OPERATION & MAINTENANCE MANUAL

DFI No. : [D00977]
Facility Type: Newberg Dundee Bypass Water Quality Bio-infiltration Swales

(Swale #D00977: GJ-4, GJ-10, 22B, 22F and 22D in attached plans)

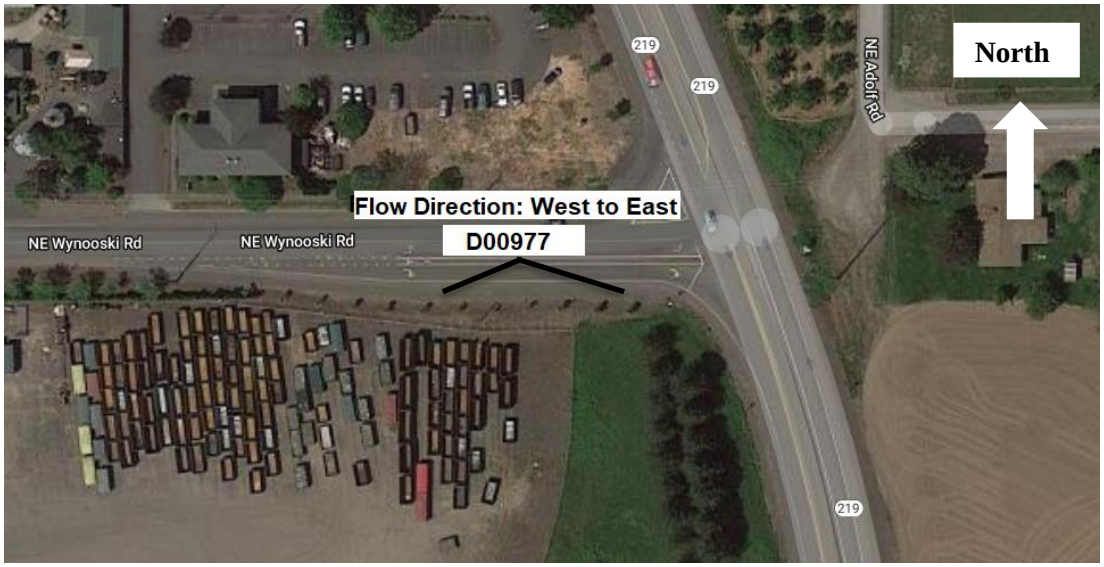

Figure 1: Facility location map

[January 2019]

INDEX

1. Identification

Drainage Facility ID (DFI):	**[D00977]**
Facility Type:	[Bio-infiltration Swale]
Construction Drawings:	(V-File Number) [49V-017]
Location:	District: 3
	Highway No.: 140
	Mile Post: [22.18; 22.21 (beg./end)]
	Description: located near the intersection of OR 219 and Wynooski Road on the south side of Wynooski Road and west of OR 219.

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:	Consultant Designer – Parametrix, Rebecca S. Cushman, PE, 206-394-3679
Facility construction:	2016/2017
Contractor:	K&E Excavating

4. Storm Drain System and Facility Overview

The featured bio-infiltration swales (referred to from this point forward as a (swale) functions both as a water quality treatment and retention facility. The facility provides water quality treatment of smaller storm events and retention of the larger storm events. Suspended solids and pollutants are filtered out through a compost amended soil medium used as the growing medium in the swales. Smaller, water quality events, will infiltrate through the compost amended soil where a perforated pipe will convey the stormwater to the ultimate discharge location. Larger rain events may exceed the infiltration capacity of the compost amended soil and be collected by an area drain.

A sedimentation manhole is located immediately upstream of the swale providing preliminary sedimentation removal.

The following elements are included with this document. Additional information can be found in the supporting drainage report '*Drainage report to support phase 1G final stormwater management facility design, November 2015'*.

A. Maintenance equipment access:
   The water quality treatment compost medium in the swales is not to be compacted. Therefore tracked or tired equipment (equipment) is not allowed in the swale.

B. Heavy equipment access into facility:

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

C. Special Features:

   ☒ Amended Soils
   ☐ Porous Pavers
   ☐ Liners
   ☐ Underdrains

5. Facility Haz Mat Spill Feature(s)

The bio-infiltration swale is not to be used as a hazardous material containment facility. The facility should be protected from hazardous material spills and contamination. A hazardous material spill plan should include protecting the pond from contamination.

6. Auxiliary Outlet (High Flow Bypass)

Auxiliary Outlets are provided if the primary outlet control structure cannot safely pass the projected high flows.

The auxiliary outlet feature for this facility is:

☐ Designed into facility:

☒ Other, as noted below:
Should the ditch inlet or conveyance system become compromised, water will pond in the swale and back up. Once the water reaches the top of the swale, water will begin to flow toward the south and a draw that empties into Hess Creek.

