STORMWATER OPERATION & MAINTENANCE MANUAL
for
OR 213: I-205 to Redland Road O'xing (Oregon City)
OR 213 Cascade Hwy MP 0.36
Clackamas County, Oregon

Stormwater Swale SW9
ODOT DFI No. D00526

May 10, 2011

EXPIRES: 06/30/12

Prepared By:
Benjamin P. Wewerka, PE

Reviewed By:
Jerome D. Lane, PE

OBEC CONSULTING ENGINEERS

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Eugene, OR 97401
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Facility Identification

Stormwater management facility SW9 for the OR 213: I-205 to Redland Road O'xing (Oregon City) Project on OR 213 Cascade Highway in the city of Oregon City, Clackamas County, Oregon, is a swale constructed under project drawing number 44V-008 and assigned an Oregon Department of Transportation (ODOT) Drainage Facility Identification (DFI) number of D00526. The swale is located at mile post (MP) 0.36 along the northbound lanes of OR 213 Cascade Highway between the intersections with Redland Road and Prairie Schooner Way. Access to the swale is via northbound OR 213. A vicinity map is provided in Figure M1, and the access route is shown on Figure M2. ODOT is responsible for maintenance of the swale.

Designer

This stormwater facility was designed for ODOT by OBEC Consulting Engineers as part of the OR 213: I-205 to Redland Road O'xing (Oregon City) Project. Contacts for the designer and ODOT are as follows:

Benjamin P. Wewerka, PE OBEC Consulting Engineers 920 Country Club Road, Suite 100B Eugene, OR 97401 541.683.6090 bwewerka@obec.com	Tom Weatherford Agency Project Manager ODOT Region 1 503.731.8238 Thomas.L.Weatherford@odot.state.or.us

Construction

This facility is part of the OR 213: I-205 to Redland Road O'xing (Oregon City) Project. Construction of the facility is expected to take place during 2011 and 2012.

System Overview

The drainage contributing to the swale comes from OR 213 and the adjacent side slopes (see Figure M2). Runoff flows from the roadway into inlets and slotted drains located along OR 213, and is then conveyed by pipe to the swale. Runoff both flows through the swale and is infiltrated into the swale amended soils. Once runoff has passed through the swale, it outfalls into the existing roadside ditch that drains into the unnamed tributary to Abernethy Creek. The swale provides treatment of the runoff by filtration as it flows through the swale and through

infiltration. The construction plans for the swale are included in the Appendix as Figures M3 through M8. The cross section of the swale is shown in Figure M3 and the layout is detailed in Figure M5.

Overflow System

The swale is a water quality treatment facility, but it will also detain runoff from the 10-year storm event. The facility is designed to treat runoff from 50 percent of the 2-year storm and to convey a 25-year storm without damage to the swale grades. If an overflow of the swale banks occurs the facility is to be checked for erosion damage, and any damaged grades or vegetation are to be repaired as necessary.

Maintenance Requirements

Maintenance for the water quality swale shall be in accordance with the following table and schedule.

Maintenance Requirements for Swales

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment accumulation along bottom of swale	Sediment depth exceeds 2 inches.	Sediment deposits removed along bottom of swale. Swale slope and geometry restored to design standards. Areas with minimal grass cover reseeded. There should be no areas of standing water once inflow has ceased.
	Ponding water	Water ponds in the swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, or add an underdrain.
	Insects	Insects such as wasps or hornets interfere with maintenance activities. Insects such as mosquitoes are breeding within swale.	Remove insects from site. Ponding water that serves to facilitate mosquito breeding is remedied as instructed above.
	Poor vegetation coverage	Grass is sparse or bare, or eroded patches occur in more than 10 percent of the swale bottom.	Poor grass growth is corrected and bare areas reseeded.

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General (continued)	Vegetation growth	Grass becomes excessively tall (greater than 10 inches); nuisance weeds and other vegetation start to dominate.	Vegetation is mowed and nuisance vegetation removed so flow is not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings. Noxious weeds are removed following state or local policies. Herbicides should not be used to control vegetation.
	Excessive shading	Grass growth is poor due to lack of sunlight.	Overhanging limbs are trimmed. Brushy vegetation on adjacent slopes is removed.
	Trash and debris	Trash and debris have accumulated in the swale.	Trash and debris are removed from swale.
	Erosion	Swale bottom has eroded due to flow channelization or high flows.	Bare areas are regraded and reseeded.
	Contaminants and pollution	Oil, gasoline contaminants, or other pollutants are evident following any hazmat spill. (Additional information is provided in the following section on waste material handling.)	All contaminated sediment, sludge, topsoil, vegetation, etc. are removed until no contaminants or pollutants are present.
	Access obstruction	Vegetation, trash, debris, etc. block maintenance access to swale.	Remove obstruction from swale access.

Adapted from Table 8 in the ODOT Water Quality Guidance document.

Schedule

Special

- Inspection and maintenance of swale as needed (after first 24-hour rainfall greater than 0.50 inches).

Annual

- Inspection and maintenance of swale as needed (prior to autumnal rains).

Hazardous Material Spill Operation

The swale is a water quality treatment facility but will also detain runoff from the 10-year storm event. Any desire for the detention or containment of hazardous materials will require blocking the downstream end of the swale (see Figure M9).

Waste Material Handling

Material removed from the facility is defined as waste by the Department of Environmental Quality (DEQ) and, therefore, must be disposed of at a permitted waste management facility (i.e., landfill or incinerator) or managed, reused, or recycled according to DEQ waste rules.

Management of roadwaste and the rules that surround it are extremely complicated. ODOT has researched this subject and has posted a report offering detailed guidance at the ODOT Research Unit website: http://www.oregon.gov/ODOT/TD/TP_RES/ (see October 2000 – *Roadwaste Management – A Tool for Developing District Plans*).

Roadwaste materials can be contaminated with chemical pollutants such as heavy metals or hydrocarbons generated from highway vehicles. If clean-out material is sent to a permitted waste management facility (landfill or incinerator), the facility operator may require testing for specific pollutants, such as lead, before the material will be accepted for disposal.

Clean-out material that is being stockpiled or recycled should be identified if it is contaminated and at what levels. Chemical testing for total metals (lead, arsenic, cadmium, and chromium) and hydrocarbons (polycyclic aromatic hydrocarbons – PAHs) is usually adequate. However, be aware of other pollutants that might be present; and test accordingly (for example, a facility may have a history of heavy pesticide use, highway spills, etc.). All trash and litter must be removed and properly disposed of. In general, whenever placing roadwaste material ensure that it will not migrate or erode; and that it does not contain pollutants that will negatively impact adjacent land, waterways, or groundwater.

If you are planning to reuse clean-out material, DEQ will likely require a "solid waste letter of authorization" for final placement of the material. Typically, DEQ will help to ensure that proper permits and papers are obtained, required pollution testing is completed, and final placement of the material is appropriate.

