OPERATION & MAINTENANCE MANUAL

Water Quality Swale
I5SB: Carman Rd – Lower Boones Ferry Rd Sec

DFI No: D00531

Facility Type: Water Quality Biofiltration Swale

July 2011

RENEWS: 12-31-2011

INDEX

Identification

Drainage Facility ID (DFI)	D00531
Facility Type	Swale
Construction Drawings Location:	Region 1 District 1A Highway name: Pacific Highway Highway No.:001 Route #: I5 Mile Post: 291.26 – 291.48 County: Washington Description: This facility is located on the west side of I5 at the Carman Drive onramp south bound. Access can be obtained from the ramp.

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

Or

Geo-Environmental Senior Hydraulics Engineer (503) 986-3365.

Construction

Engineer of Record: Edward Foltyn
ODOT Designers: Region 1 Tech. Center,
Phone no. 503-731-3160
Facility construction: TBD.
Contractor: TBD

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.

Stormwater for this facility is collected in two ways. The portion of I5 southbound, north of the proposed gore point, will sheet-flow into a shallow ditch, then into a median catch basin , where it then flows through a proposed 18" pipe beneath the SB on ramp. After the runoff flows through a riprap basin, it will flow through a 4' wide swale constructed with compost amended soils. Runoff from the reconstructed ramp will sheet-flow into a newly constructed swale, upstream of the riprap basin. This runoff will then mix with the runoff from I5 through the 4' wide swale.

Runoff from the northbound lanes, on the east side of I5, flows into the lower portion of the drainage system. The lower drainage system cannot be reconstructed to treat this water as part of this project. Therefore it is left untreated.

The proposed swale ties into the existing lower drainage system at an existing inlet structure. This inlet will be modified from a median inlet to a Type "D" inlet

A. Maintenance equipment access:

Maintenance crews can access the facility from the on ramp at Carman Drive.

B. Heavy equipment access into facility:

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

C. Special Features:

☒ Amended Soils
☐ Porous Pavers
☐ Liners
☐ Underdrains

Photograph 1 Existing swale looking south. The proposed swale will shift to the east with the reconstructed onramp.

Facility Haz Mat Spill Feature(s)

Any Haz-Mat spill that may occur will flow over a vegetated slope. This slope length is on the order of 20 feet or more and the slope is on the order of 10 (H) : 1(V). The swale can also be used to store a volume of liquid by blocking the Type "D" inlet

Auxiliary Outlet (High Flow Bypass)

The new swale is designed to treat and convey all of the flow expected from the new ramp and the portion of I5 that flows to the swale.. The inlet is sized to convey the flow and there is no auxiliary outlet per se.

The auxiliary outlet feature for this facility is:

☒ Designed into facility
☐ Other, as noted below

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:

☒	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: N/A

Note: Tables 1 and 3 are included in Appendix A

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:

O&M Tables 1 and 3

Appendix B

Content:

ODOT Project Plan Sheets

Appendix A

Content:

O&M Tables 1 and 3

Table 1: General Maintenance			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Recommended Maintenance to Correct Problem**
Annual Visual Inspection and Maintenance	Routine inspection	**Facilities should be inspected annually prior to fall rains**. If appropriate, also inspect the facility after the first significant rain event following dry spell (e.g. the first 24-hour rainfall greater then 0.5 inches after summer)	Identify existing and potential operational problems. Repair damaged components that are critical to the operation of the feature (e.g. flow control valves, liners, underdrains, and pipes) as soon as practical. Schedule routine maintenance such as mowing, sump cleanout, lube moving parts, repairs, etc. If the facility is problematic, schedule additional inspections or maintenance. Repair or replace facility field markers according to Technical Bulletin GE10-01(B). A marked facility has an O&M Plan.
	Maintenance of ancillary structures, if present Examples include • Flow splitter manhole • Diversion manhole • Catch basin • Shut-off valve assembly • Pretreatment or primary treatment manhole • Large detention pipe • Vault • Outfall	Damage or problems are observed or anticipated during the annual inspection.	Grease moving parts to ensure proper operation. Remove sediment from sumps, vaults, catch basins, and structures to prevent the release of oil or sediment. Annual cleaning is recommended. The use of a Vactor® truck is allowed unless prohibited in the facility's O&M manual Repair or replace damaged orifice assembly/riser pipe. Restore to design standards. Be aware of possible confined space requirements. Repair or replace damaged gates, locks, chains, etc that are used to secure valves and access points to prevent vandalism
General	Temporary erosion control hampers maintenance	Erosion control remains from project construction (contractor did not remove)	Contact contractor to complete work OR remove temporary erosion control that is not specified in the O&M Plan.

