OPERATION & MAINTENANCE MANUAL

DFI No. : D00353
Facility Type: Detention Pond/Water Quality Biofiltration Swale Combo

September 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00353**
Facility Type:	Detention Pond/Water Quality Biofiltration Swale Combo
Construction Drawings:	(V-File Number) 36V-035
Location:	District: 2C
	Highway No.: 174
	Mile Post: 2.9 (beg./end)]
	Description: This facility is located along the north side of the Clackamas-Boring Highway OR212 (Hwy 174), just east of Damascus, Oregon near Royer Road. Access may be obtained from a maintenance access pad alongside the westbound lane of the highway.

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, Bruce Council, P.E., 503-731-8319
Facility construction:	2003
Contractor:	N/A

4. Storm Drain System and Facility Overview

A detention pond/water quality biofiltration swale combo (referred to from this point forward as a pond/swale combo) combines the forms and functions of a water quality swale and a detention pond. In a pond/swale combo, the biofiltration swale is situated within the bottom confines of the detention facility. The facility provides water quality treatment of the smaller storm events and detention of the larger storm events.

The biofiltration swale is designed as if it was a separate facility and consists of a grassy-lined facility with a flat trapezoidal cross section and gradual slope. Treatment is provided through sedimentation and filtration processes. If amended soils are present, additional treatment is obtained through infiltration through the amended soil media.

When the flows exceed the water quality flows, the pond/swale combo facility begins to provide detention. Detention is required to reduce or mitigate the increases in discharge, resulting from development. The facility is designed to store and gradually release (or attenuate) stormwater runoff via a control structure or release mechanism, then releasing it slowly over a more extended period of time. The flow control mechanism for this facility involves a 4-inch orifice surrounded by a wirecloth strainer assembly. When flows exceed the water quality design flow, the orifice restricts the flow causing the water to backup within the facility.

This facility is located along the north side of the Clackamas-Boring Highway OR212 (Hwy 174), just east of Damascus, Oregon near Royer Road. Access may be obtained from a maintenance access pad alongside the westbound lane of the highway.

A localized storm drain system collects runoff and conveys the stormwater toward the facility inlet via 15 and 24-inch drain pipes. A pollution-control manhole and swale flow spreader both precede the facility inlet/entrance where flows will both be detained and treated in the facility as necessary and the flow travels westward toward the outlet structure.

Five perforated underdrain pipes are placed beneath the swale channel and amended soil layer within a layer of river run rock and drainage geotextile. The pipes are parallel to one another, perpendicular to and just prior to the outlet structure. Once any remaining stormwater has passed through the facility it is conveyed through the outlet structure to a 24-inch pipe and discharged to a rock-line outfall at point D of the Operational Plans; see Appendix A.

A. Maintenance equipment access:

Unrestricted access may be obtained from a maintenance access pad on the north side of the highway just east of Royer Road.

B. Heavy equipment access into facility:

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

C. Special Features:

☒ Amended Soils
☐ Porous Pavers
☒ Liners; drainage/riprap geotextile.
☒ Underdrains; multiple perforated pipe near the facility outlet.

Photo 1: Pond/Swale Combo facility looking north toward pollution control manhole and facility inlet.

Photo 2: Pond/Swale Combo facility looking west toward the facility inlet and maintenance access pad. Hwy 174 is located to the left.

Photo 3: Looking north at the maintenance access pad/entrance.

Photo 4: Looking north at the outlet pipe (Point D) of the Pond/Swale Combo facility.

5. Facility Haz Mat Spill Feature(s)

The Pond/Swale Combo facility can be used to store a volume of liquid by blocking the 24-diameter outlet pipe located at the outlet of the Pond/Swale Combo facility. This pipe is noted in combination with points C and D of the Operational Plan; Appendix A. Blocking the outlet structure's sloping grated inlets may also be of benefit as part of this effort, and can be facilitated with either steel plates or sandbags.

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
A secondary auxiliary inlet/outlet and a set of two 6-inch PVC pipes, acting as overflow risers, has been designed as part of the facility's outlet control structure, and act as an emergency overflow in the event in which the outlet control device is plugged.

Before flows ever reach the higher level of the secondary inlet/outlet, however, they can be released through the additional 6-inch PVC pipe of the specialized auxiliary inlet/outlet control structure. If runoff should ever exceed the water quality event, where flows normally are directed to the lower primary outlet of the pond, the pond level will rise and release through a secondary auxiliary inlet/outlet located just above the primary outlet.

☐ Other, as noted below

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

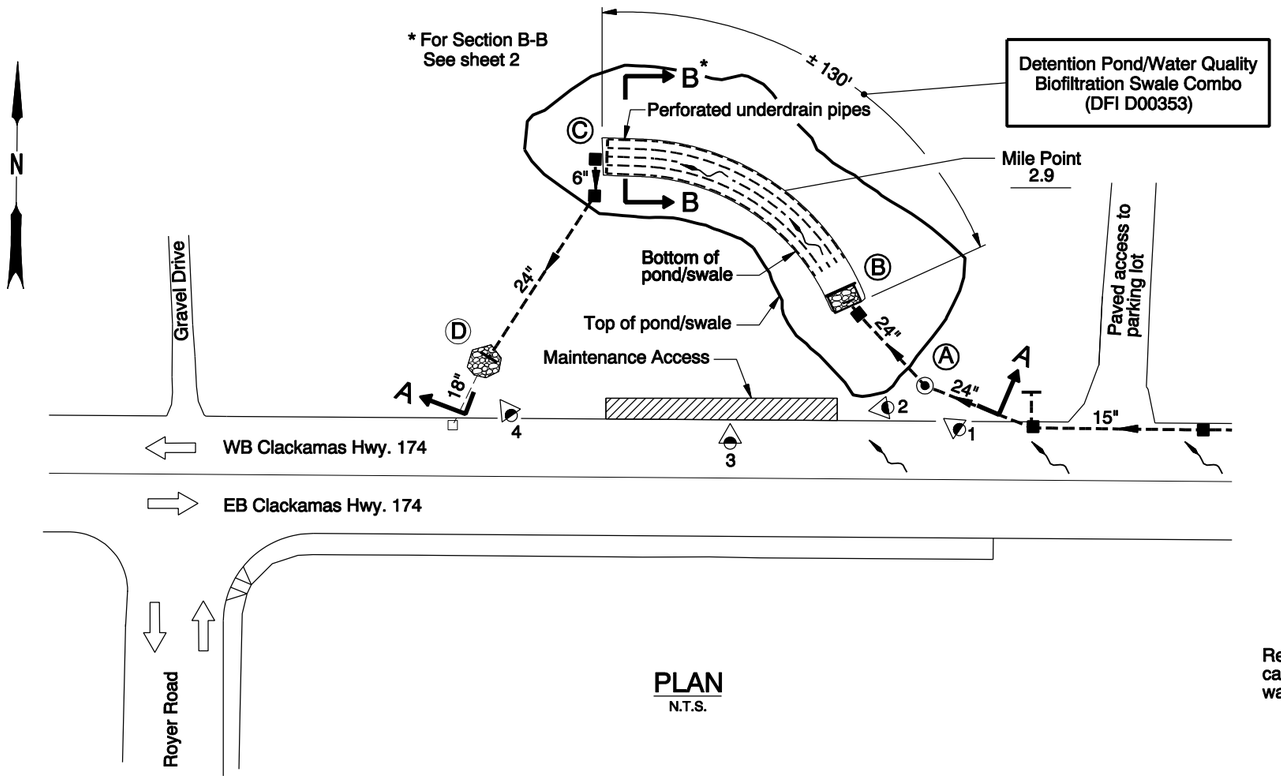
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129
ODOT Region Hazmat Coordinator	(503) 731-8290
ODEQ Northwest Region Office	(503) 229-5263

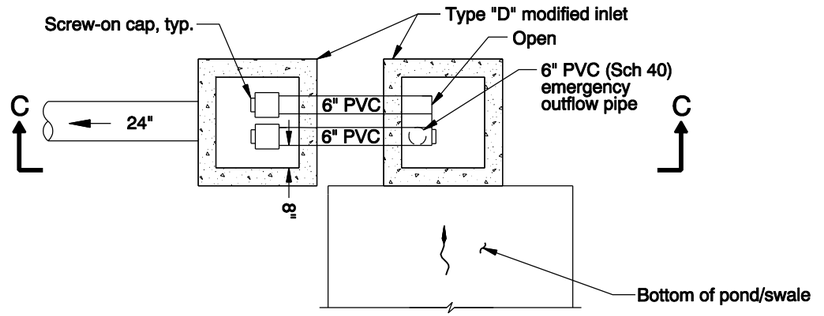
Appendix A

Content:

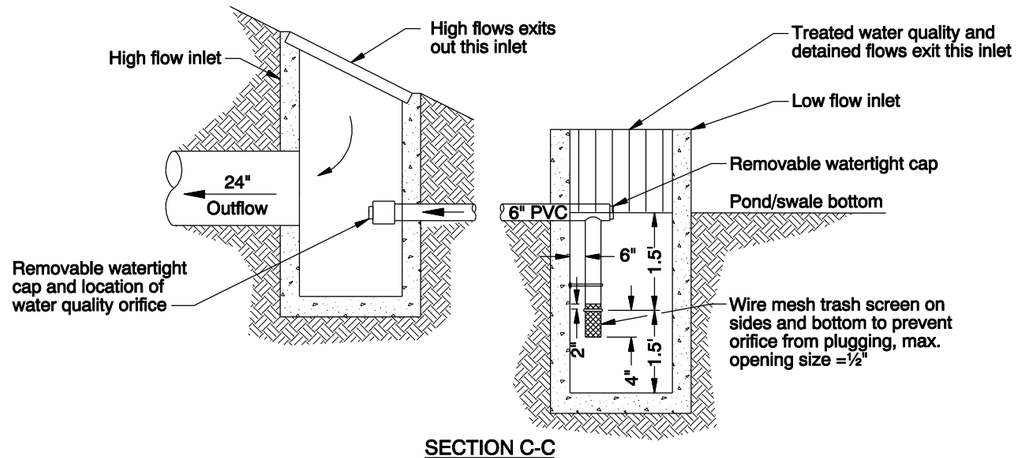
- **Operational Plan and Profile Drawing(s)**



PLAN
N.T.S.

