OPERATION & MAINTENANCE MANUAL

DFI No. D00047
Facility Type: Water Quality Biofiltration Swale

MARCH, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	D00047
Facility Type:	Water Quality Swale
Construction Drawings:	(V-File Number) 38V-117
Location:	District: 3
	Highway No: 001
	Mile Post: 253.72; 253.74
	Description: This facility is located in the southeast quadrant of the OR 22 (Hwy 162, and I-5 (Hwy 001) Interchange. Access to the swale can be obtained from the northbound lane of 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

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 1) is approximately 125 feet long with a relatively flat slope. The drainage area for the swale includes a portion of northbound I-5 (Hwy 001) and the North Santiam Highway (Hwy 162) off-ramp; see the Operational Plan, Appendix A or Photo 2. The 12-inch storm pipe outlets into the swale at Point A (Photo 3), as shown on the Operational Plan. The swale also receives sheet flow stormwater runoff from the NB off-ramp and travel lanes of I-5 (Hwy 001) adjacent to the swale.

After treatment through the swale, the water exits the swale to the north at Point B (Photo 4) via an open channel that leads to a pipe, crossing beneath the nearby on-ramp to I-5 (Hwy 001). Towards the north end of the swale there is a light pole located within the treatment area of the swale (Photo 1). Because of its location, the base of this pole should be periodically checked for erosion. It should also be noted that the downstream ditch, located north of the swale, conveys additional flow from a waterway, located east of this facility, through a second 48-inch pipe. The flow from this 48-inch pipe does not receive treatment from the swale facility. For further information see the Operational Plan, Appendix A, and Photo 4.

A. Maintenance equipment access:
   The swale can be accessed from the NB lanes of I-5 (Hwy 001) by pulling over into the grassy area between the travel lane and off-ramp. See the Operational Plan, Appendix A and Photo 5 for further clarification.