Table 1: General Maintenance			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Recommended Maintenance to Correct Problem**
General	Spilled material has entered the pond or structures	Oil, fuel, or other pollutants are evident following a spill event or accident.	Utilize valves or other features, if present, to contain the spilled material. Remove and properly manage spilled material and contaminated soil. Contact Region HazMat or spill response company for spill cleanup assistance where appropriate. Contact a Region Hydraulic Engineer for technical assistance with pond restoration, if necessary.
	Litter (trash and debris)	Trash poses a hazard, inhibits function, or is aesthetically unacceptable (e.g. evidence of dumping).	Remove problematic trash and debris as soon as practical. There should be no evidence of dumping. Remove non-problematic trash in accordance with District litter practices.
	Insects	Insects interfere with maintenance activities.	Implement vector control in accordance with County Health and District practices.
	Vegetation growth (mowing and brushing)	Vegetation growth restricts access, limits sight distance, obstructs water flow, or interferes with maintenance activity.	Mow access, berms, bottom, and side-slopes of the facility as noted in the District Integrated Vegetation Management (IVM) Plan. Remove vegetation in or around grates that obstruct (or could obstruct) flow. Avoid mowing or removing vegetation that does not need to be controlled. Avoid removing vegetation too low to the ground. NOTE: Removing vegetation too near to the ground may result in scalping of the soil, unwanted damaged to vegetation, or growth of unwanted plant species. Heavy equipment is allowed within aboveground water quality and detention facilities unless access restrictions are listed in the O&M Manual.

Table 1: General Maintenance			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Recommended Maintenance to Correct Problem**
	Noxious weed growth	Control of noxious weeds is required by law or prescribed in the District IVM Plan	Remove noxious weeds in accordance with the District IVM Plan. Follow Environmental Protection Agency (EPA) label and ODOT policies on herbicide usage.
General	Hazard trees	Trees are found to be weakened, unsound, undermined, leaning, or exposed and may fall across the highway	Remove hazard trees as soon as practical. Where appropriate, consult an ODOT Forester for help identifying or removing hazard trees.
	Tree growth	Tree growth restricts access, obstructs function, jeopardizes infrastructure, or interferes with maintenance actions.	Prune or remove as needed to maintain access, function, and tree health. Manage potentially problematic woody material before the trees reach 6 inches diameter at breast height (DBH). Consult an ODOT Forester for the removal or management of trees greater than 6 inches DBH. Obtain permits where appropriate. Refer to the District IVM Plan for the management of smaller trees. Avoid removing trees that will not interfere with the operation or maintenance of the facility.

Table 3: Maintenance of Water Quality or Biofiltration Swales

Swales should provide even sheet flow that moves water from the inlet to the outlet.

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Follow applicable Guidance from Table 1 AND applicable guidance from this table.		
	Vegetation growth (mowing and brushing)	Vegetation growth restricts access, limits sight distance, obstructs water flow, or interferes with maintenance activity. **Swales should be mowed annually.**	Mow access, berms, swale, and side-slopes as noted in the District Integrated Vegetation Management (IVM) Plan. The use of heavy equipment is allowed unless access restrictions are listed in the O&M Manual.
Swale Components	Sediment accumulation in pre-treatment areas or ancillary structures (e.g. manholes)	Sediment affects flow. Sediment jeopardizes infrastructure.	Remove sediment that prevents adequate drainage into swale. Use methods that minimize disturbance to surrounding vegetation. The use of heavy equipment is allowed unless access restrictions are listed in the O&M Manual. Sediment may contain oil and other pollutants, especially in areas with high ADT. Refer to the ODOT Maintenance Environmental Management System (EMS) Manual for the disposal of contaminated sediment. Note: Pollutant concentrations may increase if sediment is not routinely removed.
	Sediment accumulation along swale bottom	Sediment inhibits the flow of water through the grass (e.g. water is ponding or cutting a channel).	Remove sediment from grassy areas. The use of a Vactor® truck is allowed unless access restrictions are listed in the O&M Manual. Restore slope and geometry to design standards, if necessary. Reseed grass cover where needed. Stormwater should infiltrate or flow toward outlet once inflow has ceased.

Table 3: Maintenance of Water Quality or Biofiltration Swales

Swales should provide even sheet flow that moves water from the inlet to the outlet.