Contact either of the following for more detailed information about management of this waste material:

ODOT Statewide HazMat Coordinator Jennie Armstrong 12600 SW 72nd Avenue, Suite 100 Tigard, OR 97223 503.229.5129 Jennie.ARMSTRONG@odot.state.or.us	DEQ Headquarters 811 SW 6th Avenue Portland, OR 97204 503.229.5696

APPENDIX

Appendix Table of Contents

Appendix – Plans and Details

Vicinity Map M1

Drainage Area Map M2

Project Plan Sheets ..... M3 – M8

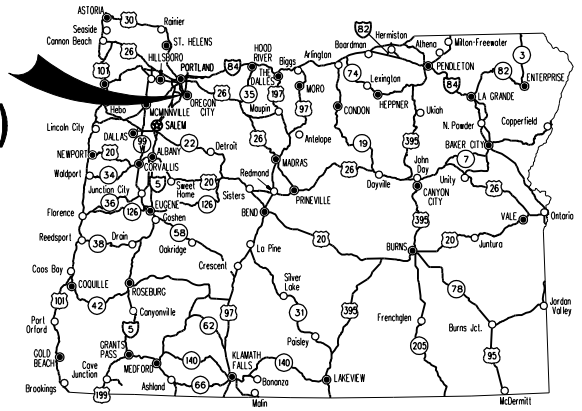
Operation Drawing M9

STATE OF OREGON
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT
GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION & SIGNALS

OR213: I-205 - REDLAND ROAD O'XING. (OREGON CITY)

CASCADE HWY. SOUTH

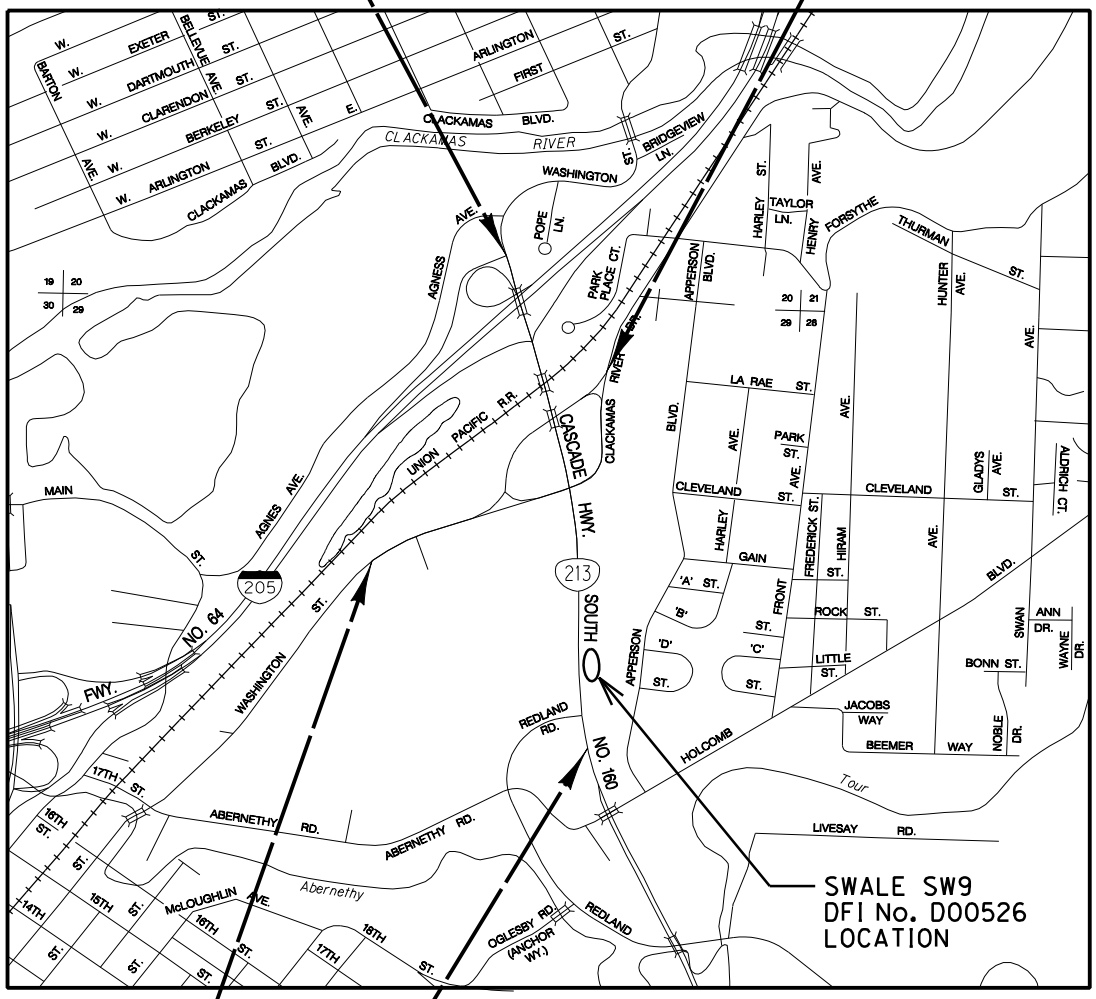
CLACKAMAS COUNTY
JANUARY 2011



Overall Length Of Project - 0.76 Miles

BEGINNING OF PROJECT
STA. "OR" 156+10 (HWY 64 M.P. 10.18)

BEGIN WORK
STA. "W" 258+26



END WORK
STA. "W" 293+78

END OF PROJECT
STA. "C" 96+00 (OR213 M.P. 0.57)

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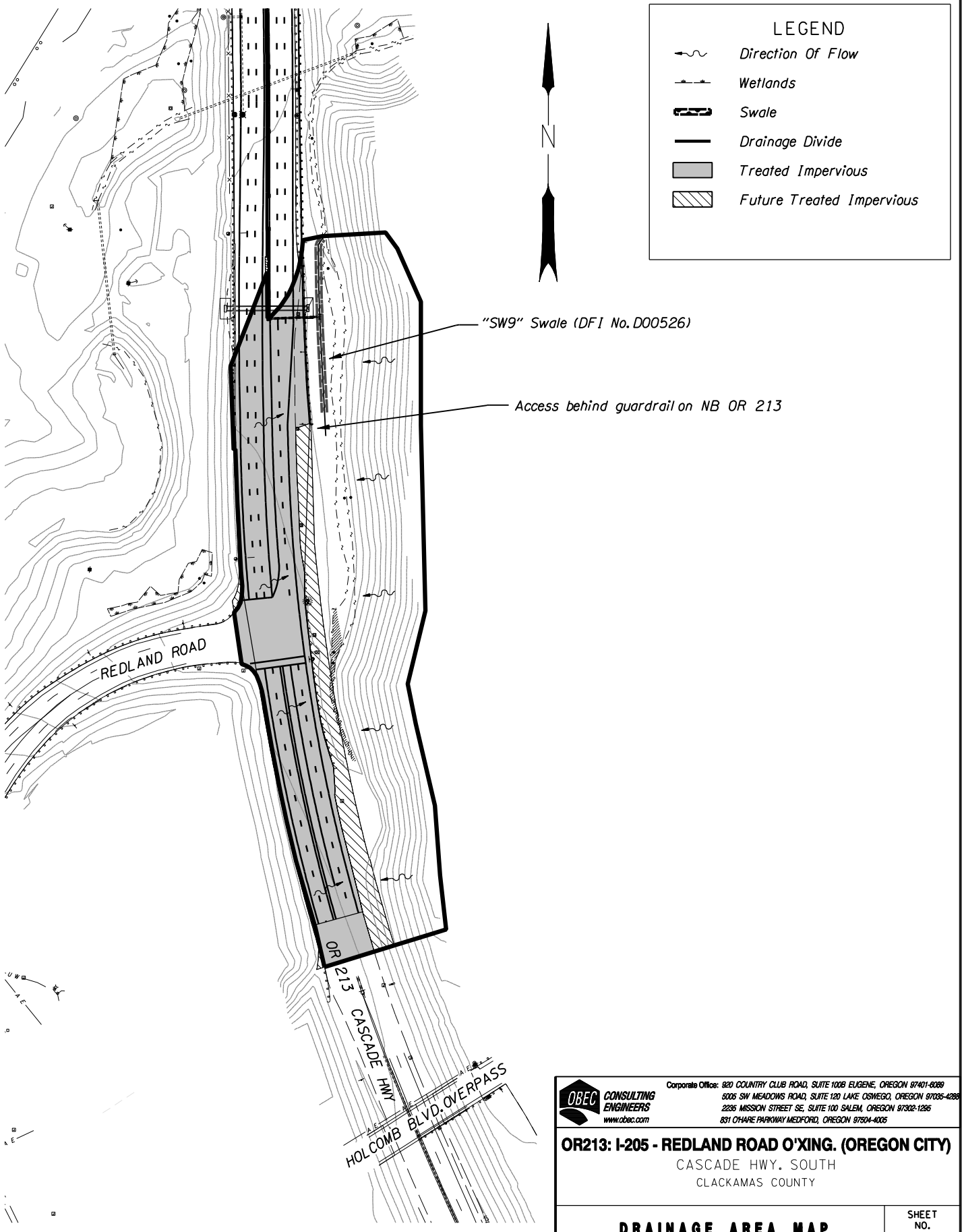
CASCADE HWY. SOUTH
CLACKAMAS COUNTY

