OPERATION & MAINTENANCE MANUAL

DFI No. D00042
Facility Type: Water Quality Biofiltration Swale

MARCH, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	D00042
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Number) 38V-117
Location:	District: 3
	Highway Number: 162
	Mile Post: 1.25 / 1.27 (beg./end)
	Description: This facility is located at the southwest quadrant of the OR 22 (Hwy 162) and I-5 (Hwy 001) Interchange. Access to the swale can be obtained from the southbound onramp to I-5 (Hwy 001).

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 2 Tech. Center, Chris Carman, P.E., (503) 986-2691
Facility construction year:	2005
Contractor:	Hamilton Construction Company

4. Storm Drain System and Facility Overview

A water quality swale is a flat-bottomed open channel designed to treat stormwater runoff from highway pavement areas. This type of facility is lined with grass. Treatment by trapping sedimentation occurs when stormwater runoff flows through the grass.

This swale (Photo 3) is approximately 123 feet long with a mild slope. The swale primarily receives stormwater from a 27-inch storm pipe (Photo 1) located at the east edge of the facility. This storm pipe serves as an outlet pipe for a nearby detention facility (DFI D00040, photo 5) located east of the facility; see Point A of the Operational Plans, Appendix A. The swale also receives a small portion of stormwater runoff as it sheet flows from Mission Street (OR 22, Hwy 162).

All flows detained within the nearby detention facility, are directed into this swale. Treatment occurs as the flows are conveyed through the swale and later discharged to Mill Creek to the west; see Point D or Photo 4. Particular care and evaluation should be made of the swale to identify any potential erosion issues (rutting, shortcutting, etc) due to the longer duration of flows directed into the swale.

A. Maintenance equipment access:
The swale can be accessed by pulling over along the I-5 southbound on-ramp. From that position, heavy equipment can be directed along the embankment into the swale. See Photo 2 below and the Operational Plan in Appendix A for a better view of the access points.

B. Heavy equipment access into facility:

☐ Allowed (no limitations)
☒ Allowed (with limitations): no access road constructed within swale area
☐ Not allowed

C. Special Features:

☐ Amended Soils
☐ Porous Pavers
☐ Liners
☐ Underdrains

Photo 1: Inlet pipe

Photo 2: Looking northwest at the access to the swale along the SB on-ramp to I-5.

Photo 3: Swale channel and outlet, looking west.

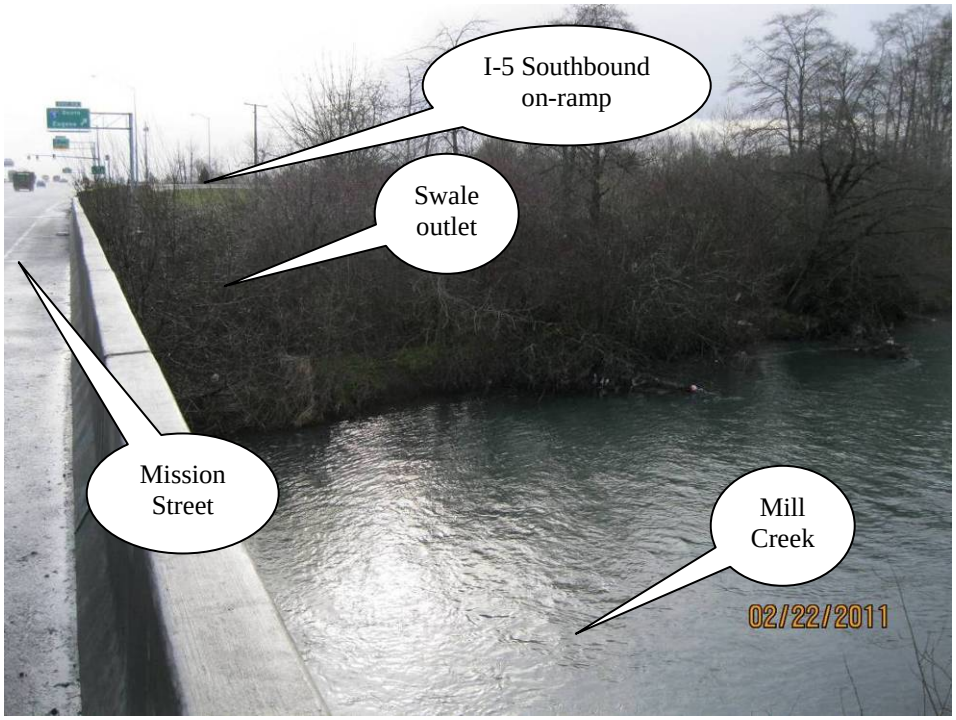


Photo 4: Swale channel and outlet, looking west.

Photo 5: Detention pond

5. Facility Haz Mat Spill Feature

The swale can be used to store a volume of liquid by blocking the outlet of the swale. A barrier such as a temporary berm made of sandbags could be used to prevent liquid from draining from the swale.

6. Auxiliary Outlet (High Flow Bypass)

Auxiliary Outlets are provided if the primary outlet control structure can not safely pass the projected high flows. Broad-crested spillway weirs and over flow risers are the two most common auxiliary outlets used in stormwater treatment facility design. The auxiliary outlet feature is either a part of the facility or an additional storm drain feature/structure.

The auxiliary outlet feature for this facility is:

☐ Designed into facility

☒ Other
This facility does not contain an auxiliary outlet feature. The facility was designed to receive detained flows from the nearby detention facility. In the event the facility receives flows greater than its design, the water can safely overtop the south berm of the swale.

