRETTLER

Lawerence A Krettler

EXPIRATION DATE: 6-30-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

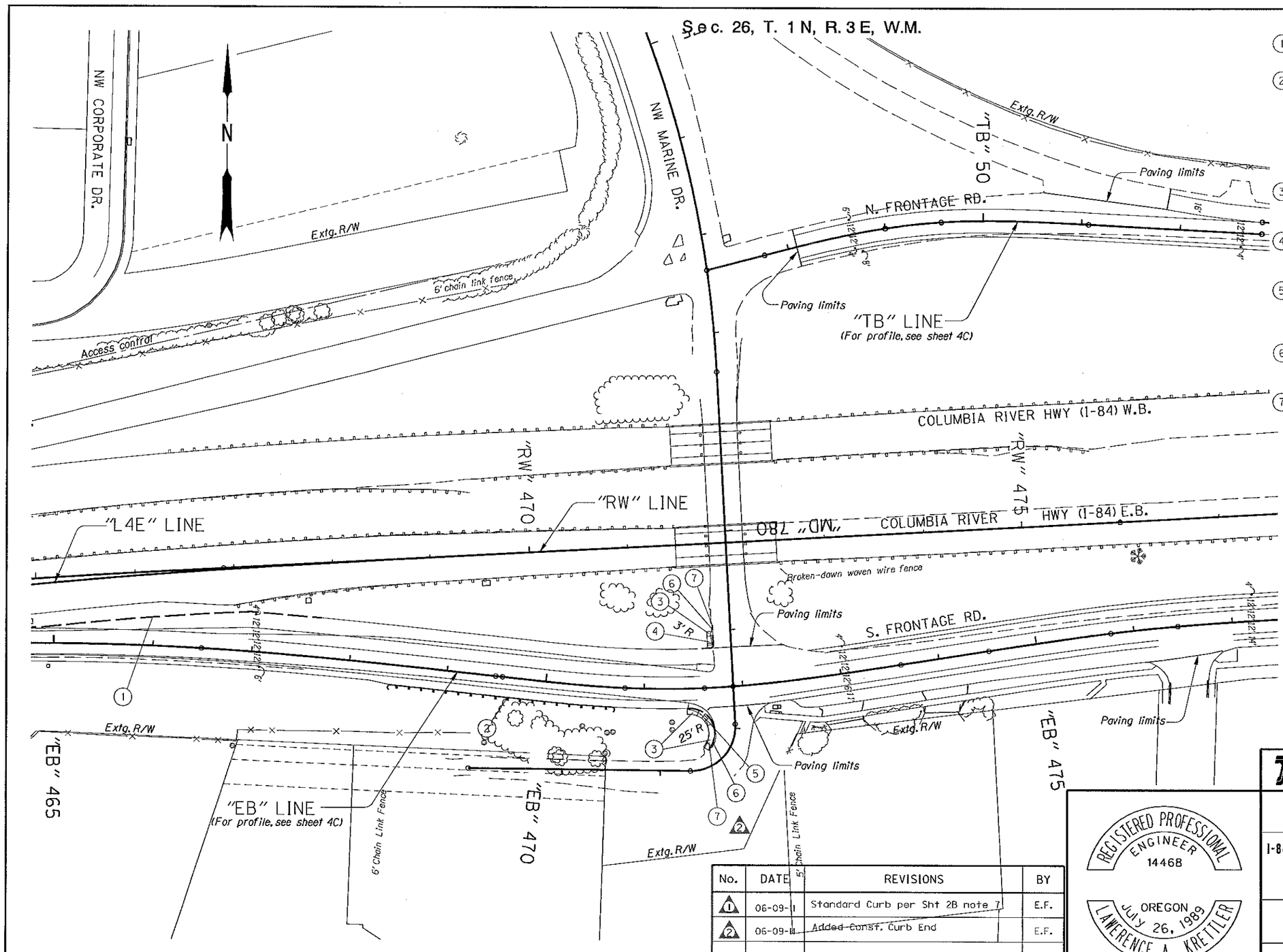
Design Team Leader - Lawerence Krettler
Designed By - Marco Singer & Dave Haase
Drafted By - Carolyn Allen

TYPICAL SECTIONS

SHEET NO. 2A-5

Sec. 26, T. 1 N, R. 3 E, W.M.

44V-028



1. See sht. 3A, note 4
2. Sta. "EB" 468+43 to Sta. "EB" 470+69, Rt.
   Const. guardrail - 175' (Type 2A)
   Const. anchor (Type 1 modified)
   Inst. end piece (Type B)
   Const. guardrail terminal non-flared - 50'
   Test level 3
   W=1, E=2'
3. Const. P.C. conc. sidewalk (See drg. no. RD720)
4. Const. sidewalk ramp (For details, see sht. 2B)
5. Remove extg. curb & sidewalk
   Const. parallel sidewalk ramp
   (See drg. no. RD755)
6. Const. standard curb (See drg. no. RD700) ⚠1
7. Const. curb end (See drg. no. RD700)

No.	DATE	REVISIONS	BY
⚠1	06-09-11	Standard Curb per Sht 2B note 7	E.F.
⚠2	06-09-11	~~Added Const.~~ Curb End	E.F.

"AS CONSTRUCTED"

Mark Bean

Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER
14468
OREGON
JULY 26, 1989
LAWERENCE A. KRETTLER

EXPIRATION DATE: 6-30-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Design Team Leader - Lawerence Krettler
Designed By - Marco Singer & Dave Haase
Drafted By - Carolyn Allen

GENERAL CONSTRUCTION

SHEET NO. 4A

44V-028

Sec. 26, T. 1 N., R. 3 E., W.M.

"AS CONSTRUCTED"

Date 4-26-12 | Project Mngr

NW CORPORATE DR.

NW MARINE DR.

NE MARINE DR.

Exist. R/W

N FRONTAGE RD

S FRONTAGE RD

"TB" LINE

"MD" LINE

"RW" LINE

"L4E" LINE

"EB" LINE

"EB" 465

"EB" 470

"EB" 475

COLUMBIA RIVER HWY (WB I-84)

COLUMBIA RIVER HWY (I-84) E.B.