FEDERAL HIGHWAY ADMINISTRATION
OREGON DIVISION

VICINITY MAP



Scale 1" = 200'

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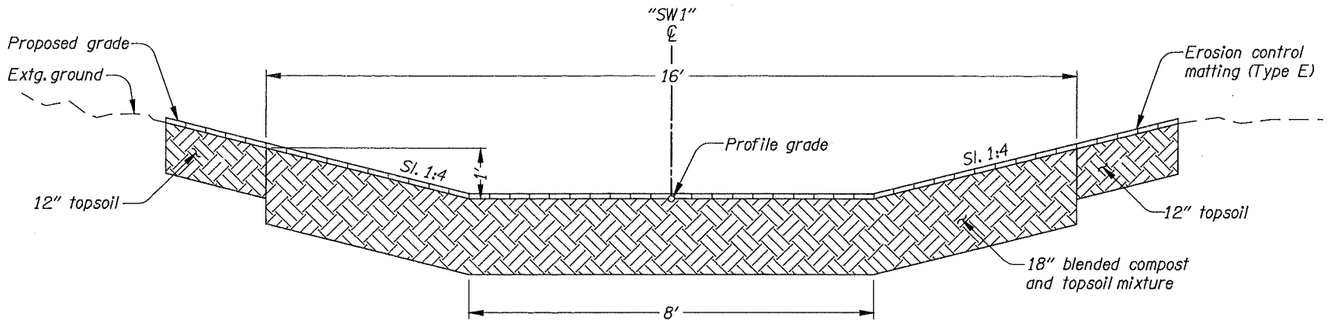
CASCADE HWY. SOUTH

CLACKAMAS COUNTY

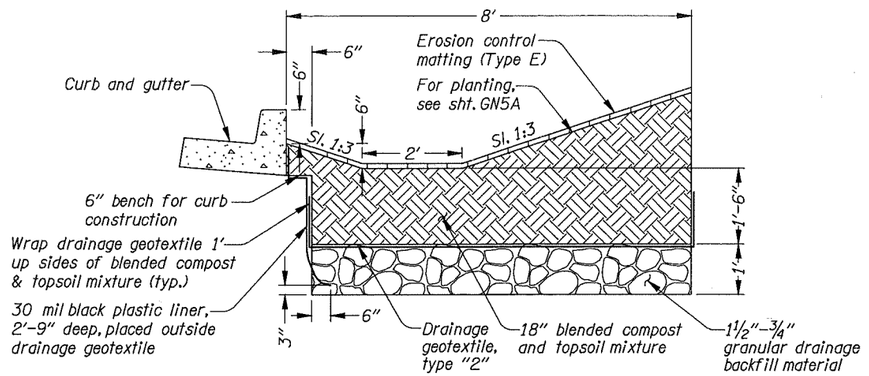
DRAINAGE AREA MAP
SWALE "SW9"
DFI NO. D00526

SHEET NO. 1

M2

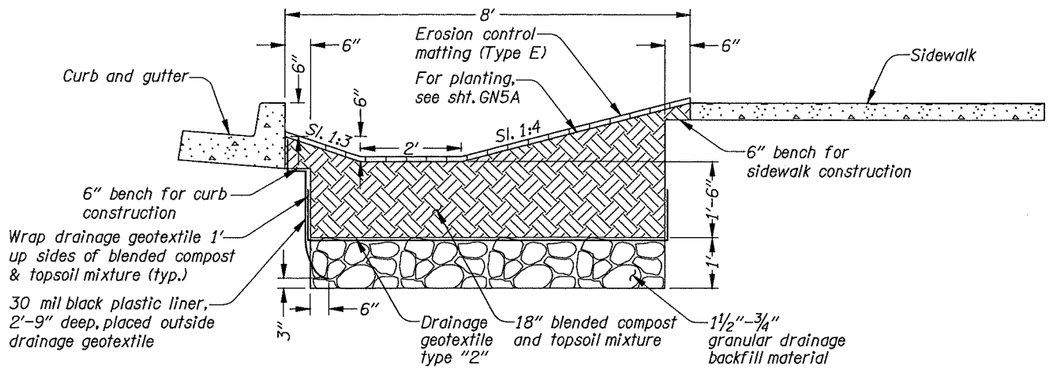


WATER QUALITY SWALE TYPICAL SECTION "SW1"
(Sta. "SW1" 0+17.48 to Sta. "SW1" 1+43.56)



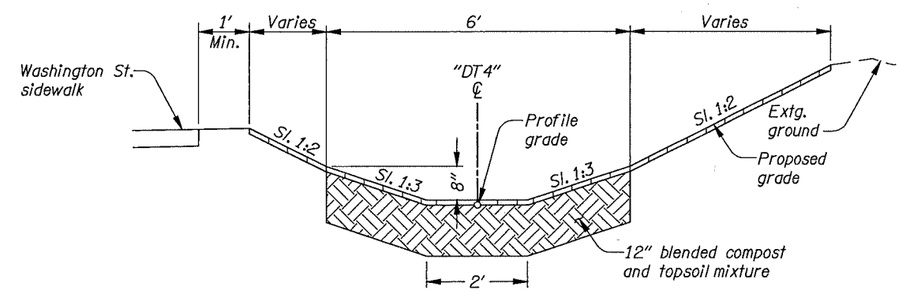
(Green Street swale without sidewalk)

WATER QUALITY SWALE TYPICAL SECTION "SW3A" AND "SW3B"
(Sta. "W" 268+74 to Sta. "W" 270+30
Sta. "W" 271+79 to Sta. "W" 274+03.47)

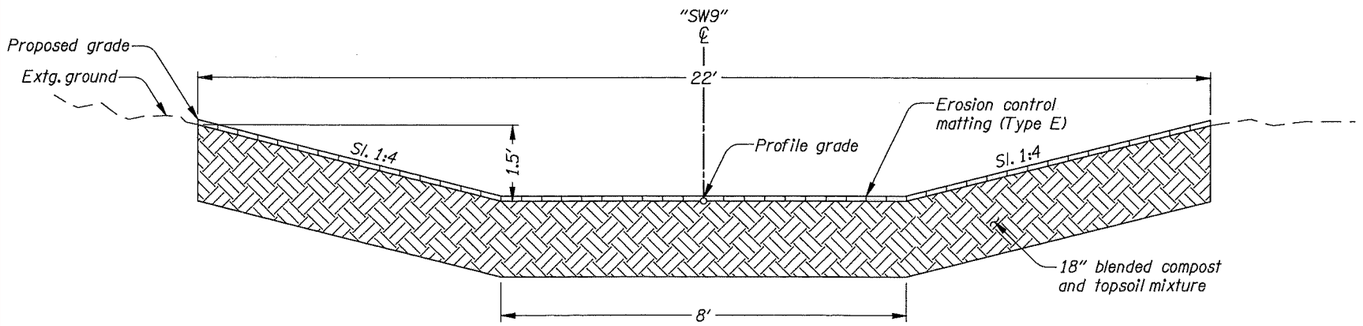


(Green Street swale with sidewalk)

WATER QUALITY SWALE TYPICAL SECTION "SW2"
(Sta. "W" 269+59 to Sta. "W" 273+85.65)



"DT4" DITCH TYPICAL SECTION
(Sta. "DT4" 0+00 to Sta. "DT4" 2+88.71)