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

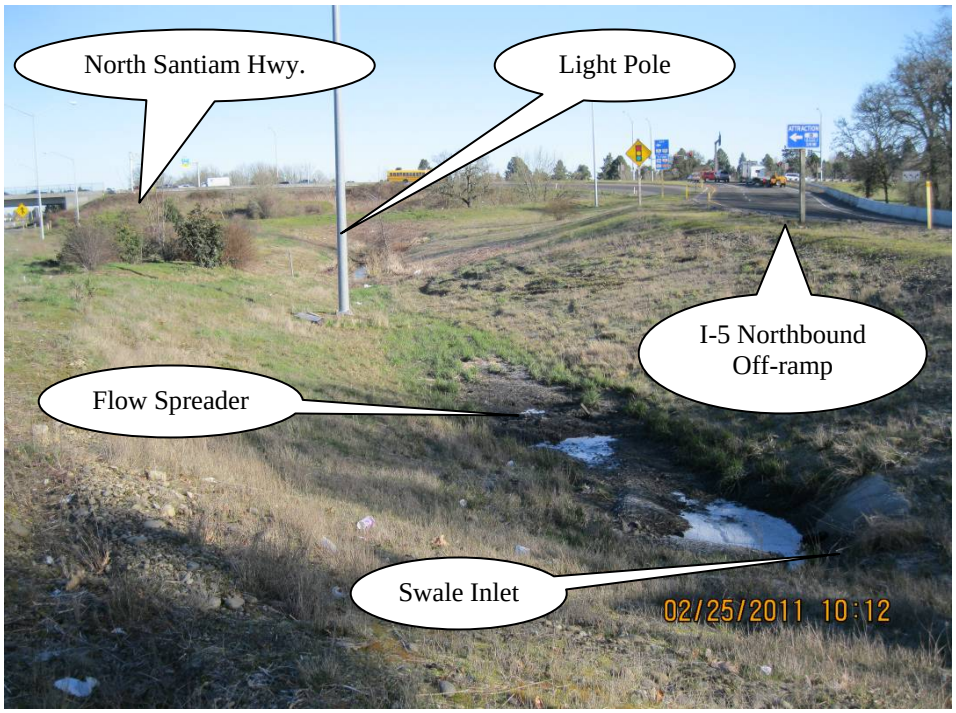


Photo 1: Swale

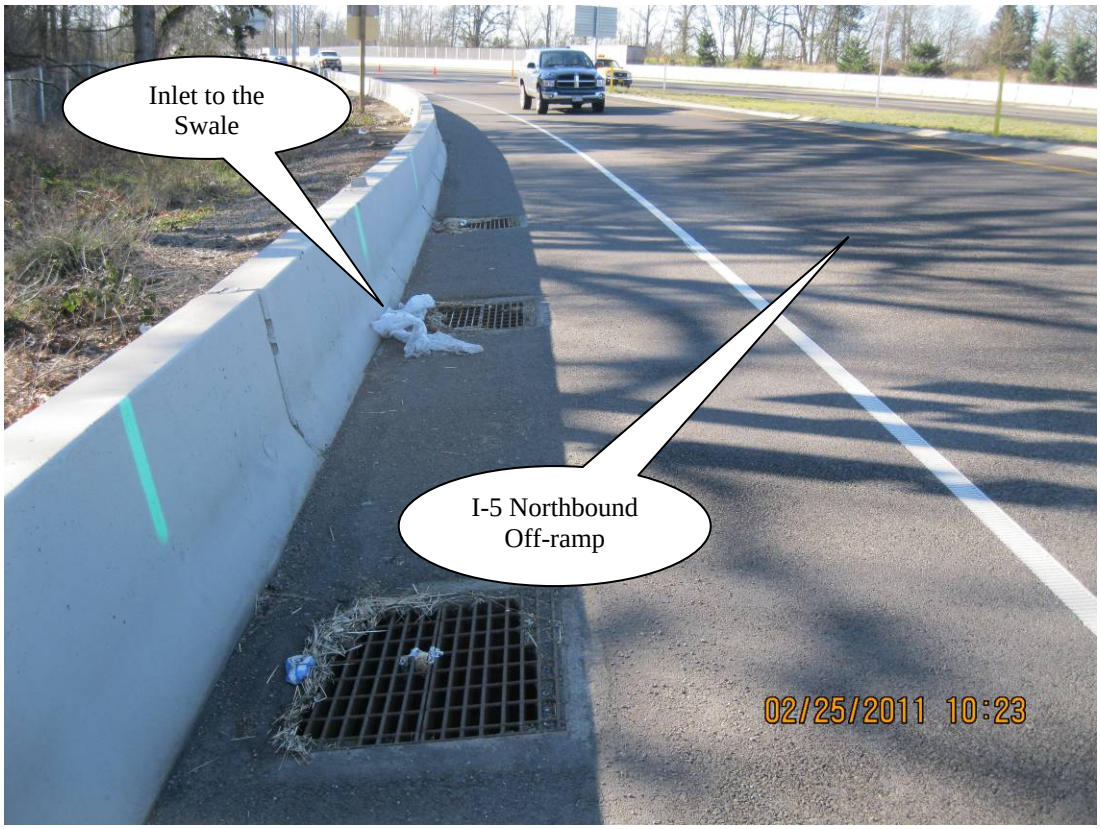


Photo 2: Inlets (looking south)

Photo 3: Swale inlet (looking south)

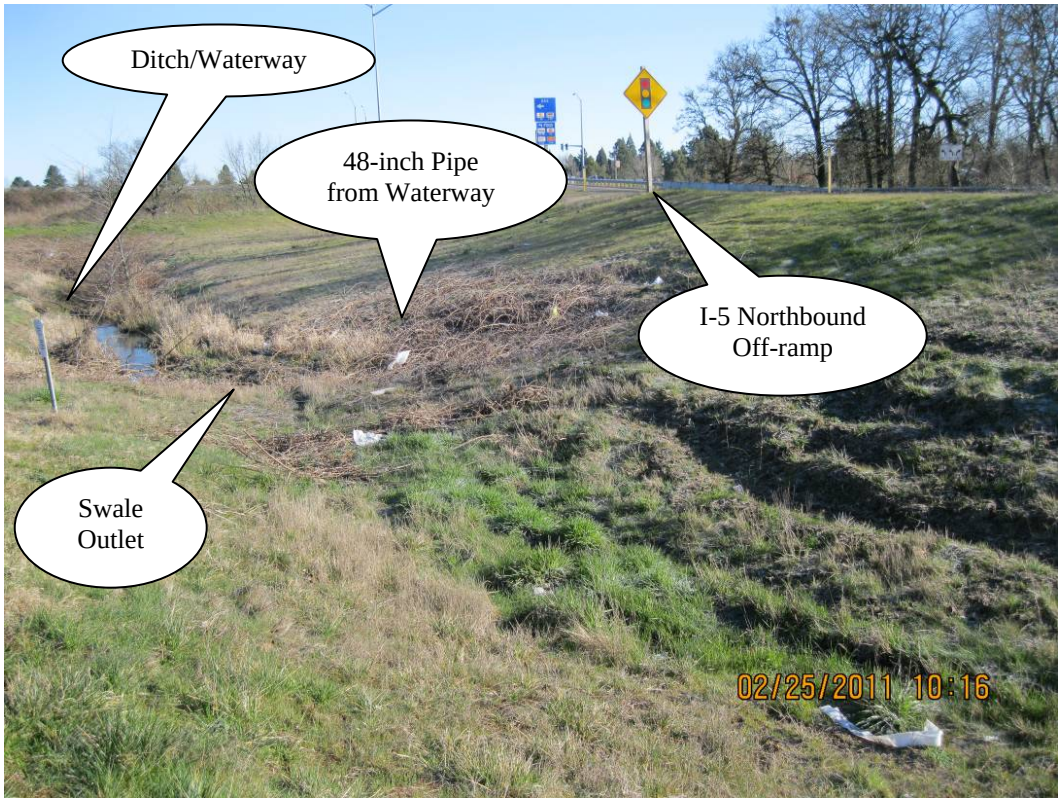


Photo 4: Swale outlet

Photo 5: Swale access area

5. Facility Haz Mat Spill Feature(s)

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

There is no auxiliary outlet feature constructed into this facility. In the event of flows greater than the design flow, the water will safely drain into the ditch which connects to a waterway, located north 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

