OPERATION & MAINTENANCE MANUAL

Water Quality Bioretention Pond

Manual prepared: July 2022

DFI No. D01392

Bioretention Pond DFI No. D01392

Figure 1: DFI No. D01392, looking [note cardinal direction]

1. Identification

Drainage Facility ID (DFI):	D01392
Facility Type:	Retention Pond
Construction Drawings:	(V-File Numbers) 55V-086
Location:	District: 10
	Highway No.: 017
	Mile Post: 14.77 to 14.83, [RT]

2. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions for stormwater ponds.

3. Facility Location

The location map below details the facility location. The highway, mile posts, side streets, access location, and stormwater flow directions are noted on the map.

Facility location type: Roadway shoulder

Flow direction: [south]

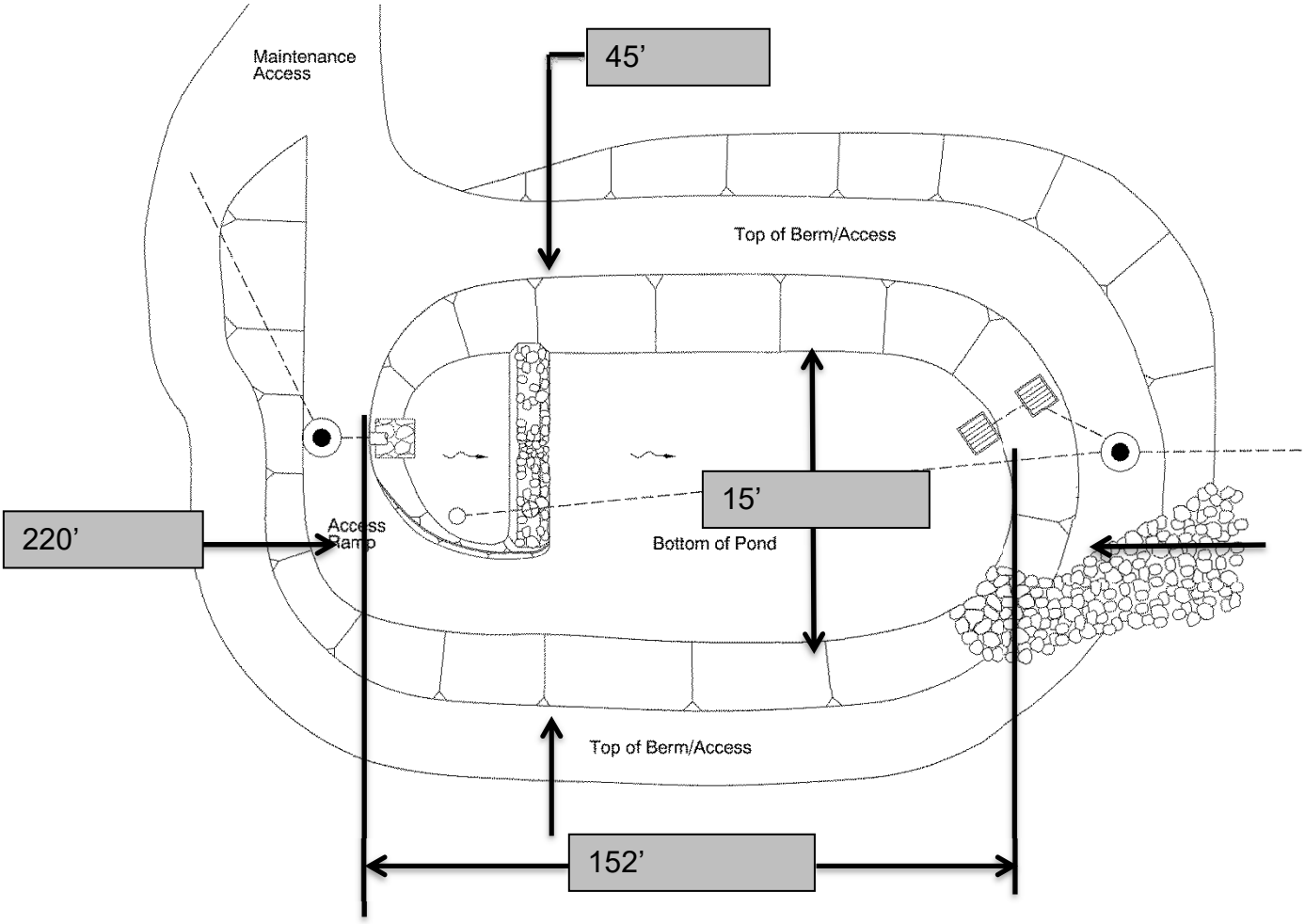
Figure 2**: [ODOT Geo-Environmental to insert facility location map]**

4. Facility Summary

The pond size is based on storage volume, the bottom and top surface areas and the depth are used for this measurement.