WATER QUALITY SWALE TYPICAL SECTION "SW9"
(Sta. "SW9" 0+07.44 to Sta. "SW9" 2+74.07)

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REGISTERED PROFESSIONAL ENGINEER
79131
OREGON
JUNE 14, 2007
BENJAMIN P. WEWERKA
EXPIRES: 06/30/12

OR213: I-205 - REDLAND ROAD O'XING. (OREGON CITY)

CASCADE HWY. SOUTH

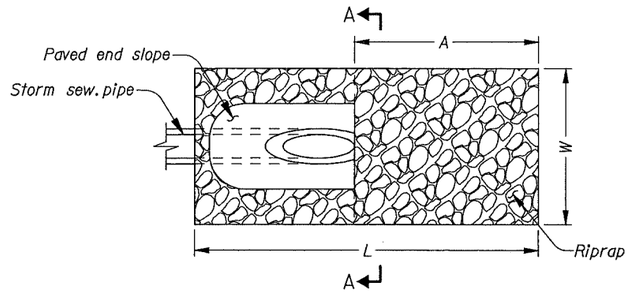
CLACKAMAS COUNTY

Design Team Leader - Jerry Lane
Designed By - Ben Wewerka
Drafted By - Mathew Bunde

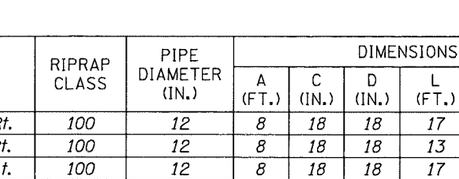
DETAILS

SHEET NO. 2B-21

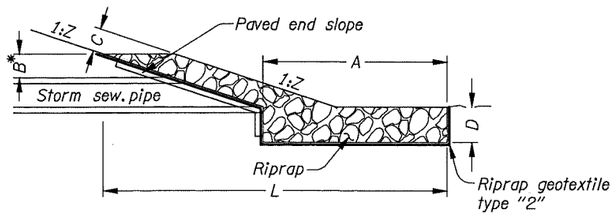
LOCATION	RIPRAP CLASS	PIPE DIAMETER (IN.)	DIMENSIONS					
			A (FT.)	C (IN.)	D (IN.)	L (FT.)	W (FT.)	Z
"W" 258+79.33, 39.92' Rt.	100	12	8	18	18	17	8	4
"W" 260+55.95, 41.88' Rt.	100	12	8	18	18	13	8	2
"W" 261+53.35, 74.87' Lt.	100	12	8	18	18	17	8	4
"W" 267+65.63, 119.80' Rt.	100	15	8	18	18	14	8	2
"W" 278+59.32, 44.71' Rt.	100	12	8	18	18	14	5	3
"W" 281+67.77, 74.65' Lt.	100	12	5	18	18	11	5	3
"JE" 600+95.68, 78.23' Lt.	100	12	8	18	18	17	8	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"OR" 186+64.04, 76.92' Lt.	50	18	10	12	12	17	8	2



PLAN



SECTION A-A



PROFILE

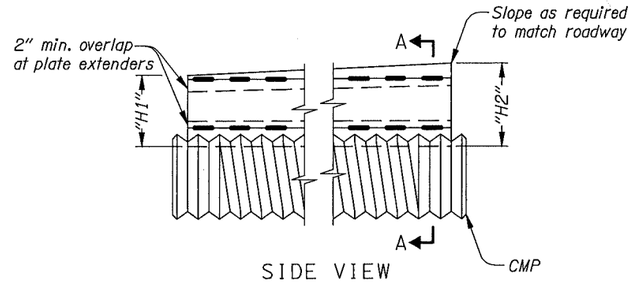
*"B" equals pipe diameter

RIPRAP PAD OUTFALL AND EMBANKMENT PROTECTION

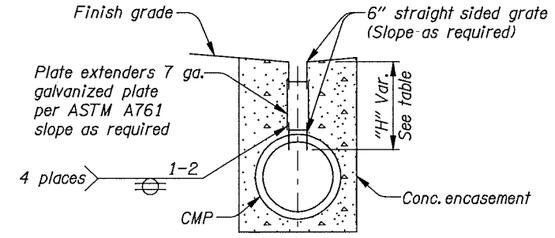
(With paved end slopes)

NOTE:
See drg. nos. RD316, RD318 & RD320.

START STATION	END STATION	DIAMETER	"H1"	"H2"
"OR" 168+39.09	"OR" 168+59.79	12"	0.50'	0.50'
"OR" 168+92.75	"OR" 169+79.75	12"	0.50'	0.98'
"OR" 169+79.75	"OR" 170+67.00	12"	0.98'	1.90'
"OR" 171+27.42	"OR" 172+30.60	12"	2.46'	0.90'
"OR" 172+30.60	"OR" 173+33.78	12"	0.90'	0.50'
"OR" 173+53.40	"OR" 174+85.39	12"	1.65'	1.22'
"OR" 174+85.39	"OR" 176+17.38	12"	1.22'	0.50'
"OR" 176+47.23	"OR" 177+47.19	12"	2.52'	2.06'
"OR" 177+47.19	"OR" 178+47.15	12"	2.06'	1.32'
"OR" 178+47.15	"OR" 179+17.05	12"	1.32'	0.95'
"OR" 179+17.05	"OR" 179+87.00	12"	0.95'	0.50'
"OR" 180+17.00	"OR" 180+79.95	12"	0.50'	1.98'
"OR" 180+76.95	"OR" 181+76.92	12"	1.84'	1.53'
"OR" 181+76.92	"OR" 182+76.90	12"	1.53'	1.23'
"OR" 182+76.90	"OR" 183+76.88	12"	1.23'	0.76'
"OR" 183+76.88	"OR" 184+76.29	12"	0.76'	0.50'
"OR" 185+27.47	"OR" 186+65.97	18"	0.50'	2.06'



SIDE VIEW



SECTION A-A

SLOTTED DRAIN RISER EXTENSION

NOTES:
1. All slotted drain pipes follow the "OR" alignment at a 2.14' offset.
2. For slotted drain details, see drg. no. RD328.