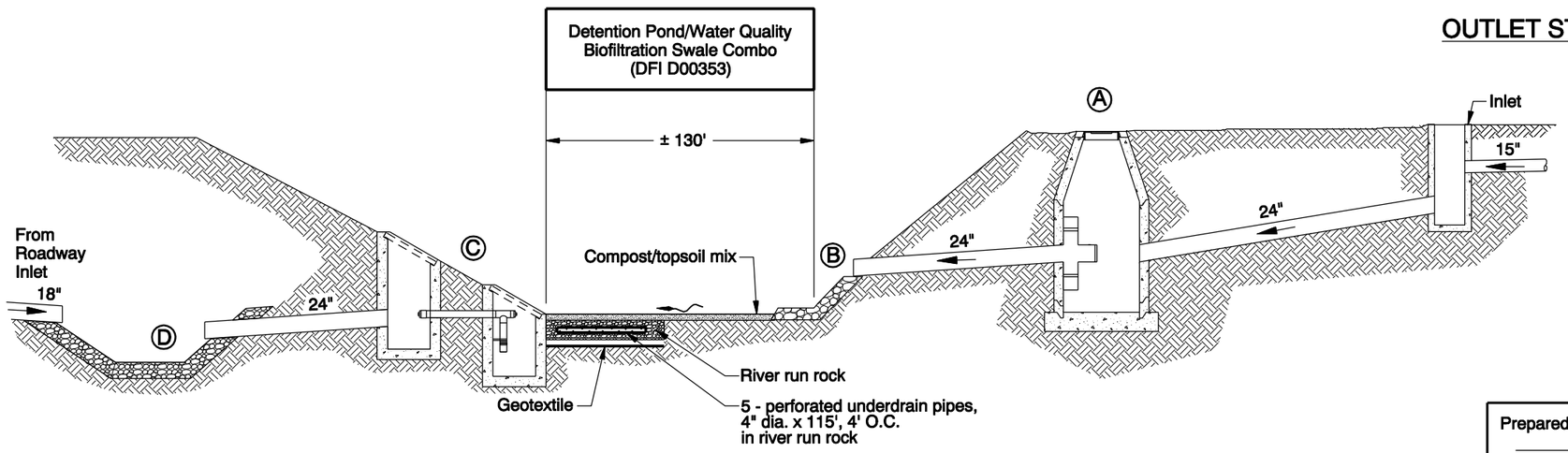


PLAN



SECTION C-C

OUTLET STRUCTURE AT POINT Ⓒ
N.T.S.



SECTION A-A
N.T.S.

LEGEND:

	Photo Location / Direction		Traffic Flow/Direction
Ⓐ	Pollution Control Manhole		Storm Pipe (Facility)
Ⓑ	Swale Flow Spreader/Inlet		Storm Pipe
Ⓒ	Swale Outlet Structure		Conveyance Direction
Ⓓ	Riprap Outfall		Pavement/Facility Flow Path
◉ and/or ◎	Manhole		Maintenance Access
■ and/or □	Inlet		Riprap

Sht. 1 of 2

OREGON DEPARTMENT OF TRANSPORTATION

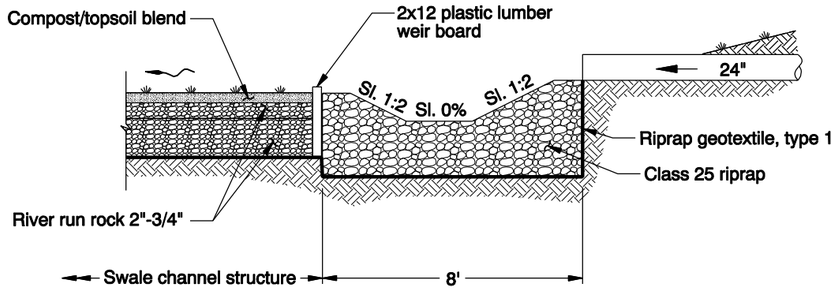
Prepared By: Bob Knorr

Drafted By: Mathew Bunde

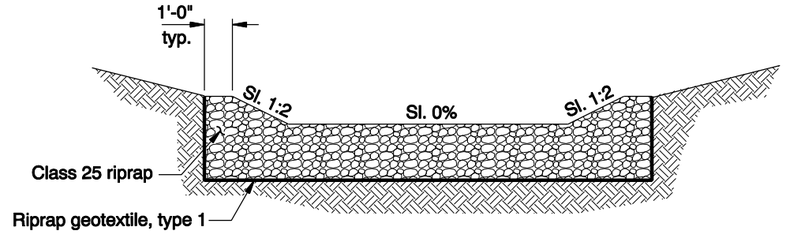
DFI D00353
MAINTENANCE DISTRICT 2C HWY 174
DETENTION POND/WQ SWALE COMBO
CLACKAMAS-BORING HWY. MP 2.9
CLACKAMAS COUNTY

G:\2C_174_D00353\Operational Plan\DFI_D00353.dgn :: Default 9/27/2011 11:57:18 AM hwye94w

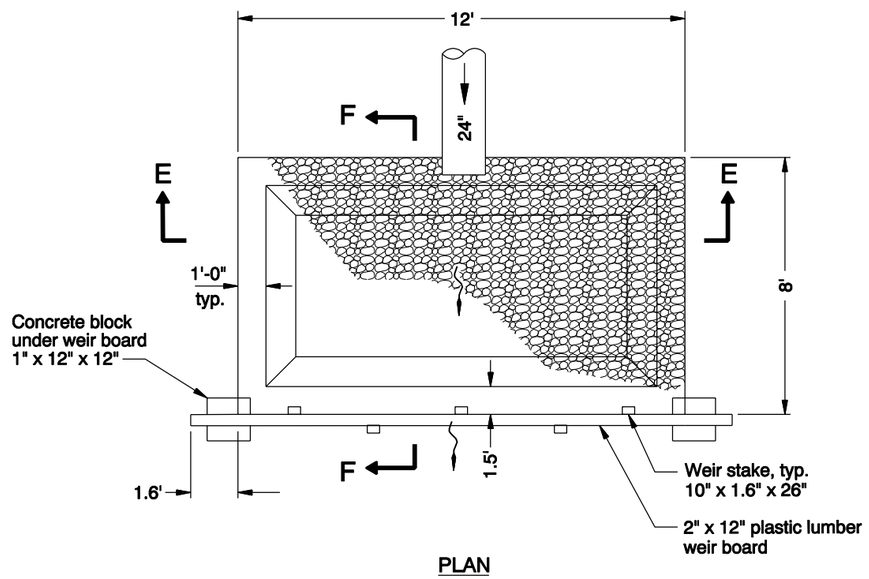
DFI_D00353.dgn



SECTION F-F



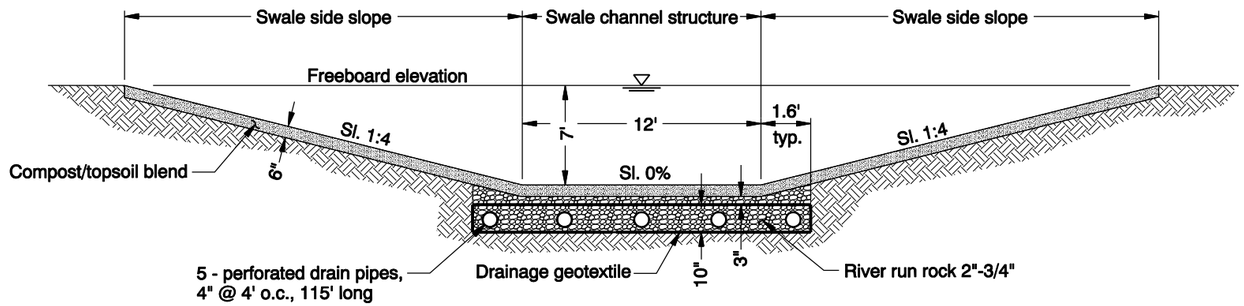
SECTION E-E



PLAN

SWALE FLOW SPREADER AT POINT Ⓑ

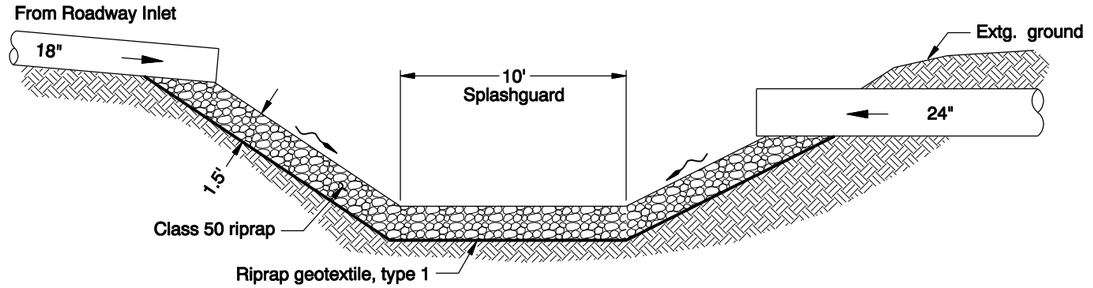
N.T.S.



SECTION B-B

N.T.S.

(From Sheet 1)



RIPRAP OUTFALL AT POINT Ⓓ

N.T.S.