The bottom area and top area of the pond is:

Bottom Area (sq. ft.)	Top Area (sq. ft.)
2,263	9,188

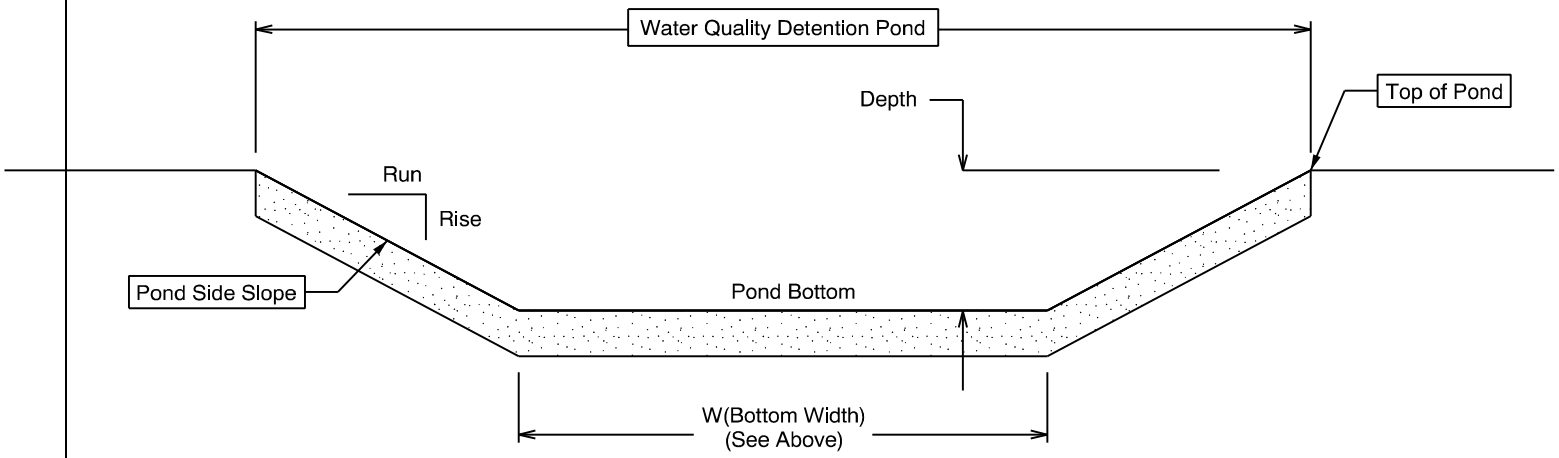


The depth of the pond is the vertical distance measured from the bottom of the pond to the top. The slope of the pond sides is presented by a vertical distance (rise) followed by the horizontal distance (run).

Depth and side slopes:

Depth (feet)
5

Side Slope	
Rise (feet)	1
Run (feet)	3



Site Specific Information: Drainage berm prevents surface flows into pond from adjacent private property. Loose riprap pad between access road and back of sidewalk protects slope from erosion.

Infiltration into the subsurface is the only outlet for this facility.

5. Facility Access

Maintenance access to the facility:

☐Roadside pad	☐Roadside shoulder
☐Access road with Gate	☒Access road without Gate

Figure 3: [insert post construction facility access photo and caption text]

6. Operational Components / Maintenance Items

Classification and Standard Operational (Op) Plan:

This facility is classified as a:

☐ Detention Pond (Op Plan A)	☒ WQ Bioretention Pond (Op Plan B)	☐ WQ Extended Detention Dry Pond (Op Plan C)	☐ WQ Detention Pond/Biofiltration Swale Combo (Op Plan D)
A standard operational plan illustrates the general facility footprint configuration and explains the purpose of each facility component. Operational plans (A,B,C,D) are provided in the Standard Operation Manual.			

See Appendix A for the site specific operational plan.

Key Features/Items:

This facility is classified as a:

☒ Dry Pond	☐ Wet Pond
The pond is wet during storm events and dries during periods of no precipitation.	**The pond has constant presence of water year round. A portion of the pond dries during periods of no precipitation.**

This facility includes a **high flow bypass component**:

☒ No	☐ Yes
There is no bypass component. High flows drains into and through the facility	**There is a bypass component. Only low/small flows drain into the pond. High flows are diverted around the pond using a bypass component**

This facility includes a **proprietary structure(s)**:

☒ No	☐ Yes
There are no proprietary structures associated with this facility.	**A proprietary structure is used in the operation of this facility. The proprietary structure is a/an:**

Operational Components

The facility components table (**Table 1**) has been provided to highlight the applicable components for this facility. The component is in use when the box contains an "x" (e.g. ☒).