Access Control

Ditch

Inlet

Blind Connect

Manhole

Catch Basin

Exist. R/W

N

EX / W — Retain and Protect existing wiring

1. Field locate to avoid conflicts with existing utilities
2. Verify new wiring is sufficient for existing lighting circuit.
3. Splice new wire to existing wire.
4. Remove & dispose of existing light pole base according to section 00310
5. Conduit previously rerouted beneath drainage ditch See R. E. 8/19/11

(18) & (19) For added detail see GJ-4 Eric Fosgard

Ditch shown thus:	
Infiltration swale shown thus:	
Infiltration slope shown thus:	
Cut line shown thus:	
Fill line shown thus:	
Adjust inlet shown thus:	
Remove exist. inlet shown thus:	
Plug and abandon pipe shown thus:	

REGISTERED PROFESSIONAL ENGINEER 58552 OREGON JULY 21, 1998 CHRISTINE J. HIGGINS

EXPIRES 06-30-14

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Craig Sheahan CSH
Designed By - Karina Nordahl
Drafted By - Edita Bogusławski

DRAINAGE & UTILITIES

SHEET NO. 4B

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1:1200_BL - 3B

(1) Sta. "EB" 472+65.42, 46.05' Lt. to
Sta. "EB" 475+50.00, 41.93' Lt.
Const. infiltration swale type A - 38.9 cu. yd.
Inst. delineators, type S1
Inst. delineators, type S2
(For details, see shts. GJ & GJ-2)

(2) Sta. "EB" 471+38.77, 67.53' Lt.
Adjust inlet
Rim 33.50
(See drg. no. RD376)

(3) Remove extg. inlet
Plug and abandon extg. 12" storm sew. pipe - 185'

(4) Remove extg. inlet
Plug and abandon extg. 18" storm sew. pipe - 182'

(5) Remove extg. inlet
Plug and abandon extg. 18" storm sew. pipe - 49'

(6) Sta. "TB" ~~48+42.47, 59.00'~~ Rt. to 47+91.2, 59.0'
Sta. "TB" ~~53+25.05, 40.29'~~ Rt. 52+73.8, 40.3'
Const. infiltration swale type C - 34.5 cu. yd.
Inst. delineators, type S1
(For details, see shts. GJ & GJ-2)

(7) Sta. "EB" 472+43.38, 57.00' Lt.
Connect 12" storm sew. pipe to extg. inlet

(8) Sta. "EB" 474+36.61, 31.60' Lt.
Remove extg. inlet
Const. manhole
Rim 35.43
F.L. 30.30 (Extg. 18" S)
F.L. 30.80 (Extg. 18" N)
(See drg. no. RD336)

(9) Sta. "TB" ~~48+42.47, 59.00' Rt.~~ to 47+91.18, 59.02' Rt.
Sta. "TB" ~~52+47.00, 67.00' Rt.~~ 51+95.71, 67.00' Rt
Const. ditch - 555 cu. yd.
(For details, see sht. GJ)

(10) Sta. "TB" ~~48+42.47, 59.00' Rt.~~ 47+91.18, 59' Rt.
Const. paved end slope - 44 sq. ft.
Extend 18" culvert pipe - 40'
5' depth
(See drg. nos. RD316, RD320 & RD326)

(11) Sta. "EB" 473+26.58, 38.83' Lt.
Adjust inlet
Rim 33.67

(12) Sta. "EB" 470+66.76, 66.29' Lt.
Const. large precast manhole (60" dia.)
over extg. 36" storm sew. pipe
Connect extg. 12" storm sew. pipe
Field locate
(See drg. no. RD346)

(13) Sta. "EB" 472+65.42, 46.05' Lt.
Const. paved end slope - 32 sq. ft.
Inst. 12" storm sew. pipe - 23'
5' depth
(See drg. nos. RD318 & RD386)

(14) Sta. "EB" 466+51.51, 34.06' Rt.
Const. manhole
Connect extg. 24" storm sew. pipe
Inst. 24" storm sew. pipe - 30'
10' depth
Extend 15" storm sew. pipe - 12'
10' depth
Inst. manhole slope protector
(See drg. no. RD358)

(15) See note 6, sht. 3B

(16) Sta. "EB" 470+58.65, 339.25' Lt.
Const. large precast manhole (60" dia.)
over extg. 36" storm sewer pipe
Connect extg. 12" storm sew. pipe
Rim 32.33
F.L. 27.19± (Extg. 12" E)
F.L. 27.19± (Extg. 36" S)
F.L. 27.19± (Extg. 36" N)
Field locate

(17) Adjust water valve - ~~2~~ 1

(18) Install Class 50 Riprap Basin (6'x 15'x 1')-4 (For Details, See Sht. GJ-4)

(19) Install Type F matting - 870 S.Y. (See Drg. No. RD 1055)

NOTE: TB Alignment Stationing changed. New stationing Shown.

"AS CONSTRUCTED"
Mark Bern
Date 4-26-12 Project Mngr

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
CHRISTINE J. HIGGINS
EXPIRES 06·30·11