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
Swale Components	Erosion	Side slopes show evidence of erosion greater than 2 inches deep and the potential for continued erosion is evident.	Promptly address erosion that causes immediate problems (e.g. damage to highway or highway structure) Schedule non-urgent repairs with routine work. Stabilize slope using appropriate erosion control and repair methods. Repair the cause of the erosion where possible. If necessary, contact the ODOT Erosion Control Coordinator to evaluate the condition.
	Poor vegetation coverage	Vegetation (grass) is sparse or eroded patches occur in more than 10 percent of swale. NOTE: A single incident (e.g. vehicle accident) typically effects less than 10 percent of the area and is unlikely to trigger a repair.	Repair and reseed as appropriate to restore coverage. Install erosion control measures as needed. Trim overhanging limbs and remove brushy vegetation that limit grass growth (provide too much shade).
	Missing or eroded amended soil mix	Bare soil is observed over 10 percent of the amended area.	Identify and resolve erosion problem Add amended soil. Contact a Region Hydraulics Engineer for required material specifications.
	Amended soil mix along swale bottom is clogged	Standing water is observed for seven (7) consecutive days or longer from May through October.	Remove and replace amended soil mix. Contact a Region Hydraulics Engineer for required material specifications. Replace or repair damaged underlying drainage geotextile, impermeable liner, drain piping, and granular drain backfill material when applicable.
	Granular drain backfill material for underdrain pipe plugged	Amended soil mix has been replaced and standing water is still observed for seven (7) consecutive days or longer from May through October.	Remove and replace granular drain backfill material. Contact a Region Hydraulics Engineer for required material specifications. Install new drainage geotextile over new granular drain backfill material. Replace amended soil mix.

Table 3: Maintenance of Water Quality or Biofiltration Swales

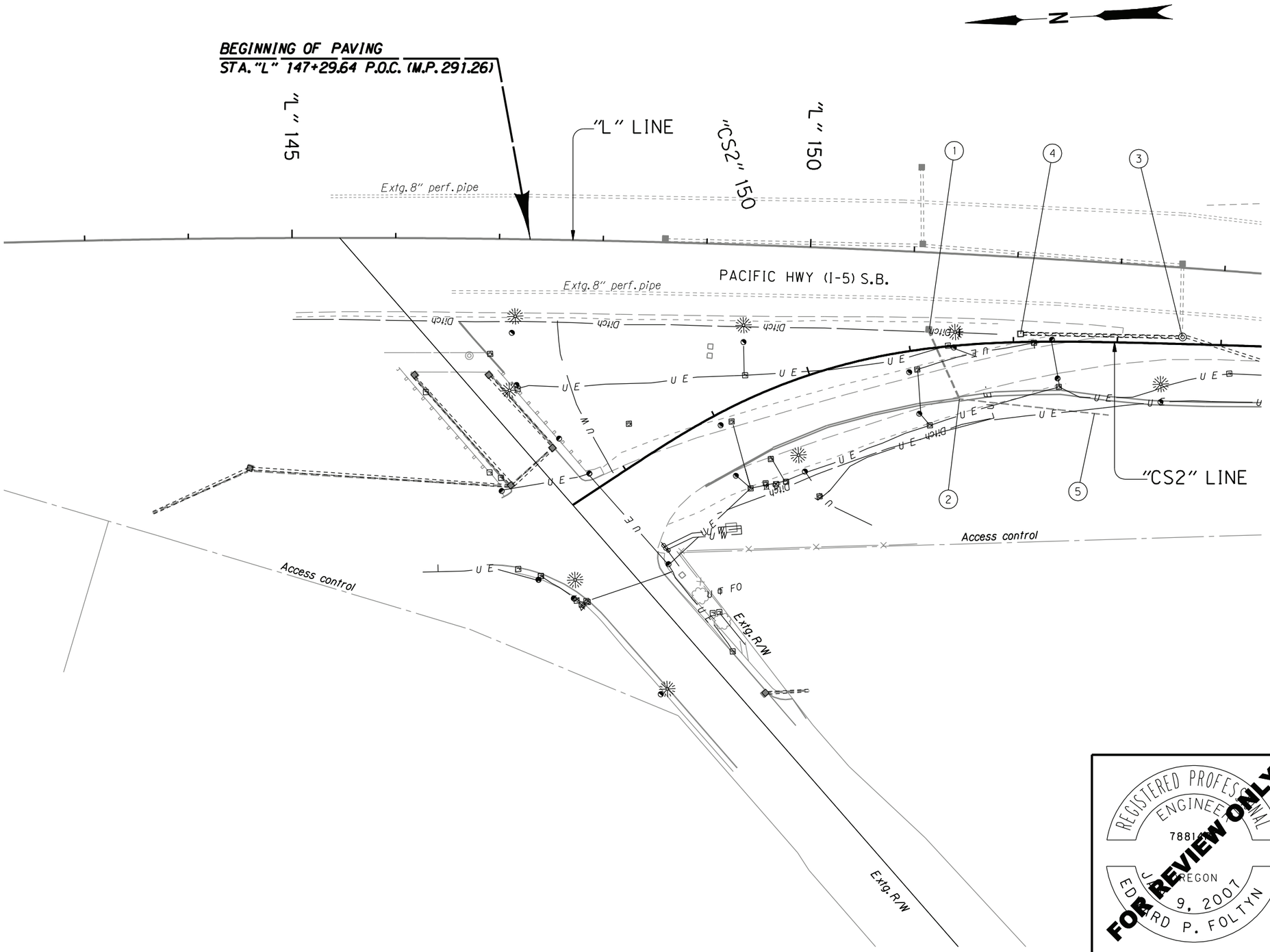
Swales should provide even sheet flow that moves water from the inlet to the outlet.