The Standard Operation Manual for Ponds (implemented Month YYYY) outlines facility operation, typical footprint configuration, and component definitions and details. A link to the manual is attached to the feature marker in TransGIS. https://gis.odot.state.or.us/TransGIS/

Maintenance Items

Operational components marked in **Table 1** should be inspected and maintained according to Section 7. Each facility component is defined and detailed in the Standard Operation Manual using the associated ID number indicated in the table below.

Table 1: Stormwater Pond Components		ID #
Upstream Manholes/Structures		
Pre-treatment Manhole Type:	☐	**P1**
Water Quality Manhole Type:	☐	**P2**
Flow Splitter Manhole	☐	**P3**
Standard Manhole	☐	**P4**
Sediment Basin/Forebay	☐	**P5**
Forebay Dewatering Riser Pipe (outlet)	☐	**P6**
Facility Inlet		
Pavement Sheet Flow	☐	**P7**
Inlet Pipe(s)	☒	**P8**
Open Channel Inlet	☐	**P9**
Riprap Pad (Energy Dissipater)	☒	**P10**
Ground Cover		
Grass Bottom	☐	**P11**
Grass Side Slopes	☐	**P12**
Granular Drain Rock	☐	**P13**
Plantings	☐	**P14**
Underground Components		
Geotextile Fabric: Type 1	☒	**P15**
Impermeable Liner	☐	**P16**
Water Quality Mix	☒	**P17**
Perforated Pipe	☐	**P18**
Bottom Marker (ex. Porous Pavers)	☒	**P19**

Flow Spreader		
Anchored Board (midpoint of pond or every 50 feet along pond bottom)	☐	**P20**
Other:	☐	**P21**
Facility Outlet		
Catch Basin with Grate	☐	**P22**
Outlet Pipe(s)	☐	**P23**
Outlet/Flow Control Structure	☐	**P24**
Auxiliary Outlet	☐	**P25**
Hazmat Control Valve:	☐	**P26**
Outfall Type		
Waterbody (**C**reek/**L**ake/**O**cean)	☐ **C** ☐ **L** ☐ **O**	**P27**
Ditch	☐	**P28**
Storm Drain System	☐	**P29**
Outfall Components		
Riprap Pad	☐	**P30**
Riprap Bank Protection	☐	**P31**

7. Maintenance

Maintenance Frequency/Maintain Records

a. Inspect annually. Preferably prior to the rainy season.
b. Clean and maintain as necessary. Refer to Activity 125 in the Maintenance Guide for conditions when maintenance is needed.
c. Keep a record of inspections, maintenance, and repairs.

Maintenance Guide/Maintenance Actions

The Maintenance Guide outlines the standard maintenance actions for water quality facilities under Activity 125.

There are standard maintenance tables for standard ODOT designs. The maintenance tables describe the maintenance component, the defect or problem, the condition when maintenance is needed, and the recommended maintenance to correct the problem. Use the following tables to maintain ODOT Ponds:

- Table 1 (General Maintenance): Contains general maintenance and inspection guidelines that are applicable to all ODOT water quality facilities
- Table 2 (Maintenance of Stormwater Ponds): Contains maintenance information for ponds

The ODOT Maintenance Guide can be viewed at the following website:
http://www.oregon.gov/ODOT/HWY/OOM/pages/mguide.aspx

The Blue Book can be viewed at the following website:
http://www.oregon.gov/ODOT/Maintenance/Documents/blue_book.pdf

8. Limitations

There are access limitations for this facility:

☐ No	☒ Yes
Access pond via 16 foot gravel road from US20 south of the O.B. Riley/Cook roundabout.	

Ponds are designed to allow equipment access along the bottom if an access grid is installed. If an access grid is NOT installed, vehicles entering the pond can create depressions (tire ruts), damage vegetation, or damage structural components (e.g. flow spreaders). These conditions may result in poor treatment and drainage performance.

If no access grid then: Equipment wheels should be kept on the tops and side slopes. Mower arms may be run along the pond bottom.