7. Maintenance Requirements

Routine maintenance tables 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/Pages/MGuide.aspx

The following stormwater facility maintenance table (See ODOT Maintenance Guide) should be used to maintain the facility outlined in this Operation and Maintenance Manual. The selected tables are provided and attached to this manual:

Mark as Required and always include Table 1:

- ☒ Table 1 (general maintenance)
- ☐ Table 2 (stormwater ponds)
- ☒ Table 3 (water quality bio-infiltration 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 Table

8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the road waste 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 Manager	(503) 986-2990
ODEQ Northwest Region Office	(503) 229-5263

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

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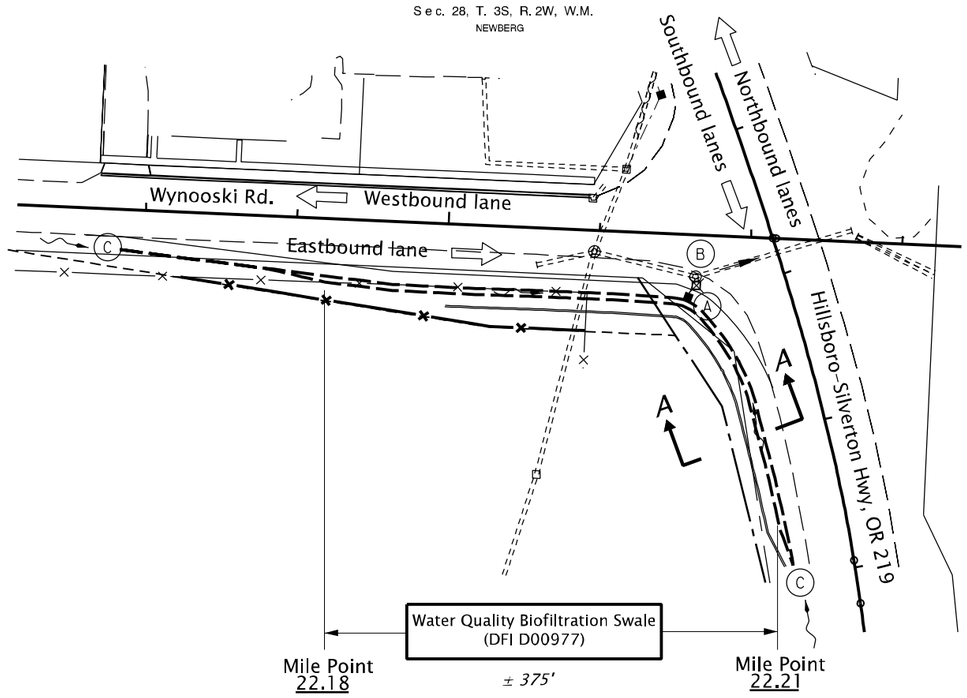
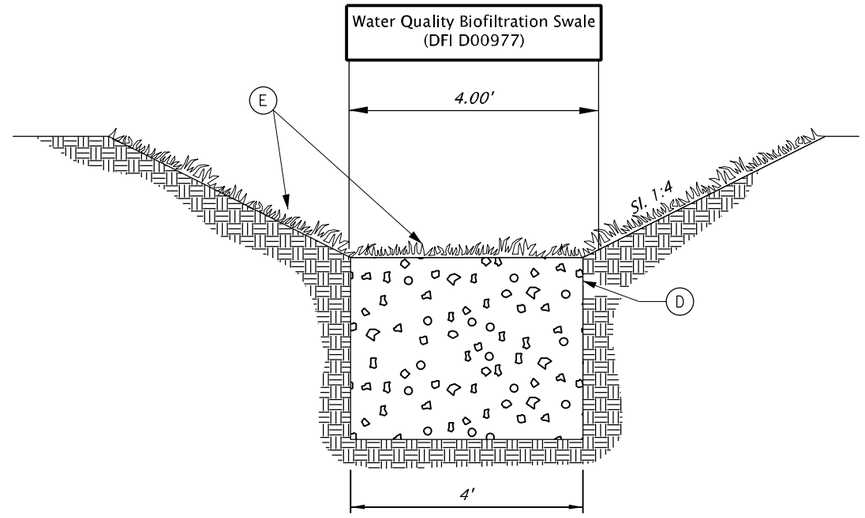
Appendix A

Content:

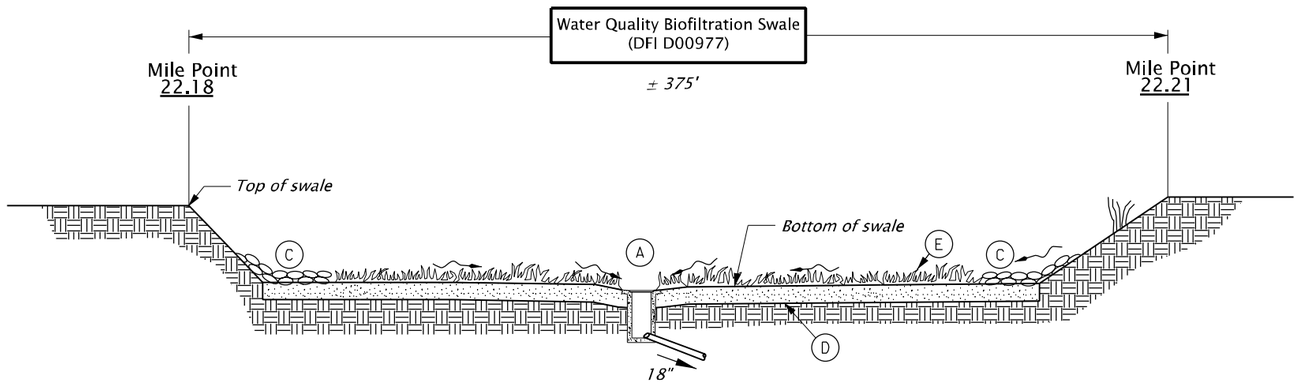
- **O&M Plan and Detail Drawing(s)**



PLAN
N.T.S.



SECTION A-A
N.T.S.



PROFILE
N.T.S.