Sht. 2 of 2

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Bob Knorr

Drafted By: Mathew Bunde

DFI D00353
MAINTENANCE DISTRICT 2C HWY 174
DETENTION POND/WQ SWALE COMBO
CLACKAMAS-BORING HWY. MP 2.9
CLACKAMAS COUNTY

Appendix B

Content:

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

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd. & Standard Drawing Nos.
2, 2A Thru 2A-5 Incl.	Typical Sections
2B Thru 2B-9 Incl.	Details
2C Thru 2C-23 Incl.	Traffic Control Plans
2D Thru 2D-7 Incl.	Erosion Control Details
2D-8 Thru 2D-27 Incl.	Erosion Control Plans
2E Thru 2E-5 Incl.	Water Quality Details
2E-6 Thru 2E-8 Incl.	Water Quality Plans
2F, 2F-2	Pipe Data
3, 3A, 4 Thru 15 Incl.	Alignment & All Construction
16	Alignment & General Construction
16A	Drainage & Utilities
16B	Profile
17	Alignment & General Construction
17A	Drainage & Utilities
17B	Profile
18	Alignment & General Construction
18A	Drainage & Utilities
18B	Notes
18C	Profile
19	Alignment & General Construction
19A	Drainage & Utilities
19B	Profile
20	Alignment & General Construction
20A	Drainage & Utilities
20B	Profile
21	Alignment & General Construction
21A	Drainage & Utilities
21B	Profile
22	Alignment & General Construction
22A	Drainage & Utilities
22B	Profile
23	Alignment & General Construction
23A	Drainage & Utilities
24	Alignment & General Construction
24A	Drainage & Utilities
25	Alignment & General Construction
25A	Drainage & Utilities
25B	Profile
26, 27, 28	Alignment & All Construction
28A	Profile
29 Thru 38 Incl.	Alignment & All Construction
39	Alignment & General Construction

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

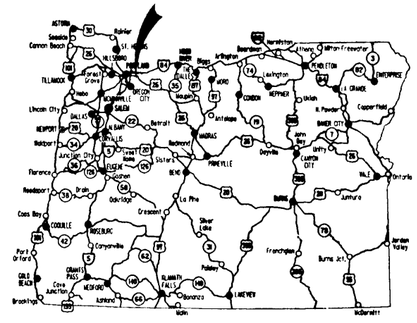
GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, SIGNALS, & ROADSIDE DEVELOPMENT

ROCK CREEK BR. - RICHEY ROAD SEC.

CLACKAMAS & CLACKAMAS - BORING HWYS.

CLACKAMAS COUNTY

FEBRUARY 2003

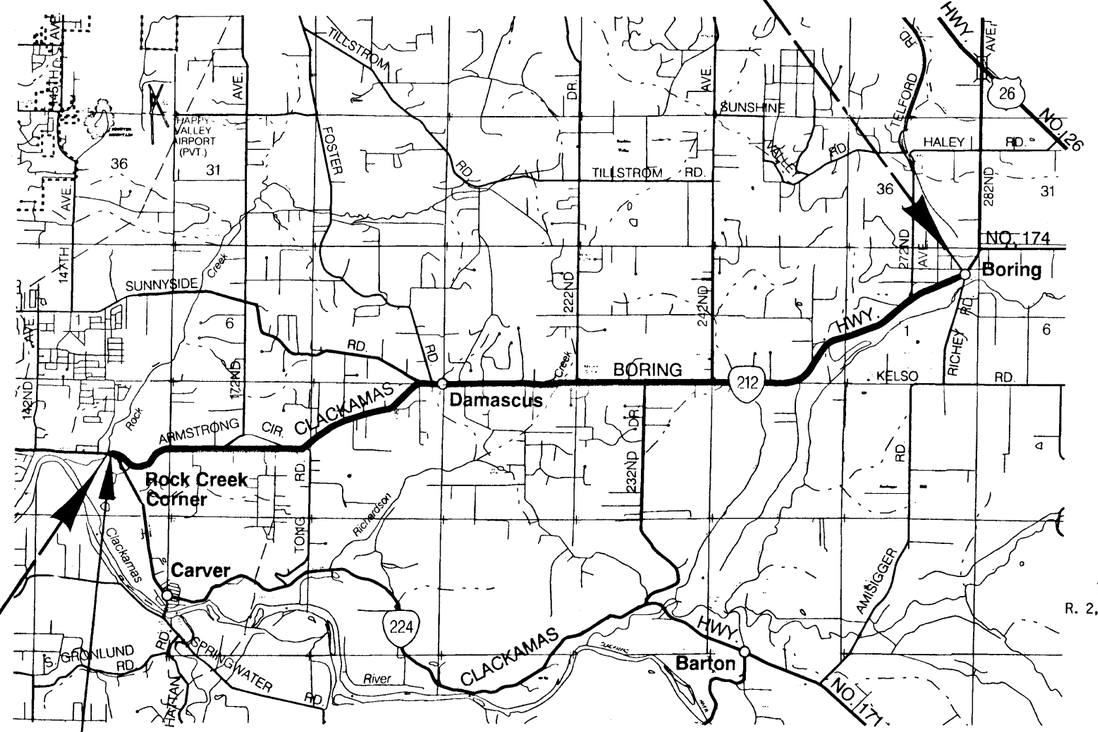


Overall Length Of Project - 11.19 km (6.96 Miles)

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 From The Center, Or Answers To Questions About The Rules By Calling (503) 232-1987.

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

X-HPP-S174(9)
END OF PROJECT
STA. 11+339 (M.P. 6.85)



T. 2 S., R. 2, 3 E., W.M.

X-HPP-S174(9)
BEGIN. OF PROJECT
STA. 6+145 (M.P. 8.07) Clackmas Hwy.

M.P. 8.19 Clackamas Hwy. Bk.= EQ.
M.P. 0.03 Clackamas - Boring Hwy. Ah.

⚠1 2-14-03 - Added Detail Sheet

OREGON TRANSPORTATION COMMISSION

Steven H. Corey	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Stuart Foster	COMMISSIONER
Randall Papé	COMMISSIONER
John Russell	COMMISSIONER
Bruce A. Warner	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER 13,704
OREGON JULY 16, 1987 CATHERINE M. NELSON Expires Dec. 31, 2004

Catherine M. Nelson
TECHNICAL SERVICES MANAGING ENGINEER

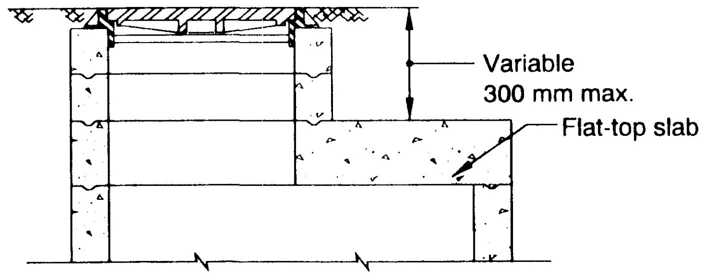
ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS & CLACKAMAS - BORING HWYS.
CLACKAMAS COUNTY