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
Swale Components	Impermeable liner damage NOTE: Liners may not be visible. If present, liners are typically below the grass surface along the bottom of the swale Fabric wrapped around underdrains is not a liner.	Liner is damaged (e.g. during sediment removal or by motoring public). Liner is damaged when condition allows potential contamination to be released to the subsurface.	Repair or replace the liner with similar material. Replace top soil and grass as appropriate. Features with liners, typically have maintenance option limitations; check the O&M Manual. If necessary, contact a Region Hydraulics Engineer for technical assistance.
	Obstruction or blockage of pipes	Water does not flow in, through, or out of the swale.	Remove obstructions to restore flow (e.g. remove trash, debris, sediment, or vegetation as necessary). Jet rodders may be used to clean piping unless specifically prohibited in the O&M plan.
	Flow spreader is uneven or clogged	Water does not flow evenly across the structure	Clean sump or forebay as needed to maintain capacity. Clean or repair spreader as needed to provide a uniform flow and prevent erosion. Level portions of the flow spreader that have settled.

Appendix B

Content:

ODOT Project Plan Sheets



(1) *Sta. "CS2" 151+20, 18' Lt.*
Const. type "G-2MA" inlet
Rim 216.81
F.L. Out 213.16
Const. swale
Permanent seed mix - 0.17 ac.
Matting type "F" (flexible channel liner) - 820 sq. yd.
(See drg. no. RD364)

(2) *Sta. "CS2" 151+43, 51.4' Rt.*
Const. basin riprap (Class 50) - 15 cu. yd.
Riprap geotextile, type "1" - 25 sq. yd.
Const. 18" DI storm drain - 68'
10' depth
F.L. In 213.16
F.L. Out 212.45
Const. water quality swale 2' wide
Ditch excavation - 22 cu. yd.
Drainage geotextile, type "1" - 120 sq. yd.
Water quality seed mix - 0.14 acres
Blended compost soil conditioner - 5.5 cu. yd.
Topsoil - 5.5 cu. yd.
2" x 12" plastic weir board, uprights and concrete blocks - 10 lf.
Trench resurf. - 20 sq. yd.
(For details, see shts. GJ, GJ-2, & GJ-3)
(See drg. no. RD300)

(3) *Sta. "CS2" 153+62.4, 6.8' Lt.*
Minor adjust manhole
Remove pipe - 154'

(4) *Sta. "L" 152+07.8, Rt.*
Remove inlet

(5) *Sta. "CS2" 152+91, 71' Rt.*
Inst. temp drainage
Inst. temp. structure or elbow to connect to pipe in note 2 (this sht.)
Inst. 18" temp. storm drain - 144'
F.L. In 212.45
F.L. Out 211.00
Const. temp. basin riprap (Class 50) - 10 cu. yd. (As needed)
Remove temp drainage after removal of temp road widening and final grading

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

I5 SB: CARMAN DR - LOWER BOONES FERRY SEC.
PACIFIC HIGHWAY
WASHINGTON COUNTY

REGISTERED PROFESSIONAL ENGINEER
78814
OREGON
JANUARY 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011
FOR REVIEW ONLY