LEGEND:

- (A) *Type 'D' Ditch Inlet Structure*
- (B) *Manhole Connecting Area Drain to Conveyance Line*
- (C) *Inlet Ditch*
- (D) *Water Quality Soil Mixture Nom. Thickness 18"*
- (E) *Water Quality Seeding*
- *Manhole* (◉ and/or ◎)
- *Inlet* (■ and/or □)
- *Storm Pipe (Facility)*
- *Storm Pipe*
- *Conveyance Direction*
- *Pavement / Facility Flow Path*
- *Traffic Flow Direction*

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 1 of 1

Prepared By: R. CUSHMAN

Drafted By: D. GODFREY

DFI D00977
MAINTENANCE DISTRICT 3 HWY 140
WATER QUALITY BIOFILTRATION SWALE
HILSBORO-SILVERTON HWY MP22.18-MP22.21
YAMHILL COUNTY

Appendix B

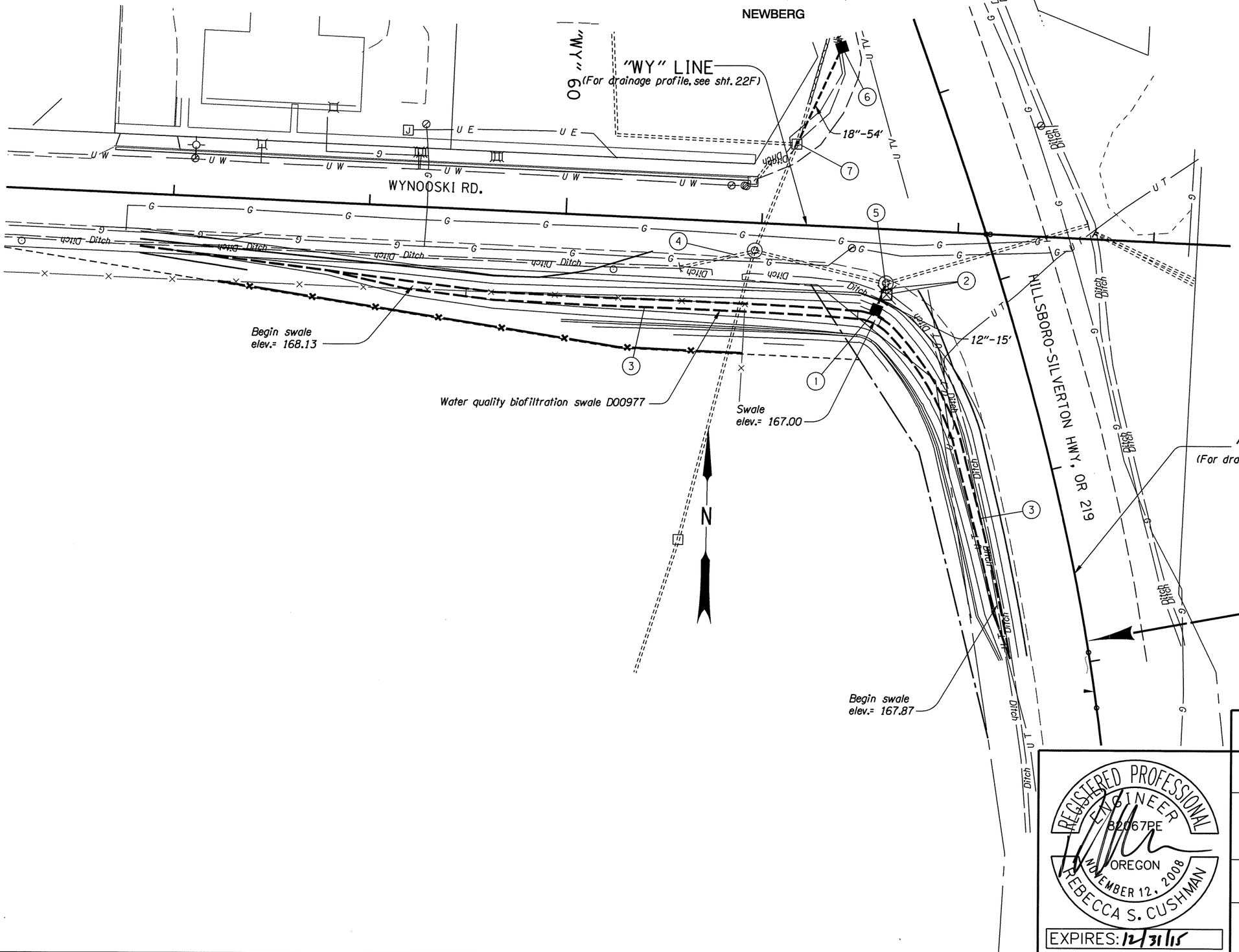
Content:

- **Plans and Detail Drawing(s)**

Sec. 28, T. 3S, R. 2W, W.M.

NEWBERG

49V-017



(1) *Sta. "WY" 61+60.23, 41.35' Rt.*
Const. type "D" inlet
Rim elev.= 167.20
I.E. (out)= 166.00

(2) *Remove inlet*
Remove pipe - 5'
Inst. 12" storm sew. pipe - 15'
5' depth
Connect to extg. manhole

(3) *Const. Water quality biofiltration swale D00977*
width= 4'
side slopes= 1:4
s=0.0050'/ft
Inst. field facility markers - 4
(For details, see sht. GJ-4 and GJ-12)

(4) *Remove pipe - 39'*
Trench resurf. - 4 sq. yd.