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 or 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:

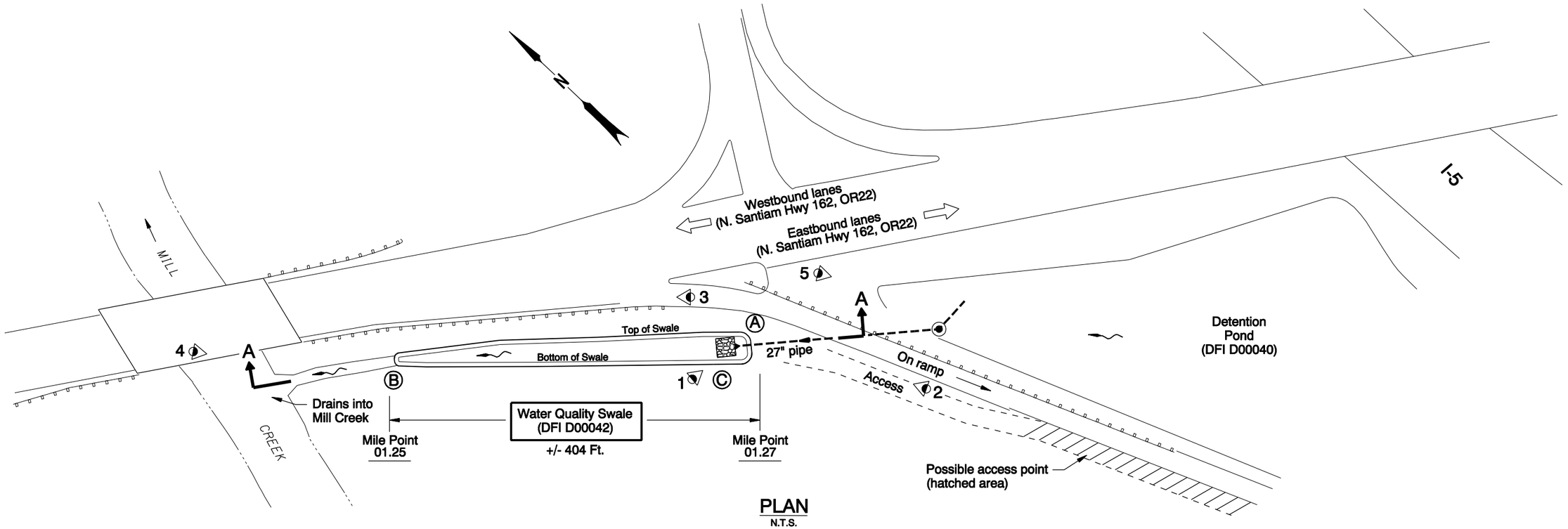
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129

ODOT Region Hazmat Coordinator	(503) 986-2647
ODEQ Northwest Region Office	(503) 229-5263

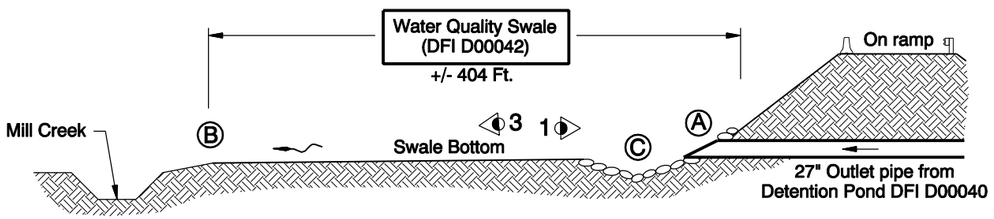
Appendix A

Content:

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



PLAN
N.T.S.



SECTION A-A
N.T.S.

LEGEND:
- Photo Location / Direction
- Swale Inlet, 27" Dia.
- Swale Outlet
- Flow Spreader
- Access to Swale
- Storm Pipe (Facility)
- Manhole
- Conveyance Direction
- Pavement / Facility Flow Path

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: M. Wittenbrink

Drafted By: Jim Holeman

DFI D00042
MAINTENANCE DISTRICT 3 HWY 1
WATER QUALITY SWALE
N. SANTIAM HIGHWAY MP 001.25-001.27
MARION COUNTY

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Appendix B

Content:

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

38V-117

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.
1A-2	Index Of Sheets Cont'd.
1A-3	Index Of Sheets Cont'd.
1A-4	Standard Drawing Nos.
1B	Layout Sheet

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

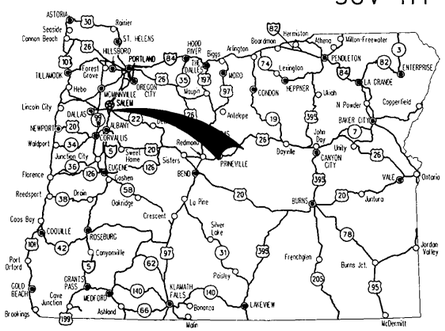
GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.

