

OPERATION & MAINTENANCE MANUAL

Water Quality Bioslope

Manual prepared: December 2018

DFI No. D00727



Figure 1: DFI No. D00727, looking north

1. Identification

Drainage Facility ID (DFI): D00727
Facility Type: Water Quality Bioslope
Construction Drawings: (V-File Numbers) 46V-111
Location: District: 2B
Highway No.: 001
Mile Post: 293.67-293.75, [right side, hwy
connector SK]

2. Manual Purpose

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

3. 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. **NOTE: Mile posts are based off of the V-File, and may vary from TransGIS mile posts.**

Facility location type: **Off ramp**

Flow direction: Southwest

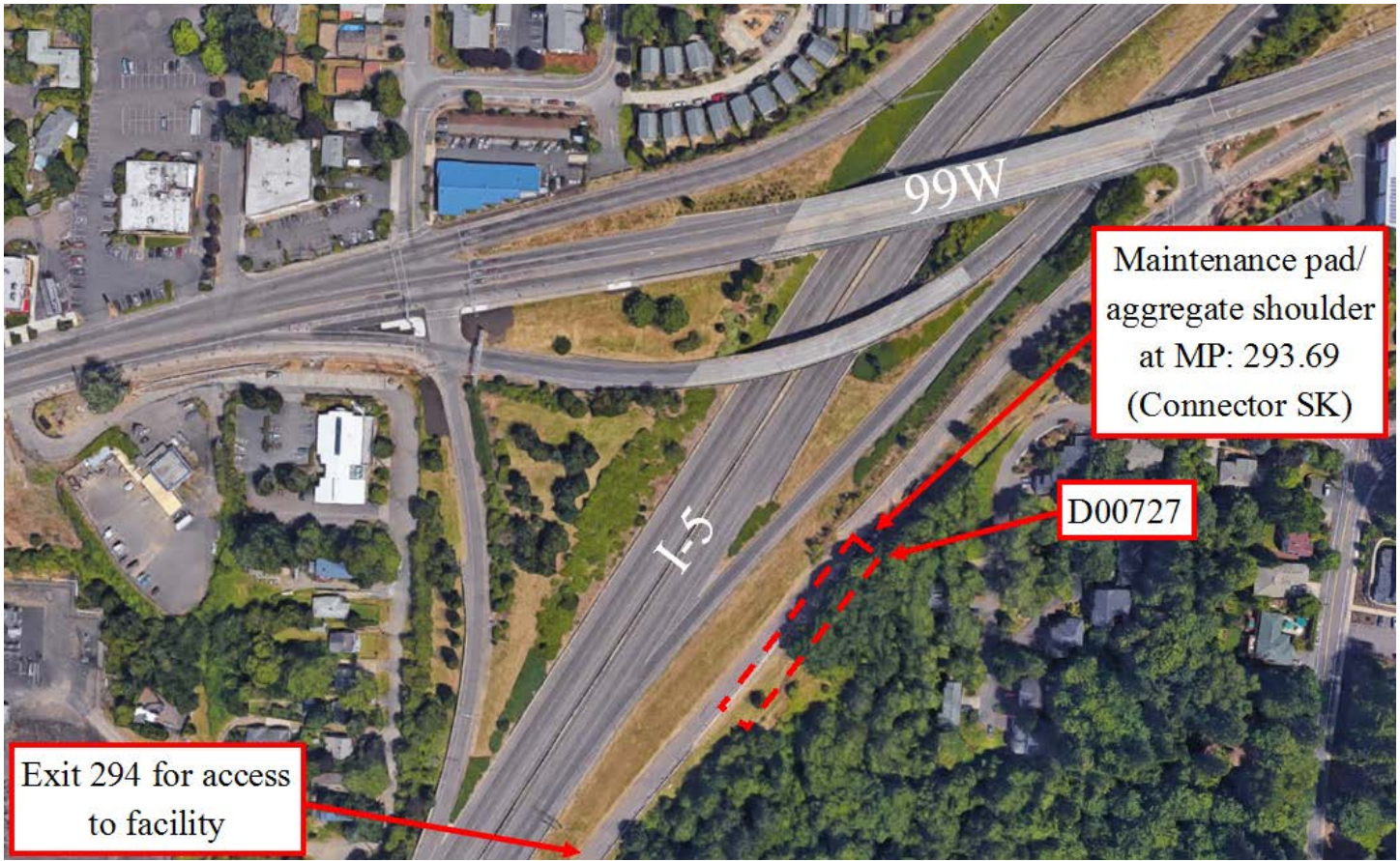


Figure 2: Facility Map

4. Facility Summary

The width is measured perpendicular to the edge of pavement and is equivalent to the flow length. The length is measured parallel to the edge of pavement and is equivalent to the length of the contributing impervious area.

The length and width of the applicable facility components are:

Component	Length (feet)	Width (feet)
Bioslope	330	17.5

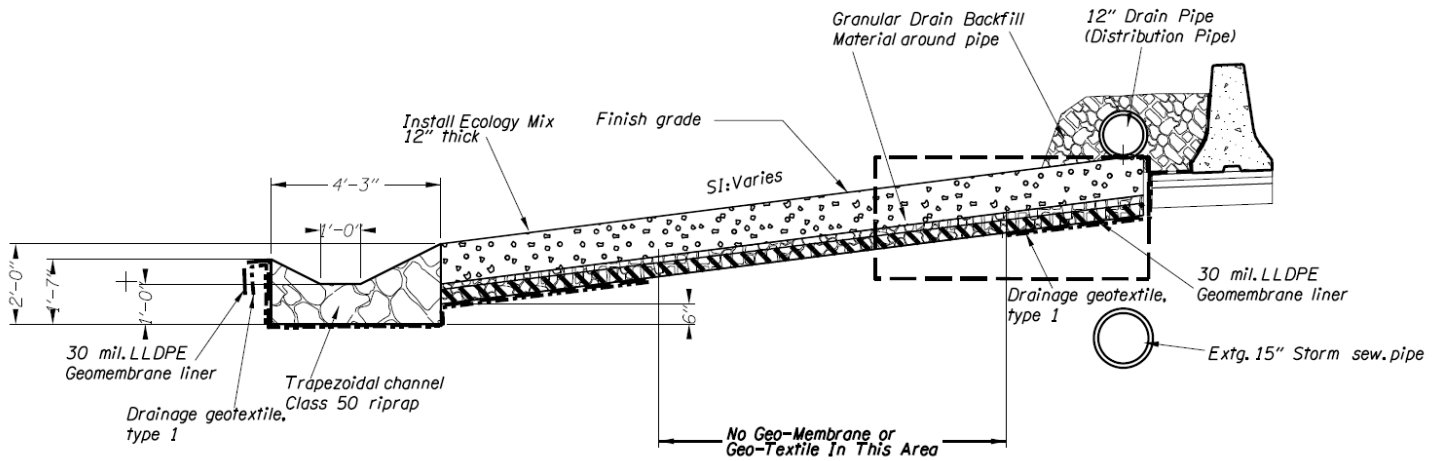


Figure 3: Bioslope Profile

Site Specific Information: This water quality facility was built in 2013 and was designed as a modified bioslope (prior to the designation between bioslopes and media filter strips). The as-built plans (shown in Appendix B) use the term “bioslope” for the water quality facility.

This particular facility has:

- **Pollution Control Manholes** – Are provided upstream of the bioslope to remove sediments, oil and debris, reduce the runoff velocity, and provide pretreatment.
- **Perforated Pipe** – It is provided upstream of the bioslope to evenly distribute flow into the treatment zone and reduce the runoff velocity.
- **Treatment Zone using Ecology mix** – It is provided to remove pollutants as stormwater runoff drains through this zone. The ecology mix is a mixture of aggregate, dolomite, gypsum, and perlite.
- **Sub surface drain** – it is provided to allow positive outflow for runoff at the toe of the bioslope.

This drainage facility includes a modified media filter slope, two pollution control manholes, one flow splitter manhole, six PVC flow reduction manholes and a perforated pipe for distribution of stormwater. General maintenance practices described by Table 1 of the ODOT Stormwater Facility Maintenance Tables (See Appendix F) apply. The facility drainage area is approximately 6.11 acres and includes OR 99W from SW 60th Ave to SW 53rd Ave, the Comfort Inn property and a portion of the NB I-5 exit ramp.

Water from the 6.11 acre drainage area enters from the existing storm sewer. It is pretreated by two pollution control manholes in series. A flow splitter manhole then

directs approximately 30% of the flow into the bioslope, while routing 70% of the flow back into existing storm sewer pipes running below this facility. The 30% flow is conveyed in solid pipe to a 12" perforated drain distribution pipe. A weir in each of the six PVC inlets causes water to backfill the perforated drain pipe. Water then slowly percolates laterally through the ecology mix, backfill and bark mulch, downslope to the riprap channel. The sixth PVC inlet contains an open ended outfall, as an outlet for exceedingly high flows. The system outfalls into a storm ditch which connects to Red Rock Creek. Red Rock Creek empties into Crystal Lake approximately one mile southwest of the facility.

5. Facility Access

Maintenance access to the facility:

<input checked="" type="checkbox"/> Roadside pad	<input type="checkbox"/> Roadside shoulder
<input type="checkbox"/> Access road with Gate	<input type="checkbox"/> Access road without Gate



Figure 3: Facility Access

6. Operational Components / Maintenance Items

Classification and Standard Operational (Op) Plan:

This facility is classified as a:

<input type="checkbox"/> Filter Strip (Op Plan A)	<input checked="" type="checkbox"/> Bioslope (Op Plan B)
<p>A filter strip consists of a vegetated or media slope located parallel to the edge of pavement. It maintains sheet flow of stormwater runoff over the width of the strip.</p>	<p>A bioslope consists of a filter strip and treatment zone. It is a flow-through stormwater treatment facility located along roadside embankments.</p>
<p>A standard operational plan illustrates the general facility footprint configuration and explains the purpose of each facility component. Operational plans (A, B) are provided in the Standard Operation Manual.</p>	

See Appendix A for the site specific operational plan.