CI 08-010

REGISTERED PROFESSIONAL ENGINEER 79131 OREGON JUNE 14, 2007 BENJAMIN P. WEWERKA

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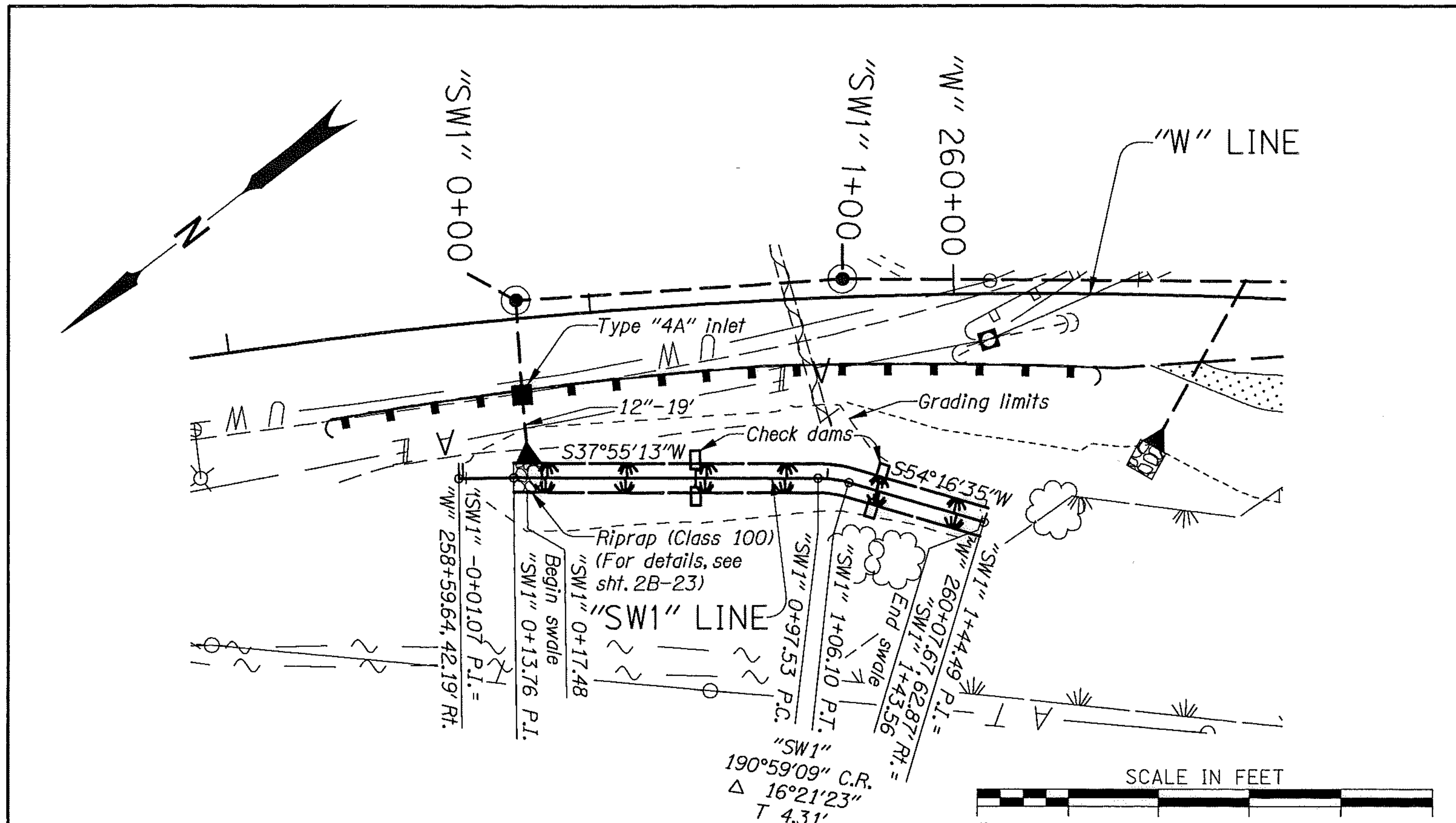
CASCADE HWY. SOUTH

CLACKAMAS COUNTY

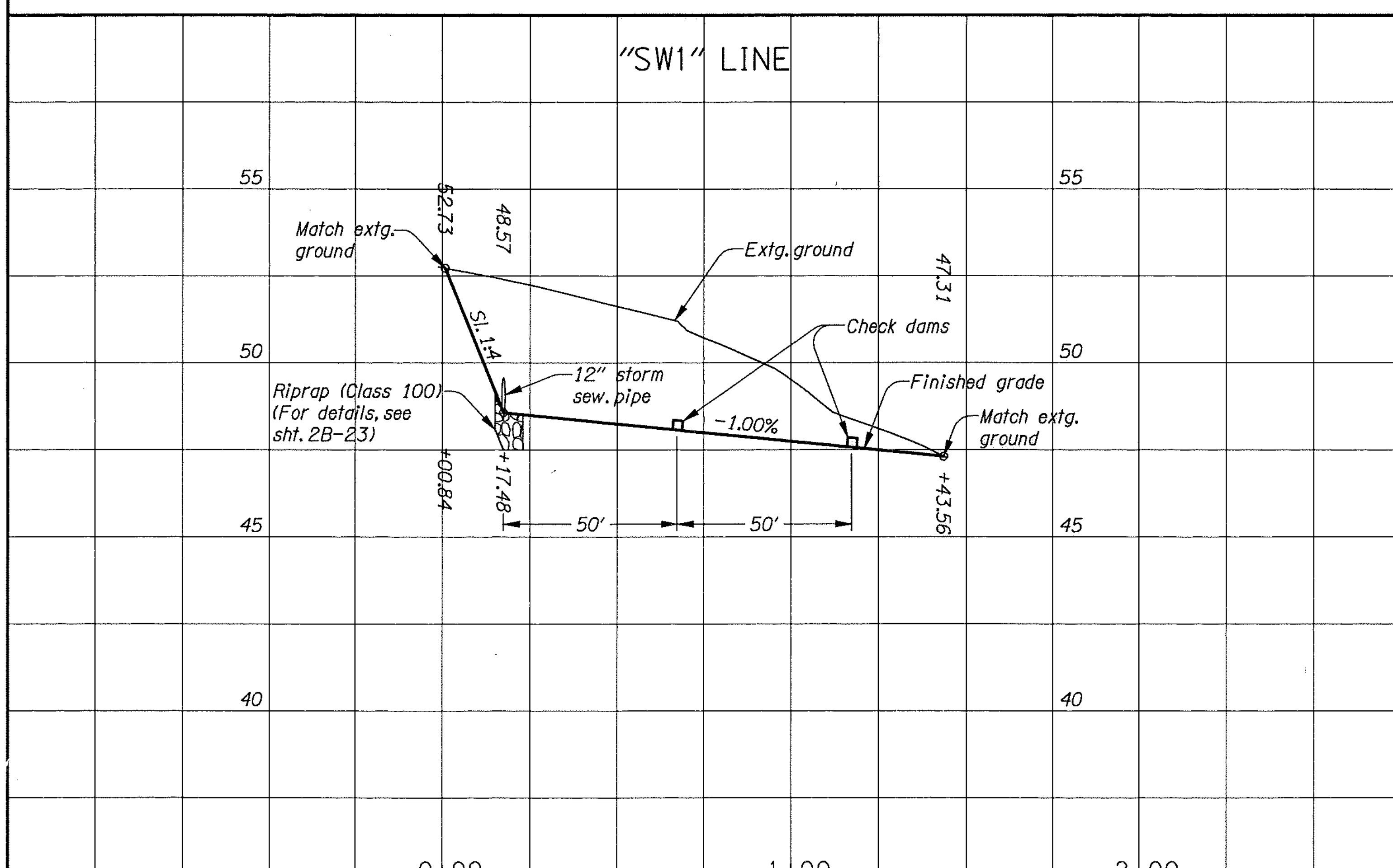
Design Team Leader - Jerry Lane
Designed By - Ben Wewerka
Drafted By - Mathew Bunde