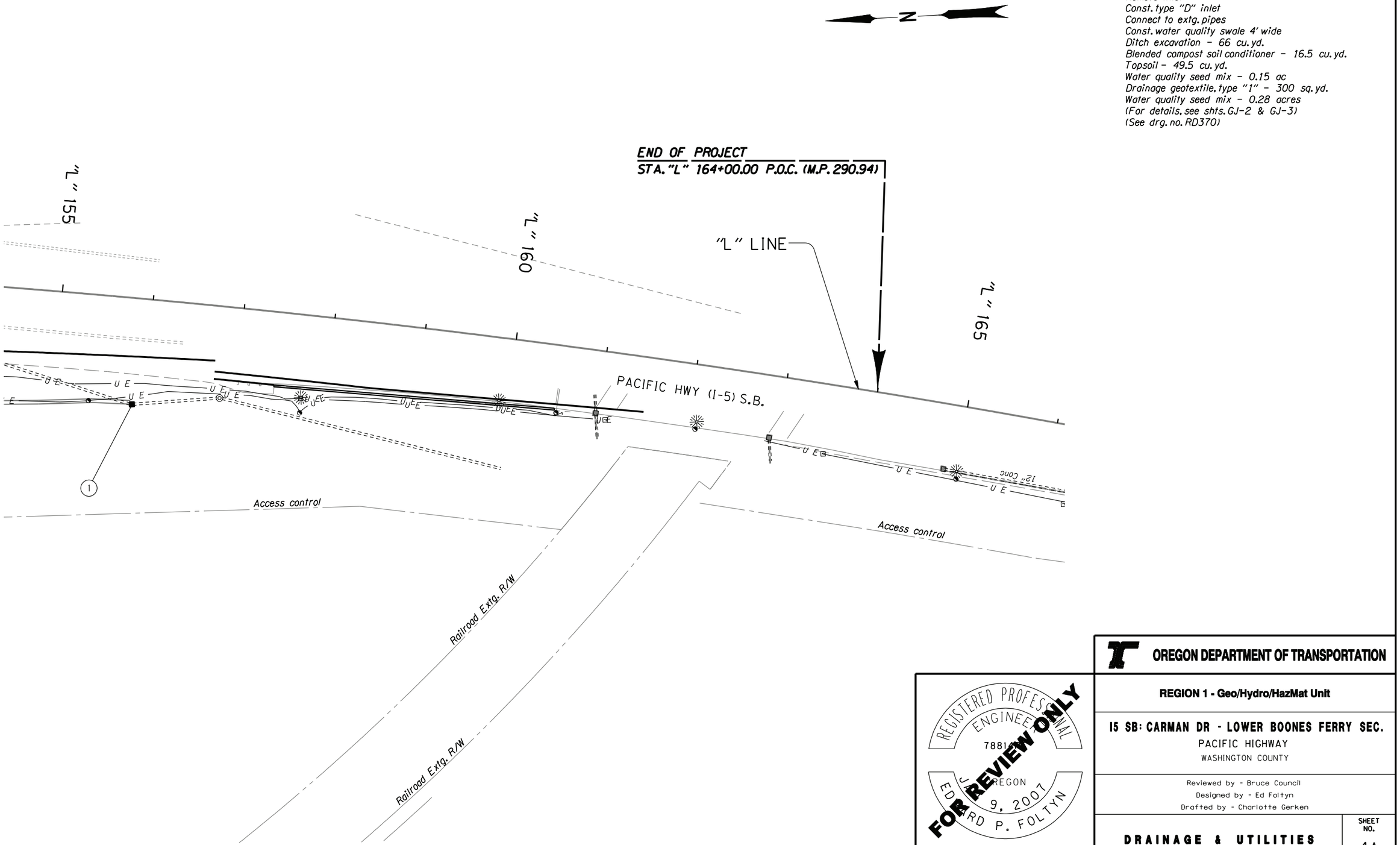
Reviewed by - Bruce Council
Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

DRAINAGE & UTILITIES

SHEET NO. 3A

Sec. 12, T. 2S, R. 1W, W.M.
Sec. 13, T. 2S, R. 1W, W.M.

(1) *Sta. "L" 155+86.8, 116' Rt.*
Remove inlet
Const. type "D" inlet
Connect to extg. pipes
Const. water quality swale 4' wide
Ditch excavation - 66 cu. yd.
Blended compost soil conditioner - 16.5 cu. yd.
Topsoil - 49.5 cu. yd.
Water quality seed mix - 0.15 ac
Drainage geotextile, type "1" - 300 sq. yd.
Water quality seed mix - 0.28 acres
(For details, see shts. GJ-2 & GJ-3)
(See drg. no. RD370)



REGISTERED PROFESSIONAL ENGINEER
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JANUARY 9, 2007
EDWARD P. FOLTYN
RENEWS: 12-31-2011
FOR REVIEW ONLY