PACIFIC HIGHWAY

MARION COUNTY

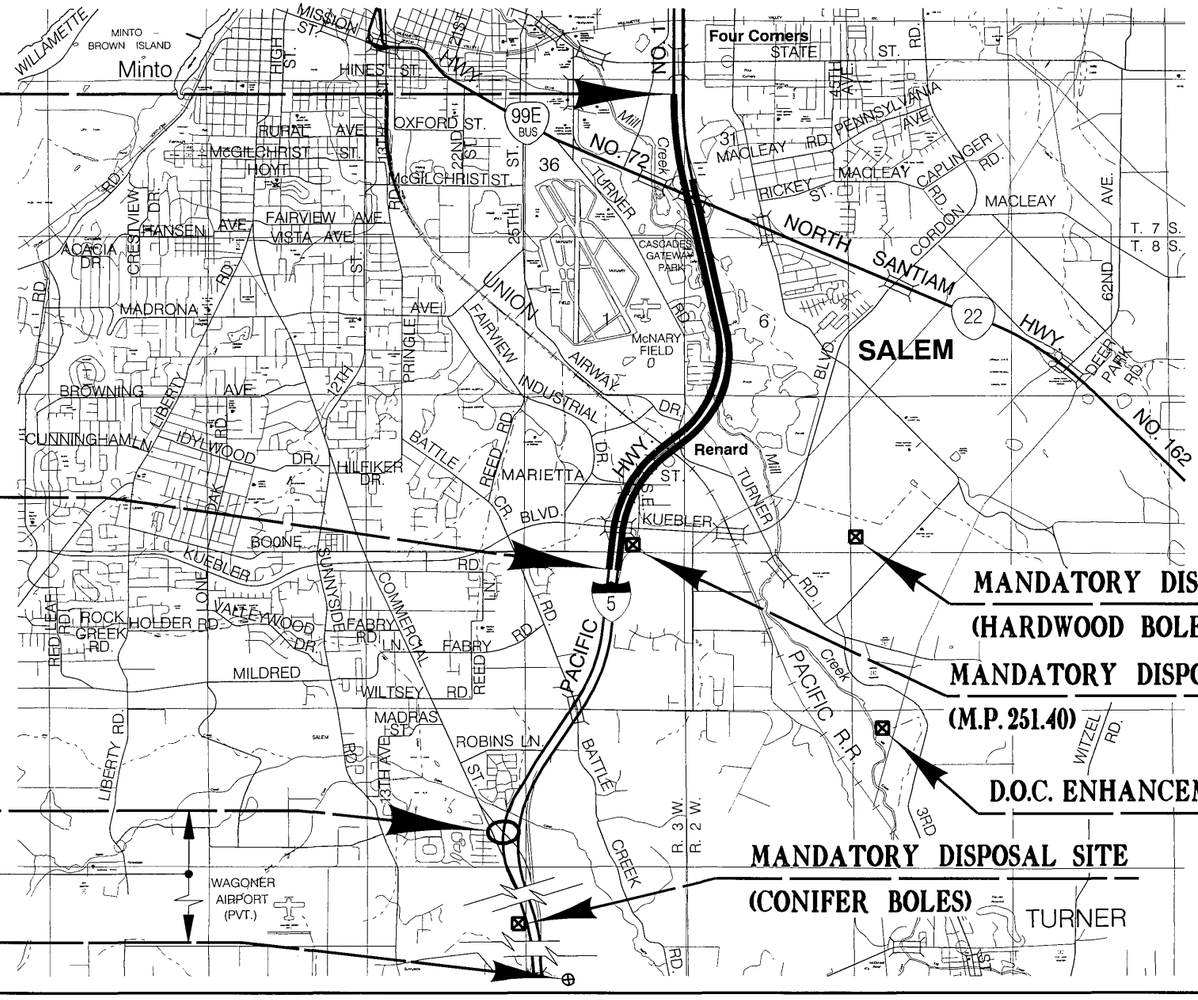
OCTOBER 2005



Overall Length Of Project - 4.02 km (2.49 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.)

OTIA-NH-IM-S001(196)
BEGINNING OF PROJECT
STA. "L" 10+280 (M.P. 254.58)



END OF WORK AREA
STA. "L" 15+682.3 (M.P. 251.22)

NO WORK AREA

OTIA-NH-IM-S001(196)
END OF PROJECT
STA. "LS" 18+664.61 (M.P. 249.38)

Approx. 28 Mi. South

PROSPECTIVE MATERIAL SOURCE
(M.P. 221.13)

MANDATORY DISPOSAL SITE
(HARDWOOD BOLES)

MANDATORY DISPOSAL SITE
(M.P. 251.40)

D.O.C. ENHANCEMENT SITE

MANDATORY DISPOSAL SITE
(CONIFER BOLES)

OTIA
OREGON TRANSPORTATION INVESTMENT ACT

SAFETY FIRST
LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Papé	COMMISSIONER
Janice J. Wilson	COMMISSIONER
Bruce A. Warner	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
13,704
OREGON
JULY 16, 1987
CATHERINE M. NELSON
Expires Dec. 31, 2006

Catherine M. Nelson
TECHNICAL SERVICES MANAGING ENGINEER

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	OTIA-NH-IM-S001(196)	1

METRIC

PE000950

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SALEM

N. SANTIAM HWY. INTCHGE.

38V-117

SEE SHEET 7A
MATCH LINE A-A

"C" R 215.000 m C.L. 14°19'09" ΔT 27.007 m
"C" 120.000 m Sp. S 16°53'39" A 165.370
"C" 110.000 m Sp. S 14°39'25" A 15.786
"D2" 60.000 m Sp. S 34°22'39" A 54.772
"D2" R 50.000 m C.L. Δ 160°26'45" T 290.160 m

"C" LINE
"L" LINE (For Profile, See Sht. 7B)
"B2" LINE
"NS" LINE
"D2" LINE

"C" 0+500
"C" 0+529.194 P.S.C.
"C" 0+582.926 P.C.S.
"C" 0+600
"NS" 0+500
"NS" 0+600
"NS" 0+400
"L" 11+300
"L" 11+400
"L" 11+500
"L" 11+600
"D2" 11+700
"D2" 11+719.816 P.C.S.
"D2" 11+779.816 P.T.
"D2" 11+800
"D2" 11+519.800 P.S.
"D2" 11+579.800 P.S.C.
"D2" 11+851.905 P.O.T.
"B2" 10+906.497 P.O.T.
"B2" 10+974.905 P.S.
"B2" 11+396.495 P.O.T. (18.30 m Rt.)
"L" 11+396.574 P.O.T.
"L" 11+405.173 P.O.T. (18.30 m Lt.)