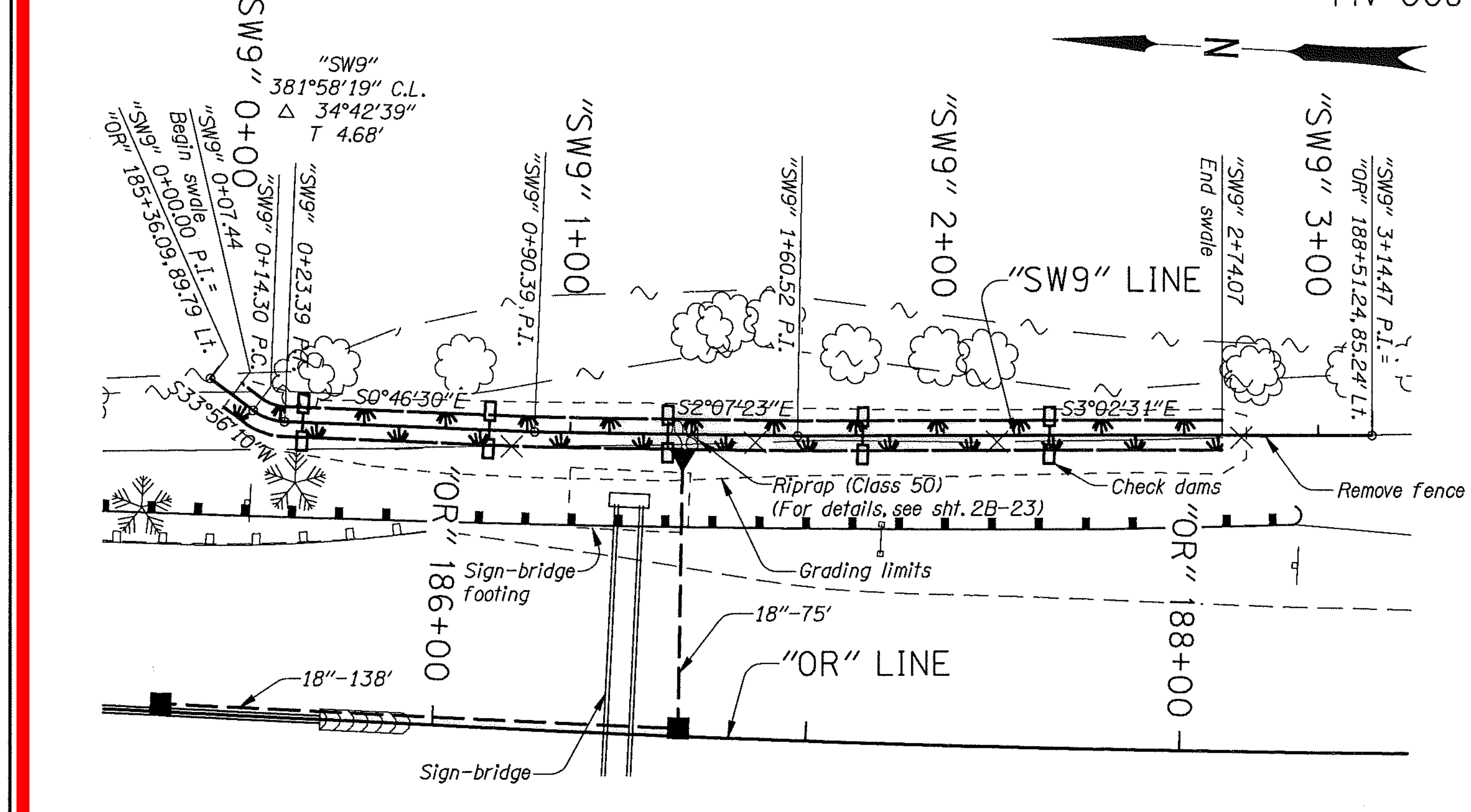
DETAILS

SHEET NO. 2B-23

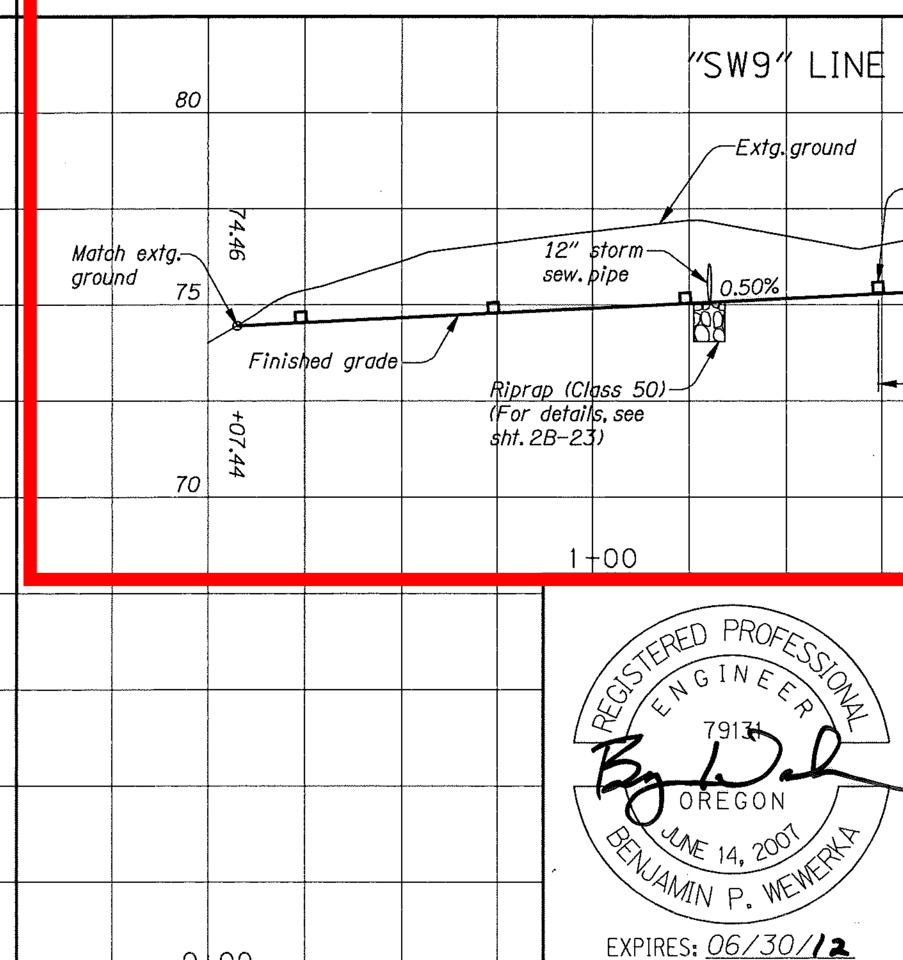


"SW1" ALIGNMENT PLAN
(For location, see sht 6A, note 23)





"SW9" ALIGNMENT PLAN
(For location, see sht 5A, note 12)



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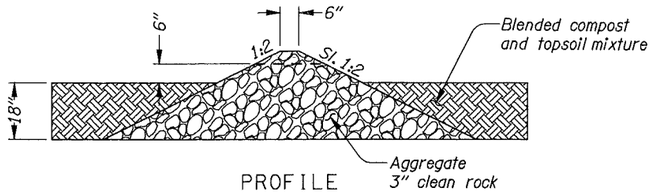
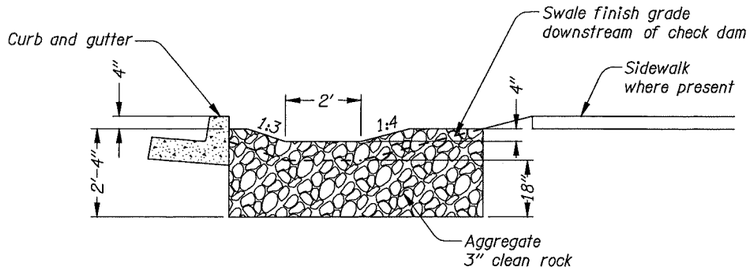
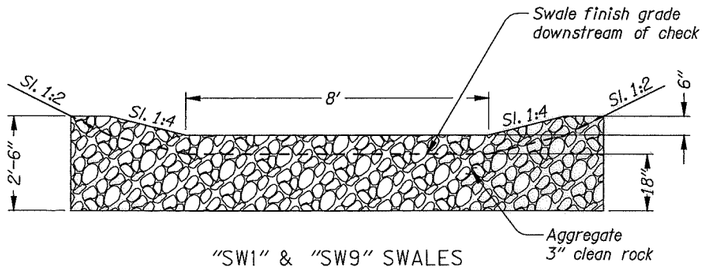
SHEET NO. 2B-24