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

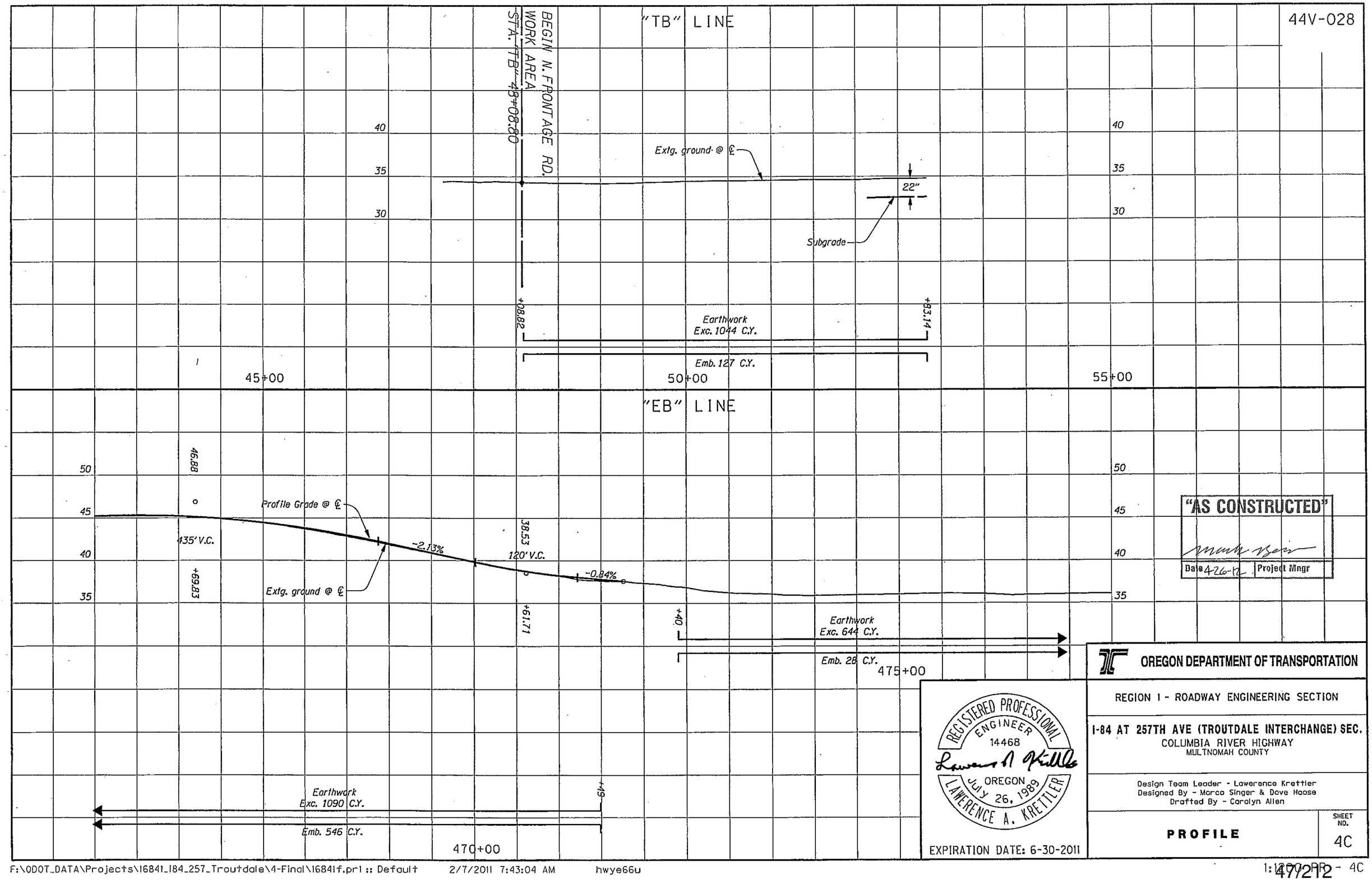
I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY.

Reviewed By - Craig Sheahan CAS
Designed By - Karina Nordahl
Drafted By - Edita Bogusiawski

DRAINAGE & UTILITIES

SHEET NO. 4B-2

44V-028



"AS CONSTRUCTED"

Date 4-26-12 Project Mngr

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

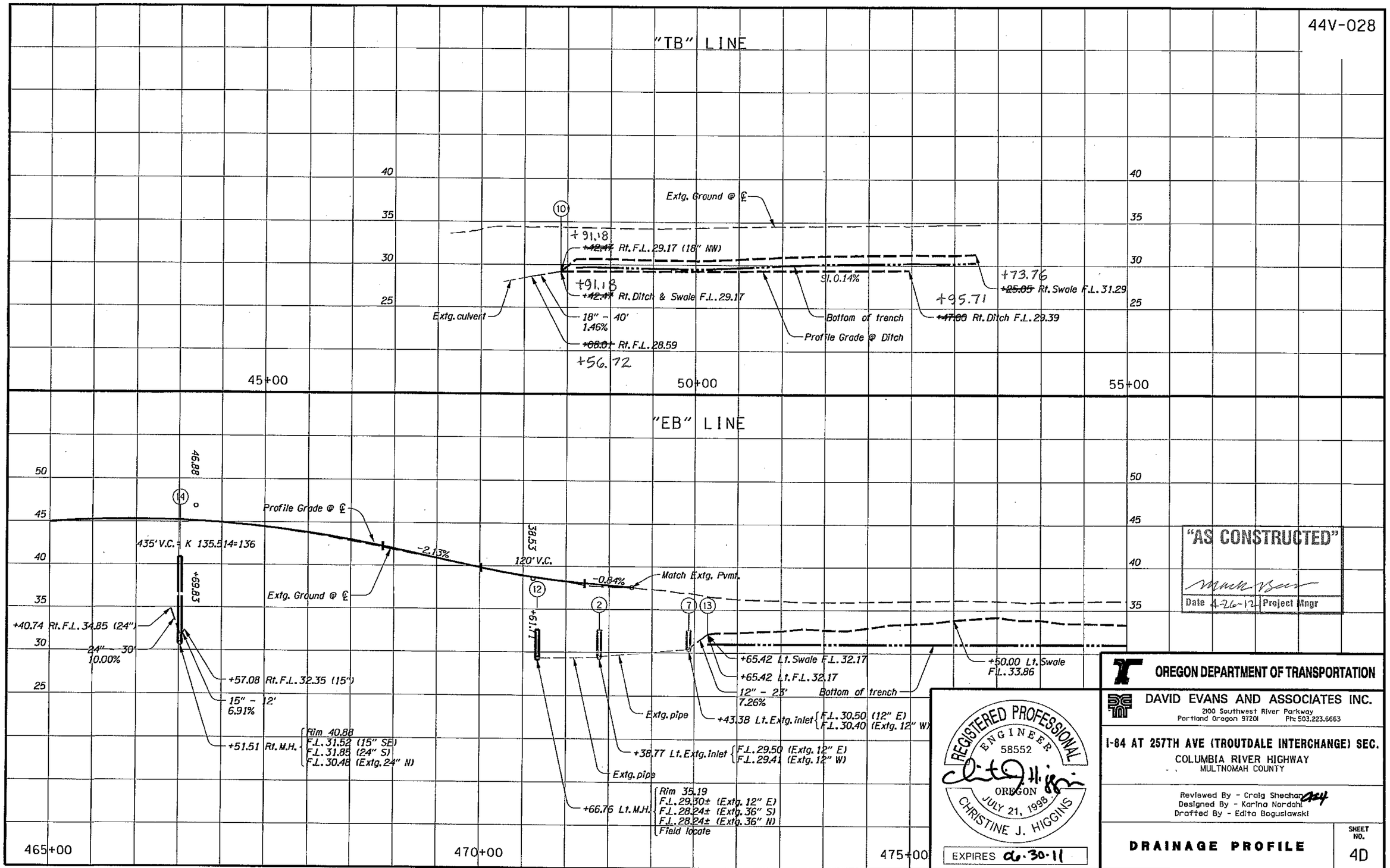
REGISTERED PROFESSIONAL ENGINEER
14468
OREGON
JULY 26, 1989
LAWERENCE A. KRETTLER