(5) *Minor adjust manhole*

(6) *See sht. 21B, note 5*
Const. type "D" inlet
Inst. storm sew. pipe

(7) *See sht. 21B, note 6*
Protect extg. inlet
Inst. 18" storm sew. pipe

END OF CONTRACT PROJECT STP-S000(973)

STA. "HSc"83+92 (M.P. 22.19)

REGISTERED PROFESSIONAL ENGINEER
82067PE
OREGON
NOVEMBER 12, 2008
REBECCA S. CUSHMAN
EXPIRES: 12/31/15

OREGON DEPARTMENT OF TRANSPORTATION

Parametrix

OR18: NEWBERG-DUNDEE BYPASS (PHASE 1G) (SPRINGBROOK RD) SEC.
HILLSBORO-SILVERTON, PACIFIC HWY WEST, & SALMON RIVER HWYS.
YAMHILL COUNTY

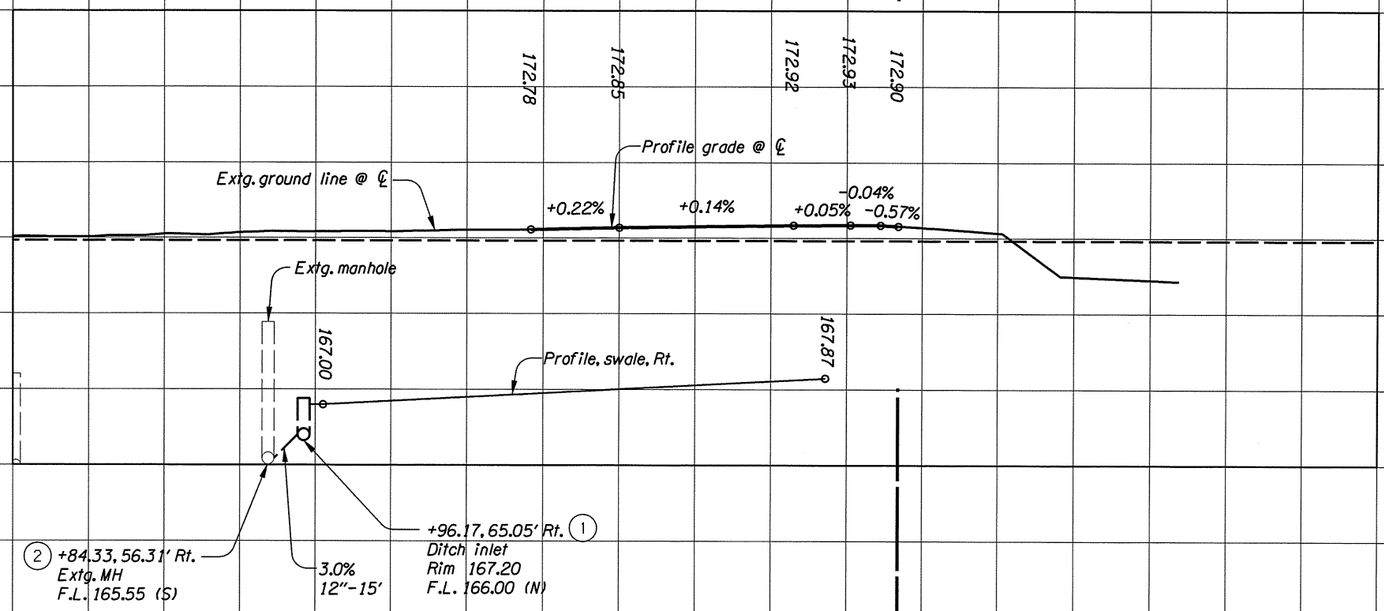
Design Team Leader - Rebecca Cushman
Designed By - Ryan Retzlaff
Drafted By - Jim Phillips

DRAINAGE & UTILITIES

SHEET NO. 22B

49V-017

"HSc" LINE



END OF CONTRACT PROJECT
STP-S000(973)
STA. "HSc" 83+92 (M.P. 22.21)

81 82 83 84 85

OREGON DEPARTMENT OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
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REBECCA S. CUSHMAN
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OR18: NEWBERG-DUNDEE BYPASS (PHASE 1G) (SPRINGBROOK RD) SEC.
HILLSBORO-SILVERTON, PACIFIC HWY WEST, & SALMON RIVER HWYS.
YAMHILL COUNTY

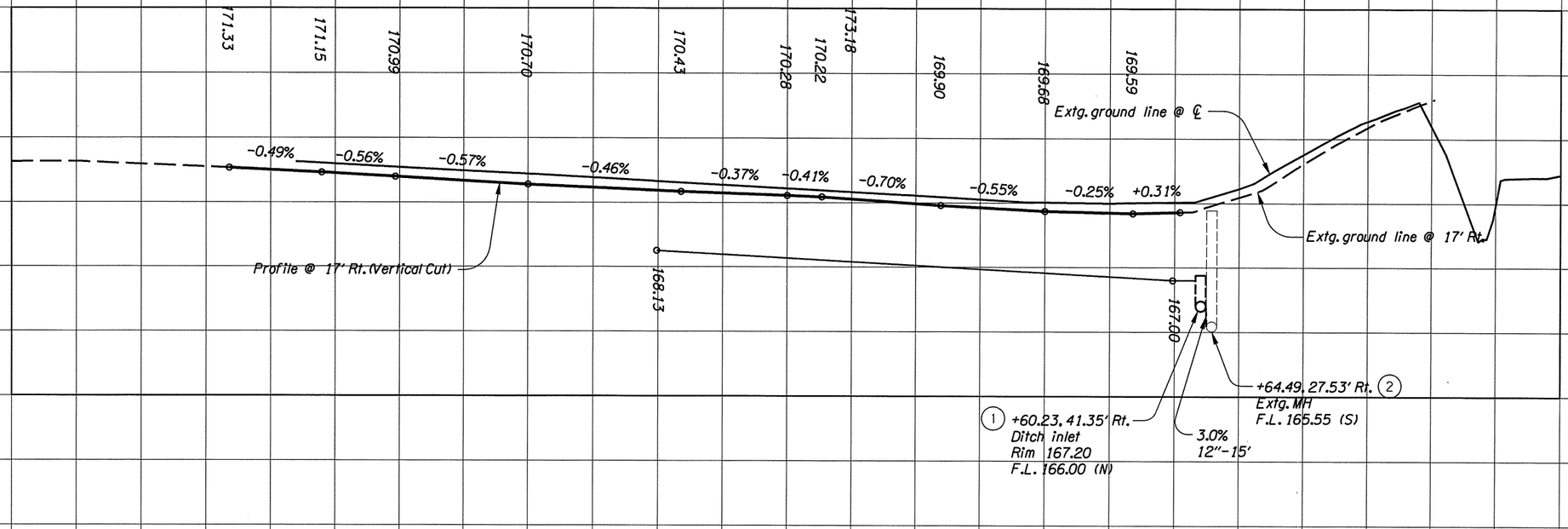
Design Team Leader - Rebecca Cushman
Designed By - Ryan Retzlaff
Drafted By - Jim Phillips