Operational Components

Filter strips and bioslopes have many components that assist with treatment, conveyance, and infiltration of stormwater runoff. The components in use can vary depending on the facility design. 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 Filter Strips and Bioslopes 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/>

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: Facility Components		ID #
Facility Inlet		
Pavement Sheet Flow	<input checked="" type="checkbox"/>	B1
18" PVC Inlet	<input checked="" type="checkbox"/>	B2
Ground Cover		
Vegetated Slope	<input checked="" type="checkbox"/>	B3
Aggregate Media Slope	<input type="checkbox"/>	B4
Underground Components		
Water Quality Mix	<input type="checkbox"/>	B5
Ecology Mix	<input checked="" type="checkbox"/>	B6
Granular Drain Backfill Material	<input checked="" type="checkbox"/>	B7
Geotextile Fabric	<input checked="" type="checkbox"/>	B8
Geocell Grid	<input type="checkbox"/>	B9
Structures		
Curb/Berm	<input type="checkbox"/>	B10
Check Dam	<input type="checkbox"/>	B11
Cleanout	<input type="checkbox"/>	B12
Facility Outlet		
Perforated Drain Pipe	<input type="checkbox"/>	B13
Open Slope Outlet	<input type="checkbox"/>	B14
Open Channel Outlet	<input checked="" type="checkbox"/>	B15
Storm Drain Outlet Pipe	<input type="checkbox"/>	B16
Outfall Type		
Waterbody (C reek/ L ake/ O cean)	<input type="checkbox"/> C	B17
	<input type="checkbox"/> L	
	<input type="checkbox"/> O	
Outfall Channel	<input checked="" type="checkbox"/>	B18
Storm Drain System	<input type="checkbox"/>	B19
Outfall Components		
Pervious Berm	<input type="checkbox"/>	B20
Riprap Pad	<input type="checkbox"/>	B21
Additional Components		
Storm Sewer pollution manhole	<input checked="" type="checkbox"/>	B22
Flow splitter manhole	<input checked="" type="checkbox"/>	B23



Figure 6: I-5 Northbound off ramp exit 294, looking north.



Figure 7: Looking north at bioslope. Southern-most PVC inlet (#6) visible.



Figure 8: Looking north at riprap channel



Figure 9: Looking north at inlet #6. Overflow outlet visible



Figure 10: Outlet from both riprap channel and inlet #6 into drainage ditch looking southeast



Figure 11: Aerial view of PBV inlet (1 of 6) with weir



Figure 12: View of storm sewer pollution control manhole



Figure 13: Looking southeast at bioslope facility with inlet #1 visible

7. Maintenance

Maintenance Frequency/Maintain Records

Annual inspection should be conducted to identify existing and/or potential problems. Damaged components should be repaired to conform to the original design specifications as required. Accumulated sediments and debris from the pollution control manholes should be removed annually. A Vactor[®] truck is the preferred means for removing collected sediments and debris from the manholes. Weir plates should be visually inspected for damage annually. Notify engineering if the weirs are broken. The weir plates are lightweight aluminum and come apart in horizontal sections.

Annual emergent weed control application is recommended for the filter media to prevent growth. Manual weeding is currently required to remove plants, including blackberries, from the ecology mix as well as the riprap channel. The removal of small trees growing in the soft ecology mix is also required.

In the event of hazmat spills, crashes, or uprooted or fallen trees, the pollution control manholes and media should be inspected for contamination or damage. Repairs or reconstruction of the facility should conform to original design specifications as required. Handling and disposal of contaminated materials should be completed using approved methods, equipment, and disposal sites.

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 filter strips and bioslopes:

- Table 1 (General Maintenance): Contains general maintenance and inspection guidelines that are applicable to all ODOT water quality facilities
- Table 5 (Water Quality Bioslopes)

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

<http://www.oregon.gov/ODOT/HWY/OOM/pages/mguide.aspx>

The *Blue Book* can be viewed at the following website:

http://www.oregon.gov/ODOT/Maintenance/Documents/blue_book.pdf

8. Limitations

Filter strips and bioslopes are NOT designed to allow the use of heavy equipment. Vehicles entering the facility 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 is not allowed on the filter media located on the embankment slope unless directed by an engineer. An aggregate shoulder is provided to access the pollution control manholes located on the east shoulder.

Heavy equipment access into facility:

- Not allowed

Special Features:

- Ecology Mix (rock media)
- Partial Lining
- Perforated Pipe Flow Spreader within a Drain Rock Berm

9. Waste Material Handling

Material removed from the facility is defined as waste by the Department of Environmental Quality (DEQ). Refer to the road waste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:

<http://www.oregon.gov/ODOT/HWY/OOM/pages/ems.aspx>

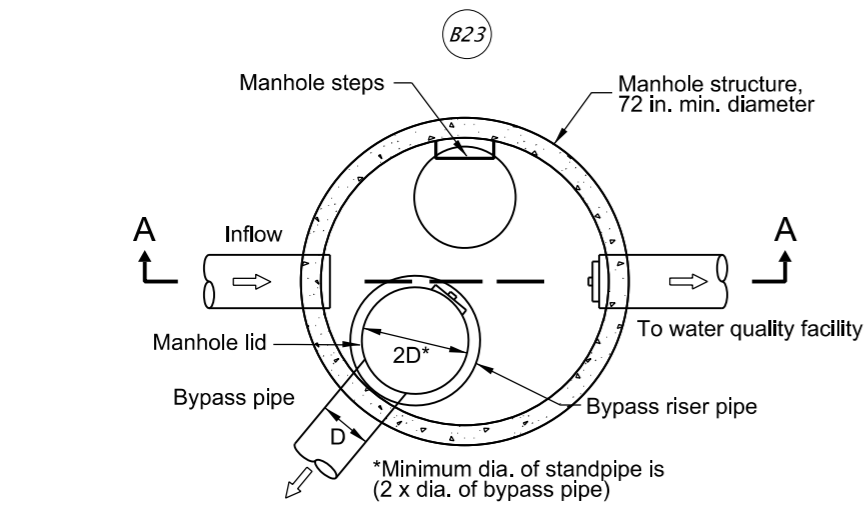
Contact any of the following for more detailed information about management of waste materials found on site:

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

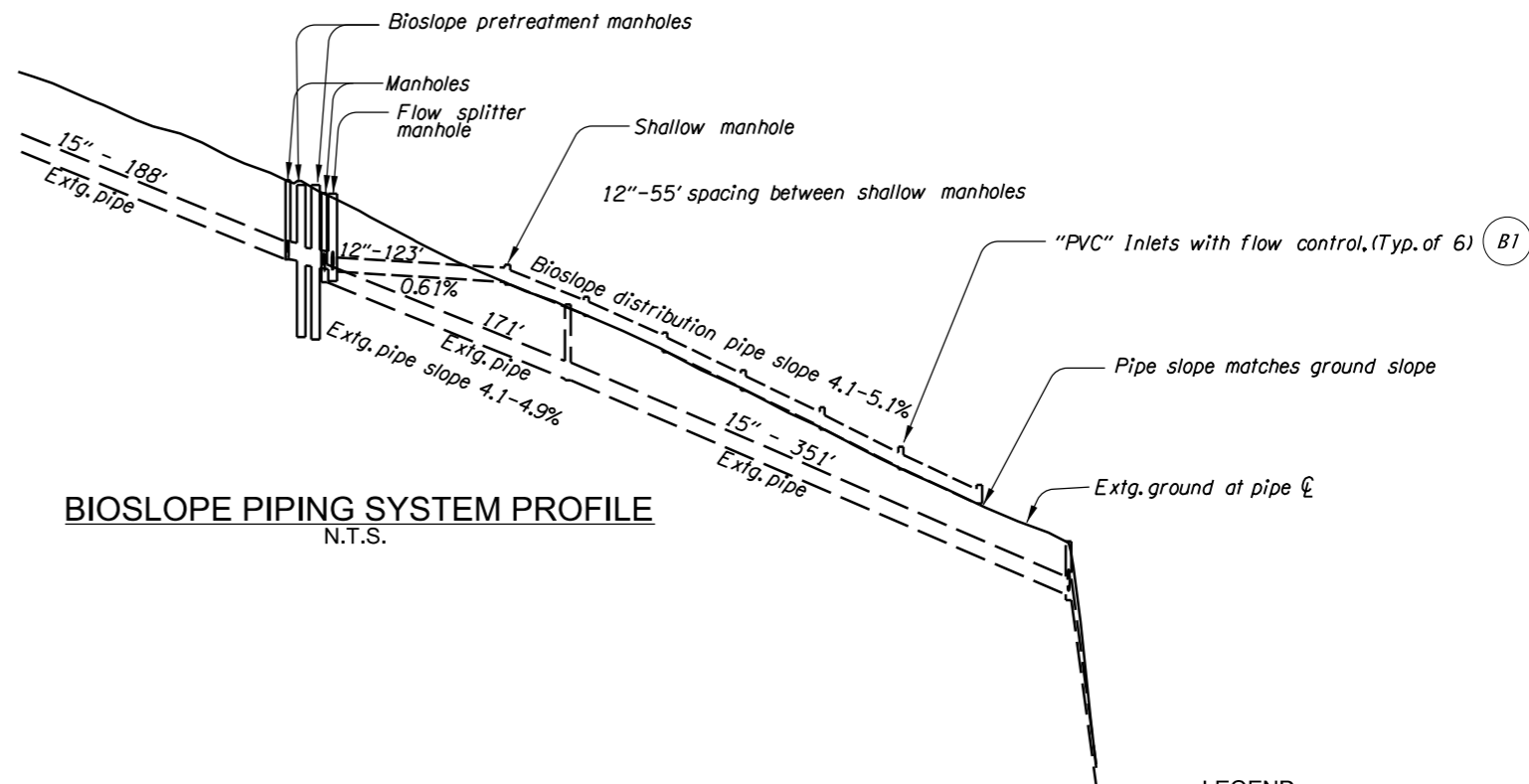
A Appendix A – Site Specific Operational Plan

Contents:

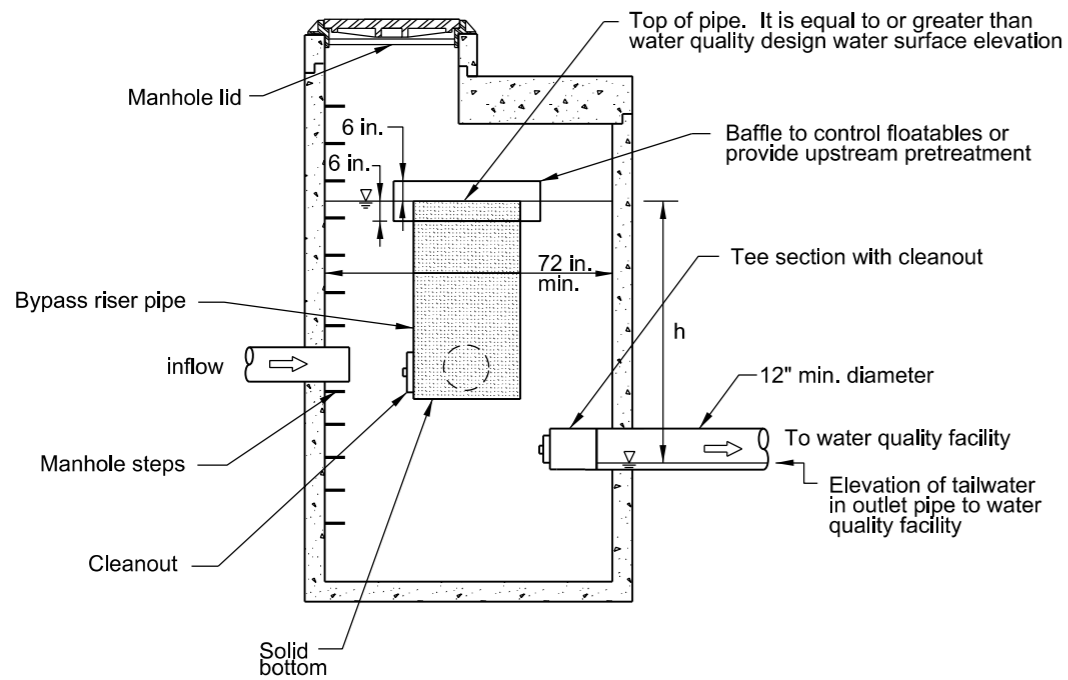
Operational Plan: DFI D00727



FLOW SPLITTER MANHOLE
N.T.S.