EXPIRATION DATE: 6-30-2011

Design Team Leader - Lawerence Krettler
Designed By - Marco Singer & Dave Haase
Drafted By - Carolyn Allen

PROFILE

SHEET NO. 4C



"AS CONSTRUCTED"

Mark Bass

Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
CHRISTINE J. HIGGINS
EXPIRES 6-30-11

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

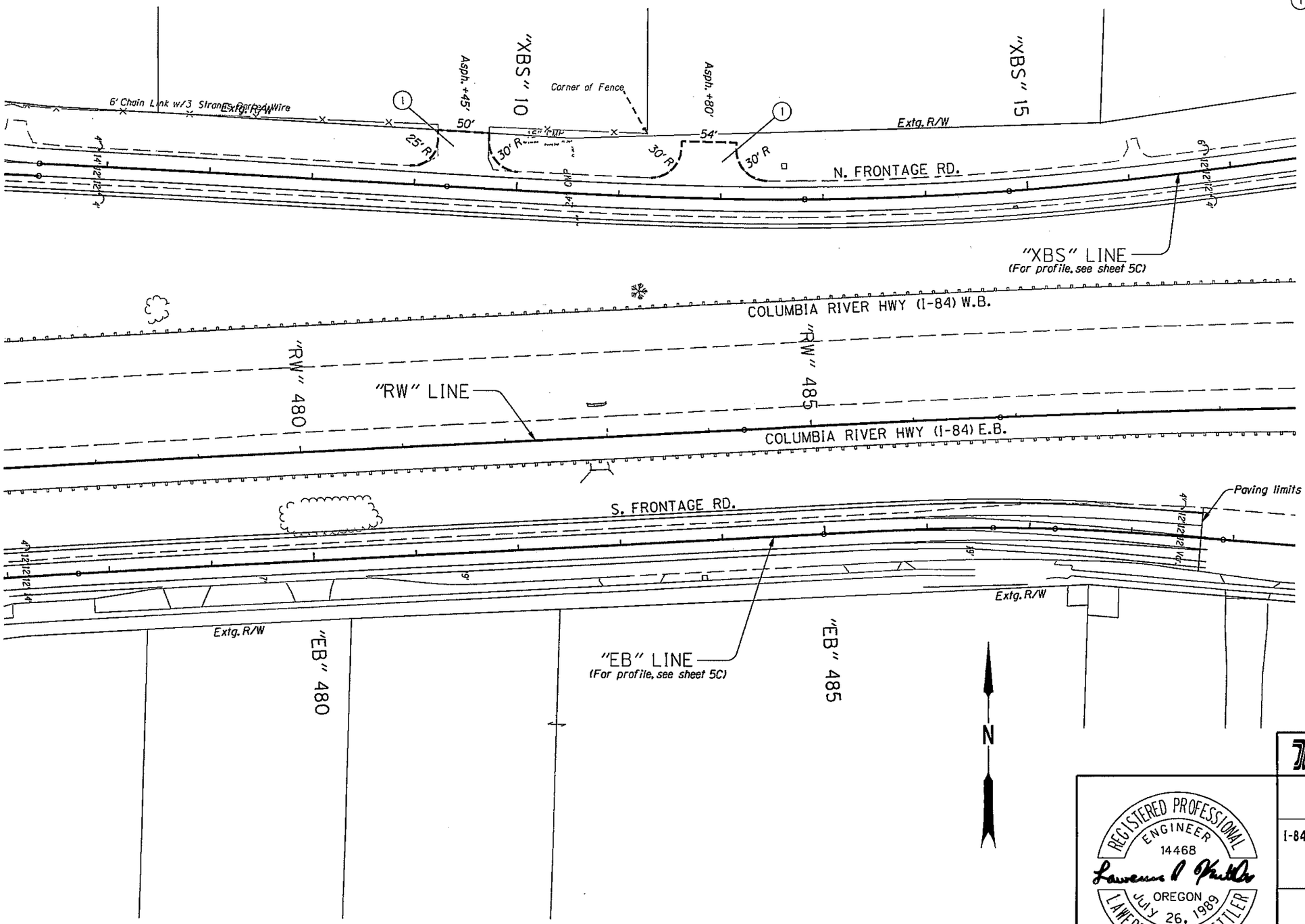
Reviewed By - Craig Sheahan
Designed By - Karina Nordahl
Drafted By - Edita Boguslawski

DRAINAGE PROFILE

SHEET NO. 4D

Sec. 26, T. 1 N, R. 3 E, W.M.

44V-028



"AS CONSTRUCTED"

Mark Bean

Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER
14468
Lawrence A. Krettler
OREGON
JULY 26, 1989
LAWRENCE A. KRETTLER