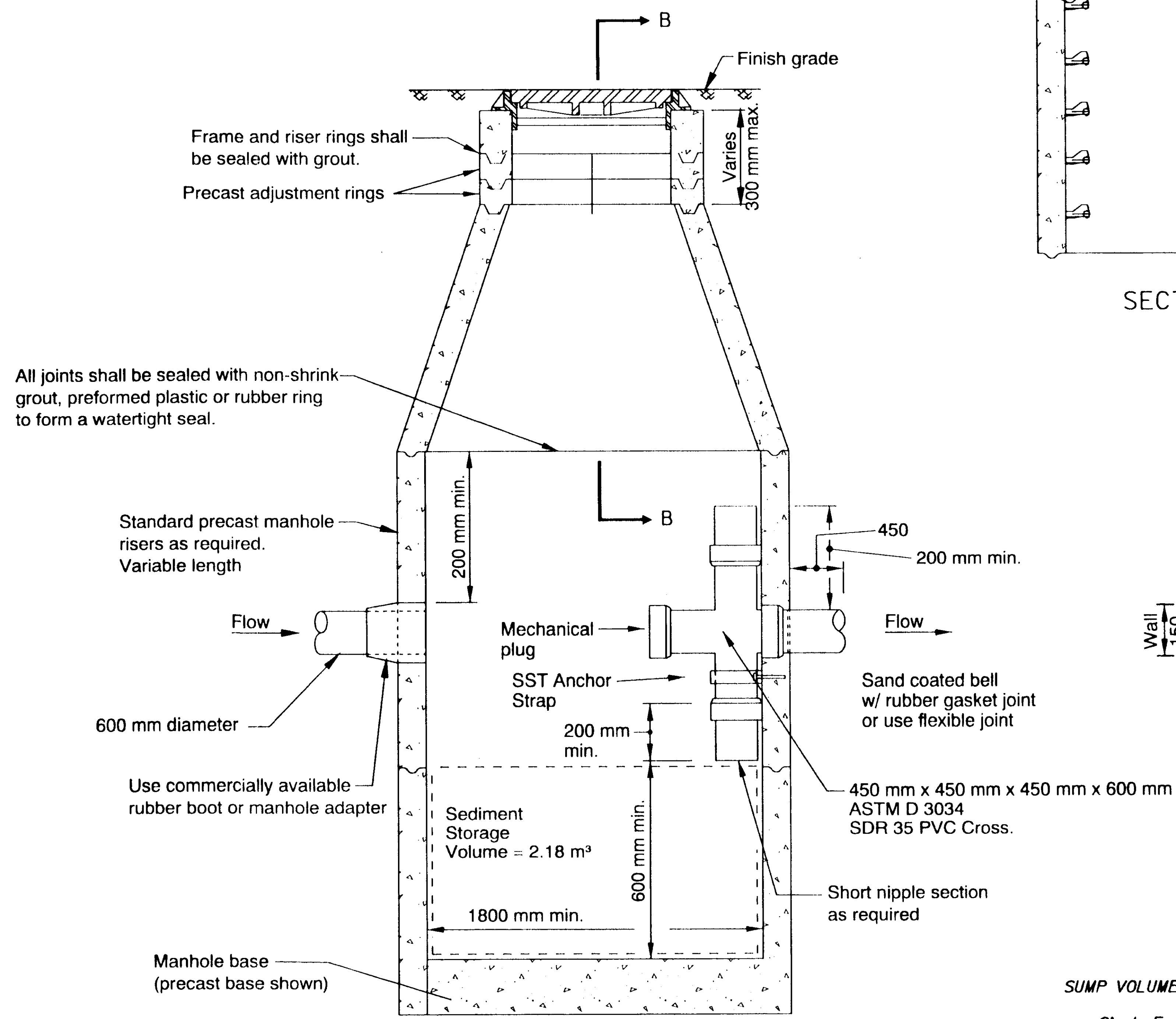
METRIC

FEDERAL HIGHWAY ADMINISTRATION		PROJECT NUMBER	SHEET NO.
REGION 10	OREGON DIVISION	X-HPP-S174(9)	1

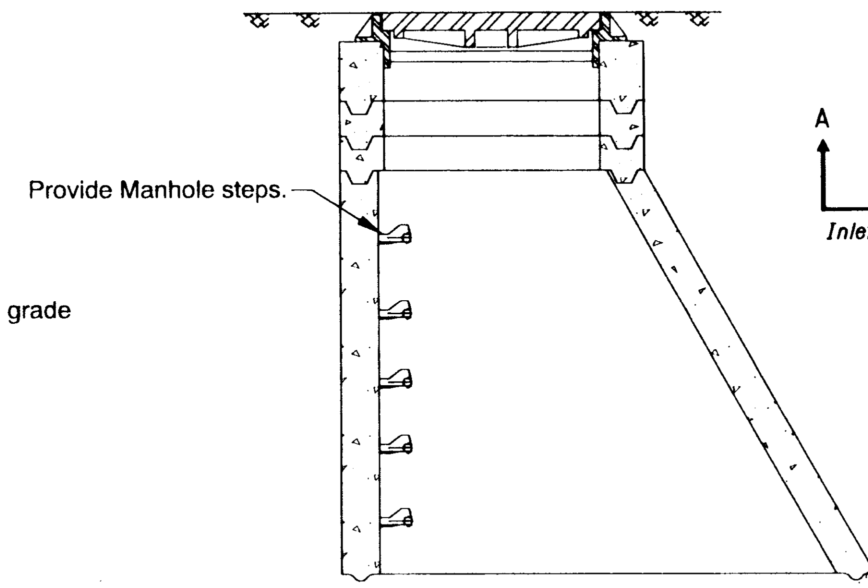
VIEW A1 C103-1419-011

WATER QUALITY MANHOLE

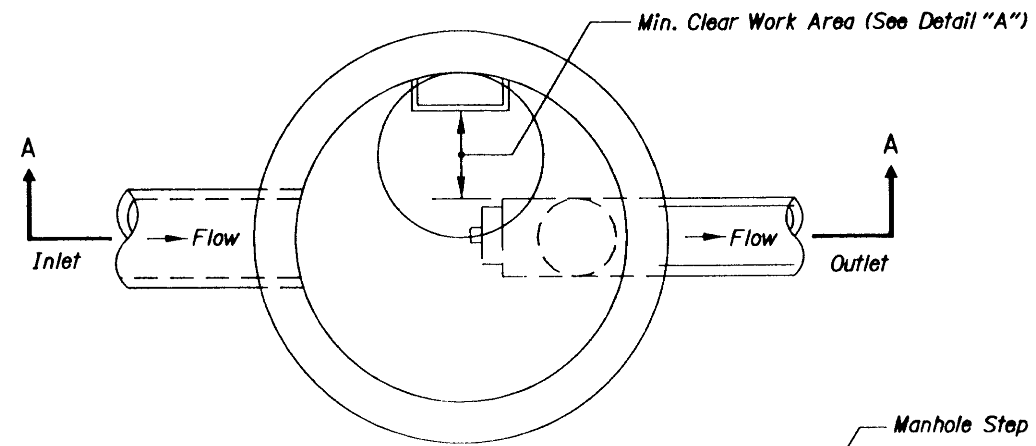




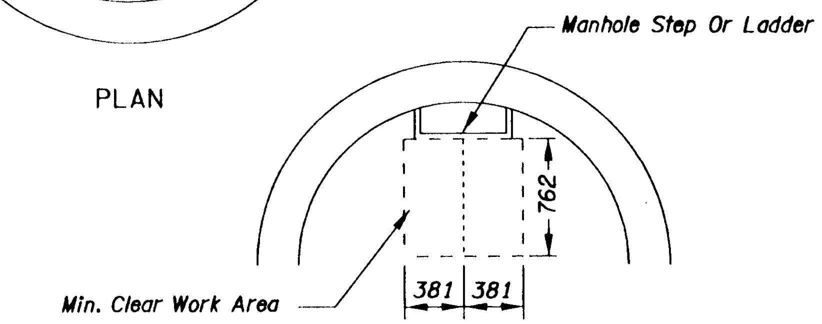
SECTION A-A



SECTION B-B



PLAN

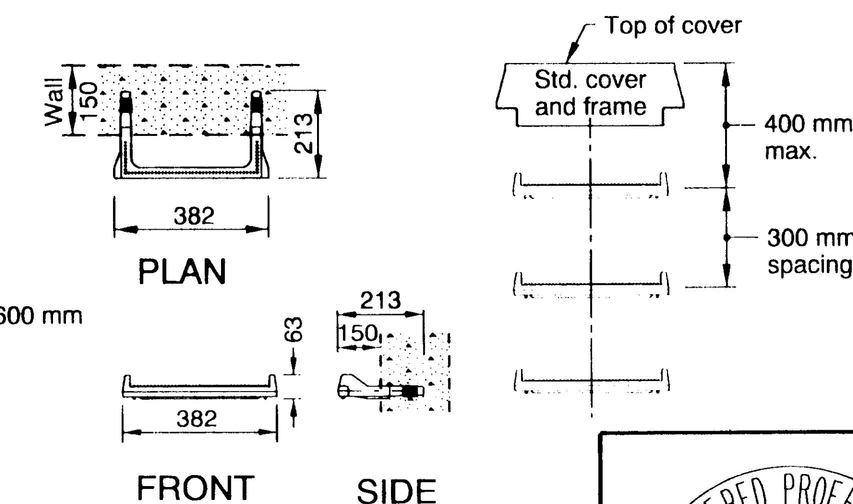


DETAIL "A"

Locate Pipes, Etc. So That No Portion Of Them Are Within Min. Clear Work Area

STEPS

See Current Qualified Products List (QPL) For Acceptable Alternate Manhole Steps



NOTES:

1. *Hardware, Fasteners And Anchors To Be Stainless Steel.*
2. *See Pipe Data Sheet And Plan Sheets For Pipe Size(s).*
3. *Manhole And Base Per Manhole Standard Drawings.*
4. *Hardware, Fasteners, Anchors, Fittings, Appurtenances, Labor And Equipment Is Incidental To Water Quality Manhole Item.*

- All dimensions are in mm unless otherwise noted.

SUMP VOLUME REQUIREMENTS

Single Family Residential	*.245 m³/hectare*
Multi Family Residential	*1.539 m³/hectare*
Commercial/Industrial	*6.577 m³/hectare*

(For Details Not Shown, See Manhole Standard Drawings, RD324, & RD327)

REGISTERED PROFESSIONAL ENGINEER 19156 OREGON JULY 15, 1997 BRUCE S. COUNCIL Expires Dec. 31, 2003

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS-BORING HIGHWAY
CLACKAMAS COUNTY

Reviewed By - Henry M. Allen
Designed By - Bruce S. Council
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. 2E

23-JAN-2003 09:27

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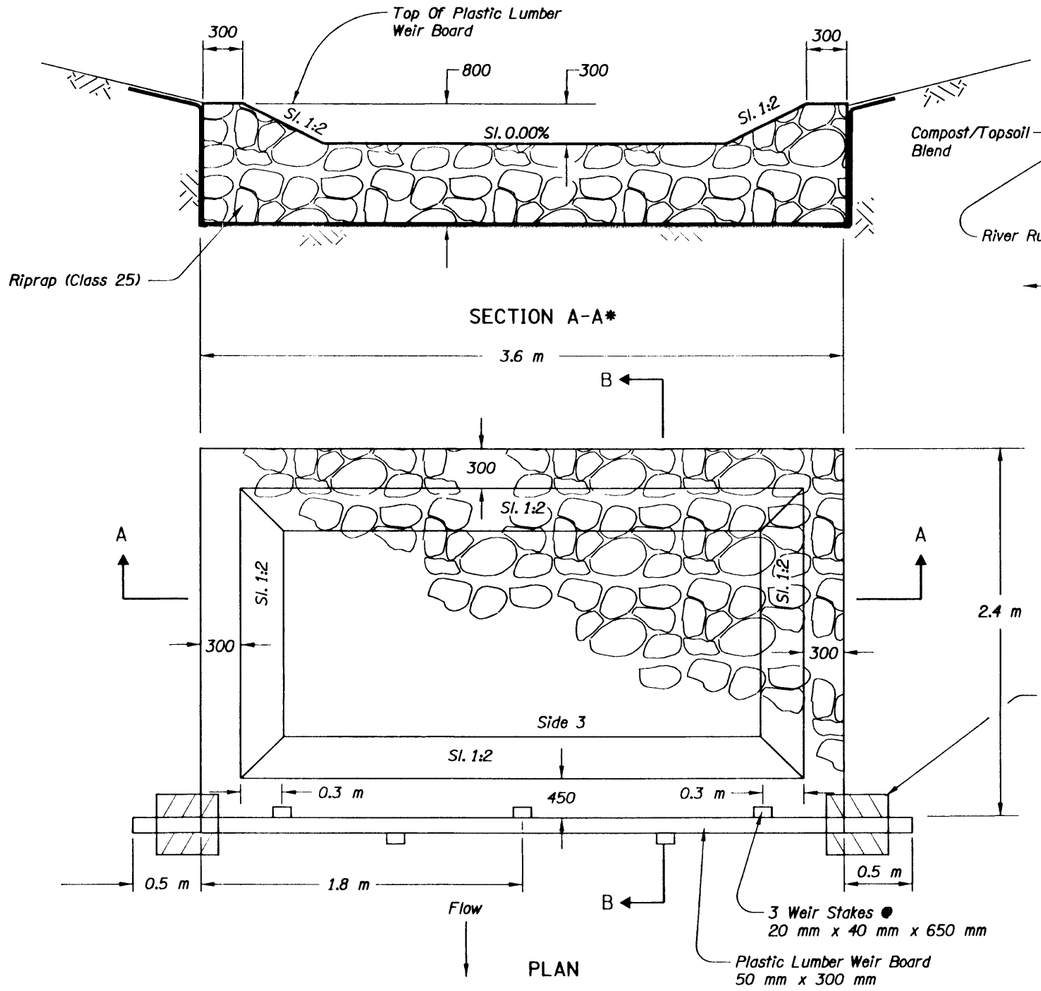
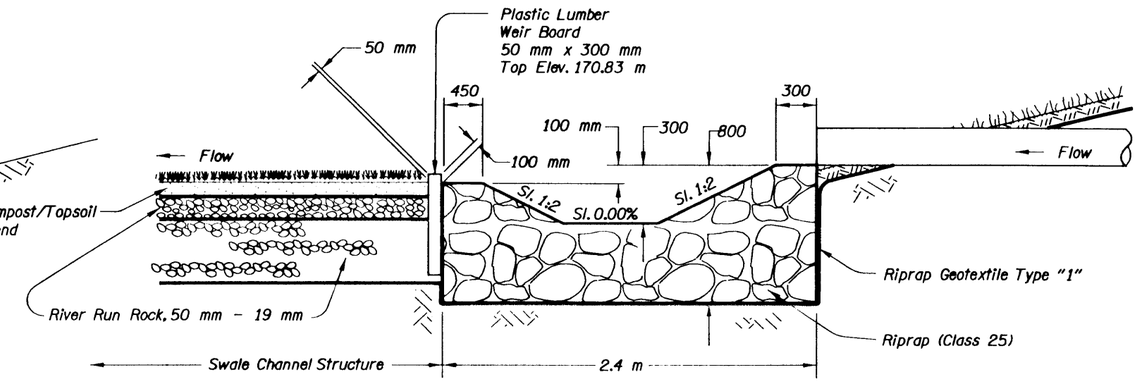
SWALE FLOW SPREADER