DRAINAGE PROFILE

SHEET NO. 22D

49V-017

"WY" LINE



57 58 59 60 61 62 63 64

REGISTERED PROFESSIONAL ENGINEER
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OREGON DEPARTMENT OF TRANSPORTATION

Parametrix

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HILLSBORO-SILVERTON, PACIFIC HWY WEST, & SALMON RIVER HWYS.
YAMHILL COUNTY

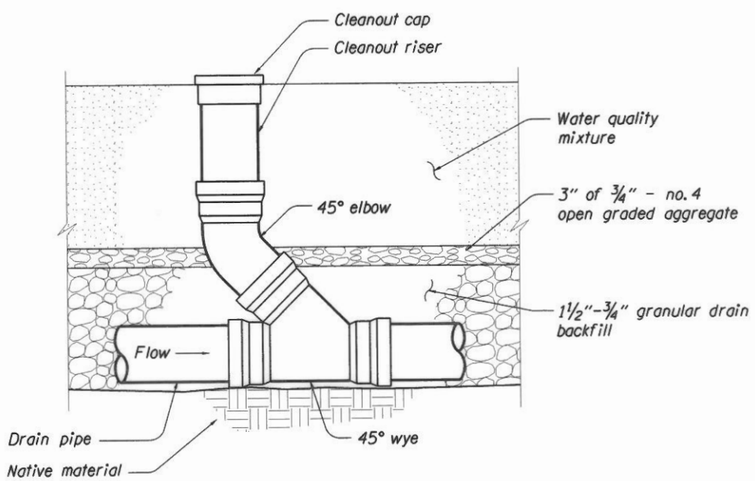
Design Team Leader - Rebecca Cushman
Designed By - Ryan Retzlaff
Drafted By - Jim Phillips