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

I5 SB: CARMAN DR - LOWER BOONES FERRY SEC.
PACIFIC HIGHWAY
WASHINGTON COUNTY

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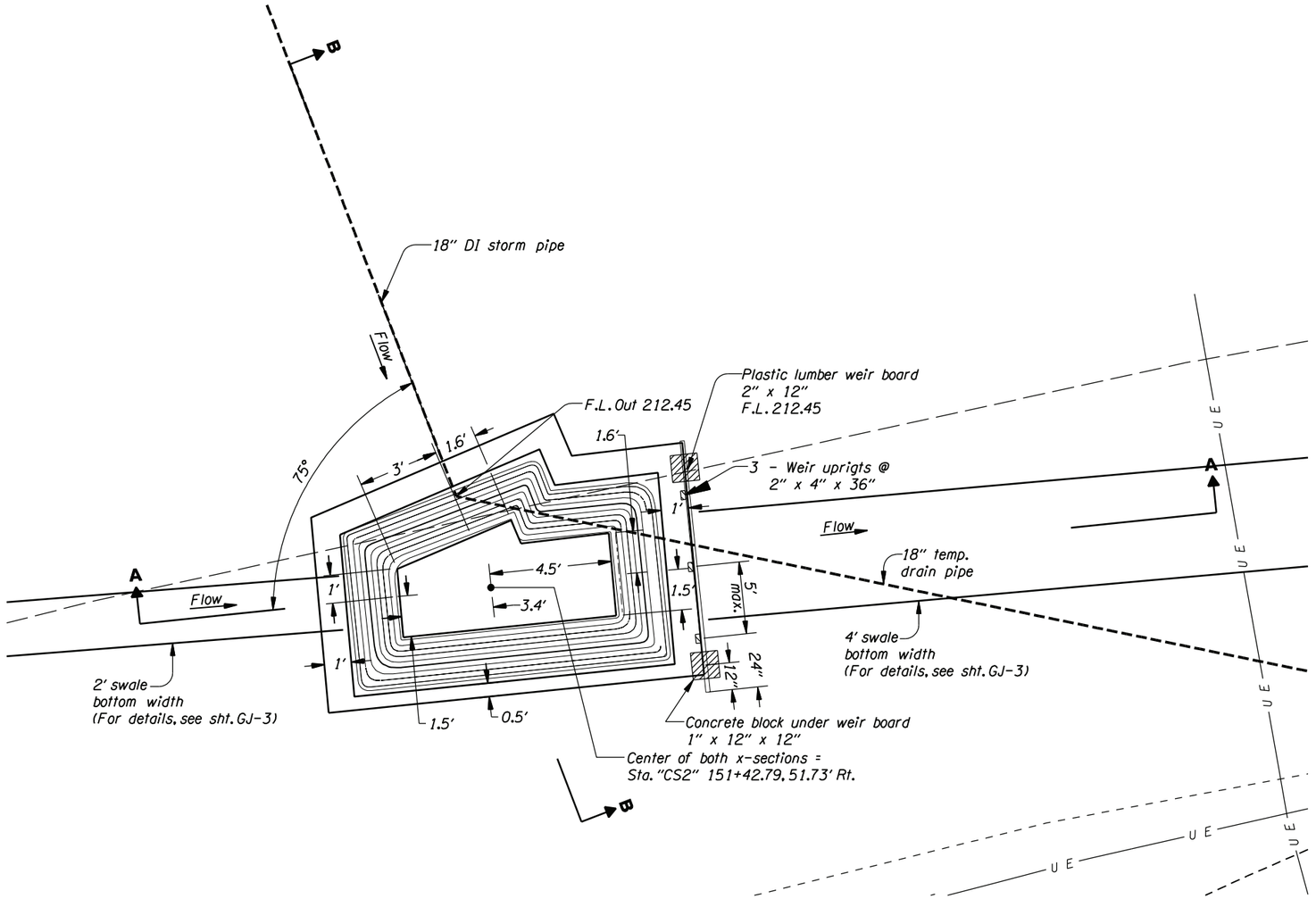
Drafted by - Charlotte Gerken