*Note:
Length/Width Of The Swale Flow Spreader, Use In Conjunction With Sheet 2E-6, Note 2. Shall Be 2.4 m. Only The Riprap Geotextile Type "1", And Riprap (Class 25) Portions Of This Detail Is Applicable.

All Dimensions Are In Millimeters (mm) Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER 19156 OREGON JULY 15, 1997 BRUCE S. COUNCIL Expires Dec. 31, 2003

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS-BORING HIGHWAY
CLACKAMAS COUNTY

Reviewed By - Henry M. Allen
Designed By - Bruce S. Council
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. 2E-2

23-JAN-2003 13:39
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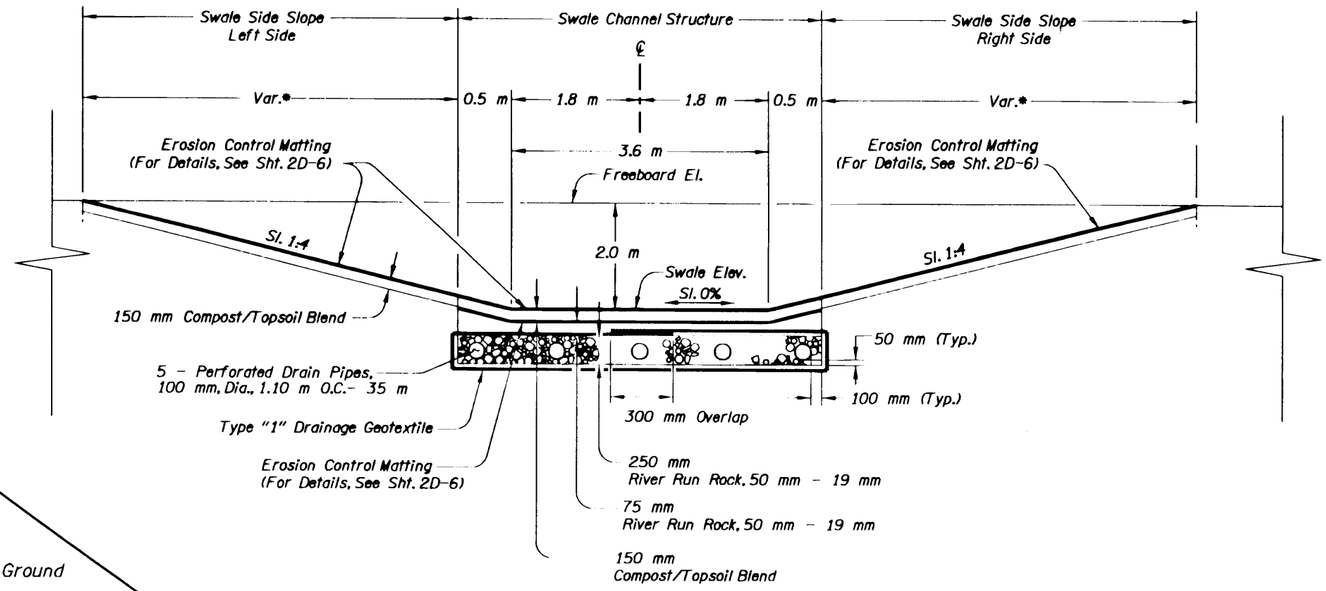
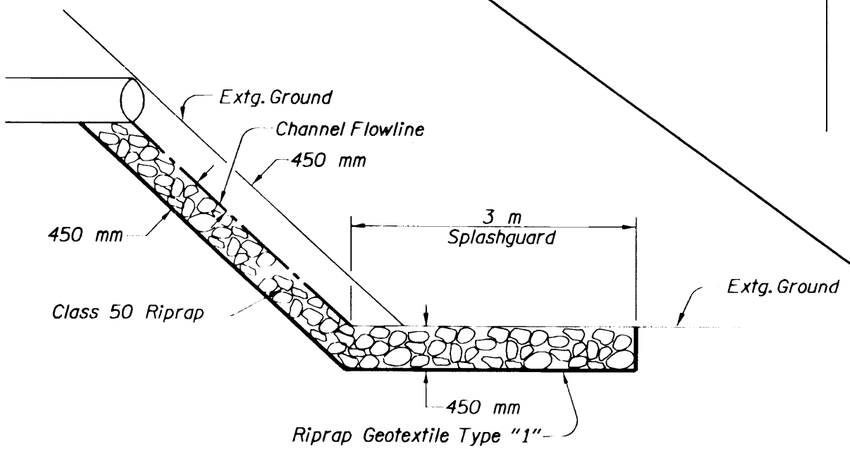
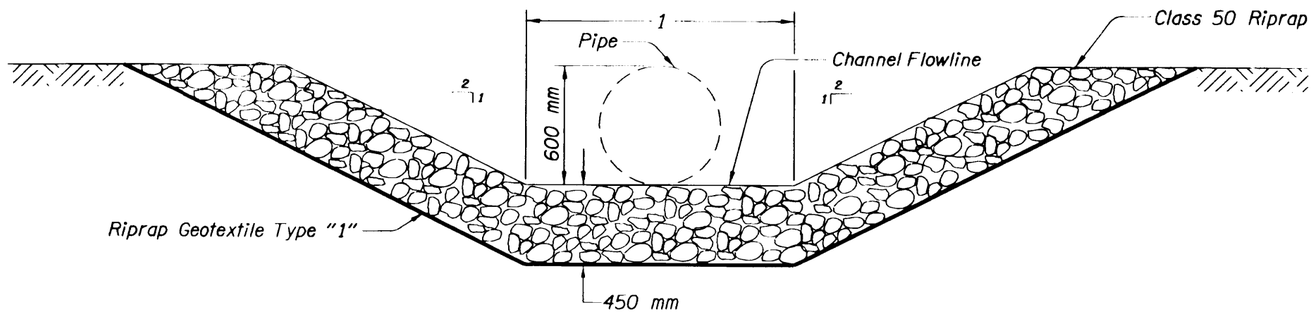
SWALE TYPICAL SECTION



* See Sht.2E-8 For Specific X-section Dimensions Not Shown Here

RIPRAP OUTFALL PROTECTION





Swale Notes:
1) See Shts. R1 For Applicable Bioswale Seeding And Plantting Instructions.
2) River Run Rock Shall Be Well Graded And Shall Consist Of Well Rounded Stones With Diameters Ranging From 19 To 50 mm.

REGISTERED PROFESSIONAL ENGINEER
19156
OREGON
JULY 15, 1997
BRUCE S. COUNCILL
Expires Dec. 31, 2003

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS-BORING HIGHWAY
CLACKAMAS COUNTY

Reviewed By - Henry M. Allen
Designed By - Bruce S. Councll
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. 2E-3