Waterway
1200 mm
1200 mm CMP
NORTH SANTIAM HWY.
MISSION ST.
N.62°01'30"W.
N.62°01'21"W.
S.12°49'28"E.
S.10°19'30"E.
S.12°49'30"E.
S.64°53'15"E.
Extg. Edge Of Conc. Pvmt.
U E Ditch
+970.990
+830.990
m - 55 m
300 mm - 55 m
300 mm - 51 m
Sec. 36
Sec. 31
T. 7 S., R. 2 W., W.M.
T. 7 S., R. 3 W., W.M.
MATCH LINE B-B SEE SHEET 8B

(1) Remove Extg. Curb
Const. Low Profile Mountable Curb
(1A) Connect To Extg. Curb
(1B) Const. Curb Transition
(For Details, See Sht. 2B-4)

(2) Const. Low Profile Mountable Curb
(2A) Connect To Extg. Curb

(3) Sta. "L" 11+444.0 To Sta. "SB" 13+485.0
Remove Extg. Conc. Median Barrier - 510.1 m
Const. Precast Tall Conc.
Median Barrier - 2040.2 m
(Reflectorized)
(3A) Bury End In Extg. Mound
Const. Tall Conc. Barrier Mound Terminal
Flare Rate=0, W=0, E=0
(See Drg. Nos. RD545 & RD565)

(4) Remove Extg. Curb
Const. Mod. Low Profile Mountable Curb
(4A) Connect To Extg. Curb
(For Details, See Sht. 2B-4)

(5) Sta. "L" 11+460.0
Const. Type "G-2" Inlet With Basin
0.45 m Deep
Inst. 300 mm Sew. Pipe - 65.5 m
Pipe Boring - 66 m
Const. Paved End Slope, Rt.

(6) Sta. "L" 11+553.1
Const. Type "G-2" Inlet With Basin
0.45 m Deep
Inst. 300 mm Sew. Pipe - 62.5 m
Pipe Boring - 63 m
Const. Paved End Slope, Rt.

(7) Sta. "NS" 0+394.9
Inst. 300 mm Sew. Pipe - 54.0 m
Pipe Boring - 54 m
Connect To Extg. Inlet

(8) Const. Ditches
Modify Existing Pond
(For Details, See Sht. GJ-1)

(9) Const. Temp. Type Orange Plastic Fence

(10) Conc. Pvmt. Spall Repair
(For Details, See Sht. 2B-10)

No Work Area Shown Thus:

Plug And Abandon Extg. Pipe Shown Thus:

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

REGISTERED PROFESSIONAL ENGINEER
14,931
Carol A. Cartwright
OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

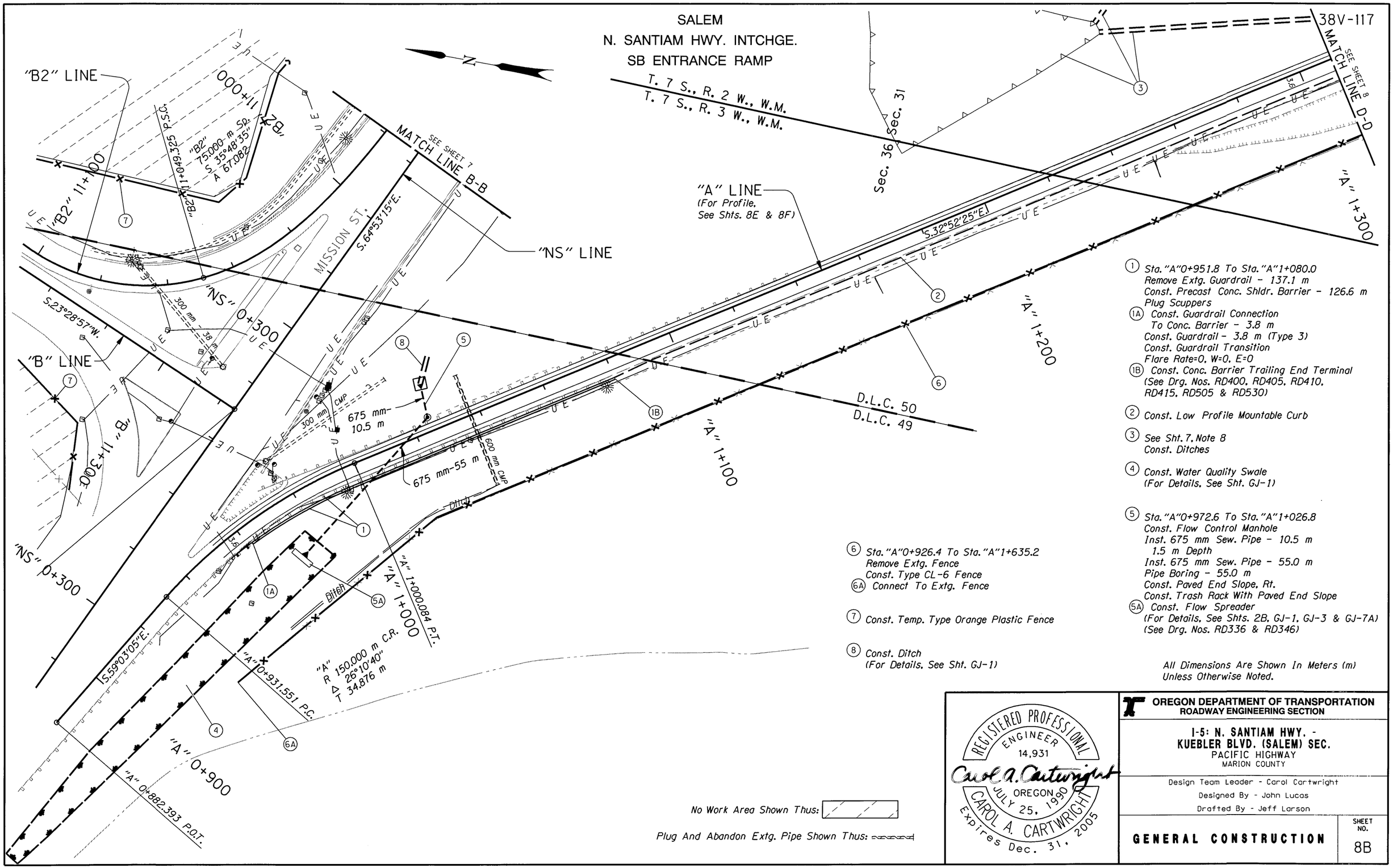
I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright
Designed By - John Lucas
Drafted By - Jeff Larson