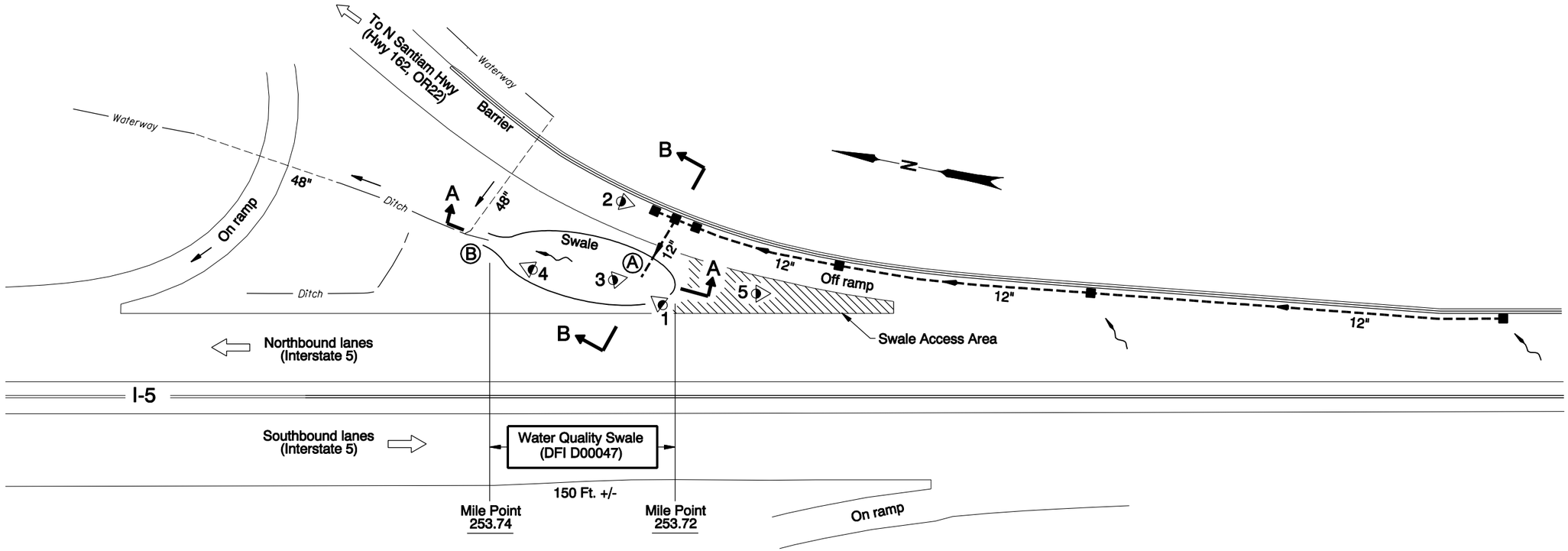
Contact any of the following for more detailed information about management of waste materials found on site:

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

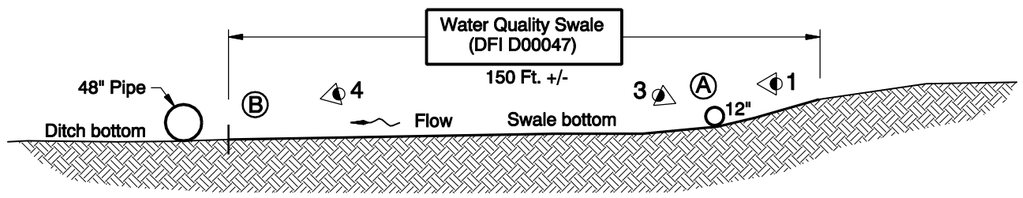
Appendix A

Content:

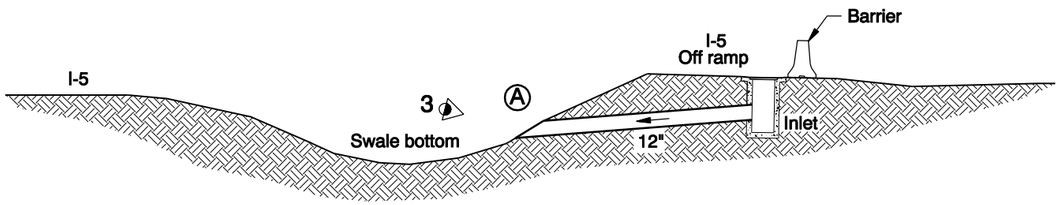
- **Operational Plan and Profile Drawing(s)**