9. Waste Material Handling

Material removed from the facility is defined as waste by the Department of Environmental Quality (DEQ). Refer to the road waste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:

http://www.oregon.gov/ODOT/HWY/OOM/pages/ems.aspx

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

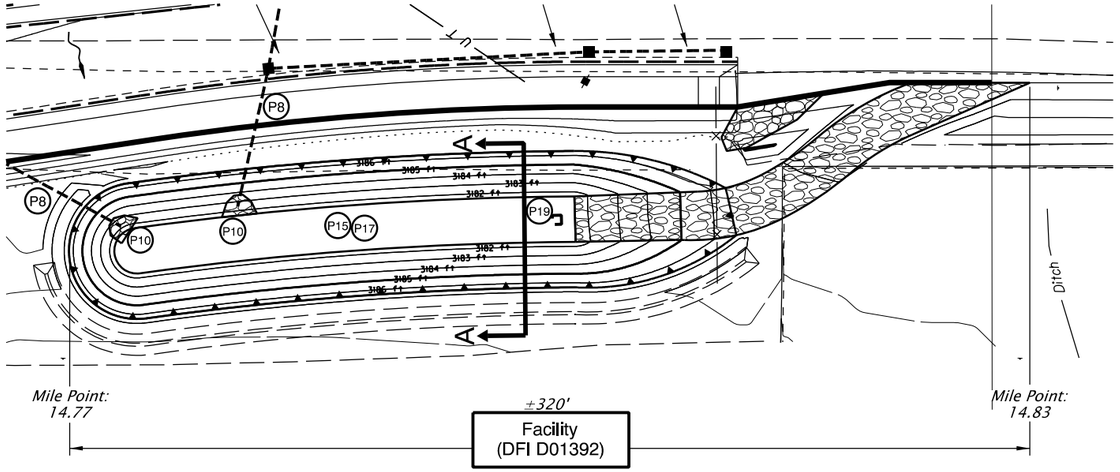
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442
ODOT Region 1 Hazmat Coordinator	(503) 731-8290
ODOT Region 2 Hazmat Coordinator	(503) 986-2647
ODOT Region 3 Hazmat Coordinator	(541) 957-3594
ODOT Region 4 Hazmat Coordinator	(541) 388-6186
ODOT Region 5 Hazmat Coordinator	(541) 963-1590
ODEQ Northwest Region Office	(503) 229-5263

A Appendix A – Site Specific Operational Plan

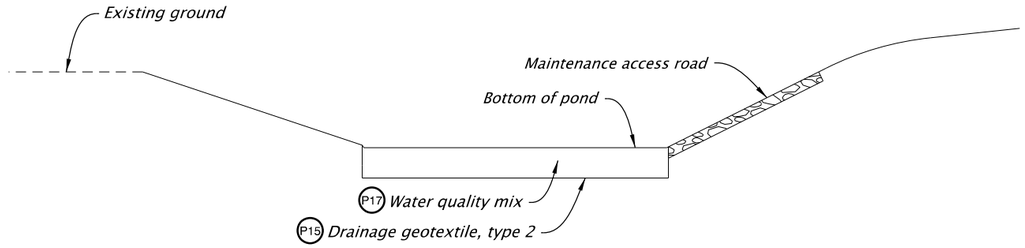
Contents:

Operational Plan: DFI D01392

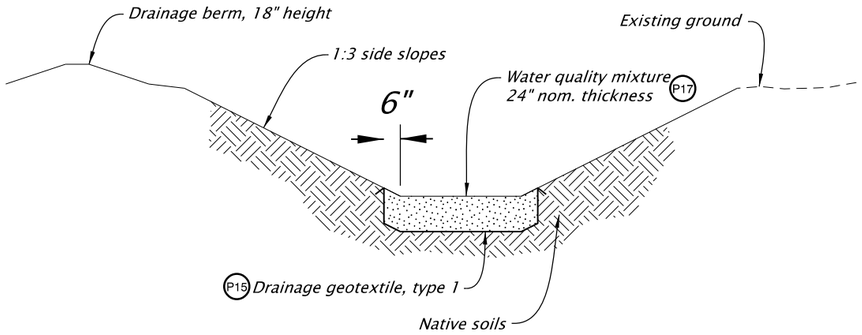
US20: McKenzie - Bend Hwy.



PLAN
N.T.S.



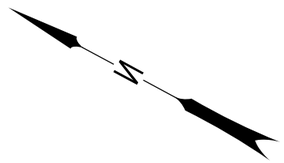
PROFILE
N.T.S.



SECTION A-A
N.T.S.

LEGEND:

- Photo Location / Direction
- P# Facility component (see table 1 in O&M Manual)
- Manhole
- Inlet
- Manhole with Inlet Top
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path



OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Tyler Van Meter

Drafted By: Tyler Van Meter

DFI D01392
MAINTENANCE DISTRICT 10 HWY 17
BIORETENTION POND
14.40
DESCHUTES COUNTY

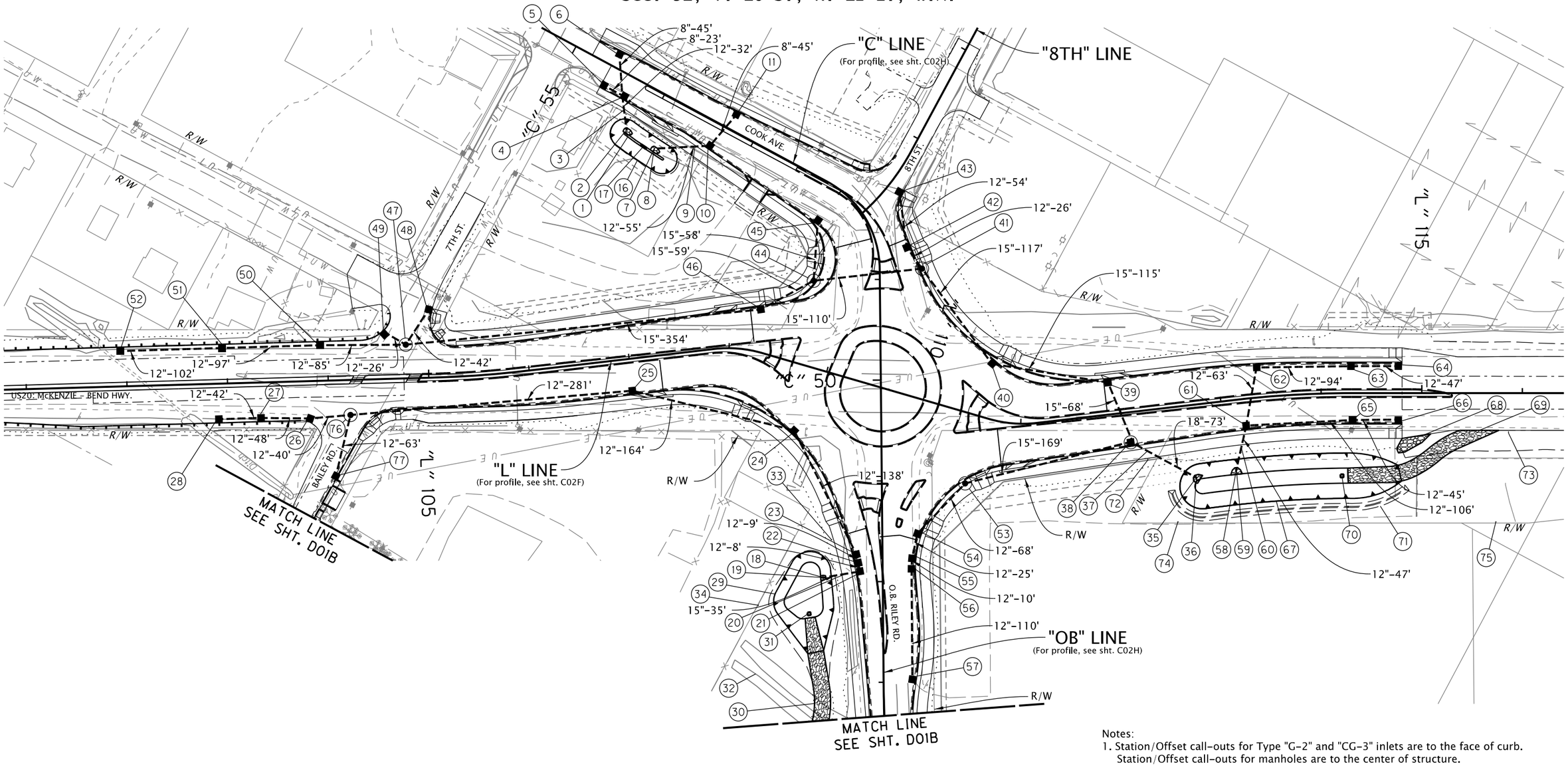
B Appendix B – Project Contract Plans

Contents:

Drainage Plan Sheet

Stormwater Details

Sec. 31, T. 16 S., R. 12 E., W.M.



Notes:
1. Station/Offset call-outs for Type "G-2" and "CG-3" inlets are to the face of curb. Station/Offset call-outs for manholes are to the center of structure.

REGISTERED PROFESSIONAL ENGINEER
14,972
OREGON
JULY 25, 1990
BARRY C. JOHNSON
EXPIRES: 06/30/2023

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OREGON DEPARTMENT OF TRANSPORTATION

US20: TUMALO - COOLEY RD. (BEND) SEC.
MCKENZIE-BEND HIGHWAY
DESCHUTES COUNTY

Designer: Tyler Van Meter | Reviewer: Barry Johnson
Drafter: Tyler Van Meter | Checker: Shawn Ellis

DRAINAGE

SHEET NO. C02B

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Rotation: 298.3607° Scale: 1"=100'

1. *Const. sloped end*

2. *Const. riprap pad*
(For details, see sht. HA02)