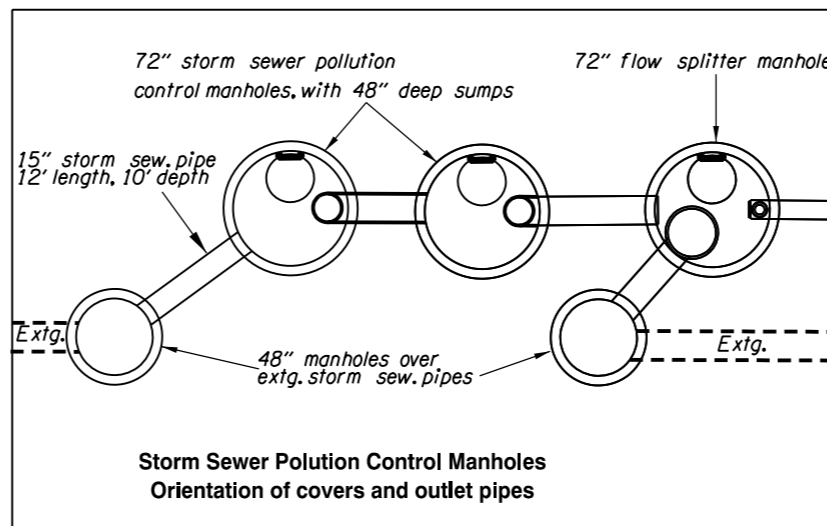


BIOSLOPE PIPING SYSTEM PROFILE
N.T.S.



SECTION A-A
N.T.S.

Source: King County



Storm Sewer Pollution Control Manholes
Orientation of covers and outlet pipes

- LEGEND:**
- Photo Location / Direction
 - Manhole
 - Inlet
 - Storm Pipe (Facility)
 - Storm Pipe
 - Conveyance Direction
 - Pavement / Facility Flow Path
 - Riprap channel
 - Ecology mix
 - Bark Mulch

Sht. 02 of 02

Prepared By:
Dan Gunther

Drafted By:
Zoe Keve



OREGON DEPARTMENT OF TRANSPORTATION

DFI D00727
MAINTENANCE DISTRICT 2B HWY 001
Water Quality Bioslope
Highway MP 293.65 to 293.75
Multnomah County

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 46V-111

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

STATE OF OREGON DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

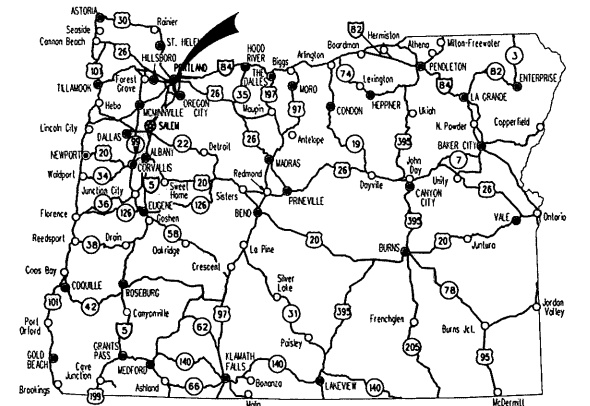
**GRADING, DRAINAGE, STRUCTURES, PAVING,
SIGNING, SIGNALS & ROADSIDE DEVELOPMENT**

FFO - OR99W: I-5 NB RAMPS SEC.

PACIFIC HIGHWAY WEST

MULTNOMAH & WASHINGTON COUNTIES

NOVEMBER 2013



Overall Length Of Project - 0.55 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.)

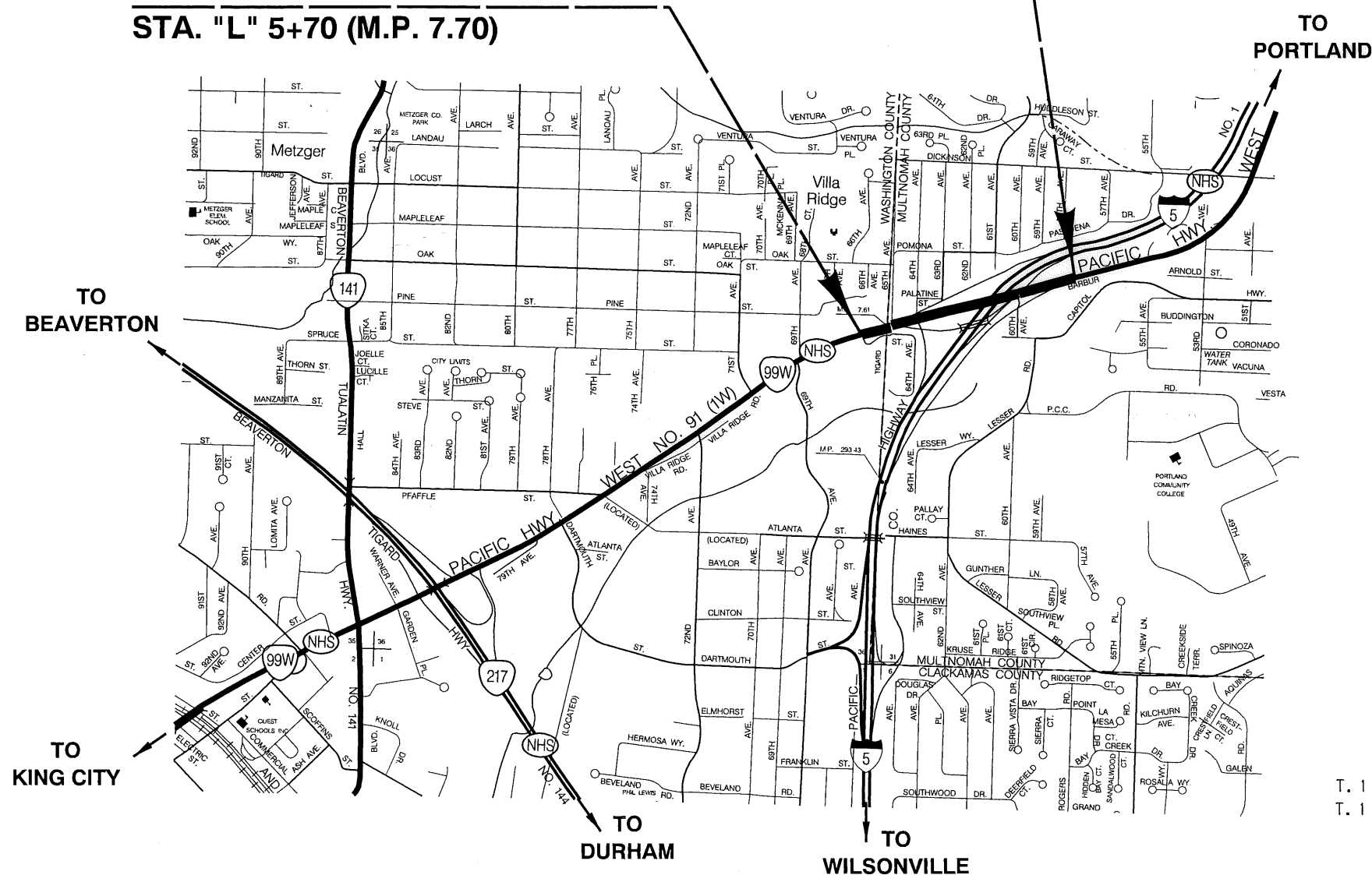


**END OF PROJECT
HSIP-S091(062)**

STA. "L" 5+70 (M.P. 7.70)

**BEGINNING OF PROJECT
HSIP-S091(062)**

STA. "E2" 11+10 (M.P. 7.15)



T. I. S., R. I. E., W. M.
T. I. S., R. I. W., W. M.



OREGON TRANSPORTATION COMMISSION

- | | |
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| Pat Egan | CHAIR |
| Mary F. Olson | COMMISSIONER |
| David Lohman | COMMISSIONER |
| Mark Frohnmayer | COMMISSIONER |
| Tommy Baney | 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*
Naveen G. Chandra, P.E.
Project Delivery Manager, Region 1

Tom Rindler
Concurrence by ODOT Chief Engineer

**FFO - OR99W: I-5 NB RAMPS SEC.
PACIFIC HIGHWAY WEST
MULTNOMAH & WASHINGTON COUNTIES**

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	HSIP-S091(062)	1

PIPE 2008 - File Update: Jul. 2011

SHEET NUMBER

NOTE NO. ON PLANS DESIGN HEIGHT OF COVER (FEET)

Main data table with columns for PIPE (CIRCULAR OR ELLIPTICAL), PIPE - ARCH, USE / INSTALLATION CRITERIA, ALTERNATE MATERIALS (ALUMINUM, HELICAL CORRUGATED METAL, RIGID, PLASTIC & IRON), APPURTENANCES (MANHOLES, INLETS), and EXTENSION. Includes pipe sizes (e.g., 2.9', 3.0', 4.0'), lengths, and material specifications.