PLAN
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

LEGEND:
- Photo Location / Direction
- Facility Inlet
- Facility Outlet to Ditch
- Access to swale
- Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility flow path

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: M. Wittenbrink

Drafted By: Jim Holeman

DFI D00047
MAINTENANCE DISTRICT 3 HWY 1
WATER QUALITY SWALE
PACFIC HIGHWAY MP 253.72-253.74
MARION COUNTY

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

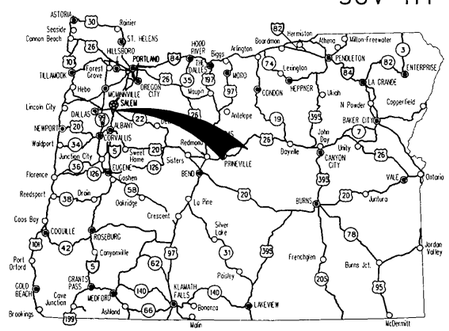
GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

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

PACIFIC HIGHWAY

MARION COUNTY

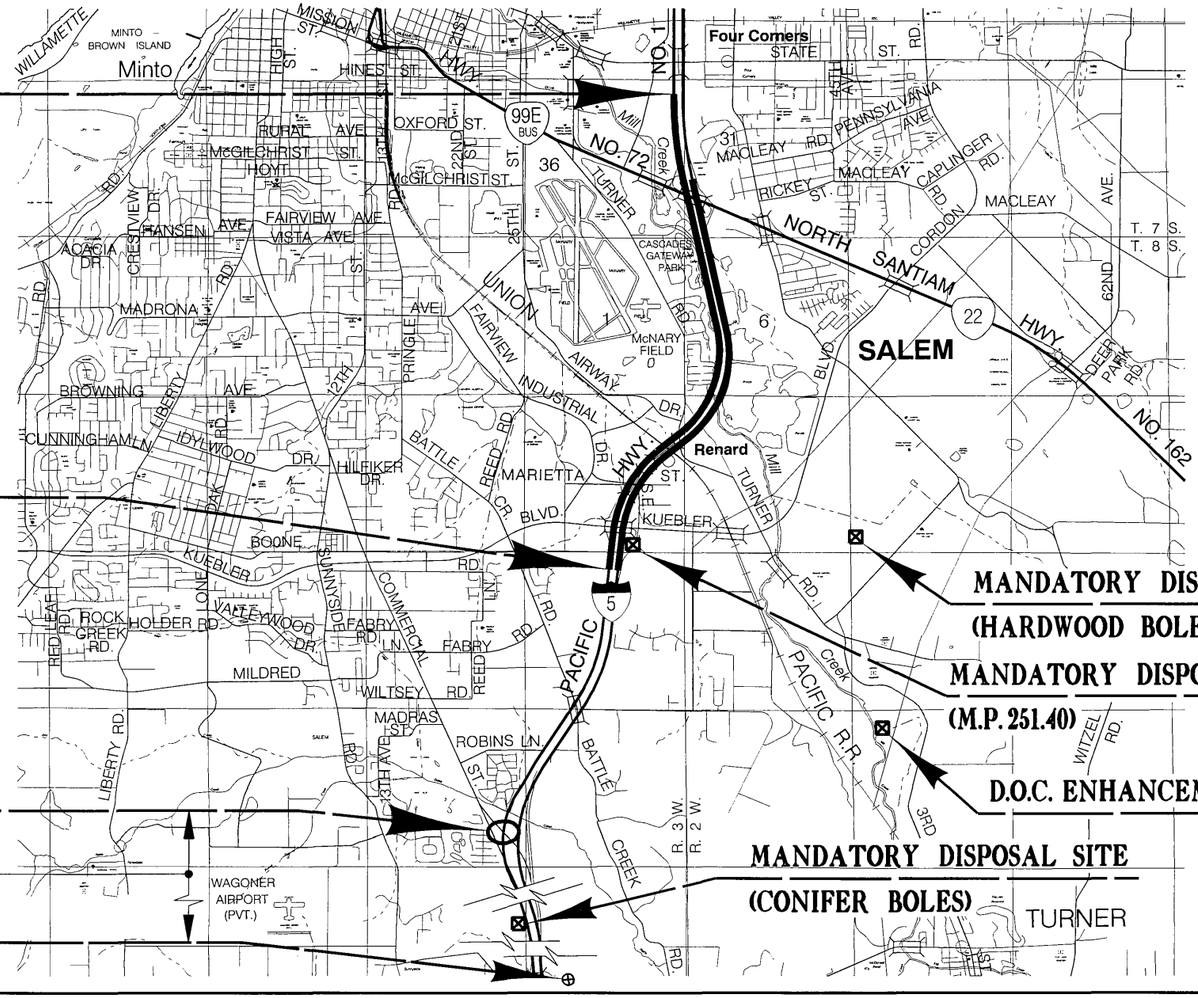
OCTOBER 2005



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

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

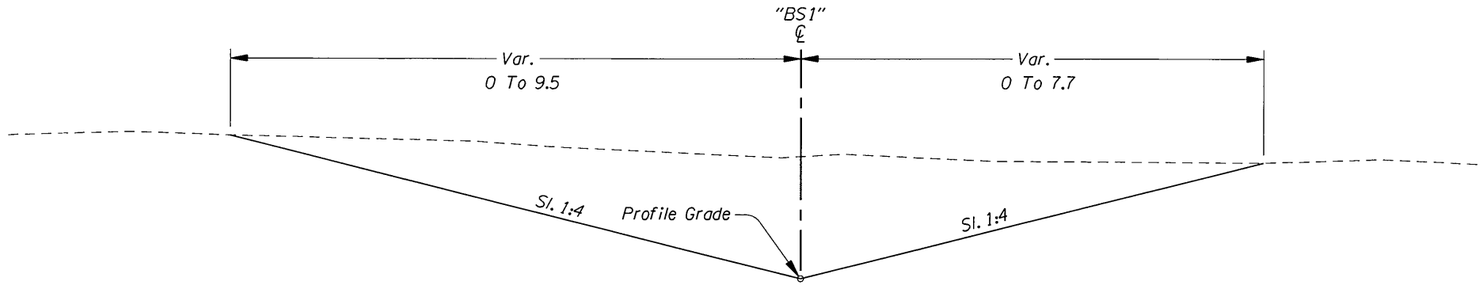
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	OTIA-NH-IM-S001(196)	1