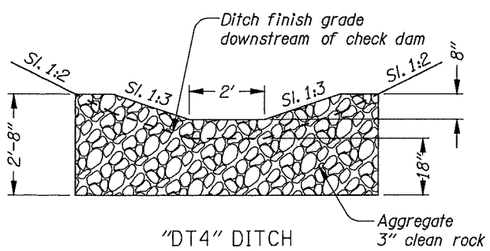
PROFILE



"SW2", "SW3A" & "SW3B" SWALES

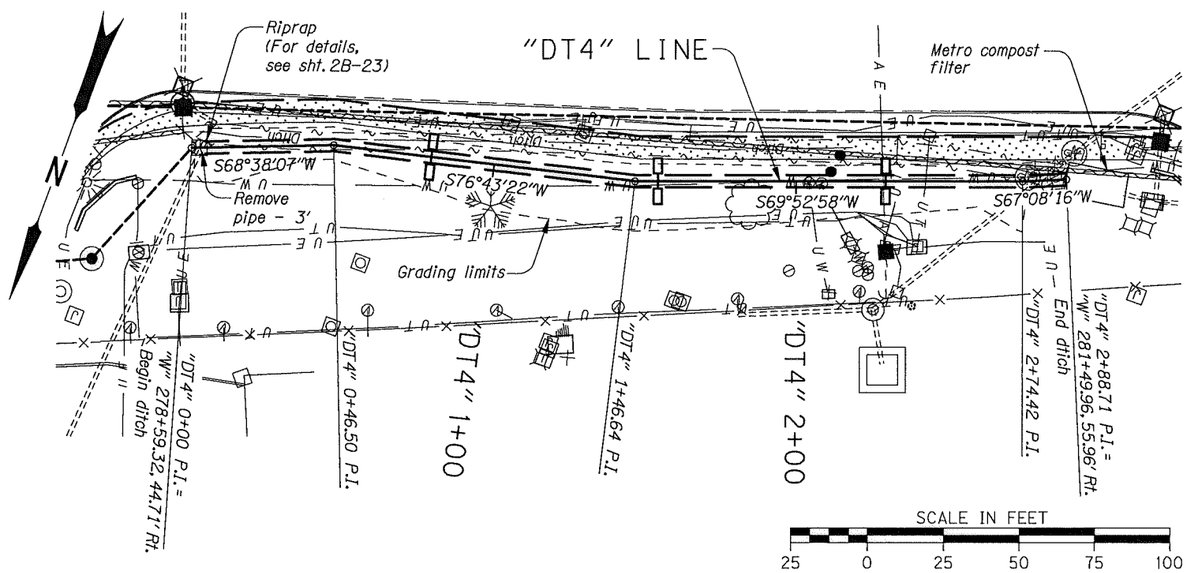


"SW1" & "SW9" SWALES



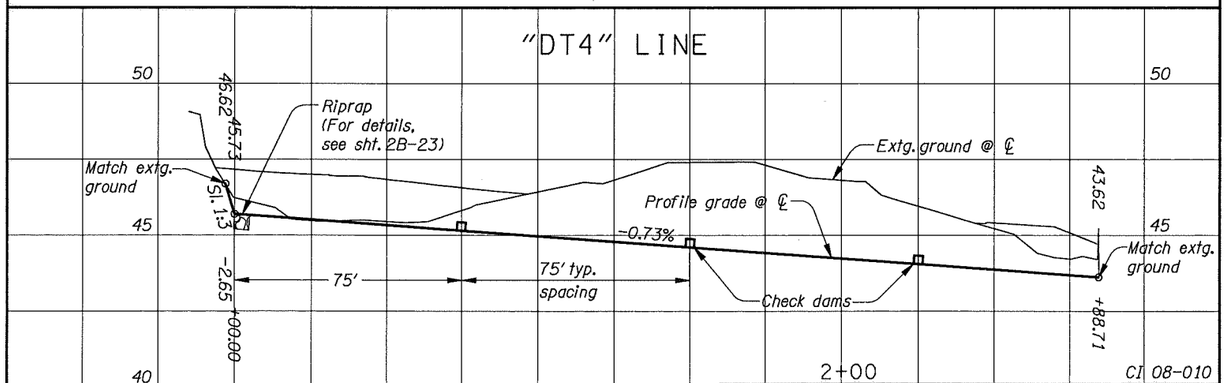
"DT4" DITCH

CHECK DAMS



"DT4" ALIGNMENT PLAN
(For location, see sht. 8A, note 18)

NOTE:
"DT4" is relocation of a metro water quality facility located prior to the metro compost filter.



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EXPIRES: 06/30/12

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831 CHAPEL PARKWAY MEDFORD, OREGON 97504-4005

OR213: I-205 - REDLAND ROAD O'XING. (OREGON CITY)

CASCADE HWY. SOUTH

CLACKAMAS COUNTY

Design Team Leader - Jerry Lane
Designed By - Ben Wewerka
Drafted By - Mathew Bunde

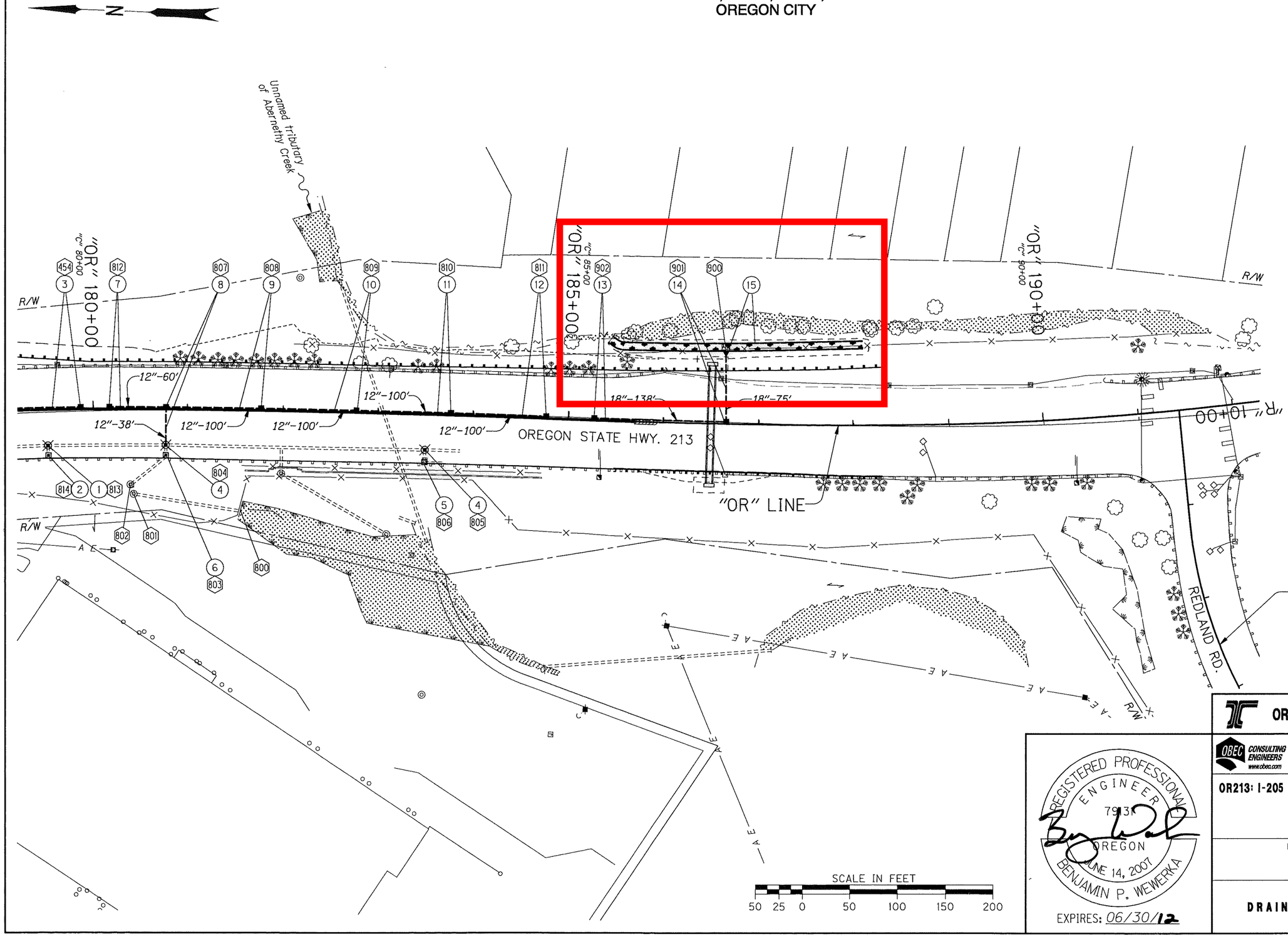
DETAILS

SHEET NO. 2B-28

File No. 23084

Sec. 29, T. 2 S., R. 2 E., W.M.
OREGON CITY

44V-008



CI 08-010

OREGON DEPARTMENT OF TRANSPORTATION

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REGISTERED PROFESSIONAL ENGINEER
79131
OREGON
JUNE 14, 2007
BENJAMIN P. WEWERKA
EXPIRES: 06/30/12