23-JAN-2003 09:27
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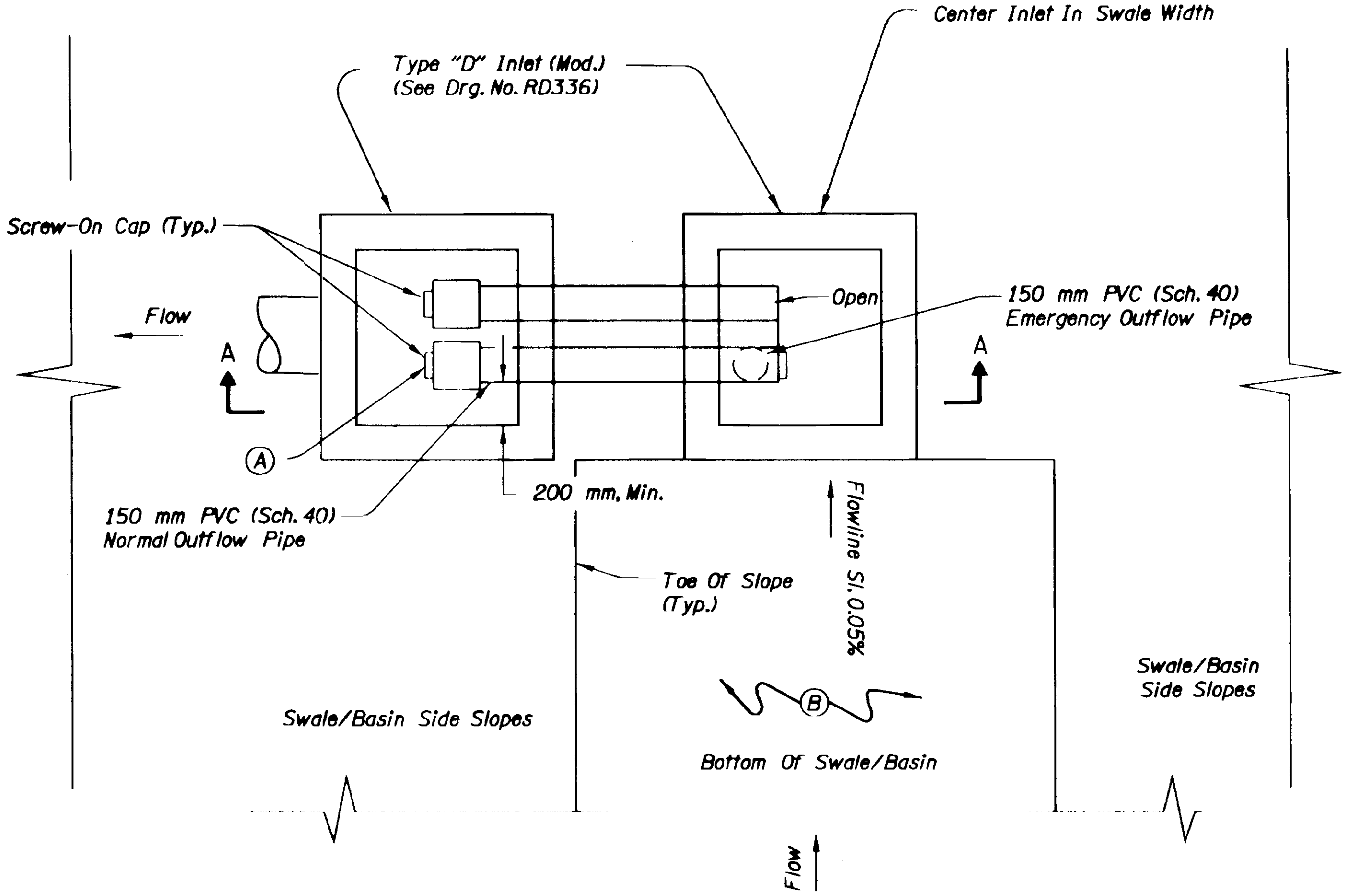
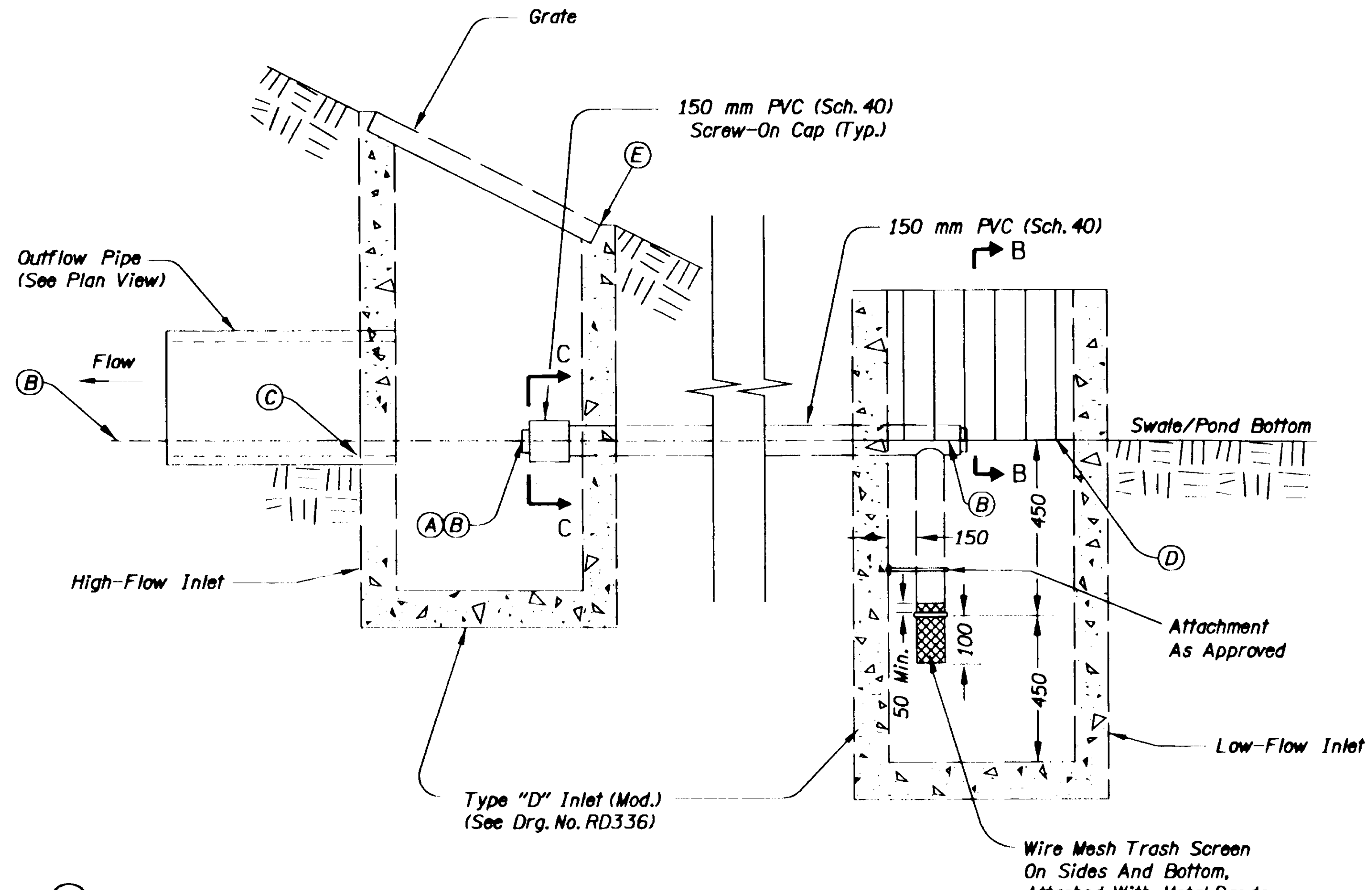
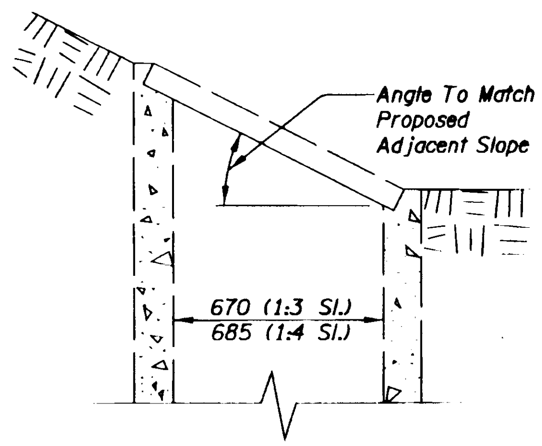
WATER QUALITY OUTLET STRUCTURE
FOR WATER QUALITY SWALE "S1"



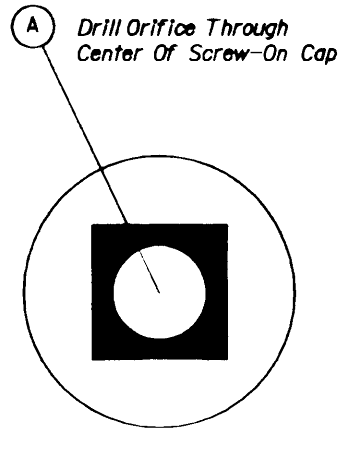


SECTION A-A

A	Orifice Diameter	50 mm
B	Elev. Of Swale/Pond Bottom, Center Of Orifice, And Center-line Of 150 mm PVC (Normal And Emergency Outflow) Pipes.	170.76 m
C	FL Elev. Of Outfall Pipe	170.68 m
	Wall Location For Outfall Pipe	Back
D	Elev. Of Lip Of Low-Flow Inlet	170.76 m
E	Elev. Of Lip Of High-Flow Inlet	172.00 m
	Outfall Pipe Diameter	300 mm



SECTION B-B



SECTION C-C

Notes:
1) Locate Center Of Low Type "D" Inlet At Center Of Swale Width.
2) For Plan View Of Extended Detention Basin Outlet, See Sht. 2E-2.
3) All Fasteners, Bands, And Wire Mesh Screens Shall Be Stainless Steel Or Shall Have A Protective Coating To Prevent Corrosion.
4) The Screw-On Cap For The Emergency Outflow Pipe Is Solid With No Orifice Opening.
5) The Orifice Opening Is In The Normal Outflow Pipe Cap.

Note: If Perf. Drain Pipe Is Required, The Flow Line Of The Outfall Pipe Should Be Set To An Elevation That Allows Perf. Pipe To Drain.