DRAINAGE & UTILITIES

SHEET NO. 4A



BASIN DETAILS

REGISTERED PROFESSIONAL ENGINEER
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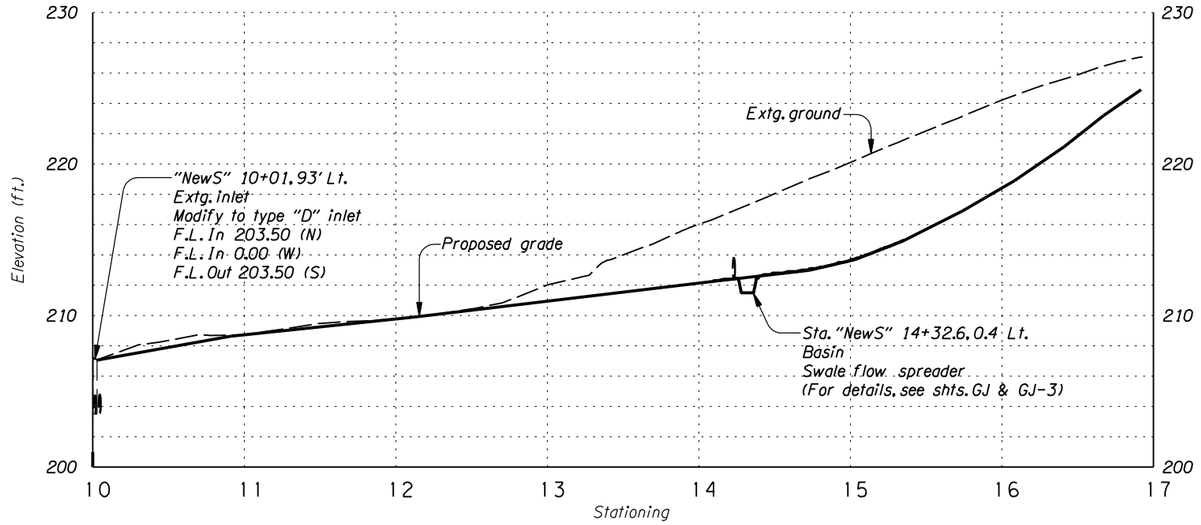
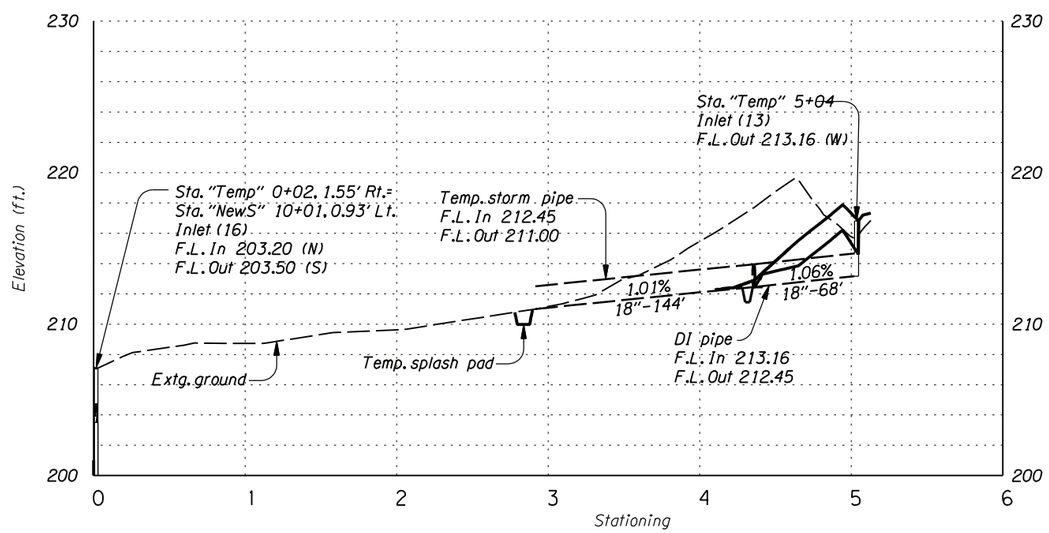
WATER QUALITY PLAN

SHEET NO. GJ



"NewS" PROFILE

Sta. "NewS" 10+00 =
Sta. "CS2" 155+81.63, 49.37' Rt.
Sta. "NewS" 16+92.91 =
Sta. "CS2" 148+58.08, 55.27' Rt.



TEMPORARY DRAIN PROFILE

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - Geo/Hydro/HazMat Unit

I5 SB: CARMAN DR - LOWER BOONES FERRY SEC.
PACIFIC HIGHWAY
WASHINGTON COUNTY

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Designed by - Ed Foltyn
Drafted by - Charlotte Gerken