GENERAL CONSTRUCTION

SHEET NO. 7

SALEM
N. SANTIAM HWY. INTCHGE.
SB ENTRANCE RAMP



(1) Sta. "A" 0+951.8 To Sta. "A" 1+080.0
Remove Extg. Guardrail - 137.1 m
Const. Precast Conc. Shldr. Barrier - 126.6 m
Plug Scuppers
(1A) Const. Guardrail Connection
To Conc. Barrier - 3.8 m
Const. Guardrail - 3.8 m (Type 3)
Const. Guardrail Transition
Flare Rate=0, W=0, E=0
(1B) Const. Conc. Barrier Trailing End Terminal
(See Drg. Nos. RD400, RD405, RD410, RD415, RD505 & RD530)

(2) Const. Low Profile Mountable Curb

(3) See Sht. 7, Note 8
Const. Ditches

(4) Const. Water Quality Swale
(For Details, See Sht. GJ-1)

(5) Sta. "A" 0+972.6 To Sta. "A" 1+026.8
Const. Flow Control Manhole
Inst. 675 mm Sew. Pipe - 10.5 m
1.5 m Depth
Inst. 675 mm Sew. Pipe - 55.0 m
Pipe Boring - 55.0 m
Const. Paved End Slope, Rt.
Const. Trash Rack With Paved End Slope
(5A) Const. Flow Spreader
(For Details, See Shts. 2B, GJ-1, GJ-3 & GJ-7A)
(See Drg. Nos. RD336 & RD346)

(6) Sta. "A" 0+926.4 To Sta. "A" 1+635.2
Remove Extg. Fence
Const. Type CL-6 Fence
(6A) Connect To Extg. Fence

(7) Const. Temp. Type Orange Plastic Fence

(8) Const. Ditch
(For Details, See Sht. GJ-1)

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

No Work Area Shown Thus:

Plug And Abandon Extg. Pipe Shown Thus:

REGISTERED PROFESSIONAL ENGINEER
14,931
Carol A. Cartwright
OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright
Designed By - John Lucas
Drafted By - Jeff Larson

GENERAL CONSTRUCTION

SHEET NO. 8B

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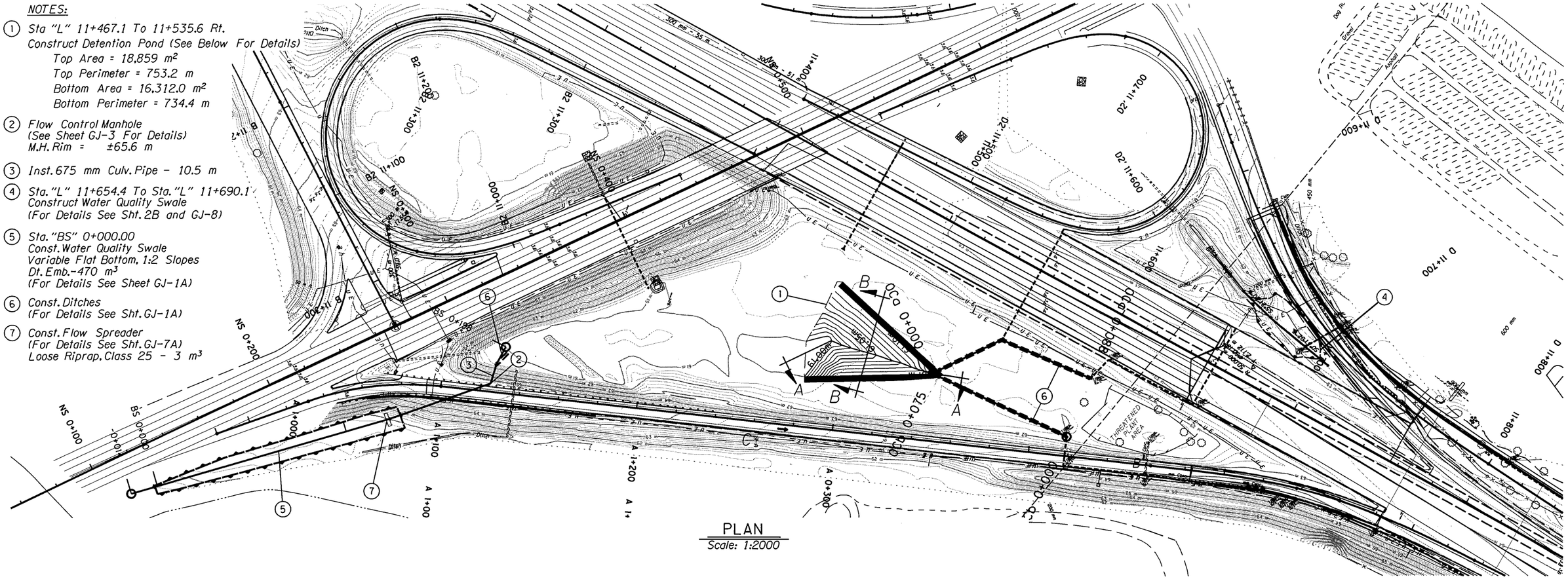
NOTES:

1. Sta "L" 11+467.1 To 11+535.6 Rt.
   Construct Detention Pond (See Below For Details)
   Top Area = 18,859 m²
   Top Perimeter = 753.2 m
   Bottom Area = 16,312.0 m²
   Bottom Perimeter = 734.4 m
2. Flow Control Manhole
   (See Sheet GJ-3 For Details)
   M.H. Rim = ±65.6 m
3. Inst. 675 mm Culv. Pipe - 10.5 m
4. Sta. "L" 11+654.4 To Sta. "L" 11+690.1
   Construct Water Quality Swale
   (For Details See Sht. 2B and GJ-8)
5. Sta. "BS" 0+000.00
   Const. Water Quality Swale
   Variable Flat Bottom, 1:2 Slopes
   Dt. Emb.-470 m³
   (For Details See Sheet GJ-1A)
6. Const. Ditches
   (For Details See Sht. GJ-1A)
7. Const. Flow Spreader
   (For Details See Sht. GJ-7A)
   Loose Riprap, Class 25 - 3 m³