REGISTERED PROFESSIONAL ENGINEER 19156
OREGON
JULY 15, 1997
BRUCE S. COUNCIL
Expires Dec. 31, 2003

OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS-BORING HIGHWAY
CLACKAMAS COUNTY

Reviewed By - Henry M. Allen
Designed By - Bruce S. Council
Drafted By - Martin G. Casillas

WATER QUALITY DETAILS

SHEET NO. 2E-4

23-JAN-2003 09:28
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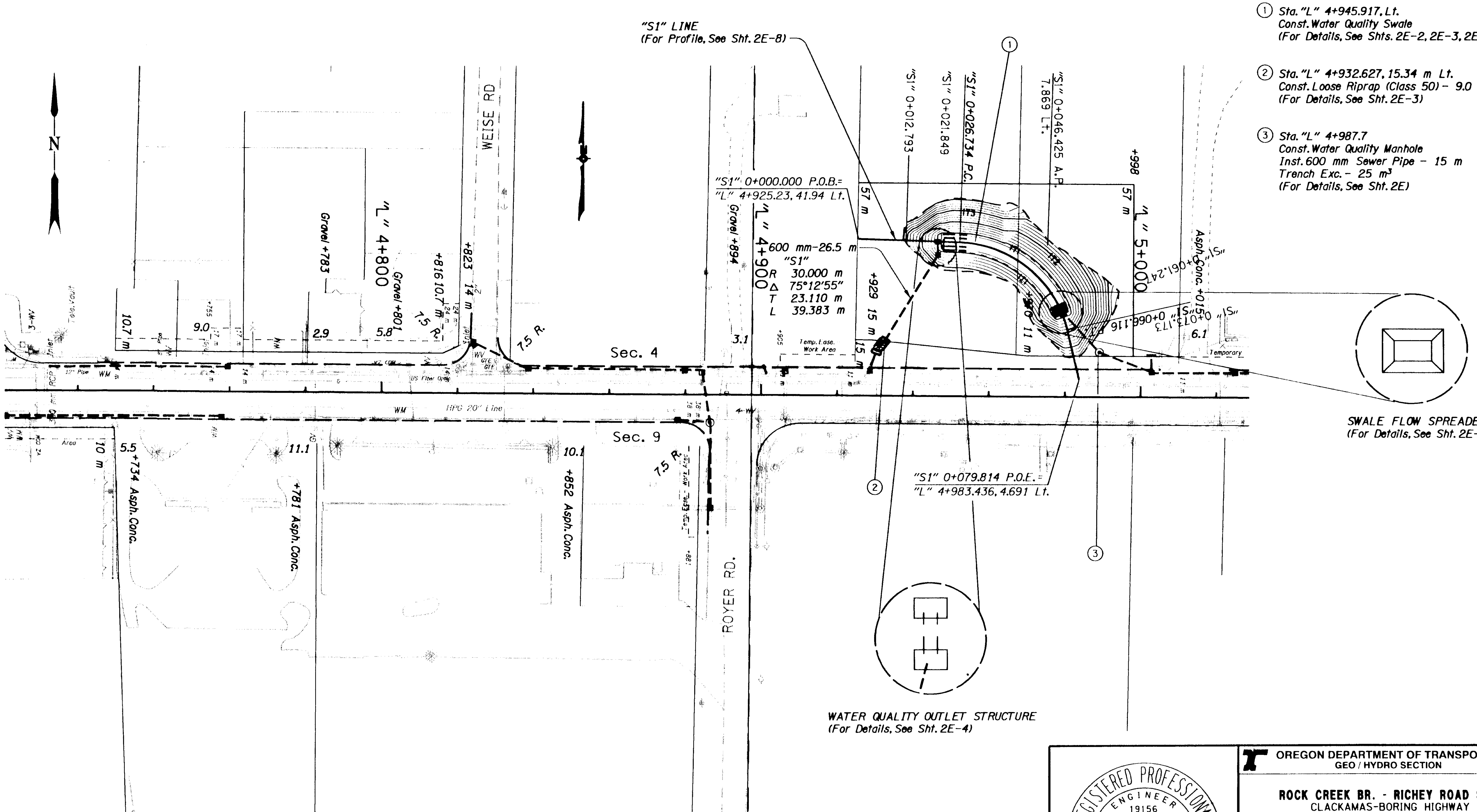
Secs. 4&9, T. 2S., R.3E., W.M.



① Sta. "L" 4+945.917, Lt.
Const. Water Quality Swale
(For Details, See Shts. 2E-2, 2E-3, 2E-4)

② Sta. "L" 4+932.627, 15.34 m Lt.
Const. Loose Riprap (Class 50) - 9.0 m^3
(For Details, See Sht. 2E-3)

③ Sta. "L" 4+987.7
Const. Water Quality Manhole
Inst. 600 mm Sewer Pipe - 15 m
Trench Exc. - 25 m^3
(For Details, See Sht. 2E)

REGISTERED PROFESSIONAL ENGINEER 19156
OREGON
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GEO / HYDRO SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS-BORING HIGHWAY
CLACKAMAS COUNTY

Reviewed By - Henry Allen
Designed By - Bruce Council
Drafted By - Bruce Council

WATER QUALITY PLAN

SHEET NO. 2E-7

23-JAN-2003 09:31

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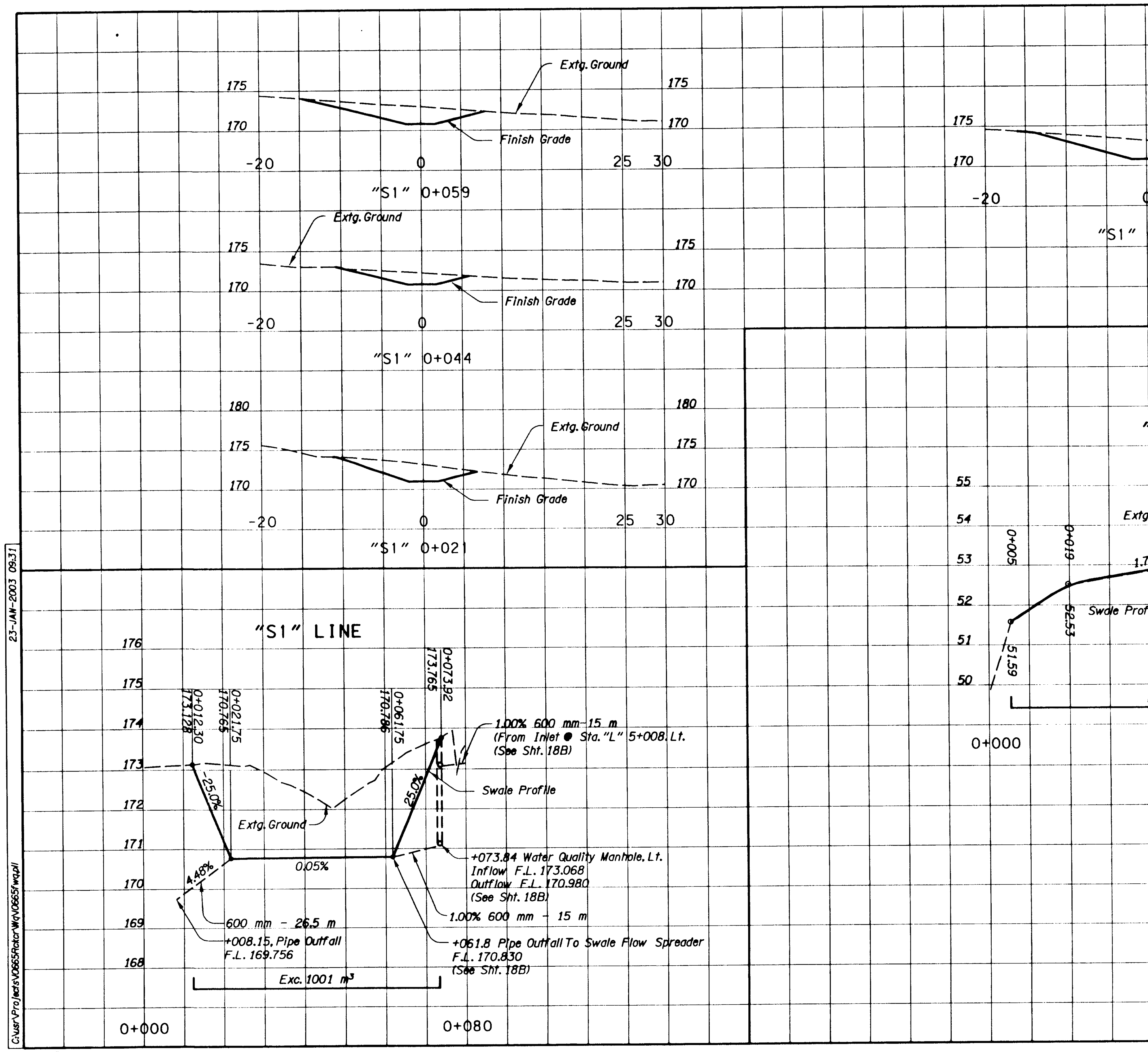


OREGON DEPARTMENT OF TRANSPORTATION
GEO / HYDRO SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS-BORING HIGHWAY
CLACKAMAS COUNTY

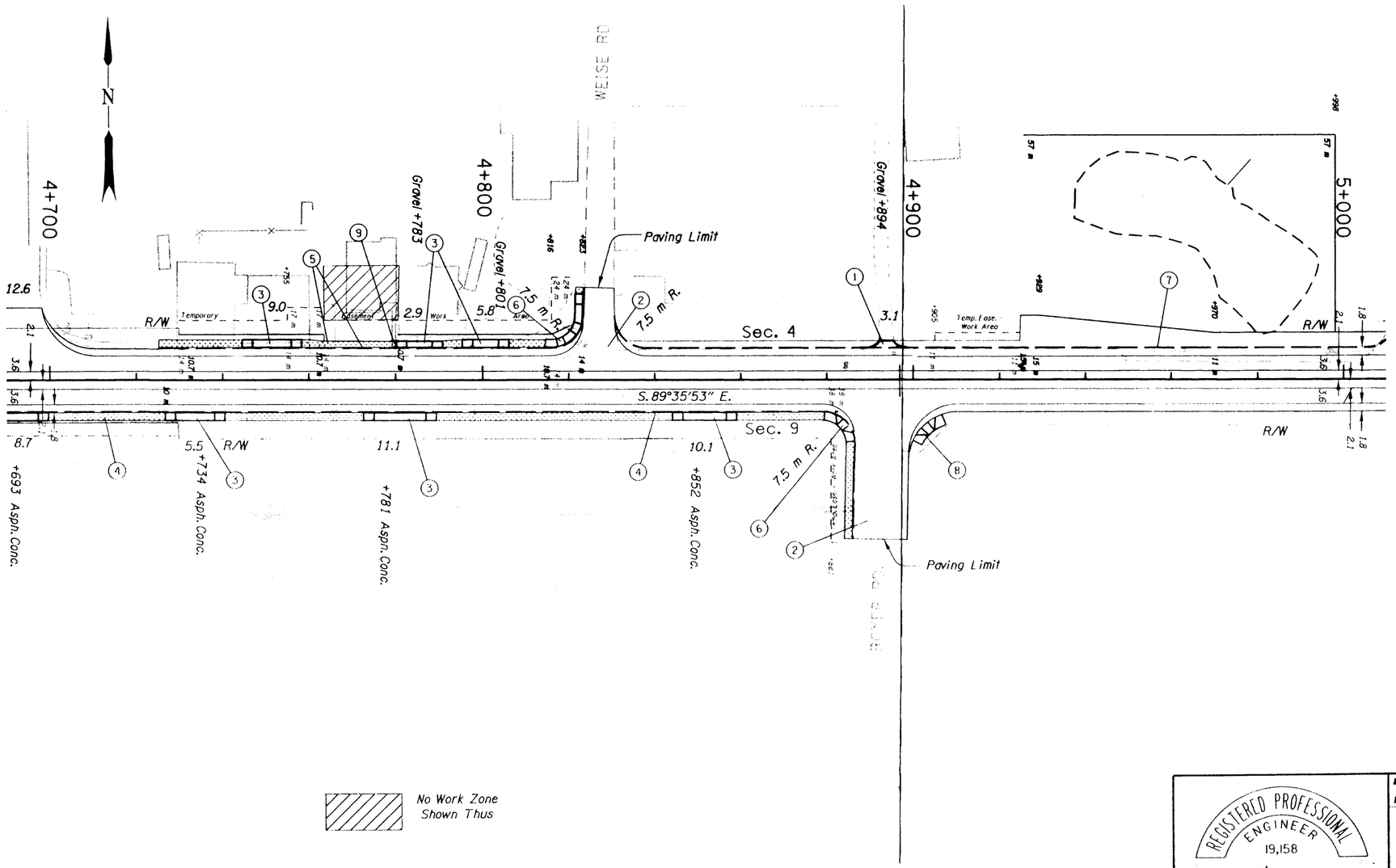
Reviewed By - Henry Allen
Designed By - Bruce Council
Drafted By - Bruce Council