WATER QUALITY PROFILE

SHEET NO. GJ-2

REGISTERED PROFESSIONAL ENGINEER
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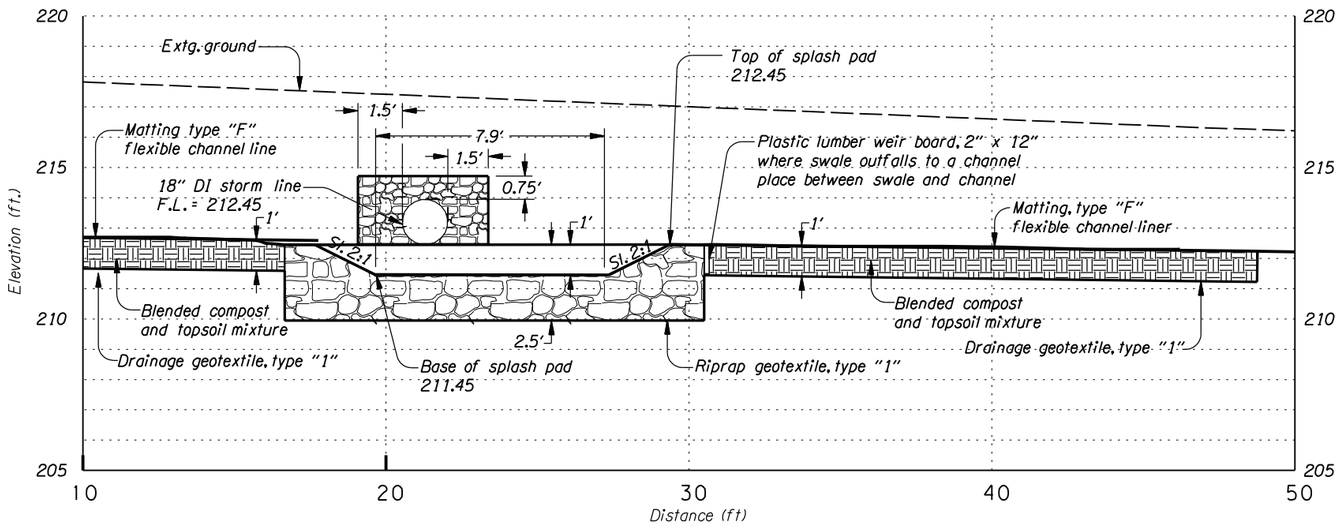
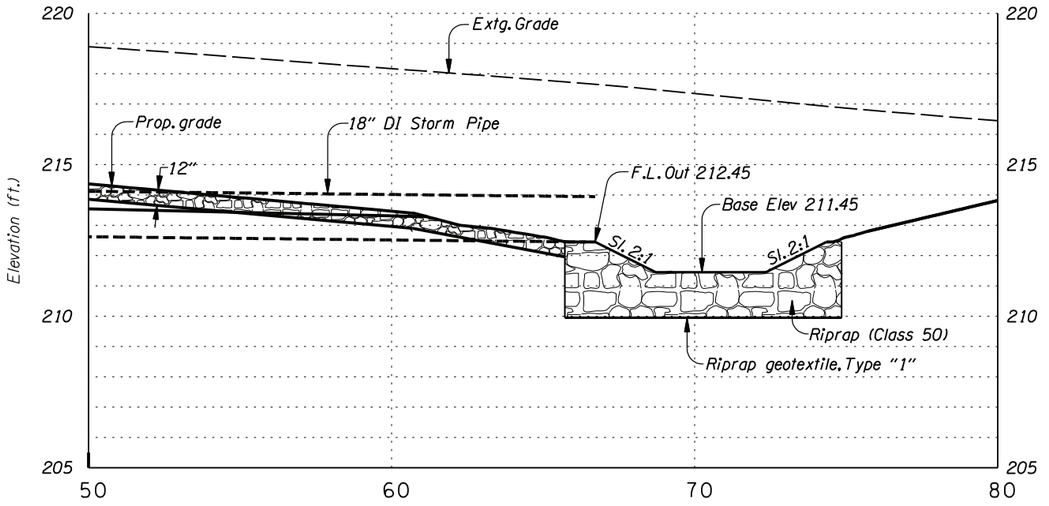
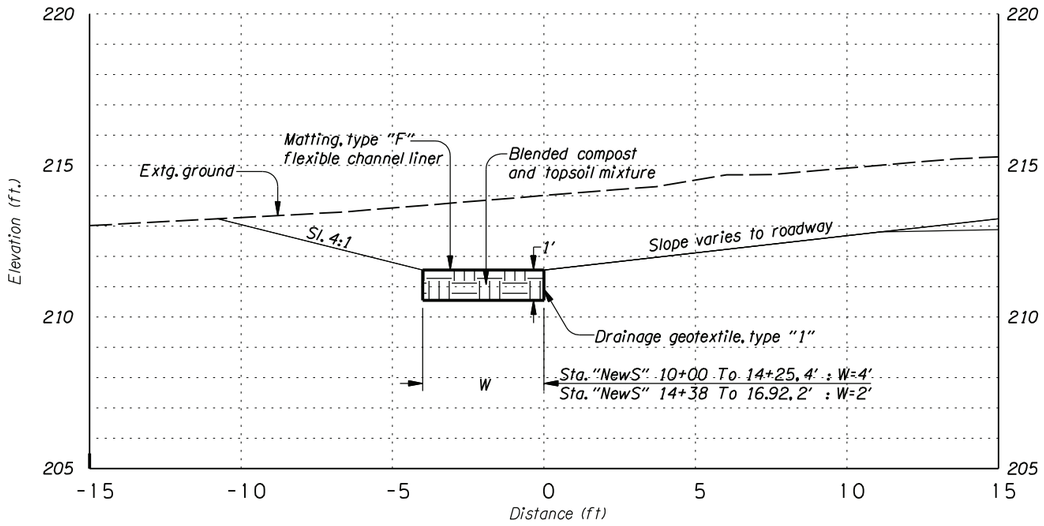


SECTION A-A

NOTE:
Pipe F.L. elev. and top of weir board elev. are the same



SECTION B-B



WATER QUALITY SWALE
Typical X-section

OREGON DEPARTMENT OF TRANSPORTATION

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WATER QUALITY DETAILS

SHEET NO. GJ-3

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