METRIC

PE000950

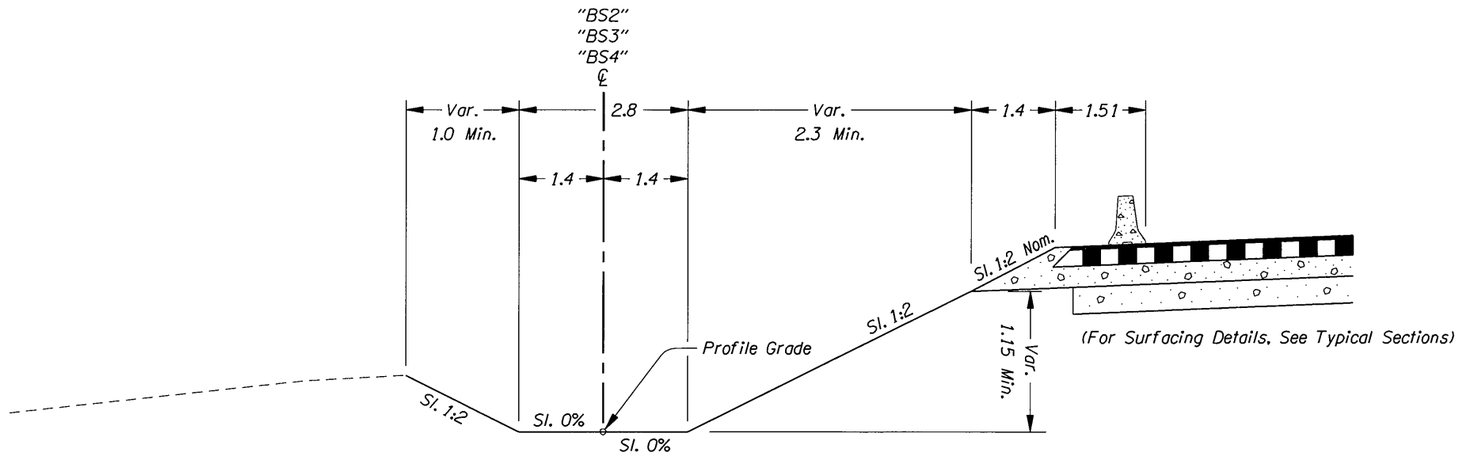
F:\ODOT_DATA\Projects\13284Kuebler\13284r2.tsl 8/2/2005 12:26:38 PM hwye07x

1:1000 - 1



(For Planting Details, See Roadside Development Plans)

WATER QUALITY SWALE
STA. "L"11+654.4 To STA. "L"11+690.1, Lt.



(For Surfacing Details, See Typical Sections)

(For Planting Details, See Roadside Development Plans)

WATER QUALITY SWALES

STA.	"L"12+000.9	To STA.	"L"12+004.3	(Taper Section)
	"L"12+004.3	To	"L"12+176.5	
	"L"12+176.5	To	"L"12+207.2	(Taper Section)
	"L"12+240.2	To	"L"12+258.5	(Taper Section)
	"L"12+258.5	To	"NB"12+770.0	
	"NB"12+770.0	To	"NB"12+774.0	(Taper Section)
	"NB"13+116.1	To	"NB"13+120.0	(Taper Section)
	"NB"13+120.0	To	"NB"13+400.0	
	"NB"13+400.0	To	"NB"13+403.9	(Taper Section)
	"NB"13+648.0	To	"NB"13+656.0	(Taper Section)
	"NB"13+656.0	To	"NB"13+787.0	
	"NB"13+787.0	To	"NB"13+790.9	(Taper Section)