GENERAL NOTES: 1. A check (✓) indicates column heading applies. 2. A new pipe culvert installation shall be of like material throughout. 3. Extension of existing metal culverts may be of unlike metal or corrugations. For connecting details, see Std Drg. No. RD326. 4. Dimensions shown are nominal. 5. All pipes shall conform to the AASHTO specification applicable for the type of material and the diameter of the pipe involved. FOOTNOTES: (1) Design height of cover is the critical design height used to select pipe materials. The height of cover for any given run of pipe may vary. Design height of cover shall be measured to subgrade. (2) Cross-sectional dimensions may vary with different materials. When galvanized iron or steel and aluminum are acceptable alternatives use a separate line for each type of material.

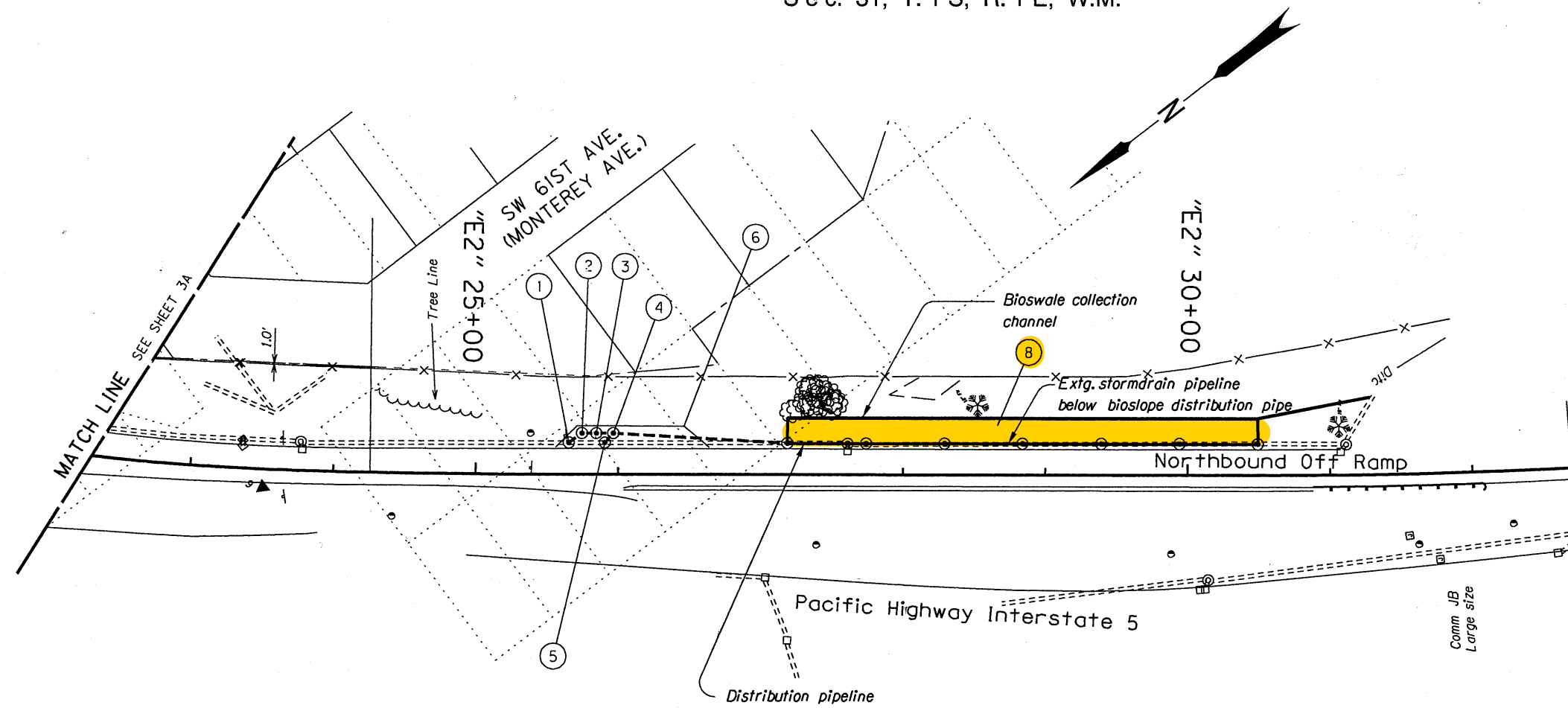
- RD300 Trench Backfill, Bedding, Pipe Zone And Multiple Installations
RD302 Street Cut
RD304 Arch Pipe Backfill/Compaction
RD306 Concrete Encasement, Cradle, and Cap Details
RD308 Bore Casing Detail
RD310 Shallow/Deep Trench Service Connection, Blocking and Markers
RD312 Subsurface Drain
RD314 Open Grade HMAC Drainage Details
RD316 Sloped Ends For Metal Pipe
RD317 Culvert Embankment Protection
RD318 Sloped Ends For Concrete Pipe
RD319 Miscellaneous Culvert Details
RD320 Paved End Slope For Culverts 60" Maximum Pipe Size
RD321 Paved End Slope With Removable Safety Bar(s)
RD322 Safety End Section For Metal Pipe
RD324 Safety End Section For Concrete, PVC, HDPE & Polypropylene Pipe
RD326 Coupling Bands For Corrugated Metal Pipe
RD328 Slotted C.M.P. Drain Details
RD330 Metal Pipe Slope Anchors
RD332 Concrete Pipe Anchor Detail
RD334 Locator Post
RD336 Standard Storm Sewer Manhole
RD338 Standard Sanitary Sewer Manhole
RD340 Storm Sewer Pollution Control Manhole
RD342 Shallow Manholes
RD344 Standard Manhole Base Section
RD346 Large Precast Manhole

- RD348 Manhole With Inlet
RD350 Sanitary Sewer Piped Inside Drop Connection for Manholes
RD352 Outside Drop Manholes
RD354 Carry Through Manhole - Storm
RD356 Manhole Covers And Frames
RD358 Manhole Slope Protectors
RD360 Manhole Frame Adjustment
RD362 Sanitary Cleanout
RD364 Concrete Inlets Type G-1, G-2, G-2M, & G-2MA
RD366 Concrete Inlets Type CG-1, CG-2 And Curb Inlet Channel
RD368 Concrete Inlets Type M-E, M-O, B And B-SL
RD370 Ditch Inlet Type D
RD371 Concrete Inlet Base Type CG-3
RD372 Concrete Inlet Top, Option 1 Type CG-3
RD373 Concrete Inlet Top, Option 2 Type CG-3
RD374 Area Drainage Basin Or Field Inlet
RD376 Miscellaneous Drainage Structures Siphon Box, Inlet Cap & Inlet Adjustment
RD378 Type "3" Catch Basin, Frame and Grate
RD380 Fill Height Tables For Aluminum & Steel Corrugated Pipe
RD382 Fill Height Tables For Aluminum & Steel Arch Pipe
RD384 Fill Height Tables For Aluminum & Steel Spiral Rib Pipe
RD386 Fill Height Table For Circular Concrete Pipe
RD388 Fill Height Tables For PVC Pipe
RD390 Fill Height Table For Corrugated HDPE Pipe
RD391 Fill Height Table For Steel Reinforced HDPE Pipe
RD393 Fill Height Tables For Polypropylene Pipe

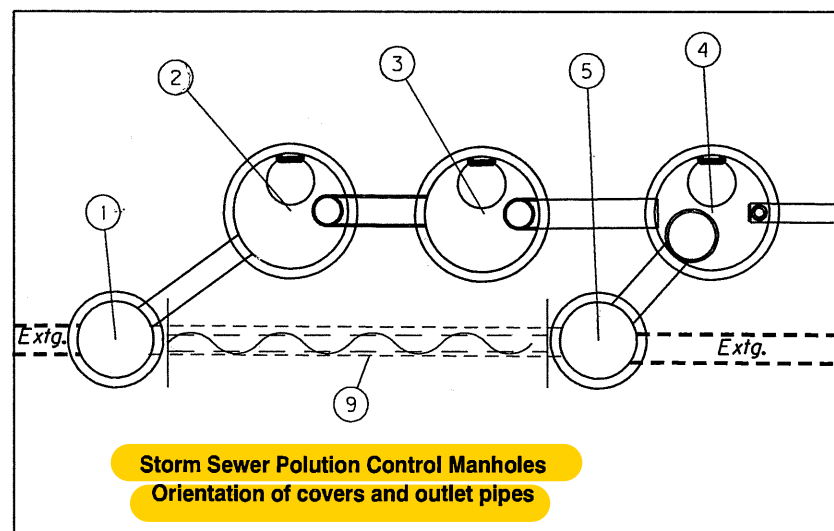


OREGON DEPARTMENT OF TRANSPORTATION
REGION 1 - Geo/Hydro/HazMat Unit
FFO - OR99W: 1-5 NB RAMPS SEC.
PACIFIC HWY WEST
MULTNOMAH & WASHINGTON COUNTIES
Reviewed by - Bruce Council
Designed by - David McDonald
Drafted by - Daniel Gunther
PIPE DATA SHEET
SHEET NO. 2D

Sec. 31, T.1 S, R.1 E, W.M.