3. *Inst. 12" storm sew. pipe - 32'*
5' depth

4. *Sta. "C" 54+34.14, 24.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 8" storm sew. pipe - 23'
5' depth
Inst. 8" storm sew. pipe - 45'
5' depth
(See dwg. nos RD388, RD390, RD393, RD364)

5. *Sta. "C" 54+57.24, 24.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

6. *Sta. "C" 54+58.13, 16.83' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

7. *Const. sloped end*

8. *Const. riprap pad*
(For details, see sht. HA02)

9. *Inst. 12" storm sew. pipe - 55'*
5' depth

10. *Sta. "C" 53+36.37, 27.02' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 8" storm sew. pipe - 45'
5' depth

11. *Sta. "C" 53+27.81, 19.27' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

16. *Const. bioretention pond D01389*
(For details, see shts. HA01, HA02 and HA03)

17. *Inst. field facility bottom marker, porous pavers - 9 sq. ft.*

18. *Const. sloped end*

19. *Const. riprap pad*
(For details, see sht. HA02)

20. *Inst. 15" storm sew. pipe - 35'*
10' depth
F.L. out = 3183.50

21. *Sta. "OB" 48+09.79, 25.67' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 8'
10' depth

22. *Sta. "OB" 48+17.63, 27.14' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 9'
5' depth

23. *Sta. "OB" 48+26.20, 28.95' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 138'
10' depth

24. *Sta. "L" 108+83.84, 68.04' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 164'
10' depth

25. *Sta. "L" 106+99.24, 35.00' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 281'
10' depth

26. *Sta. "L" 103+79.76, 40.60' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 48'
5' depth

27. *Sta. "L" 103+31.98, 39.00' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 42'
5' depth

28. *Sta. "L" 102+90.09, 39.00' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

29. *Const. bioretention pond D01390*
(For details, see shts. HA01, HA02 and HA03)

30. *Const. access road*
(For details, see sht. HA02)

31. *Inst. field facility bottom marker, porous pavers - 9 sq. ft.*

32. *Protect existing shallow irrigation pipe.*

33. *Inst. stormwater field marker, type S1, red*
DFI D01390
MP 14.70

34. *Inst. stormwater field marker, type S2*
DFI D01390
MP 14.69

35. *Const. riprap pad*
(For details, see sht. HA02 and RD317)

36. *Const. sloped end*

37. *Inst. 18" storm sew. pipe - 73'*
10' depth

38. *Sta. "L" 112+06.47, 33.13' Rt.*
Const. manhole 60" with inlet, type G-2
Const. 24" sump
Const. gutter transition
Inst. 15" storm sew. pipe - 169'
10' depth
Inst. 15" storm sew. pipe - 68'
10' depth
(See dwg. nos RD335, RD336)

39. *Sta. "L" 111+90.48, 35.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 15" storm sew. pipe - 115'
10' depth

40. *Sta. "L" 110+57.07, 56.65' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 15" storm sew. pipe - 117'
10' depth

41. *Sta. "L" 109+63.11, 125.38' Lt.*
Const. manhole 48" dia.
Inst. 15" storm sew. pipe - 110'
10' depth
Inst. 12" storm sew. pipe - 26'
5' depth

42. *Sta. "C" 51+27.42, 31.97' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 54'
5' depth

43. *Sta." C" 51+65.06, 44.08' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

44. *Sta. "L" 108+61.48, 83.52' Lt.*
Const. manhole 48" dia.
Inst. 15" storm sew. pipe - 59'
10' depth
Inst. 15" storm sew. pipe - 58'
5' depth

45. *Sta. "C" 51+99.63, 40.32' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

46. *Sta. "L" 108+22.25, 44.61' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 15" storm sew. pipe - 354'
5' depth

47. *Sta. "L" 104+78.05, 33.41' Lt.*
Const. manhole 60" dia.
Inst. 12" storm sew. pipe - 85'
5' depth
Inst. 12" storm sew. pipe - 26'
5' depth
Inst. 12" storm sew. pipe - 42'
5' depth

48. *Sta. "L" 105+04.85, 66.89' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

49. *Sta. "L" 104+54.78, 46.87' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

50. *Sta. "L" 103+92.98, 39.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 97'
5' depth

51. *Sta. "L" 102+95.77, 39.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 102'
5' depth

52. *Sta. "L" 101+93.96, 39.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

53. *Sta. " L" 110+63.77, 68.77' Rt.*
Const. manhole 48" dia.
Inst. 12" storm sew. pipe - 68'
5' depth

54. *Sta. "OB" 48+46.16, 37.95' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 25'
5' depth

55. *Sta. "OB" 48+22.41, 32.54' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 10'
5' depth