EXPIRATION DATE: 6-30-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

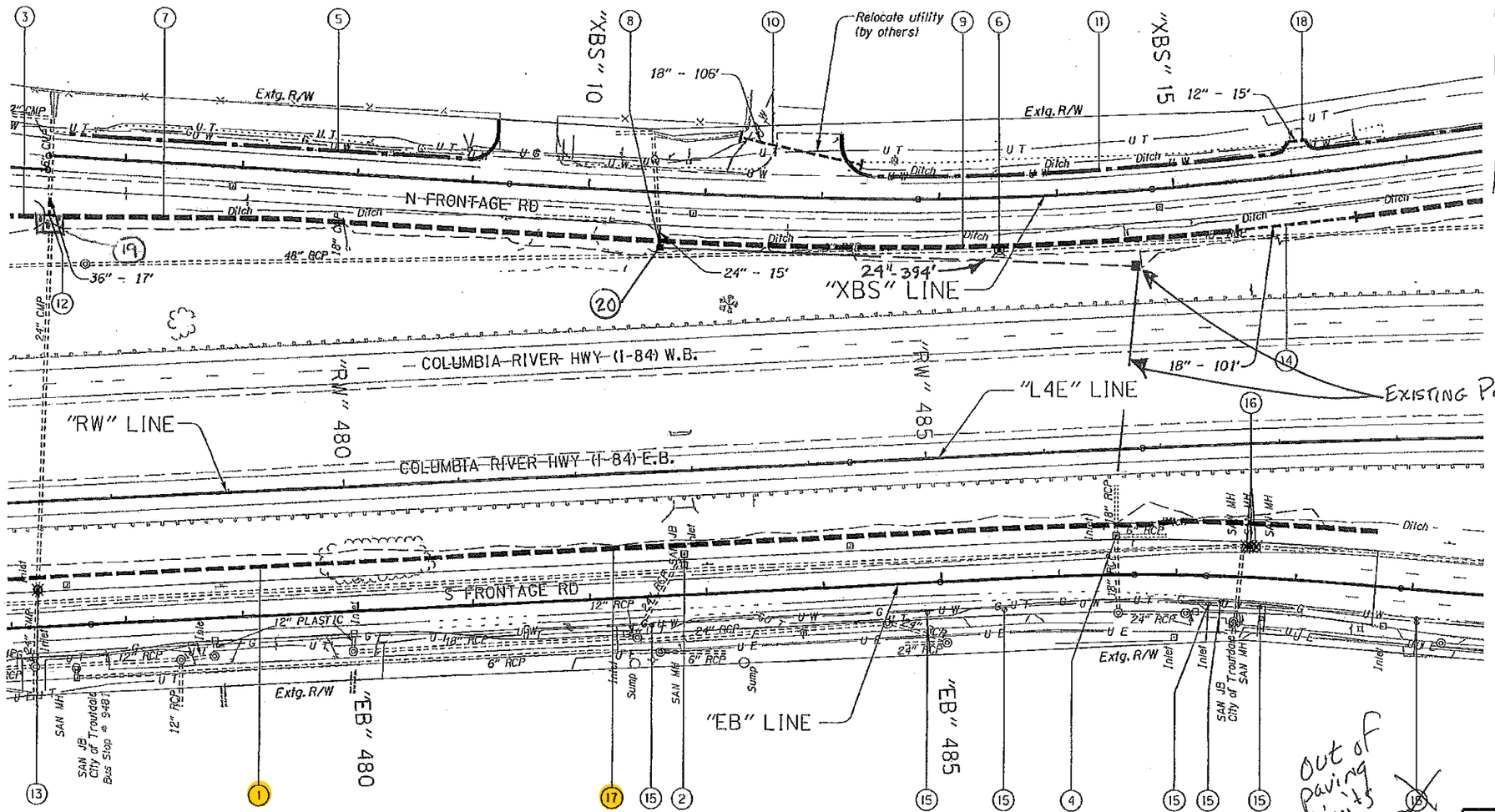
Design Team Leader - Lawerence Krettler
Designed By - Marco Singer & Dave Haase
Drafted By - Carolyn Allen

GENERAL CONSTRUCTION

SHEET NO. 5A

Sec. 26, T. 1N, R. 3E, W.M.

44V-028



(20) As per CCO # 15

Infiltration swale shown thus: ▬ ▬ ▬

Infiltration slope shown thus: ▬ • ▬

Cut line shown thus: — — —

Adjust manhole shown thus: ⊠

Adjust inlet shown thus: ⊡

"AS CONSTRUCTED"

Mark Bear

Date 4-26-12 Project Mngr

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
CHRISTINE J. HIGGINS
EXPIRES

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.

COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Craig Sheahan
Designed By - Karina Nordahl
Drafted By - Edita Bogustawski

DRAINAGE & UTILITIES

SHEET NO. 5B

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(1) Sta. "EB" 475+50.00, 41.93' Lt. to
Sta. "EB" 480+75.00, 41.93' Lt.
Const. infiltration swale type D - 49.3 cu. yd.
(For detail, see sht. GJ)

(2) Sta. "EB" 482+82.16, 34.62' Lt.
~~Adjust inlet~~ *
Rim 36.34

(3) See note 6, sht. 4B-2

(4) Sta. "EB" 486+49.32, 32.97' Lt.
~~Adjust inlet~~ *
Rim 38.36

(5) Sta. "XBS" 5+50.09, Lt. to
Sta. "XBS" 9+19.31, Lt.
Const. infiltration slope type B - 88.2 cu. yd.
Inst. delineators, type S1
(For details, see shts. GJ & GJ-2)

(6) Sta. "XBS" 13+49.46, 44.75' Rt.
Const. granular drain backfill diversion
Major adjust manhole
(For details, see sht. GJ-3)

(7) Sta. "XBS" 5+48.50, 51.06' Rt. to
Sta. "XBS" 10+60.00, 41.42' Rt.
Const. infiltration swale type B - 75.9 cu. yd.
(For details, see sht. GJ)

(8) Sta. "XBS" 10+63.01, 46.91' Rt.
Const. ditch inlet type "D"
Extend 24" culvert pipe - 15'
5' depth
(See drg. no. RD370)

(9) Sta. "XBS" 10+62.13, 41.42' Rt. to
Sta. "XBS" 15+50.03, 41.42' Rt.
Const. infiltration swale type B - 72.7 cu. yd.
(For details, see sht. GJ)

(10) Sta. "XBS" 11+28.87, 49.67' Lt. to
Sta. "XBS" 12+33.30, 28.98' Lt.
Inst. 18" culvert pipe - 106'
5' depth
Trench resurf. - 34 sq. yd.
(See drg. no. RD302)

(11) Sta. "XBS" 12+15.60 Lt. to
Sta. "XBS" 16+00.00 Lt.
Const. infiltration slope type B - 113.9 cu. yd.
(For details, see sht. GJ)

(12) Sta. "XBS" 5+36.35, 33.50' Rt.
Extend 36" culvert pipe - 17'
5' depth

(13) Sta. "EB" 477+25.60, 31.52' Lt.
Remove extg. inlet
Const. shallow manhole
Connect extg. 24" storm sew. pipes
Rim 35.90
F.L. 31.80 (Extg. 24" N)
F.L. 31.70 (Extg. 24" S)

(14) Sta. "XBS" 15+50.03, 41.42' Rt. to
Sta. "XBS" 16+50.00, 41.42' Rt.
Inst. 18" culvert pipe - 101'
5' depth

(15) Adjust water valve - X 6

(16) Minor adjust sanitary manhole - 3

(17) Sta. "EB" 480+75.00, 41.93' Lt. to
Sta. "EB" 488+68.12, 46.52' Lt.
Const. infiltration swale type A - 276.6 cu. yd.
Inst. delineators, type S1
(For details, see shts. GJ & GJ-2)