- ① Sta. "E2" 25+65.53, Lt.
Const. 48" manhole over extg. storm sew. pipes
Inst. 15" storm sew. pipe - 12' 10' depth
- ② Sta. "E2" 25+74.87, 28.80' Lt.
Const. 72" storm sewer pollution control manhole, with 48" deep sump
Orient the steps and opening as shown in the magnified view
Inst. 15" storm sew. pipe - 10' 10' depth
(See drg. no. RD340)
- ③ Sta. "E2" 25+84.82, 28.80' Lt.
Const. 72" storm sewer pollution manhole, with 48" deep sump
Orient the steps and opening as shown in the magnified view
Inst. 15" storm sew. pipe (SW) - 12' 10' depth
- ④ Sta. "E2" 25+96.82, 28.80' Lt.
Const. 72" slow splitter manhole (For details see Sht. GJ-6)
Orient the steps and opening as shown in the magnified view
Inst. 15" storm sew. pipe (N) - 9'
Inst. 12" storm sew. pipe (SW) - 123' 10' depth
- ⑤ Sta. "E2" 25+90.82, Lt.
Const. 48" manhole over extg. storm sew. pipes
- ⑥ Sta. "E2" 25+56.36 to Sta. "E2" 26+64.11, Lt.
Const. maintenance pad (For details see sht. GJ-5)



- ⑧ Sta. "E2" 27+19.00 to Sta. "E2" 30+49.00, Lt.
Const. Bioslope - 17.5' x 330'
(For details see shts. GJ, GJ-2, GJ-3, GJ-4, GJ-5 & GJ-6)
- ⑨ Sta. "E2" 25+65.33 to Sta. "E2" 25+90.82, Lt.
Remove extg. 15" storm sew. pipe - 26'

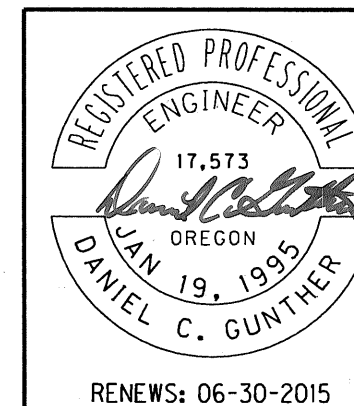
Adjust manhole shown thus:

Remove manhole shown thus:

Adjust inlet shown thus:

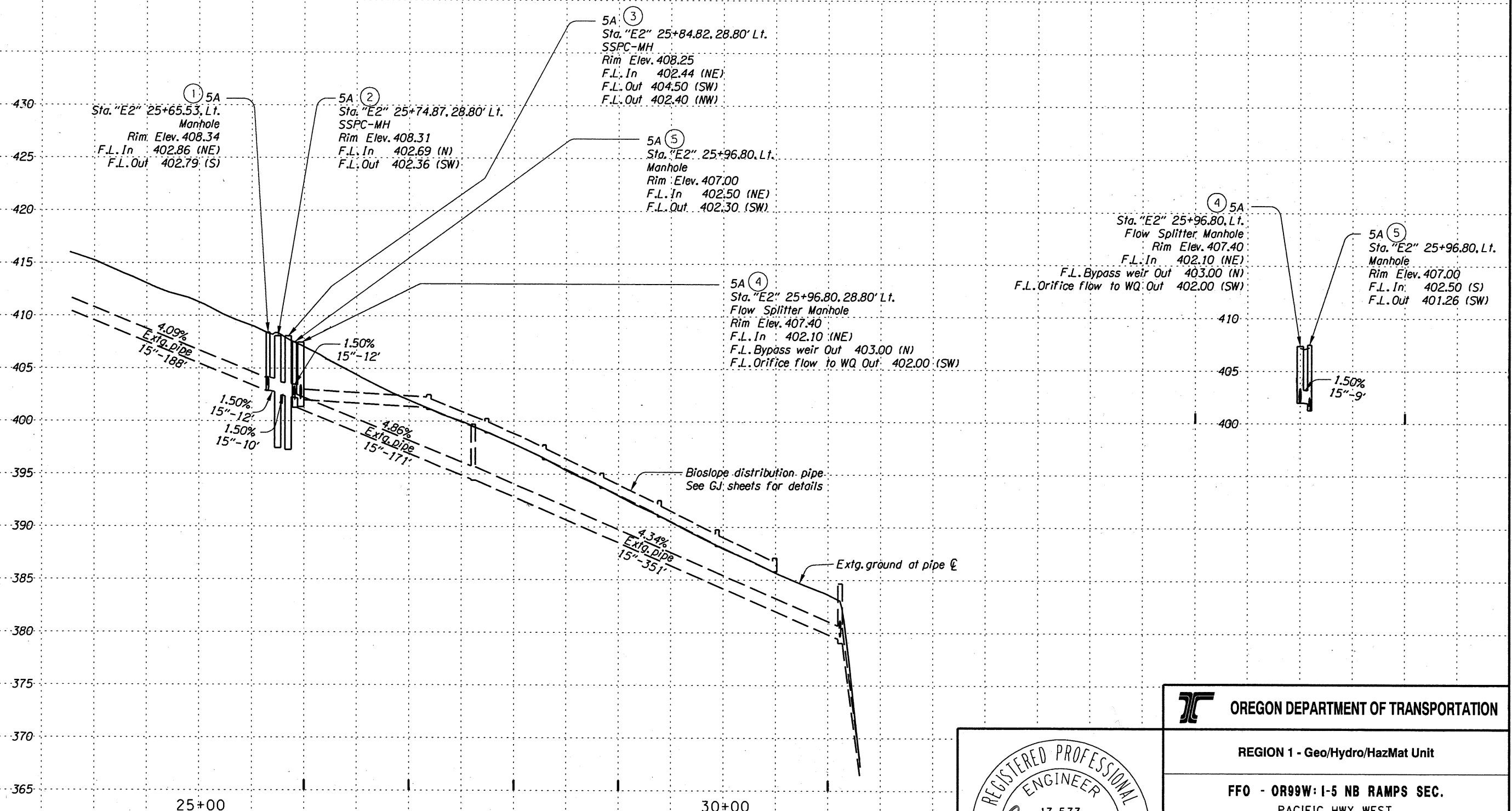
Remove inlet shown thus:

Plug and abandon pipe shown thus:

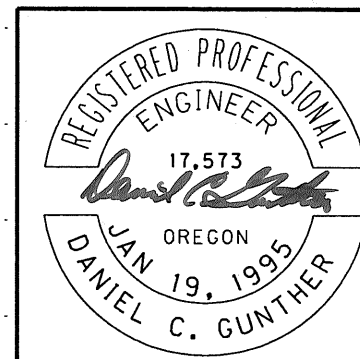


OREGON DEPARTMENT OF TRANSPORTATION	
REGION 1 - Geo/Hydro/HazMat Unit	
FFO - OR99W: I-5 NB RAMPS SEC. PACIFIC HWY WEST MULTNOMAH & WASHINGTON COUNTIES	
Reviewed by - Bruce Council Designed by - Daniel Gunther Drafted by - Daniel Gunther	
DRAINAGE & UTILITIES	SHEET NO. 5A

Sec. 31, T.1 S, R.1 E, W.M.



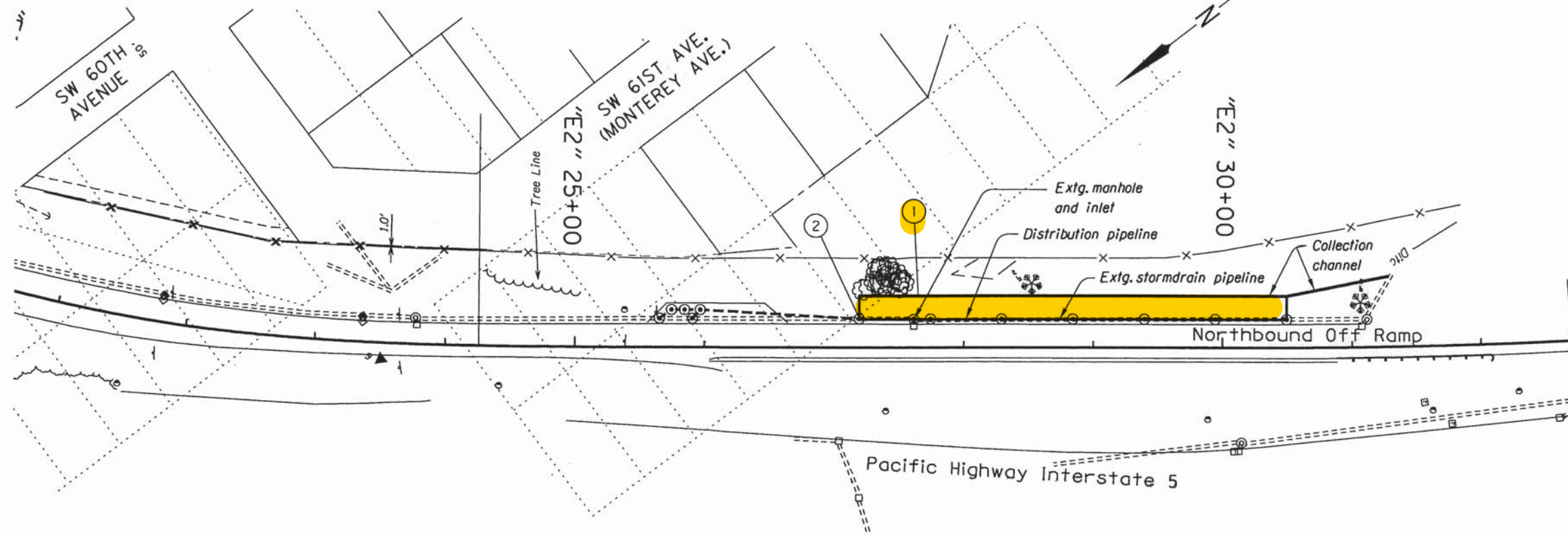
"E2" Line



RENEWS: 06-30-2015

REGION 1 - Geo/Hydro/HazMat Unit	
FFO - OR99W: I-5 NB RAMPS SEC. PACIFIC HWY WEST MULTNOMAH & WASHINGTON COUNTIES	
Reviewed by - Bruce Council Designed by - Daniel Gunther Drafted by - Daniel Gunther	
PROFILE	SHEET NO. 5B

Sec. 31, T. 1 S, R. 1 E, W.M.



- ① Sta. "E2" 27+19.00 to Sta. "E2" 30+49.00, Lt.
Const. Bioslope drain - 17.5' x 330'
 (For details see shts. GJ, GJ-2, GJ-3, GJ-4, GJ-5 & GJ-6)
- ② Sta. "E2" 27+19.10, 22.00' Lt.
 Const. 48" shallow manhole
 Inst. 12" drain pipe - 330'
 5' depth
 Orientate one row of drain holes downward (6 o'clock position) for each pipe section
 Const. watertight seal around pipe through geomembrane
 (For details, see sht. GJ-5)
 Const. 18" "PVC" inlets with flow control along drain pipe 55' O.C. - 6 each



Adjust manhole shown thus:

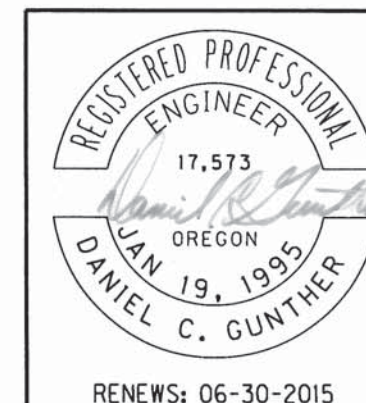
Remove manhole shown thus:

Adjust inlet shown thus:

Remove inlet shown thus:

Plug and abandon pipe shown thus:

No.	DATE	REVISIONS	BY
①	23-Oct-13	Added size of "PVC" inlet	D.C.G.



OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

FFO - OR99W: I-5 NB RAMPS SEC.
 PACIFIC HWY WEST
 MULTNOMAH & WASHINGTON COUNTIES

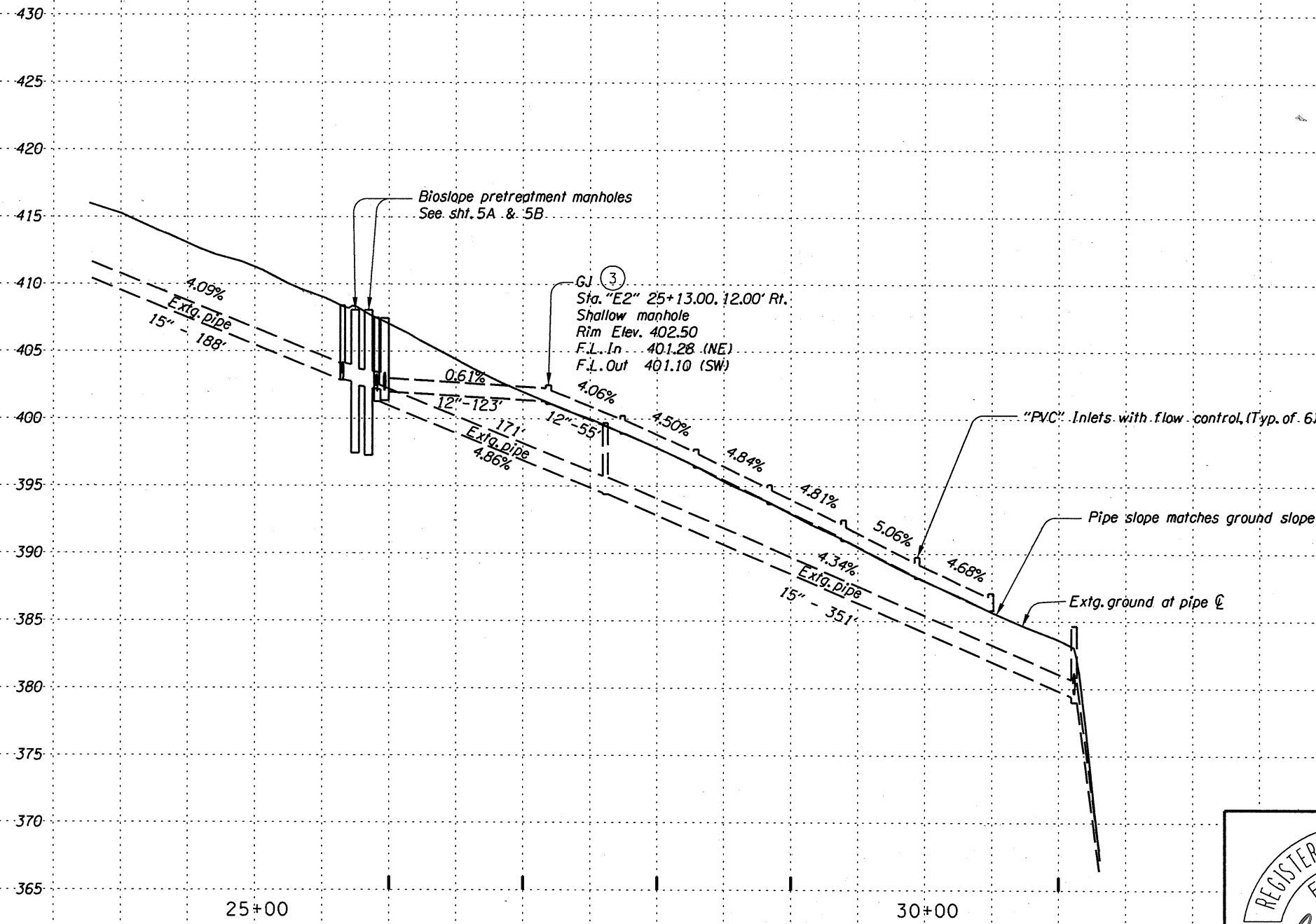
Reviewed by - Bruce Council
 Designed by - Daniel Gunther
 Drafted by - Daniel Gunther

WATER QUALITY DETAILS

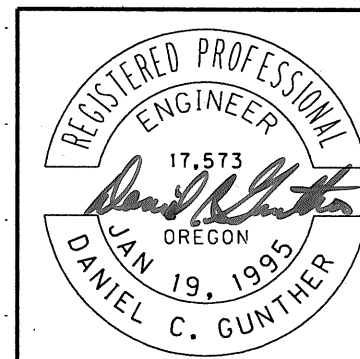
SHEET NO. GJ

Sec. 31, T.1S, R.1E, W.M.

Profile of Bioslope Piping System

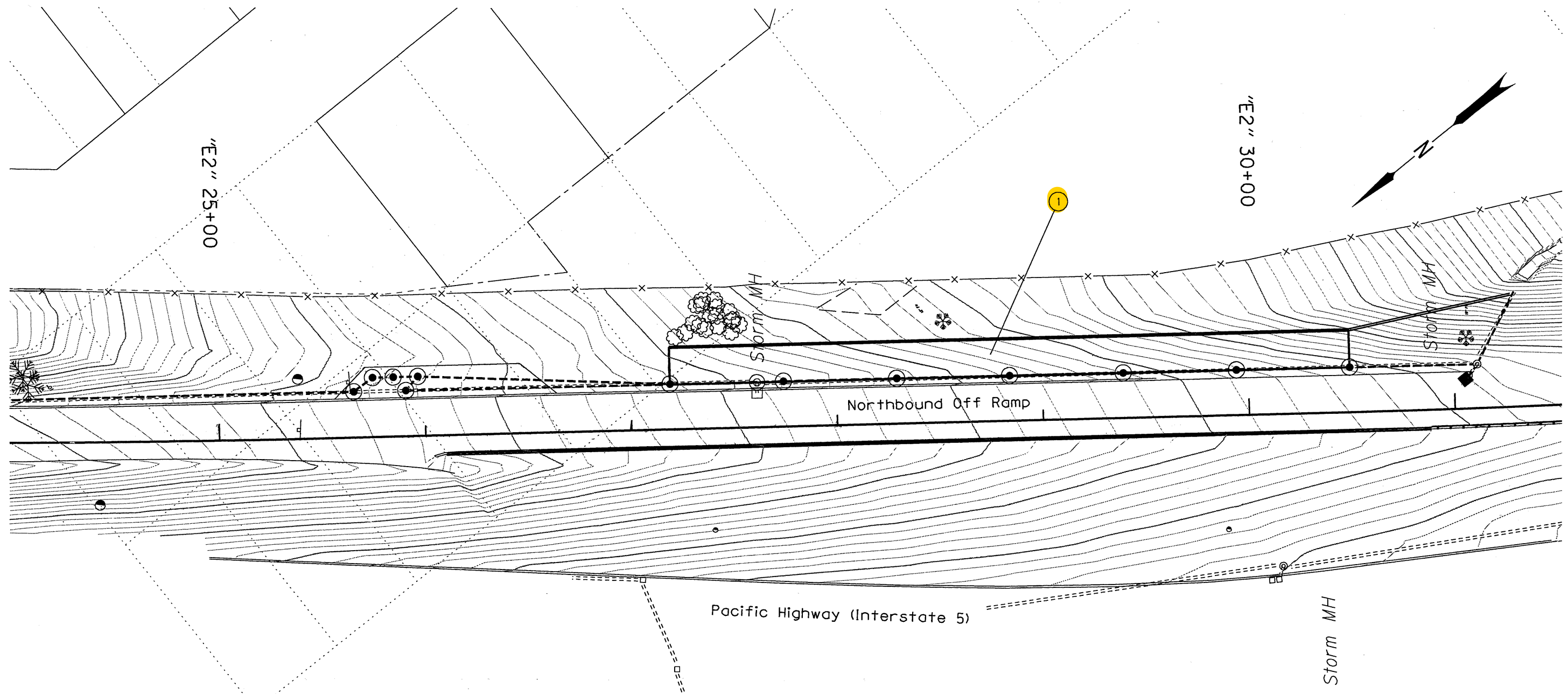


"E2" Line



RENEWS: 06-30-2015

OREGON DEPARTMENT OF TRANSPORTATION	
REGION 1 - Geo/Hydro/HazMat Unit	
FFO - OR99W: I-5 NB RAMPS SEC. PACIFIC HWY WEST MULTNOMAH & WASHINGTON COUNTIES	
Reviewed by - Bruce Council Designed by - Daniel Gunther Drafted by - Daniel Gunther	
WATER QUALITY DETAILS	SHEET NO. GJ-2

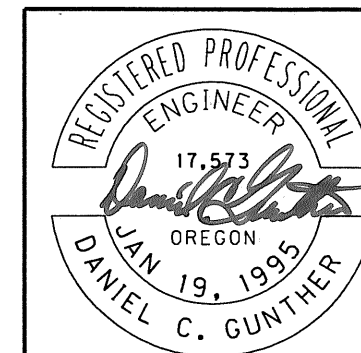


1 Const. Bioslope

STORMWATER FIELD MARKER TABLE

FACILITY LOCATION		DFI #	TYPE S2 MARKER LOCATION		TYPE S1 MARKER	
STATION "E2"	MP		BEGIN	END	RED	GREEN
27+19.00	293.75	D 00727	✓		✓	
30+49.00	293.65	D 00727		✓		✓