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

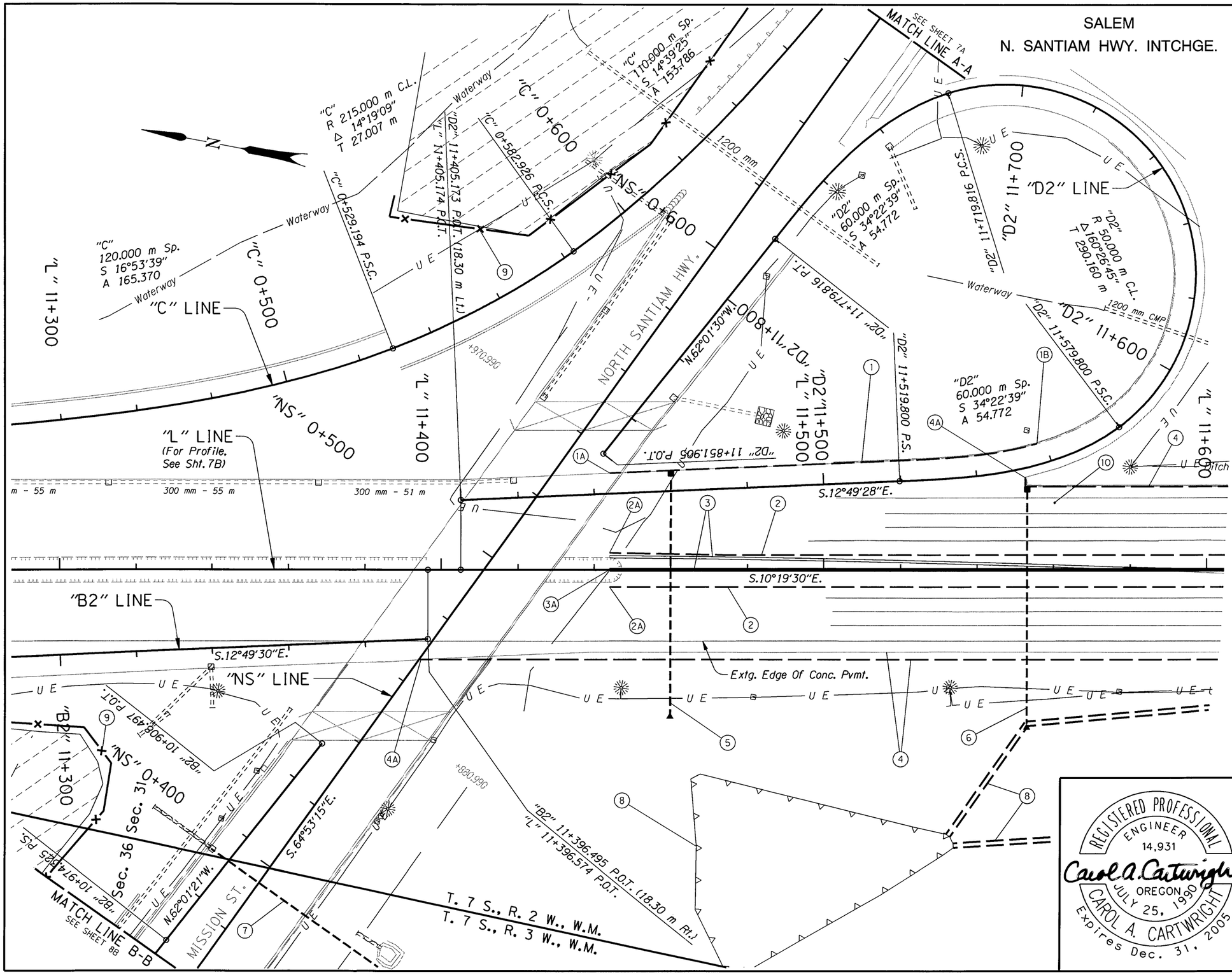
I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

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

DETAILS

SHEET NO. 2B-9

SALEM
N. SANTIAM HWY. INTCHGE.



(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.

STRUCTURAL DETAILS CHECKED

SEE SHEET 7A MATCH LINE C-C

"D" 11+600

"BS1" R 50.000 m C.L. Δ 4°50'18" T 2.112 m

"D" 75.000 m Sp. S 9°45'59" A 128.452

"D" R 220.000 m C.L. Δ 17°11'24" T 33.252 m

"BS1" 1+019.080 P.C.

"BS1" 1+023.302 P.T.

"D" 11+658.879 P.C.

"D" 11+724.883 P.C.S.

"L" 11+700

300 mm-4.5 m

300 mm-39.5 m

"D" 75.000 m Sp. S 9°45'59" A 128.452

600 mm

300 mm-67.0 m

"D" 11+800

"L" 11+800

"D" 11+766.883 P.T.