OR213: I-205 - REDLAND ROAD O'XING. (OREGON CITY)

CASCADE HWY. SOUTH

CLACKAMAS COUNTY

Design Team Leader - Jerry Lane
Designed By - Ben Wewerka
Drafted By - Mathew Bunde

DRAINAGE AND UTILITIES

SHEET NO. 5A

I:\Projects\0019\0019098\001909803\Roadway\Deliverables\517002f_5A.dr3 12/20/2010 11:12 AM

File No. 23189

M7

813 (1) See sht. 4A, note 2
Adjust manhole
(See drg. no. RD360)

814 (2) See sht. 4A, note 4
Adjust inlet
(See drg. no. RD376)

454 (3) See sht. 4A, note 20
Const. type "G-2" inlet
Inst. 12" slotted drain pipe
5' depth
Conc. in blocks
(For details, see sht. 2B-23)

804 805 (4) Adjust manhole - 2

806 (5) Cap inlet
(For details, see sht. 2B-22)
(See drg. no. RD376)

803 (6) Adjust inlet

812 (7) Sta. "OR" 180+17.00, 2.14' Lt.
Const. type "G-2" inlet
Inst. 12" slotted drain pipe - 60'
5' depth
Conc. in blocks - 5 cu. yd.
(For details, see sht. 2B-23)

807 (8) Sta. "OR" 180+76.95, 2.14' Lt.
Const. type "G-2" inlet
Inst. 12" storm sew. pipe - 38'
10' depth
Connect to extg. manhole
Trench resurf. - 19 sq. yd.

808 (9) Sta. "OR" 181+76.92, 2.14' Lt.
Const. type "G-2" inlet
Inst. 12" slotted drain pipe - 100'
5' depth
Conc. in blocks - 6 cu. yd.
(For details, see sht. 2B-23)

809 (10) Sta. "OR" 182+76.90, 2.14' Lt.
Const. type "G-2" inlet
Inst. 12" slotted drain pipe - 100'
5' depth
Conc. in blocks - 8 cu. yd.
(For details, see sht. 2B-23)

810 (11) Sta. "OR" 183+76.88, 2.14' Lt.
Const. type "G-2" inlet
Inst. 12" slotted drain pipe - 100'
5' depth
Conc. in blocks - 10 cu. yd.
(For details, see sht. 2B-23)

811 (12) Sta. "OR" 184+76.29, 2.14' Lt.
Const. type "G-2" inlet
Inst. 12" slotted drain pipe - 100'
5' depth
Conc. in blocks - 11 cu. yd.
(For details, see sht. 2B-23)

902 (13) Sta. "OR" 185+27.47, 2.14' Lt.
Const. type "G-2" inlet
Inst. 18" slotted drain pipe - 138'
5' depth
Conc. in blocks - 18 cu. yd.
(For details, see sht. 2B-23)

901 (14) Sta. "OR" 186+65.97, 2.14' Lt.
Const. type "G-2" inlet
Inst. 18" storm sew. pipe - 75'
5' depth
Const. slope end
Const. paved end slope, Lt.
Trench resurf. - 28 sq. yd.
(See drg. no. RD320)

(15) Sta. "OR" 185+36.09, 89.79' Lt.
to Sta. "OR" 188+51.24, 85.24' Lt.
Const. water quality swale "SW9"
Const. check dam
Const. loose riprap (Class 50)
Riprap geotextile type "2"
Inst. matting (Type E)
Blended compost & topsoil
Dt. exc. - 498 cu. yd.
(For details, see shts. 2B-21, 2B-23, 2B-24 & 2B-28)

LEGEND
XXX Structure no.

CI 08-010

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CASCADE HWY. SOUTH

CLACKAMAS COUNTY

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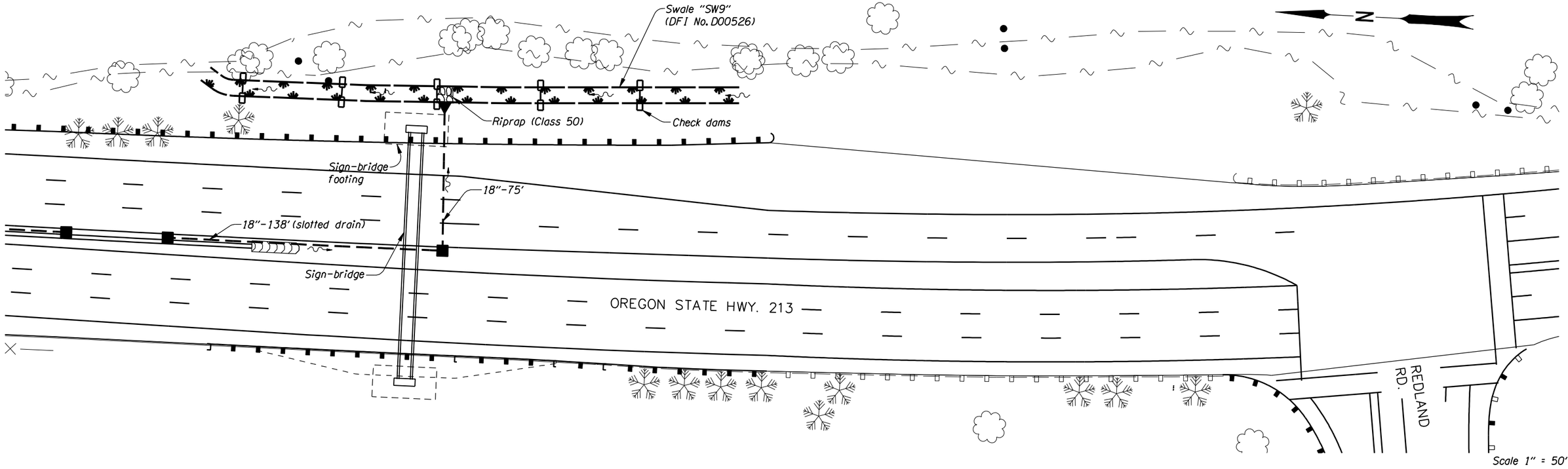
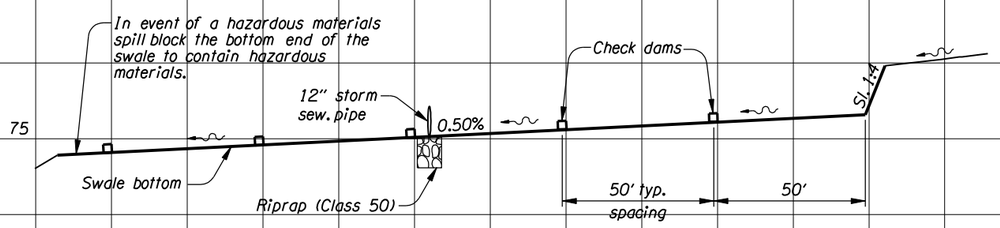
DRAINAGE AND UTILITIES NOTES

SHEET NO. 5A-2



Scale 1" = 50'



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CASCADE HWY. SOUTH

CLACKAMAS COUNTY

OPERATION DRAWING
SWALE "SW9"
DFI NO. D00526

SHEET NO. 1

M9