DRAINAGE PROFILE

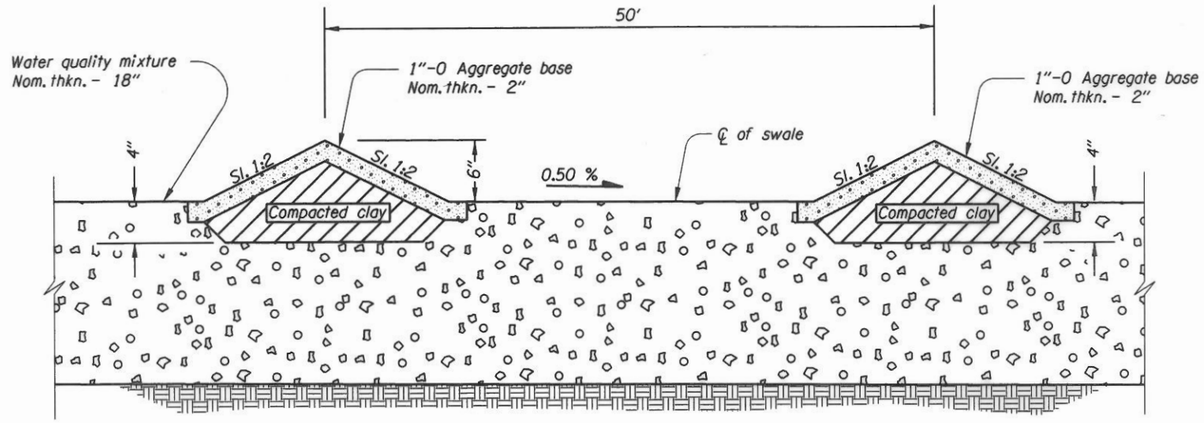
SHEET NO. 22F

CLEANOUT TABLE

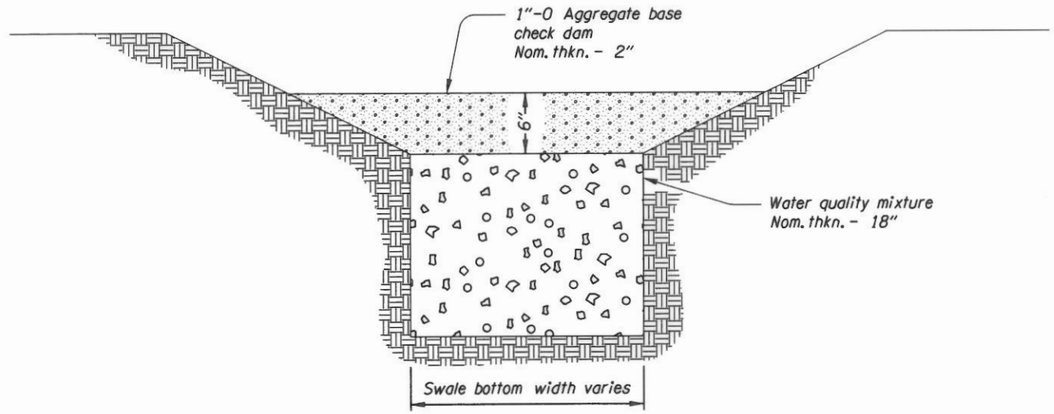
Cleanout #	Sta. and offset	Cleanout #	Sta. and offset
1	"HSc" 44+21, 35.50' Lt.	41	"SB" 27+46, 26.00' Rt.
2	"HSc" 45+25, 35.50' Lt.	42	"SB" 28+85, 26.00' Rt.
3	"HSc" 46+25, 35.60' Lt.	43	"SB" 29+25, 24.25' Lt.
4	"HSc" 47+60, 37.90' Lt.	44	"SB" 29+85, 26.00' Rt.
2 5	"HSc" 48+60, 39.00' Lt.	45	"SB" 30+91, 26.00' Rt.
2 6	"HSc" 49+60, 39.00' Lt.	46	"SB" 31+00, 24.25' Lt.
7	"HSc" 49+72, 39.00' Lt.	47	"SB" 31+85, 26.00' Rt.
8	"HSc" 50+75, 39.90' Lt.	48	"SB" 33+16, 25.00' Rt.
9	"HSc" 51+60, 32.00' Rt.	49	"SB" 33+58, 24.25' Lt.
10	"HSc" 53+73, 40.50' Rt.	50	"SB" 34+50, 24.25' Lt.
11	"HSc" 54+75, 40.50' Rt.	51	"SB" 35+63, 26.00' Rt.
12	"HSc" 56+20, 40.50' Rt.	52	"SB" 35+85, 24.25' Lt.
13	"HSc" 57+30, 54.50' Lt.	53	"SB" 37+63, 24.25' Lt
14	"HSc" 57+85, 40.50' Rt.	54	"SB" 36+60, 26.00' Rt.
15	"HSc" 58+30, 54.42' Lt.	55	"SB" 37+65, 26.00' Rt.
16	"HSc" 59+30, 45.24' Lt.	56	"SB" 38+60, 24.25' Lt.
17	"HSc" 60+10, 40.50' Lt	57	"SB" 38+60, 26.00' Rt
18	"HSc" 61+15, 40.50' Lt.	58	"SB" 40+14, 24.25' Lt.
19	"HSc" 62+15, 40.50' Lt	59	"SB" 40+40, 26.00' Rt.
20	"HSc" 63+15, 40.50' Lt.	60	"SB" 40+67, 24.25' Lt.
21	"HSc" 64+15, 40.50' Lt.	61	"SB" 41+58, 26.00' Rt.
1 22	"HSc" 66+23, 40.50' Lt.	62	"SB" 41+70, 24.25' Lt.
23	Not Used	63	"SB" 43+44, 24.50' Rt.
1 24	Not Used	64	"SB" 43+53, 24.25' Lt.
25	"IP" 10+85, 34.22' Rt.	65	"SB" 44+50, 24.25' Lt.
26	"IP" 10+90, 28.20' Lt.	66	"SB" 44+65, 24.25' Rt.
27	"IP" 11+85, 30.64' Rt.	67	"SB" 45+53, 24.25' Lt.
28	"IP" 11+92, 28.20' Lt.	68	"SB" 45+57, 24.25' Rt.
29	"SB" 10+85, 38.25' Lt.	69	"SB" 46+56, 24.25' Lt.
30	"SB" 11+85, 38.25' Lt.	70	"SB" 46+72, 26.00' Rt.
31	"SB" 12+91, 41.70' Lt.	71	"SB" 47+50, 26.00' Rt.
32	"SB" 14+30, 29.50' Lt.	72	"SB" 47+85, 24.25' Lt.
33	"SB" 20+10, 26.00' Rt.	73	"SB" 48+47, 26.00' Rt.
34	"SB" 21+20, 26.00' Rt.	74	"SB" 48+88, 24.25' Lt.
35	"SB" 22+07, 26.00' Rt.	75	"SB" 49+55, 26.00' Rt.
36	"SB" 23+68, 26.00' Rt.	76	"SB" 51+65, 26.00' Rt.
37	"SB" 24+72, 26.00' Rt.	77	"SB" 52+17, 24.25' Lt.
38	"SB" 24+86, 26.00' Rt.	78	"SB" 52+74, 26.00' Rt.
39	"SB" 25+70, 26.00' Rt.	79	"SB" 52+84, 26.00' Rt.
40	"SB" 27+07, 25.50' Lt.	80	"SB" 53+87, 26.00' Rt.
		81	"SB" 50+56, 24.25' Lt. 3



CLEANOUT DETAIL



SWALE PROFILE SECTION



SWALE SECTIONS

WATER QUALTIY BIOFILTRATION SWALE

NOTES:

1. Hand tamp water quality mixture material directly under check dam.
2. Key clay core into water quality mixture material.

No.	DATE	REVISIONS	BY
1	03-31-16	Deleted Wilsonville Rd. connection to Hwy 219, & revised drainage design	J.A.P.
2	05-17-16	Updated stormwater planter design and adjusted cleanout spacing	J.A.P.
3	01-19-17	Adjusted storm planter, pipes, inlets, and cleanouts for new driveway location	J.A.P.