Sec. 31, T. 7 S., R. 2 W., W.M.

Sec. 6, T. 8 S., R. 2 W., W.M.

"L" 11+867.384 P.O.T.

"D" 11+867.383 P.O.T.

118.30 m Lt.

"L" 11+900

"D" LINE (For Profile. See Sht. 8D)

"BS1" 1+000.000 P.O.T.

Ditch

S.0°21'20"W.

S.0°31'02"W.

"BS1" 1+057.581 P.O.T.

"G-2"/Basin

"BS1" LINE (For Profile, See Sht. 8G)

Waterway

"G-2"/Basin

300 mm-108.5 m

"G-2" Open

R/W & Access Control Line

S.6°04'30"E.

"L" 11+600

300 mm-44.5 m

S.10°19'30"E.

300 mm-49.0 m

"G-2" Open

300 mm-13.5 m

600 mm-15.0 m

600 mm-68.0 m

600 mm-42.0 m

"A" 1+400

"A" 1+362.366 P.S.

"A" LINE (For Profile, See Shts. 8E & 8F)

MATCH LINE D-D SEE SHEET 8B

"A" 75.000 m Sp. S 7°40'25" A 144.914

"A" R 280.000 m C.R. Δ 4°42'05" T 11.494 m

"A" 1+437.366 P.S.C.

"A" 1+460.341 P.C.S.

"A" R/W & Access Control Line 75.000 m Sp. S 7°40'25" A 144.914

"A" 1+500

375 mm-44.5 m

"G-2" Open

375 mm-70.0 m

450 mm-4.5 m

"L" LINE (For Profile, See Sht. 8C)

"A" 1+535.341 P.T.

"A" 1+600

"G-2" Open

S.12°49'30"E.

300 mm-100.0 m

"SW" 1+869.824 P.O.T.

"SW" 1+898.771 P.C.

"A" 1+900

"SW" LINE

S.11°44'51"E.

Restricted Work Area Shown Thus:

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. 8

STRUCTURAL DETAILS CHECKED _____

(1) Sta."D"11+621.0 To Sta."L"11+963.3
Remove Extg. Guardrail - 106.7 m
Remove Extg. Conc. Shldr. Barrier - 3.8 m
Const. Precast Conc. Shldr. Barrier - 341.3 m
(Reflectorized)
Plug Scuppers
(1A) Connect To Extg. Conc. Shldr. Barrier
Flare Rate=0, W=0, E=0

(2) Sta."D"11+690.2 To Sta."L"11+808.0
Const. Type "G-2" Inlet With Basin
0.45 m Deep
Const. Type "G-2" Inlet - 3
Shape Bottom
Const. Type "G-2" Open Grade HMAC Inlet
Shape Bottom
Adjust Inlet For Wearing Course
Inst. 300 mm Sew. Pipe - 224.0 m
1.5 m Depth
(See Drg. No. RD314 & RD376)

(3) Remove Extg. Curb
Const. Low Profile Mountable Curb

(4) Const. Water Quality Swale
(For Details, See Sht. 2B-9 & GJ-8)

(5) Sta."D"11+690.2
Inst. 300 mm Sew. Pipe - 20.0 m
1.5m Depth
Const. Paved End Slope, Rt.

(6) See Sht. 7, Note 3
Remove Extg. Conc. Median Barrier
Const. Precast Tall Conc. Median Barrier

(7) Const. Mod. Low Profile Mountable Curb
(For Details, See Sht. 2B-4)

(8) Sta."L"11+601.8 To Sta."L"11+654.0
Const. Type "G-2" Open Grade HMAC Inlet
With Basin
0.45 m Deep
Const. Type "G-2" Open Grade HMAC Inlet
Shape Bottom
Const. Type "G-2" Inlet
Shape Bottom
Inst. 300 mm Sew. Pipe - 107.0 m
1.5 m Depth
Const. Paved End Slope, Rt.

(9) Sta."A"1+318.3 To Sta."A"1+428.4
Remove Extg. Inlet
Const. Type "G-2" Inlet - 2
Shape Bottom
Inst. 600 mm Sew. Pipe - 125.0 m
1.5 m Depth
Const. Paved End Slope, Lt.
(9A) Connect To Extg. 300 mm Pipe

(10) Sta."A"1+428.4 To Sta."L"10+935.1
Const. Type "G-2" Inlet - 3
Shape Bottom
Const. Type "G-2" Open Grade HMAC Inlet - 2
Shape Bottom
Adjust Inlet For Wearing Course
Inst. 300 mm Sew. Pipe - 100.0 m
1.5 m Depth
Inst. 375 mm Sew. Pipe - 119.0 m
1.5 m Depth
Inst. 450 mm Sew. Pipe - 4.5 m
1.5 m Depth