✓ Check where appropriate
 Red = Beginning of facility
 Green = End of facility



RENEWS: 06-30-2015

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

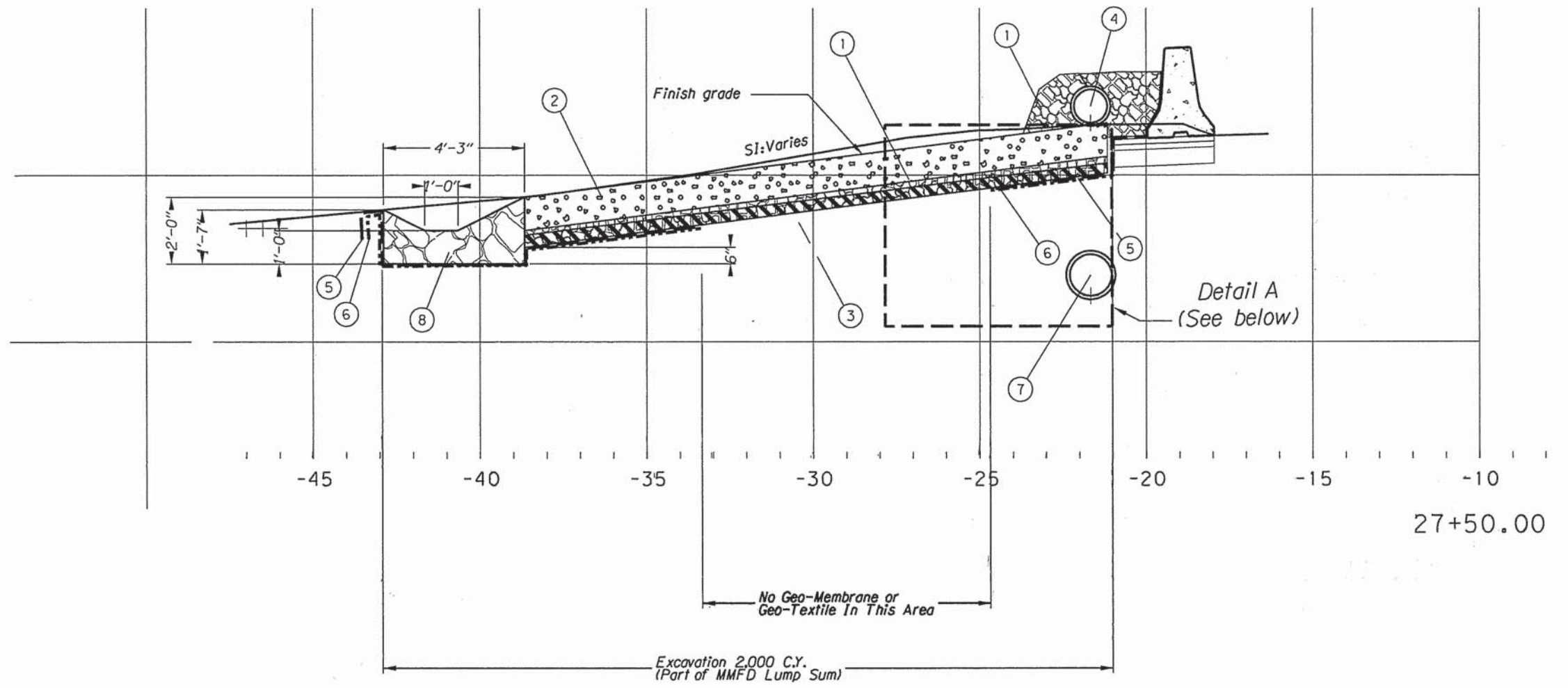
FFO - OR99W: I-5 NB RAMPS SEC.
 PACIFIC HWY WEST
 MULTNOMAH & WASHINGTON COUNTIES

Reviewed by - Bruce Council
 Designed by - David McDonald
 Drafted by - Daniel Gunther

WATER QUALITY DETAILS

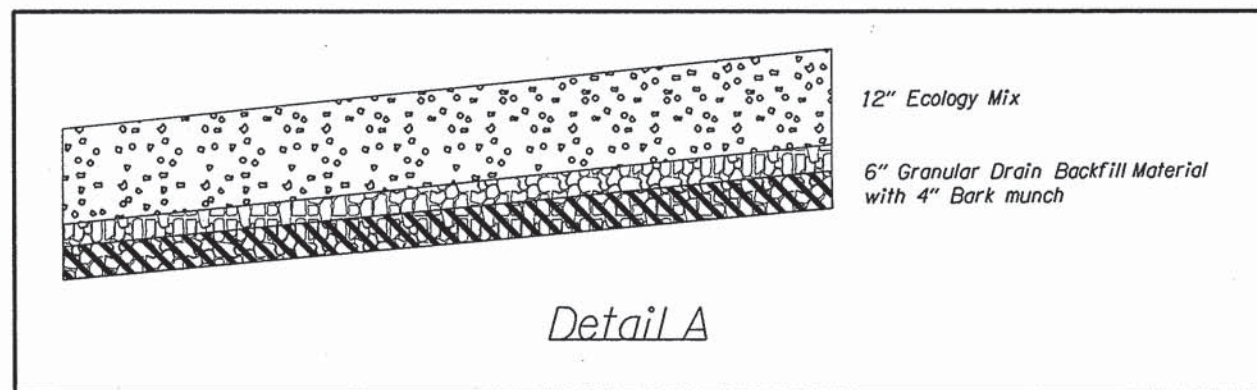
SHEET NO.

GJ-3

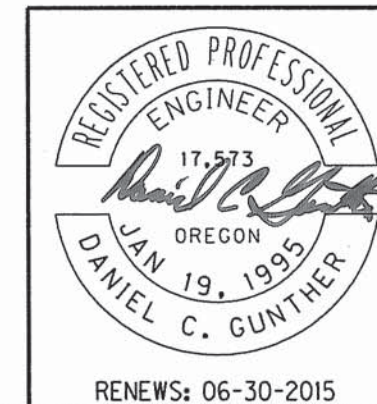


Typical Section

- ① Inst. 1-1/2"-3/4" Granular Drain Backfill Material around pipe as U.V. block min. 2" cover over pipe
- ② Install Ecology Mix - 12" thick
- ③ Place 6" of granular drain backfill material Compact with small roller compactor Inst. bark mulch - 4" Wash bark mulch completely into the voids of the granular drain backfill material by saturating with water Inst. additional lifts of granular drain backfill material to smooth slope line
- ④ 12" Drain Pipe (Distribution Pipe)
- ⑤ 30 mil. LLDPE Geomembrane liner
- ⑥ Drainage geotextile, type 1
- ⑦ Extg. 15" Storm sew. pipe
- ⑧ Const. trapezoidal channel Inst. Drainage geotextile, type 1 Inst. 30 mil. LLDPE Geomembrane liner Inst. Class 50 riprap to form a channel with 1-foot bottom width and 2:1 (H/V) side slopes Minimum 6 inch depth of riprap below granular drain backfill material