(18) Sta. "XBS" 16+00.00, 28.97' Lt. to
Sta. "XBS" 16+14.91, 29.00' Lt.
Inst. 12" storm sew. pipe - 15'
5' depth

(19) Install Type 30 Radius Basin (25'x20'x7')
with Riprap Overside, Type 1

(20) Install 24" storm sew. pipe - 394'
5' DEPTH
Connect to ~~Extg.~~ NEW Type D Inlet

* CHANGE ORDER FOR NOTES (2) & (4)

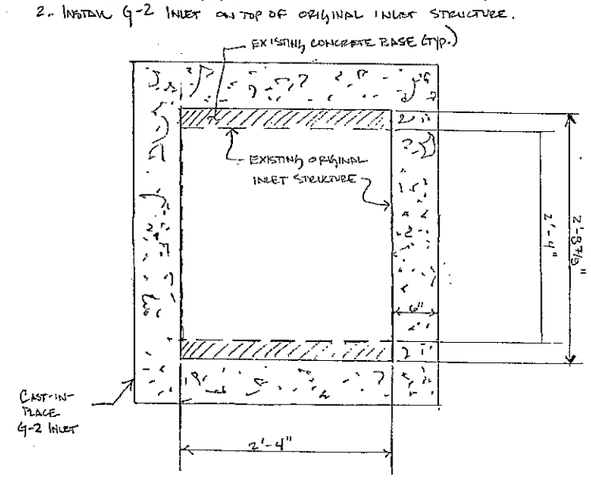
DAVID EVANS AND ASSOCIATES INC.

I-84 at 257th Ave (Troutdale Interchange) Sec.
C14335
CCO 88
Attachment "B"

JN. 0007072
BY CJH DATE 07-22-11
SHEET ___ OF ___ SHEETS
CHECKED BY ___ DATE ___

JOB DESCRIPTION Troutdale
CALCULATION FOR Adjusting Inlets - SE Frontage Rd

NOTES:
1. REMOVE EXTG DOUBLE INLET TOP TO ORIGINAL INLET STRUCTURE. PREPARE STRUCTURE PER SECTION 00440.47(a).
2. INSTALL G-2 INLET ON TOP OF ORIGINAL INLET STRUCTURE.



3. SLOPE TOP OF G-2 INLET TO MATCH PROPOSED GROUND SLOPE.
4. ADJUST INLET PER SECTION 00440.47.

"AS CONSTRUCTED"
Mark Bean
Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
CHRISTINE J. HIGGINS
EXPIRES

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

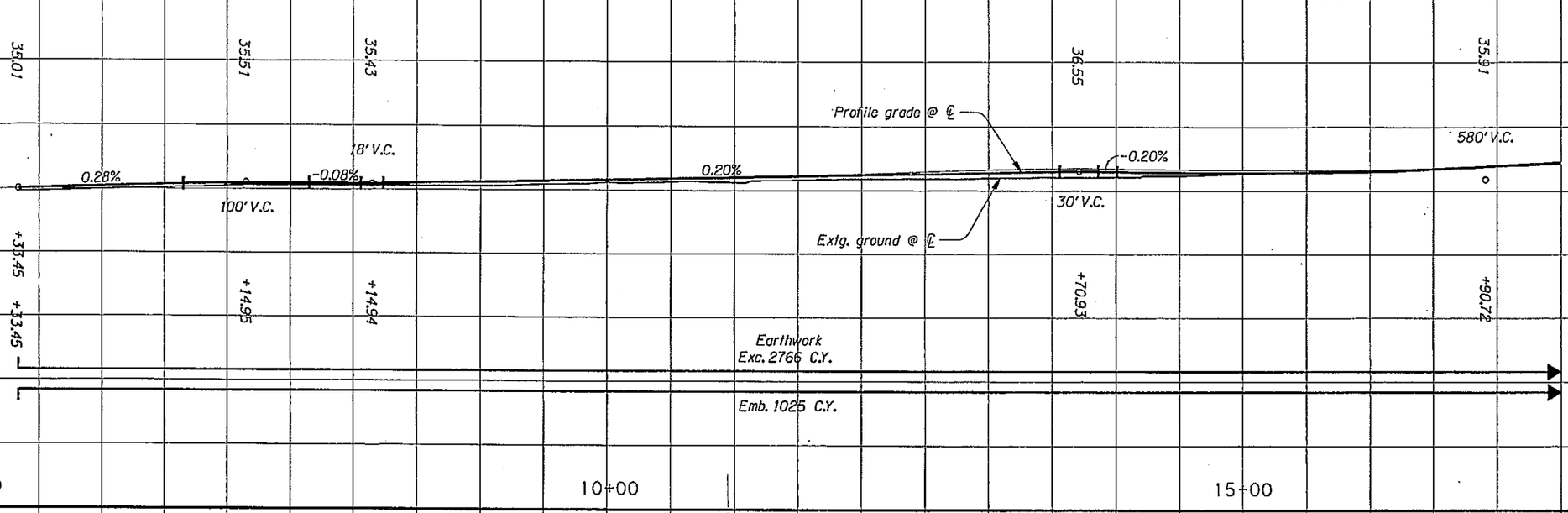
Reviewed By - Craig Sheahan
Designed By - Karina Nordahl
Drafted By - Edita Boguslawski