REGISTERED PROFESSIONAL ENGINEER
58027
OREGON
JULY 15, 2003
JAMES A PHILLIPS
EXPIRES: 12/31/18

OREGON DEPARTMENT OF TRANSPORTATION

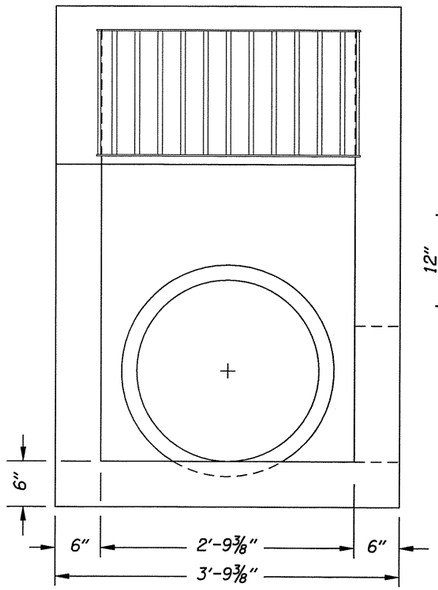
Parametrix

OR18: NEWBERG-DUNDEE BYPASS (PHASE 1G) (SPRINGBROOK RD) SEC.
HILLSBORO-SILVERTON, PACIFIC HWY WEST, & SALMON RIVER HWYS.
YAMHILL COUNTY

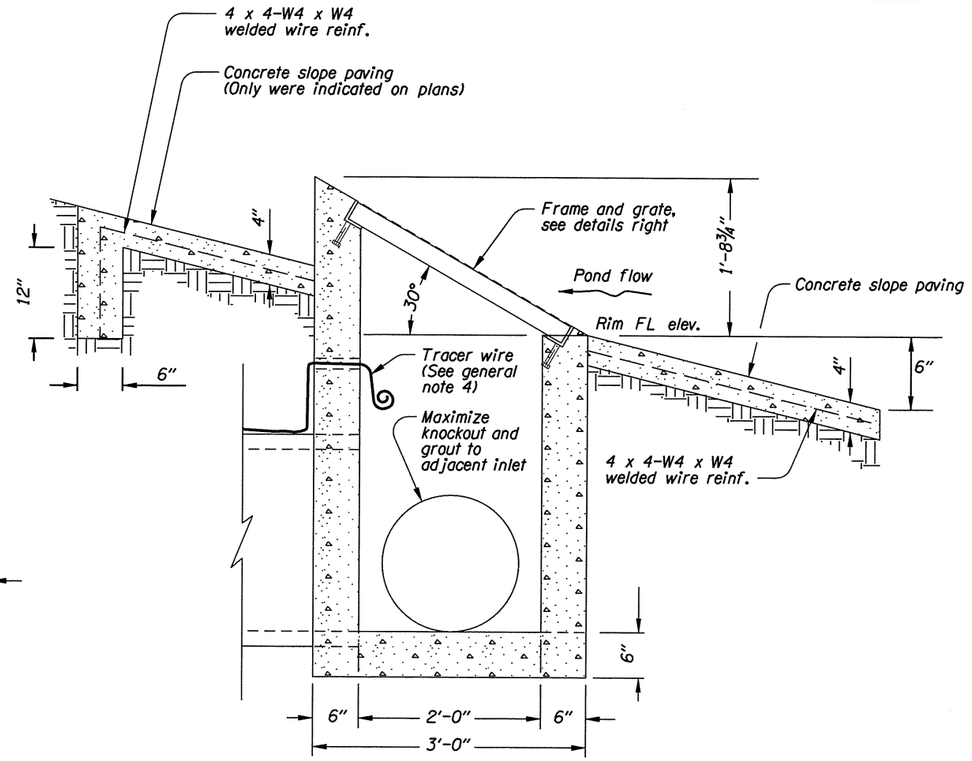
Design Team Leader - Rebecca Cushman
Designed By - Ryan Retzlaff
Drafted By - Jim Phillips