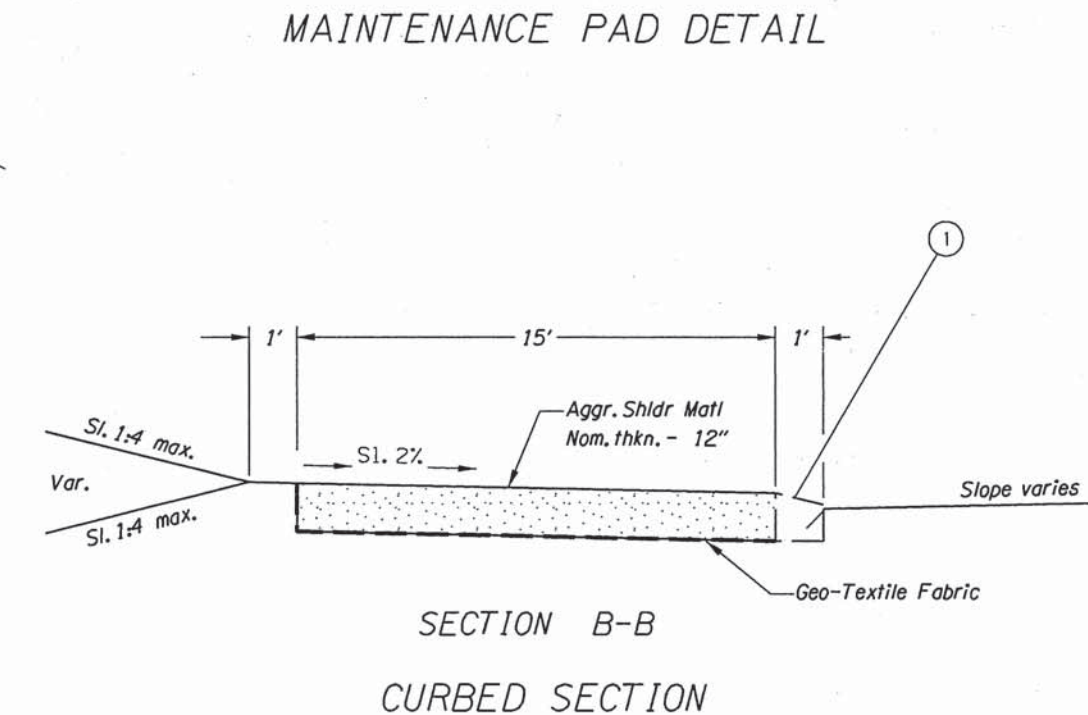
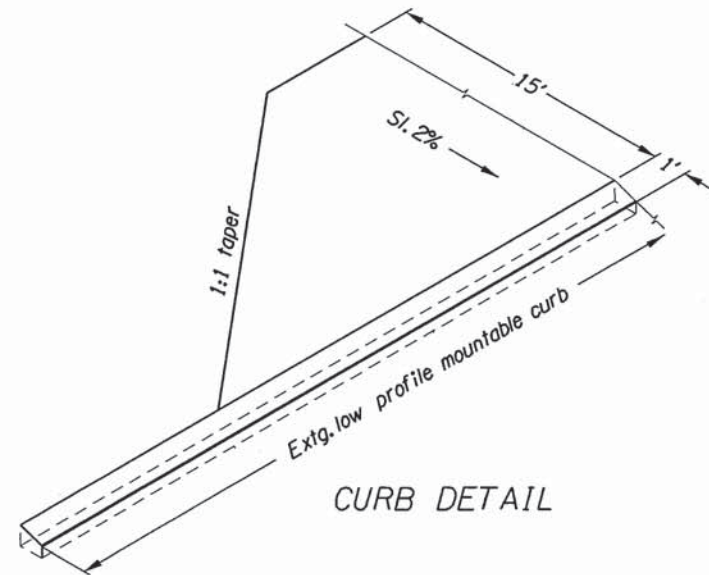
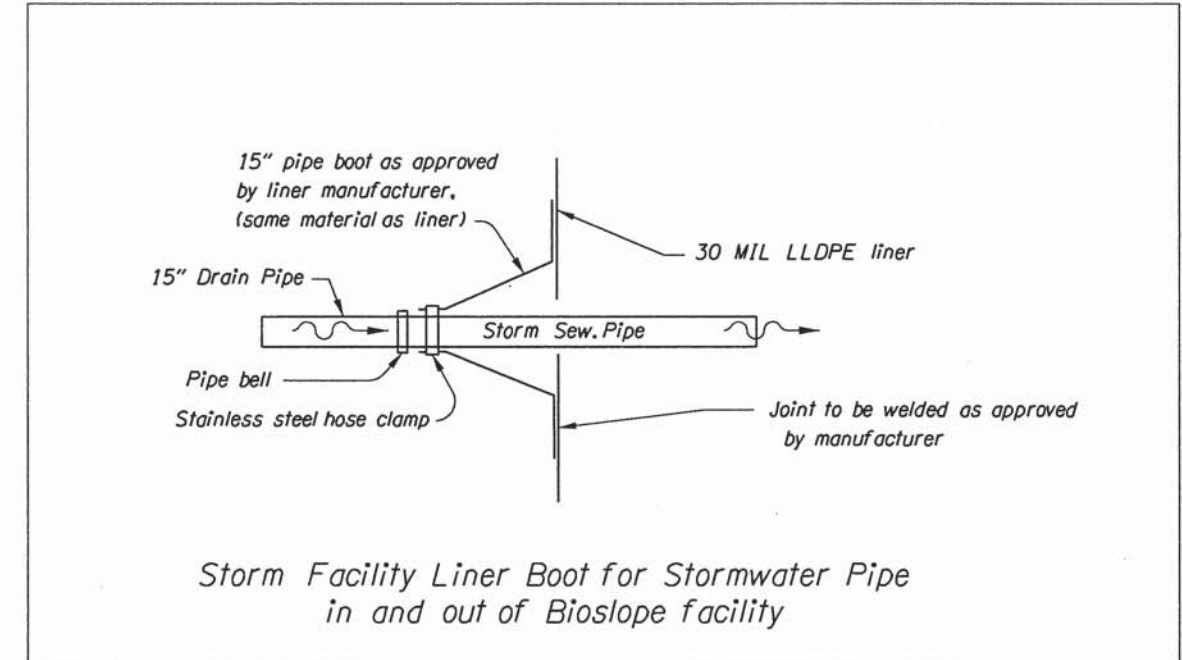
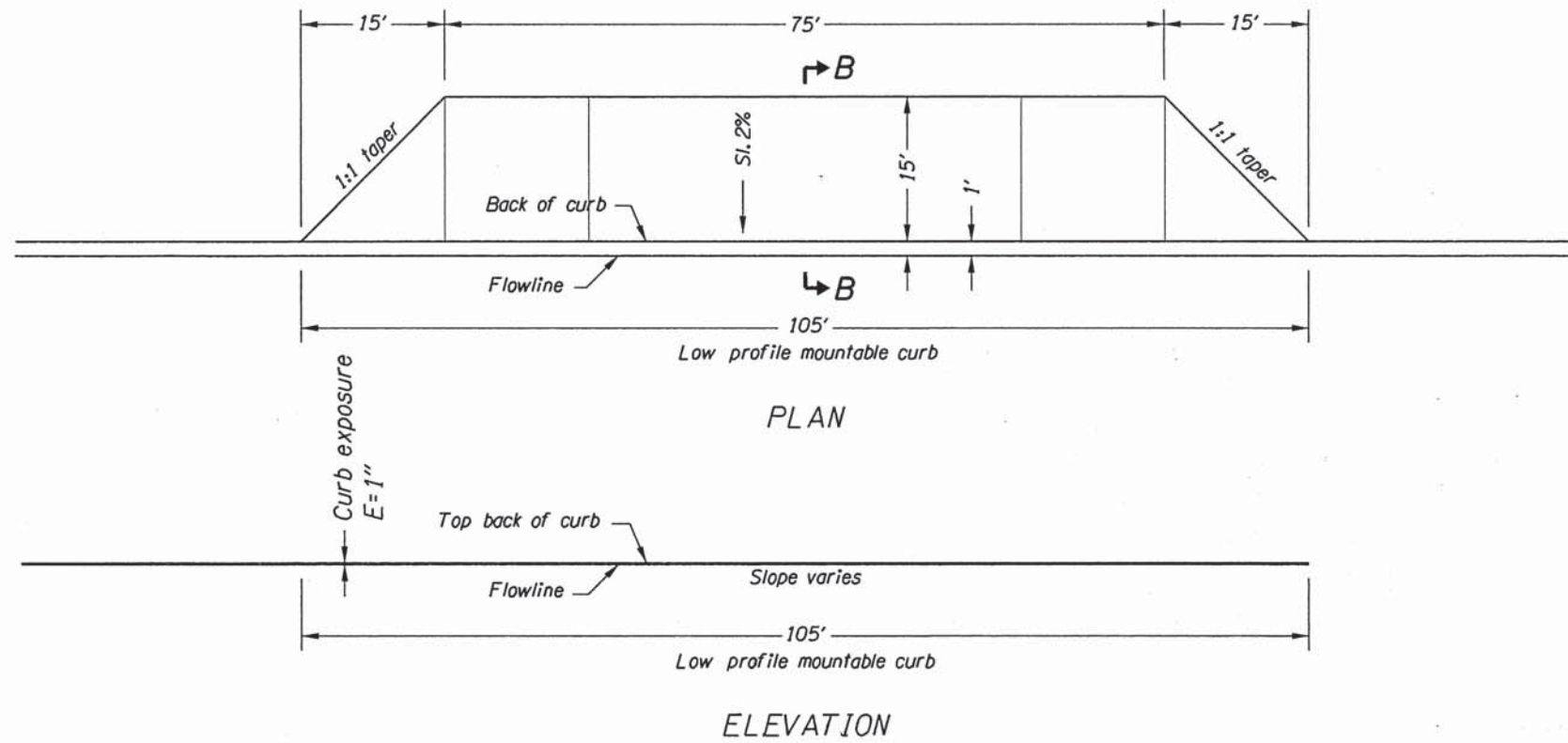


Detail A

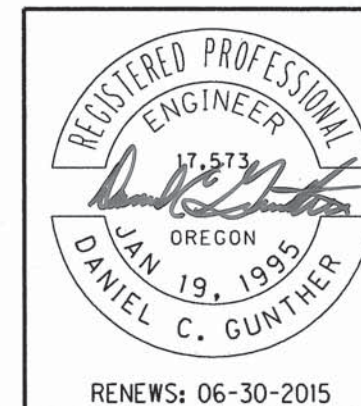


RENEWS: 06-30-2015

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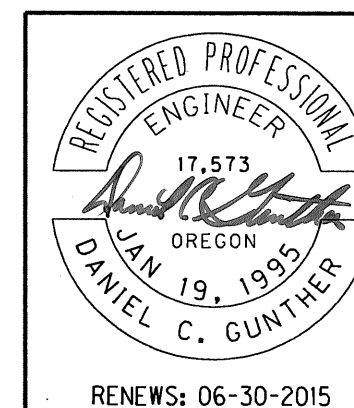
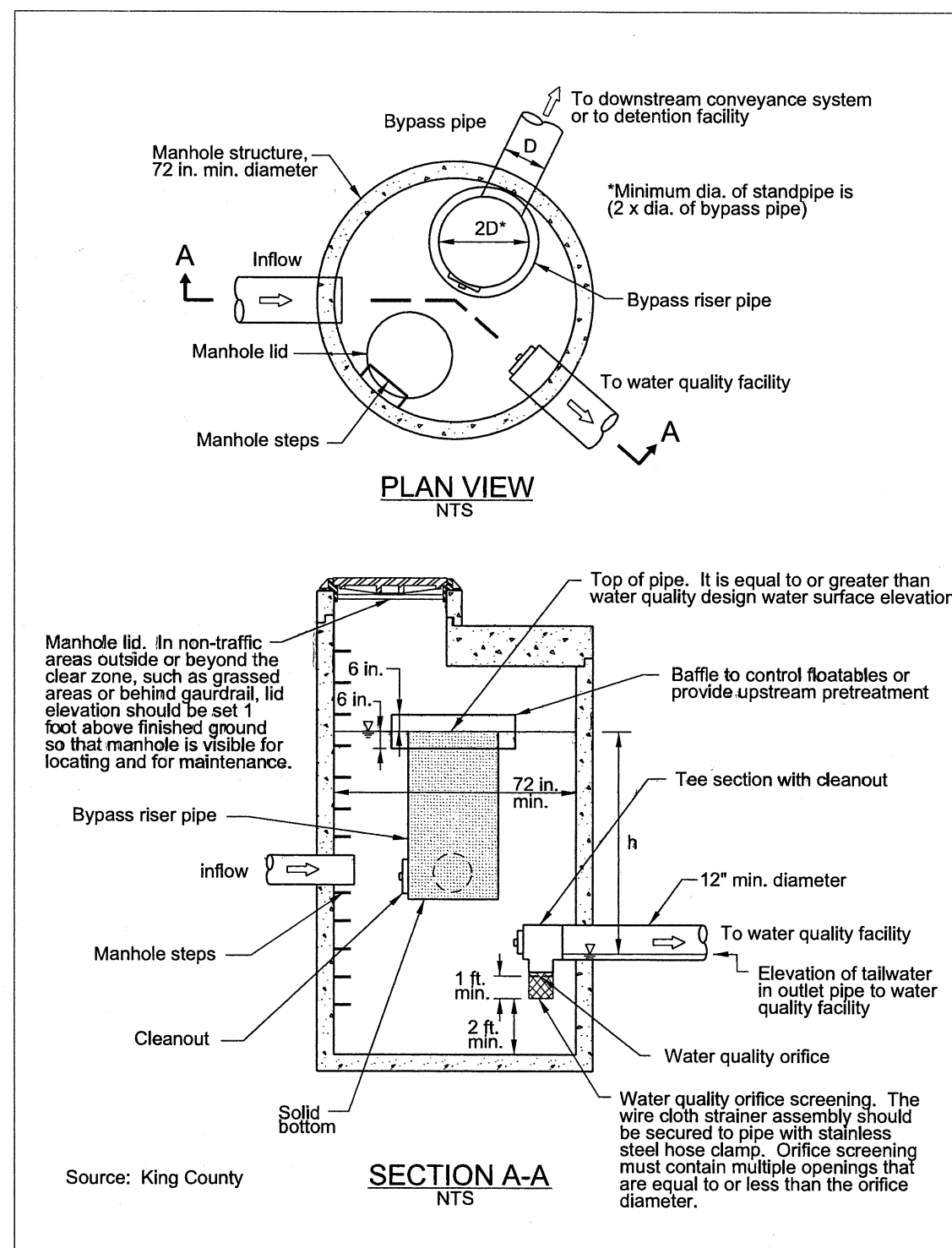


① Protect and maintain existing mountable curb. If damaged, as directed, remove curb and construct new low profile mountable curb. (See Std. Drg. RD700 for curb details.)



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WATER QUALITY DETAILS	SHEET NO. GJ-6