56. *Sta. "OB" 48+12.37, 31.94' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 110'
5' depth

57. *Sta. "OB" 47+02.08, 31.70' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

58. *Const. sloped end*

59. *Const. riprap pad*
(For details, see sht. HA02)

60. *Inst. 12" storm sew. pipe - 47'*
10' depth
F.L. out = 3182.50

General Notes:

1. *See profiles on sheets C02F and C02H for pipe invert elevations and slopes.*
2. *Station/Offset call-outs for Type "G-2" and "CG-3" inlets are to the face of curb. Station/Offset call-outs for manholes are to the center of structure.*

61. *Sta. "L" 113+22.64, 30.00' Rt.*
Const. type G-2 inlet
Const. gutter transition
Inst. 12" storm sew. pipe - 63'
5' depth
Inst. 12" storm sew. pipe - 106'
5' depth

62. *Sta. "L" 113+38.52, 33.12' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 94'
5' depth

63. *Sta. "L" 114+29.67, 30.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 47'
5' depth

64. *Sta. "L" 114+76.44, 30.00' Lt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

65. *Sta. "L" 114+31.24, 30.00' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition
Inst. 12" storm sew. pipe - 45'
5' depth

66. *Sta. "L" 114+76.44, 30.00' Rt.*
Const. type G-2 inlet
Const. 24" sump
Const. gutter transition

67. *Const. bioretention pond D01392*
(For details, see shts. HA01, HA02 and HA04)

68. *Const. riprap slope protection*
(Class 50) - 25 cu. yd.
(For detail, see sht. HA02)

69. *Const. access road*
(For details, see sht. HA02)

70. *Inst. field facility bottom marker, porous pavers - 9 sq. ft.*

71. *Const. drainage berm - 261'*
18" height
For detail, see sht. HA01

72. *Inst. stormwater field marker, type S1, red*
DFI D01392
MP 14.76

73. *Inst. stormwater field marker, type S1, green*
DFI D01392
MP 14.83

74. *Inst. stormwater field marker, type S2*
DFI D01392
MP 14.77

75. *Inst. stormwater field marker, type S2*
DFI D01392
MP 14.83

76. *Sta. "L" 104+28.45, 34.44' Rt.*
Const. manhole 48" dia.
Inst. 12" storm sew. pipe - 40'
5' depth
Inst. 12" storm sew. pipe - 63'
5' depth

77. *Sta. "L" 104+04.91, 95.20' Rt.*
Const. type G-2 inlet

REGISTERED PROFESSIONAL ENGINEER
14,972
OREGON
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BARRY C. JOHNSON
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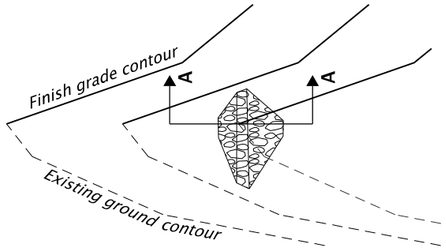
OREGON DEPARTMENT OF TRANSPORTATION

US20: TUMALO - COOLEY RD. (BEND) SEC.
MCKENZIE-BEND HIGHWAY
DESCHUTES COUNTY

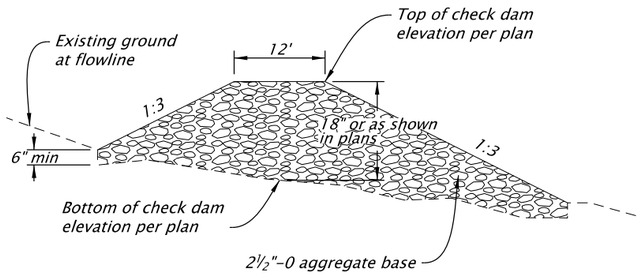
Designer: Tyler Van Meter
Drafter: Tyler Van Meter
Reviewer: Barry Johnson
Checker: Shawn Ellis

DRAINAGE NOTES

SHEET NO.
C02C



PLAN

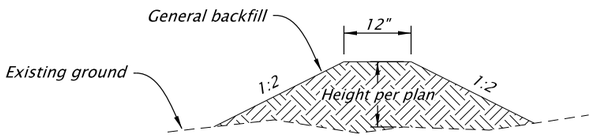


SECTION A-A

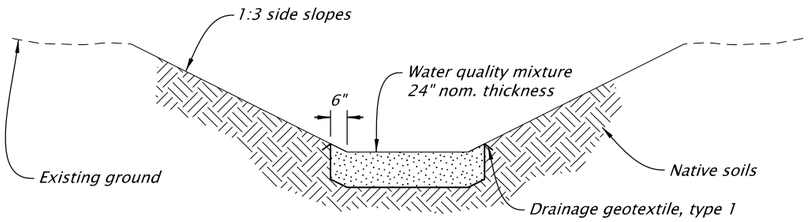
CHECK DAM LOCATION TABLE

Location		Elevation		Quantity (cu. yd.)
Station	Offset	Top	Flowline	
"L" 90+29.1	29' Rt	3215.5	3215.0	1.0
"L" 90+65.2	29' Rt	3214.5	3214.0	1.0
"L" 90+96.8	32' Rt	3213.5	3213.0	1.0
"L" 91+20.3	38' Rt	3212.5	3211.0	3.0
"L" 91+44.4	40' Rt	3211.5	3210.5	1.5