Ditch
300 mm - 35 m
B2 11+200
B2 11+300
B2 11+100
B2 11+000
NS 0+300
NS 0+200
NS 0+100
BS 0+000
BS 0+100
BS 0+200
BS 0+300
BS 0+400
A 1+000
A 1+100
A 1+200
A 0+300
D2' 11+700
D2' 11+600
D2' 11+500
D2' 11+400
D2' 11+300
D2' 11+200
D2' 11+100
D2' 11+000
D2' 10+900
D2' 10+800
D2' 10+700
D2' 10+600
Co 0+000
Co 0+075
Co 0+150
Co 0+225
Co 0+300
Co 0+375
Co 0+450
Co 0+525
Co 0+600
Co 0+675
Co 0+750
Co 0+825
Co 0+900
Co 0+975
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Co 3+300
Co 3+375
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Co 9+750
Co 9+825
Co 9+900
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Co 12+900
Co 12+975
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Co 13+275
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Co 13+575
Co 13+650
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Co 19+575
Co 19+650
Co 19+725
Co 19+800
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Co 20+250
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Co 20+550
Co 20+625
Co 20+700
Co 20+775
Co 20+850
Co 20+925
Co 21+000
Co 21+075
Co 21+150
Co 21+225
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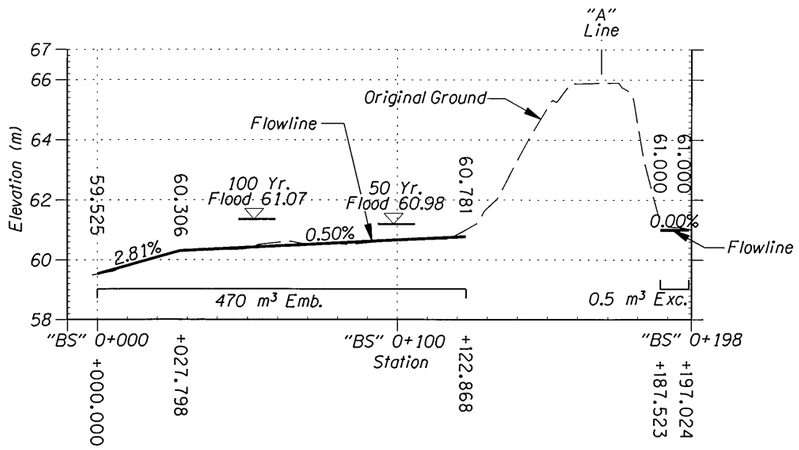
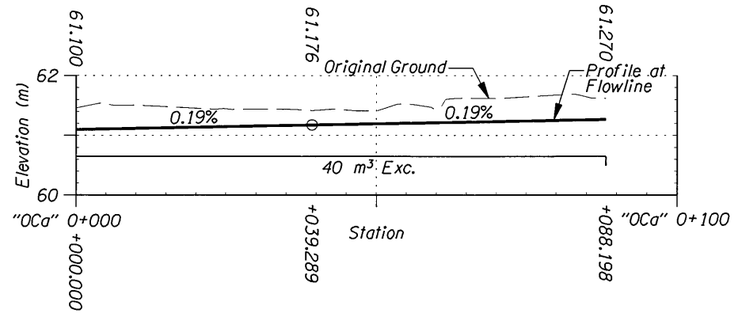
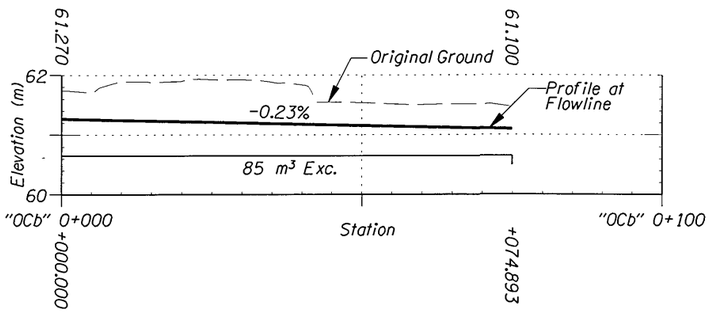


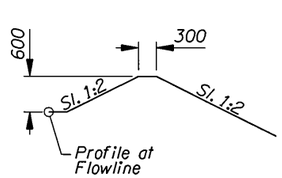
PROFILE "BS"
Vert.= 1:200
Horiz.= 1:2000



PROFILE "OCa"
Vert.= 1:100
Horiz.= 1:1000

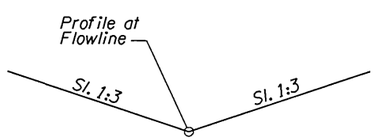


PROFILE "OCb"
Vert.= 1:100
Horiz.= 1:1000



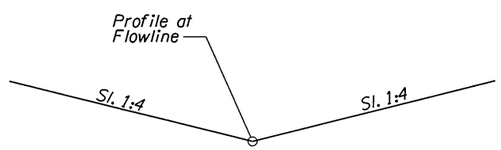
Sta. "BS" 0+000.0 To Sta. "BS" 0+122.9

TYPICAL SECTION
Scale: 1:100



Sta. "BS" 0+187.5 To Sta. "BS" 0+197.0

TYPICAL SECTION
Scale: 1:100



Sta. "OCa" 0+000.0 To Sta. "OCa" 0+088.2
Sta. "OCb" 0+000.0 To Sta. "OCb" 0+074.9

TYPICAL SECTION
Scale: 1:100

REGISTERED PROFESSIONAL ENGINEER
17807
OREGON
JULY 25, 1995
CHRIS CARMAN
EXPIRES: December 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
REGION 2 TECH CENTER