REGISTERED PROFESSIONAL ENGINEER 19156 OREGON JULY 15, 1997 BRUCE S. COUNCIL Expires Dec. 31, 2003

WATER QUALITY PLAN

SHEET NO. 2E-8

Secs. 4 & 9, T. 2 S., R. 3 E., W.M.



(1) Const. Approach

(2) Const. Road Connection - 2

(3) Const. P.C. Conc. Driveway - 6
(For Details, See Sht. 2B)

(4) See Sht. 17, Note 4
Const. Type "C" Curb
Const. P.C. Conc. Sidewalk

(5) Sta. 4+725 To 4+825, Lt.
Const. Type "C" Curb
Const. P.C. Conc. Sidewalk - 195 m²
(For Details, See Sht. 2B)

(6) Const. Sidewalk Ramp, Parallel - 2

(7) Sta. 4+831 To Sta. 5+103, Lt.
Const. Type "C" Curb

(8) Remove Extg. Sidewalk Ramp
Const. Sidewalk Ramp (As Directed)

(9) Remove Extg. Steps
Const. Conc. Steps
(For Details, See Sht. 2B-3)

No Work Zone Shown Thus

All Dimensions Are In Meters (m) Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER
19,158
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RICHARD B. CROSSLER-LAIRD
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OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS & CLACKAMAS - BORING HWYS.
CLACKAMAS COUNTY

Design Team Leader - Carol Cartwright
Designed By - Richard Crossler-Laird
Drafted By - Sandra Gish

ALIGNMENT & GENERAL CONSTRUCTION

SHEET NO. 8

24-DEC-2002 13:32
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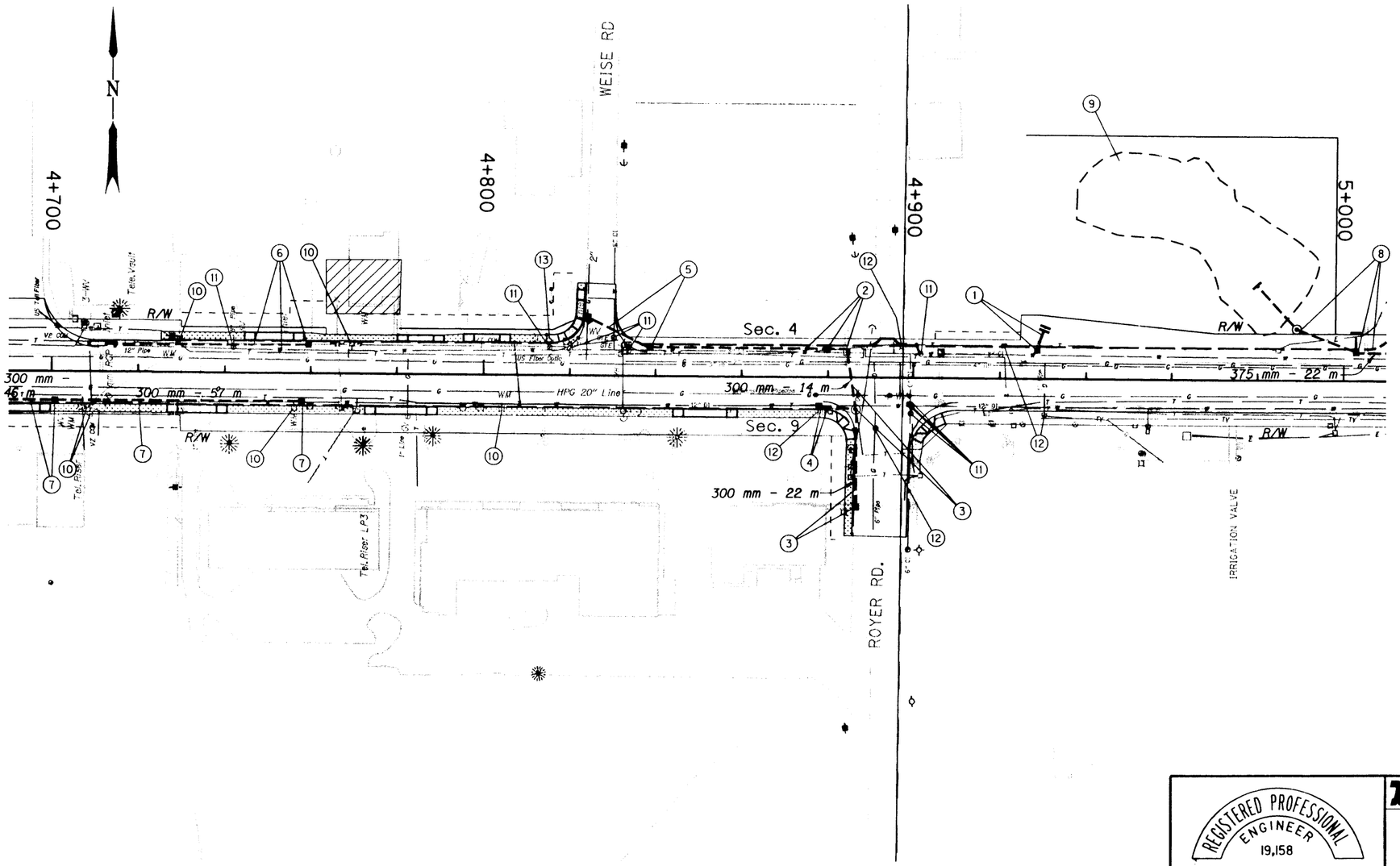
Secs. 4 & 9, T. 2S., R. 3E., W.M.



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Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER
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ROADWAY ENGINEERING SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS & CLACKAMAS - BORING HWYS.
CLACKAMAS COUNTY

Design Team Leader - Carol Cartwright
Designed By - Richard Crossler-Laird
Drafted By - Sandra Gish

DRAINAGE & UTILITIES

SHEET NO. 18A

02-JAN-2003 09:17
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VIEW 4

VIEW 4

(1) *Sta. 4+929, Lt.*
Remove Extg. 450 mm Sewer Pipe - 42 m
Const. Type "G-2" Inlet
Install 450 mm Sewer Pipe - 6 m

(2) *Sta. 4+906, Lt.*
Adjust Extg. Inlet
Remove Extg. 300 mm Sewer Pipe - 47 m
Const. Type "G-2" Inlet
Inst. 300 mm Sewer Pipe - 45 m

(3) *Sta. 4+887, Rt.*
Remove Extg. Inlet
Const. Manhole
Const. Type "G-2" Inlet
Connect Extg. Pipe
Inst. 300 mm Sewer Pipe - 36 m

(4) *Sta. 4+878, Rt.*
Const. Type "CG-3" Inlet
Inst. 300 mm Sewer Pipe - 8 m

(5) *Sta. 4+839, Lt.*
Remove Extg. Inlet
Remove Extg. 300 mm Sewer Pipe - 16 m
Const. Type "G-2" Inlet
Inst. 300 mm Sewer Pipe - 18 m

(6) *Sta. 4+760, Lt.*
Remove Extg. Inlet (Sta. 4+753)
Remove Extg. 300 mm Sewer Pipe - 15 m
Const. Type "G-2" Inlet
Inst. 300 mm Sewer Pipe - 48 m
Connect To Extg. Inlet

(7) *Sta. 4+700 To Sta. 4+760, Rt.*
Const. Type "CG-3" Inlet
Const. Type "G-2" Inlet
Inst. 300 mm Sewer Pipe - 103 m

(8) *Sta. 5+002, Lt.*
Remove Extg. 200 mm Ditch Pipe - 7 m
Const. Type "G-2" Inlet
Inst. 375 mm Sewer Pipe - 15 m
Connect To Water Quality Detention Facility

(9) *Water Quality Detention Facility*
(For Details, See Shts. 2E Thru 2E-8)

(10) *Adjust Water Meter Box - 5*
(By Others)

(11) *Adjust Water Valve Box - 9*
(By Others)

(12) *Adjust Gas Valve Box - 4*
(By Others)

(13) *Relocate Fire Hydrant (By Others)*

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OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

ROCK CREEK BR. - RICHEY ROAD SEC.
CLACKAMAS & CLACKAMAS - BORING HWYS.
CLACKAMAS COUNTY

Design Team Leader - Carol Cartwright
Designed By - Richard Crossler-Laird
Drafted By - Sandra Gish

CONSTRUCTION NOTES

SHEET NO. 18B