(11) Sta."L"11+829.7 To Sta."L"11+963.3
Const. Precast Conc. Shldr. Barrier - 130.4 m
(Reflectorized)
Bury End In Extg. Mound
Const. Conc. Barrier Mound Terminal
Flare Rate=20:1, W=6.0 m, E=0
(See Drg. Nos. RD510 & RD525)

(12) Sta."SW"1+878.3 To Sta."SW"3+699.2
Structure No. 20033
Const. Soundwall
(For Drg. Nos., See Sht. 1A)

(13) See Sht. 7, Note 8
Const. Ditch

(14) Sta."D"11+657.1 To Sta."L"11+971.0
Remove Extg. Fence
Const. Type CL-6 Fence
(14A) Connect To Extg. Fence
(See Drg. No. RD815)

(15) Const. Temp. Type Orange Plastic Fence

(16) Sta."L"11+650.0
Const. Open Grade Wearing Surface Drain
Outlet To Inlet
(See Drg. No. RD314)

(17) Sta."L"11+650.0
Const. Open Grade Wearing Surface Drain
Outlet To Inlet

(18) See Sht. 8B, Note 7
Remove Extg. Fence
Const. Type CL-6 Fence

(19) Const. Surfacing Drain Outlet
(For Details, See Sht. 2B-2)

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

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

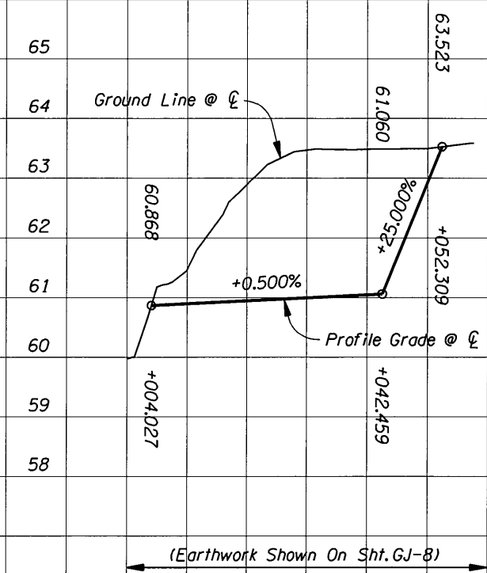
I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

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

NOTES

SHEET NO. 8A

"BS1" LINE



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

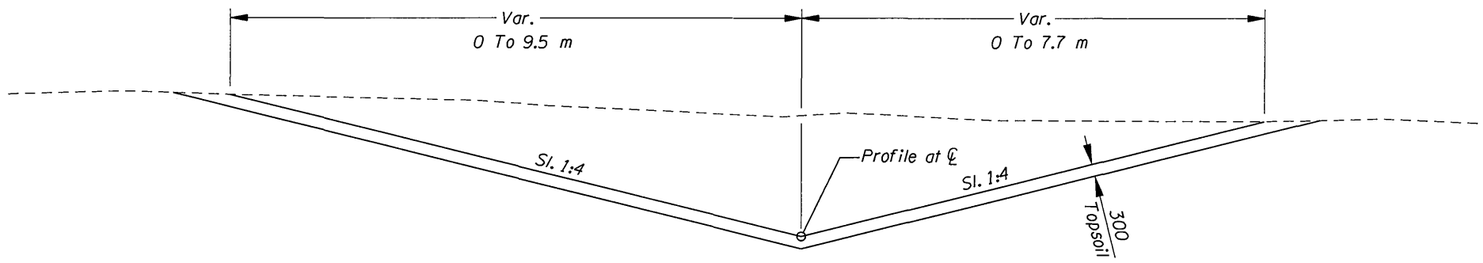
OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

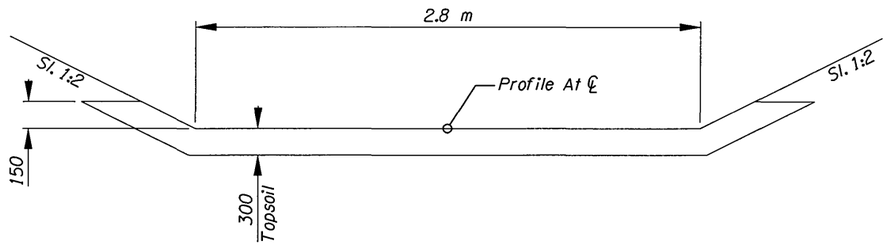
I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright P.E.
Designed By - John Lucas
Drafted By - Steve Donaldson

PROFILE

SHEET NO. 8G





(For Planting Details, See Roadside Development Plans)
(For Locations, See Sht. 2B-9)

WATER QUALITY SWALE - CROSS SECTION

Not To Scale

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

REGISTERED PROFESSIONAL ENGINEER
17807
OREGON
JULY 25, 1995
CHRIS CARMAN

EXPIRES: December 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
REGION 2 TECH CENTER

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

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

WATER QUALITY SWALE DETAILS

SHEET NO. GJ-8