DRAINAGE & UTILITIES

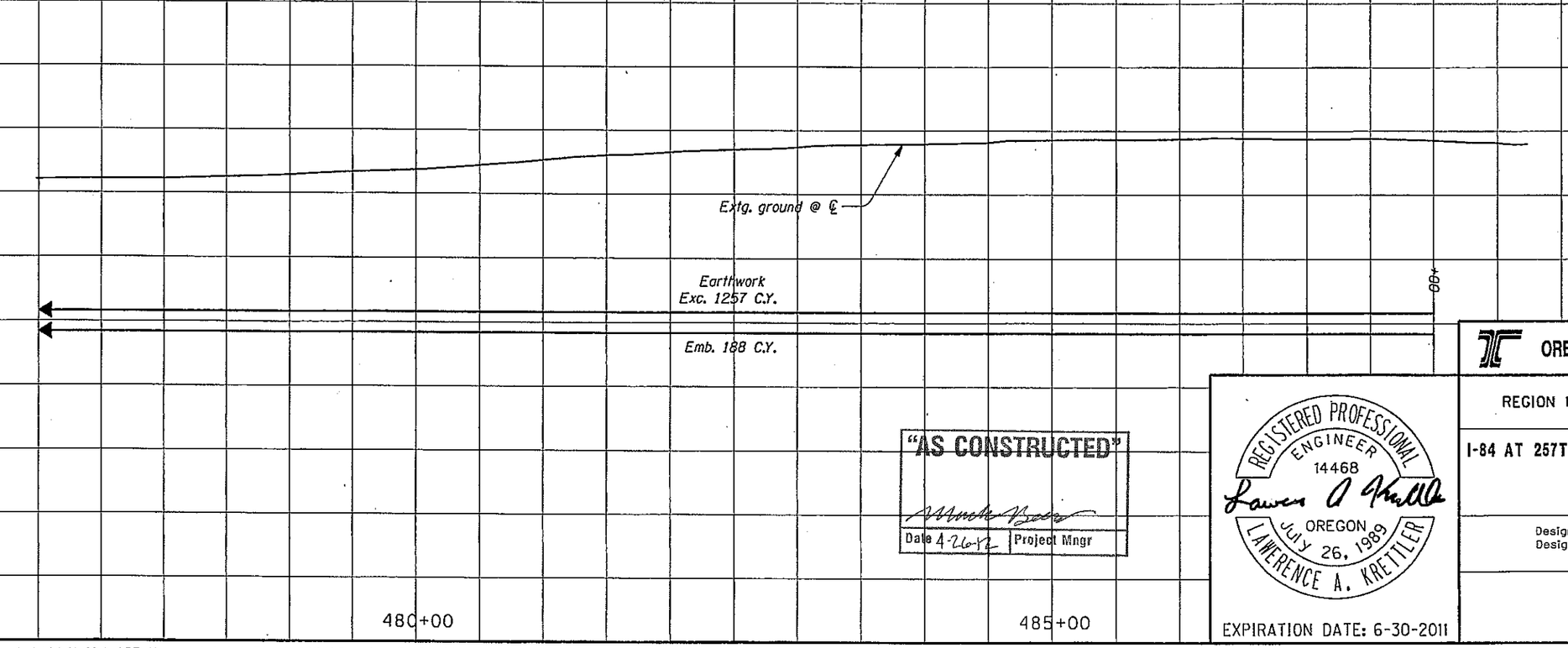
SHEET NO. 5B-2

44V-028

"XBS" LINE



"EB" LINE



"AS CONSTRUCTED"

Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER
14468
OREGON
July 26, 1989
LAWRENCE A. KRETTLER

EXPIRATION DATE: 6-30-2011

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Design Team Leader - Lawerence Krettler
Designed By - Marco Singer & Dave Haase
Drafted By - Carolyn Allen

PROFILE

SHEET NO. 5C

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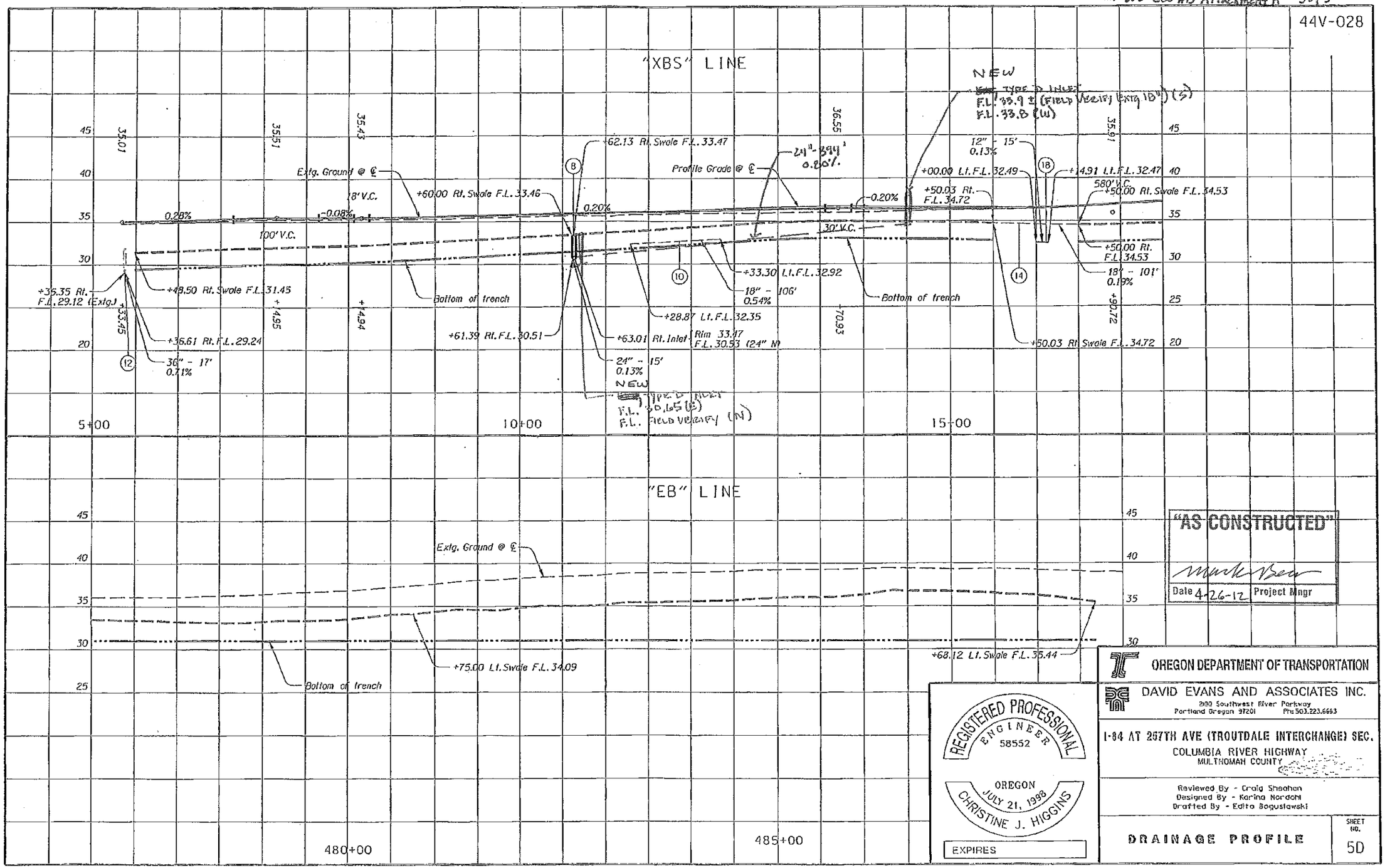