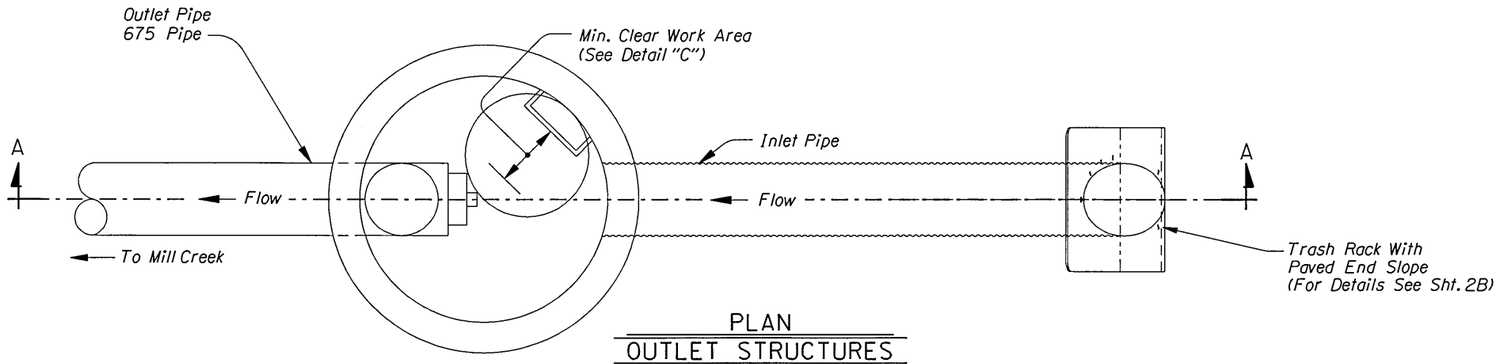
I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Reviewed By - Alvin Shoblom
Designed By - Chris Carman
Drafted By - Chris Shearer

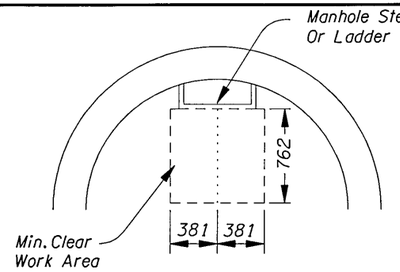
WATER QUALITY/ DETENTION PLAN

SHEET NO. GJ-1A

NOTES:
1. Hardware, Fasteners And Anchors To Be Stainless Steel: Use 3 mm Stainless Steel Cable.
2. For Manhole Details Not Shown, See RD346
3. Hardware, Fasteners, Anchors, Fittings, Appurtenances, Labor, And Equipment Are Incidental.

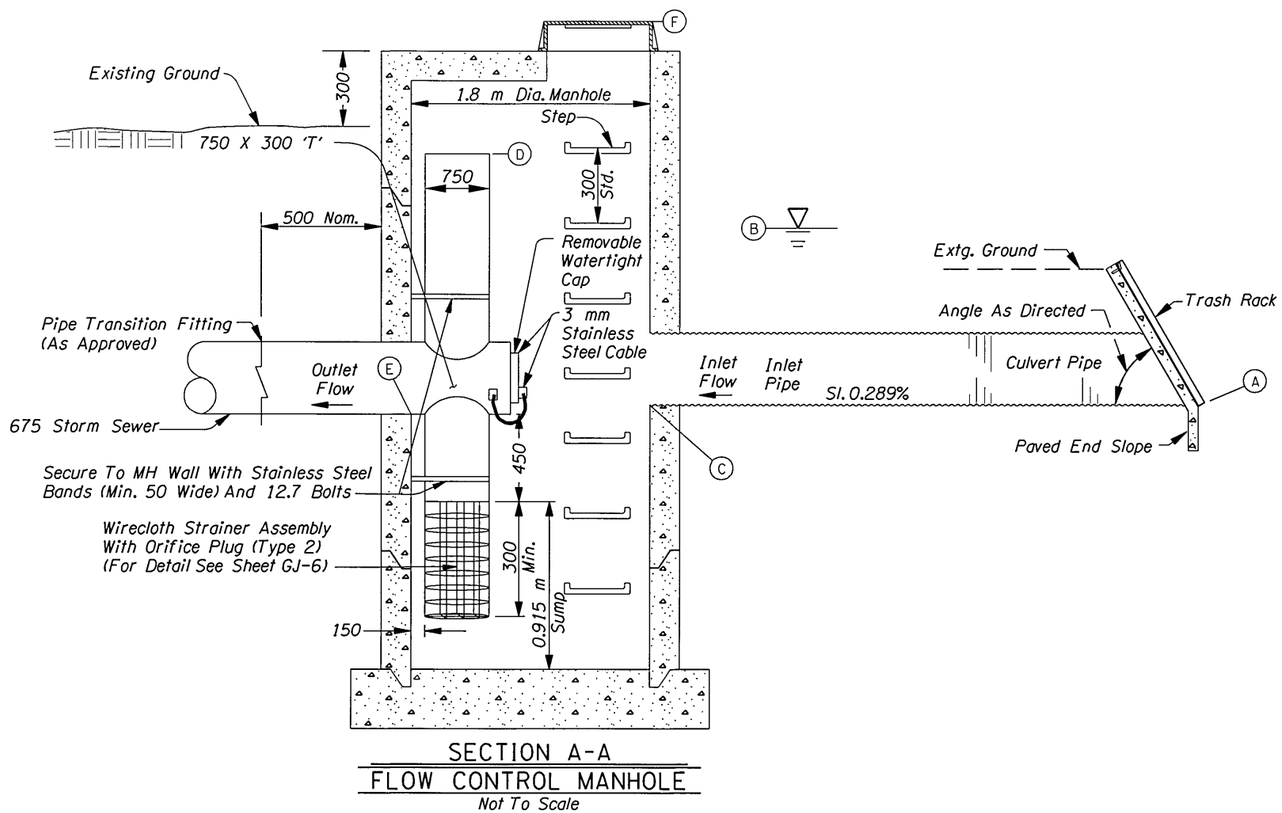


PLAN
OUTLET STRUCTURES
(For North Santiam Pond Location, See Sht. GJ-1, Note 1)