WATER QUALITY DETAILS

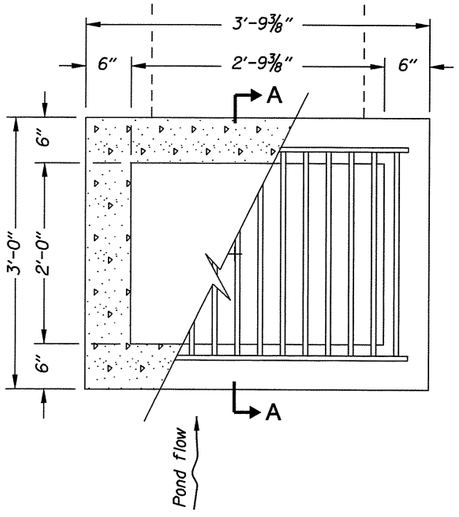
SHEET NO. GJ-4



ELEVATION

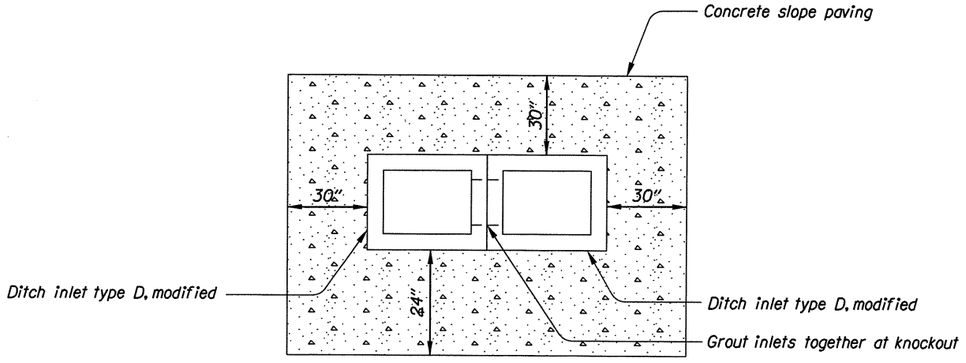


SECTION A-A



PLAN

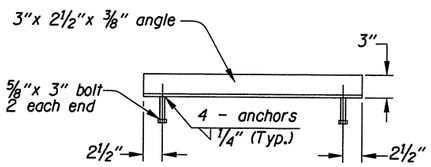
DITCH INLET TYPE D - MODIFIED



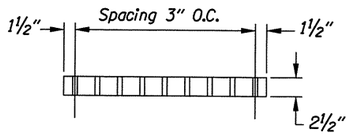
PAVED CULVERT END SLOPE - DUAL INLETS

GENERAL NOTES:

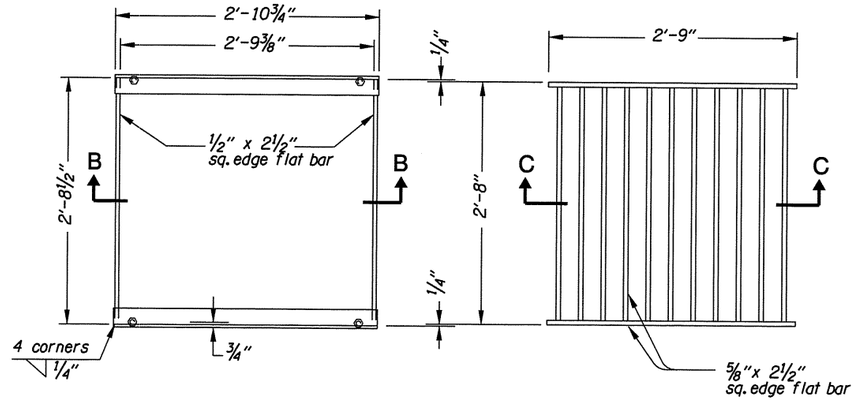
1. *All concrete shall be commercial grade concrete.*
2. *Catch basin, frame, and grates shall meet H20 loading.*
3. *⅝" cross bars shall be flush with the grate surface and may be fillet welded, resistance welded or electroforged to bearing bars.*
4. *See Std. Drg. RD336 for tracer wire details, or approved alternate.*
5. *All exposed conc. edges shall be chamfered ¾".*
6. *All metal reinforcement shall be placed 1½" clear of nearest face of concrete unless shown or noted otherwise.*



SECTION B-B



SECTION C-C



PLAN
FRAME

PLAN
GRATE - TYPE 1

REGISTERED PROFESSIONAL ENGINEER
82067PE
OREGON
NOVEMBER 12, 2008
REBECCA S. CUSHMAN
EXPIRES: 12/31/15

OREGON DEPARTMENT OF TRANSPORTATION

Parametrix

OR18: NEWBERG-DUNDEE BYPASS (PHASE 1G) (SPRINGBROOK RD) SEC.
HILLSBORO-SILVERTON, PACIFIC HWY WEST, & SALMON RIVER HWYS.
YAMHILL COUNTY

Design Team Leader - Rebecca Cushman
Designed By - Ryan Retzlaff
Drafted By - Jim Phillips

WATER QUALITY DETAILS

SHEET NO.
GJ-10

Appendix C

Content:

- **Maintenance Tables**

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 (brushing)	Vegetation growth restricts access, limits sight distance, obstructs water flow, or interferes with maintenance activity.	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 not allowed within aboveground water quality and detention facilities.
	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.

Table 1: General Maintenance			
Maintenance Component	**Defect or Problem**	**Condition When Maintenance is Needed**	**Recommended Maintenance to Correct Problem**
	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 Bio-Infiltration Swales

Swales should provide even sheet flow and infiltration 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 (brushing)	Vegetation growth restricts access, limits sight distance, obstructs water flow, or interferes with maintenance activity. Swales should not be mowed. Vegetation should be cut down in targeted areas where needed.	Mow access, berms, and sideslopes as noted in District Integrated Vegetation Management (IVM) Plan. Heavy equipment is not allowed on the swale bottom.
	Sediment accumulation in pre-treatment features (e.g. forebays, basins, sedimentation manholes)	Sediment affects flow. Sediment jeopardizes infrastructure.	Remove sediment that prevents adequate drainage into swale. Use methods that minimize disturbance to surrounding vegetation. Heavy equipment is not allowed on swale bottoms. 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 vegetation Sediment inhibits vegetation growth.	Where practical use a Vactor® truck to remove sediment from vegetated areas. When Vactoring® is not practical, follow ditch cleaning practices. Restore slope and geometry to design standards, if necessary. Reseed/replant vegetation cover where needed. Stormwater should infiltrate or flow toward outlet once inflow has ceased.

Table 3: Maintenance of Water Quality Bio-Infiltration Swales

Swales should provide even sheet flow and infiltration 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 is sparse or eroded patches occur in more than 10 percent of swale.	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 Bio-Infiltration Swales

Swales should provide even sheet flow and infiltration 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 (if installed) are typically below the vegetation surface and may not be visible. 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.