"AS CONSTRUCTED"

Mark Bean

Date 4-26-12 Project Mngr

OREGON DEPARTMENT OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
58552
OREGON
JULY 21, 1998
CHRISTINE J. HIGGINS
EXPIRES

DAVID EVANS AND ASSOCIATES INC.
200 Southwest River Parkway
Portland Oregon 97201 Phs 503.223.6663

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Craig Sheahan
Designed By - Karina Nordahl
Drafted By - Edita Boguslawski

DRAINAGE PROFILE

SHEET NO. 5D

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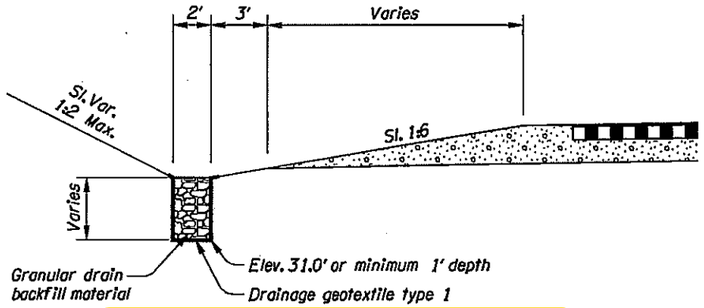
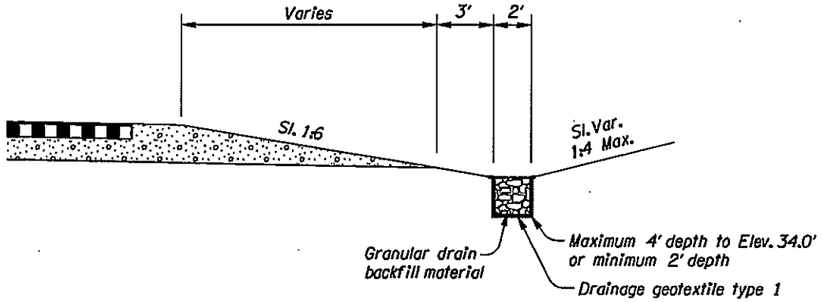
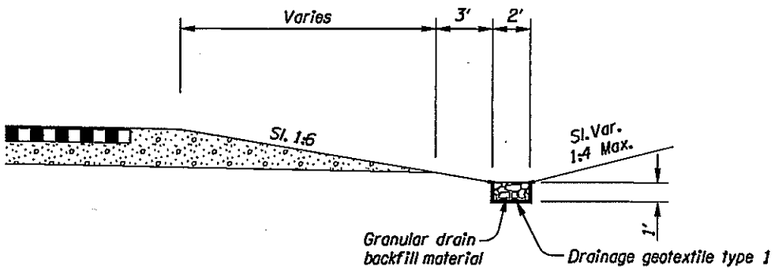


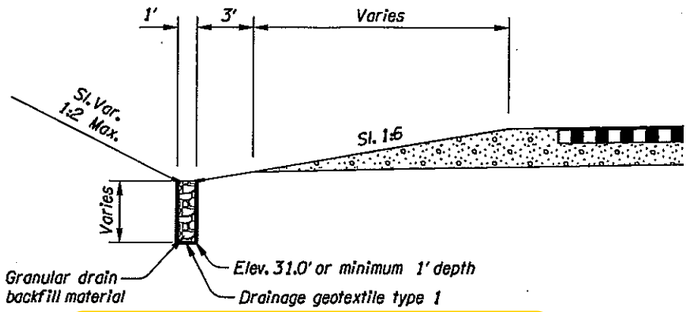
INFILTRATION SWALE TYPE A



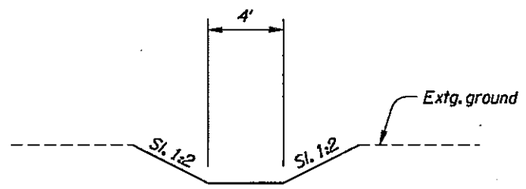
INFILTRATION SWALE TYPE B



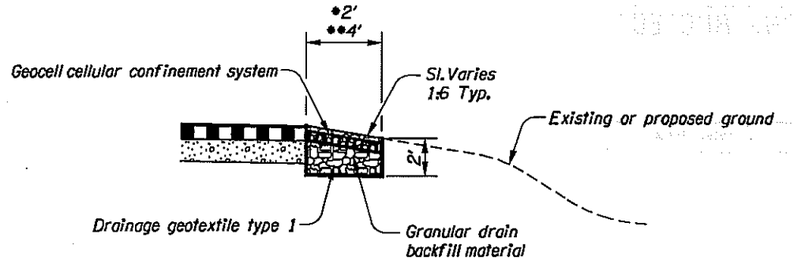
INFILTRATION SWALE TYPE C



INFILTRATION SWALE TYPE D

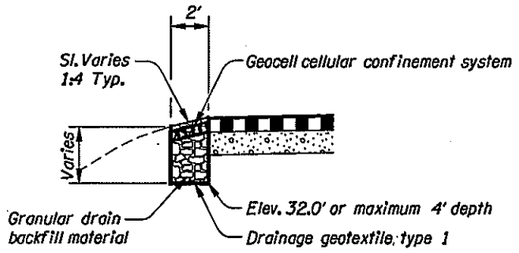


DITCH



* Sta. "L4E" 455+91.80 to Sta. "L4E" 459+70.00
** Sta. "EB" 459+71.35 to Sta. "EB" 470+03.60

INFILTRATION SLOPE TYPE A



INFILTRATION SLOPE TYPE B

"AS CONSTRUCTED"

Date 4-26-12 | Project Mngr

REGISTERED PROFESSIONAL ENGINEER 58552 OREGON JULY 21, 1998 CHRISTINE J. HIGGINS

EXPIRES 06-30-11

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84 AT 257TH AVE (TROUTDALE INTERCHANGE) SEC.
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Craig Sheahan CZH
Designed By - Karina Nordahl
Drafted By - Edita Bogustawski

DRAINAGE DETAILS

SHEET NO. GJ