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

DETAIL "C"
MIN. CLEAR WORK AREA
Not To Scale



SECTION A-A
FLOW CONTROL MANHOLE
Not To Scale

15 - NORTH SANTIAM INTERCHANGE POND		
	ELEVATION (m)	DESCRIPTION
A	61.00	Elev. Of Pond Bottom
B	61.57	Elev. Of Detention Water Surface 50 Year Storm
C	60.97	F.L. Elev. Of Inlet Pipe
D	61.87	Rim Of Overflow Riser
E	60.97	Fl. Elev. Of 675 Outlet Pipe
F	65.57	M.H. Rim

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

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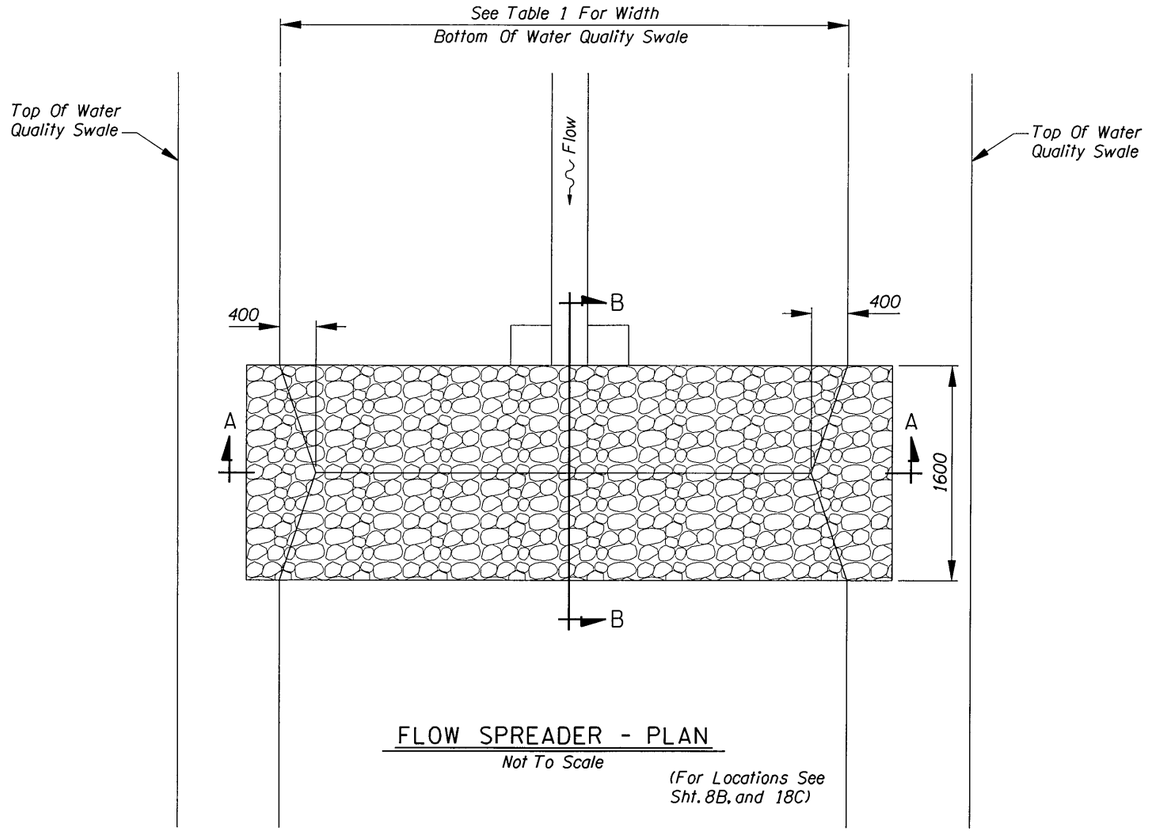
Designed By - Chris Carman
Drafted By - Chris Shearer

DETAILS

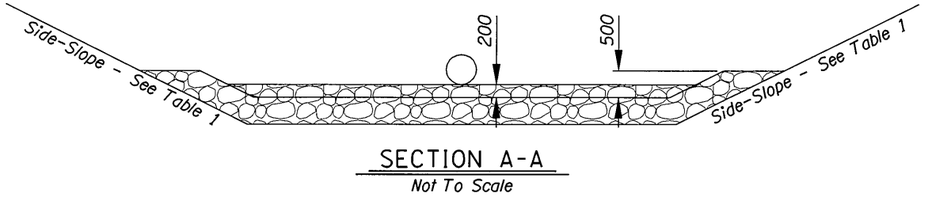
SHEET NO.
GJ-3



FLOW SPREADER - PLAN

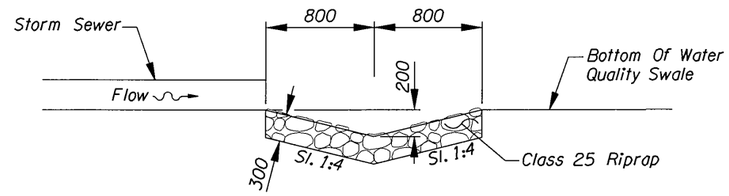
Not To Scale

(For Locations See Sht. 8B. and 18C)



SECTION A-A

Not To Scale



SECTION B-B

Not To Scale

Table 1

Location	Width (m)	Side-Slope
Sta. "A" 0+972.6 17.5 Rt.	4.8	1:2
Sta. "WD" 0+241.1 1.4 Rt.	6.1	1:4

NOTES:
1. Side-Slopes Are Shown As Vert. To Horiz.
2. All Dimensions Shown Are In Millimeters (mm) Unless Otherwise Noted

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I-5: NORTH SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
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DETAILS

SHEET NO. GJ-7A