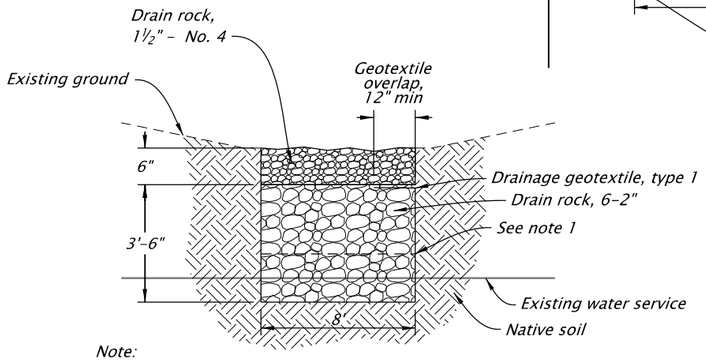
CHECK DAMS



DRAINAGE BERM AT TOP OF POND



BIORETENTION POND TYPICAL SECTION

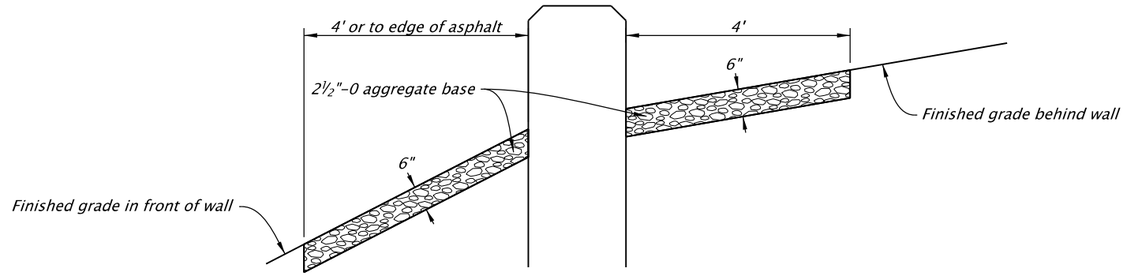


Note:

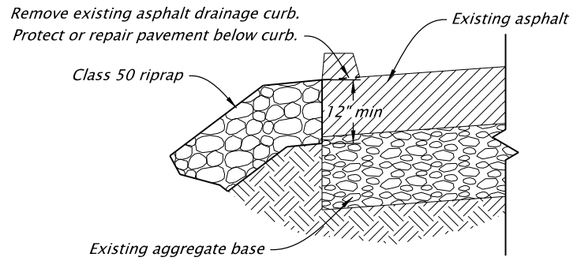
Adjust bottom of trench to maintain 2' clear horizontally and 6" clear vertically from water service pipe. Pothole to verfiy water pipe location.

Adjust horizontal layout of trench to maintain 1' clear from existing water meter vault and existing irrigation pipe.

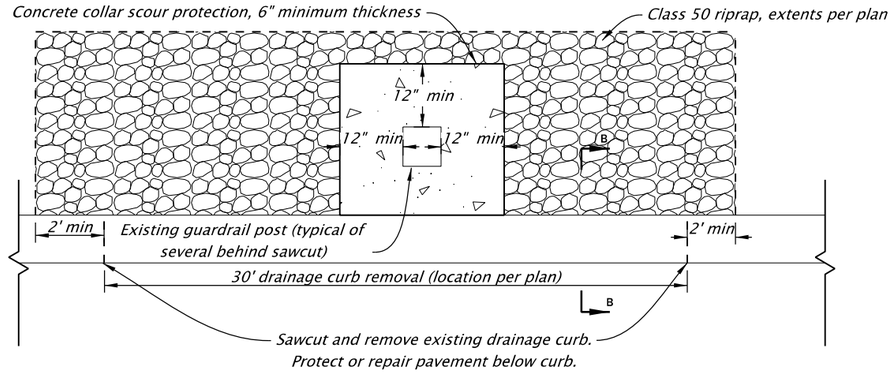
INFILTRATION TRENCH



SLOPE PROTECTION AT CULVERT WINGWALLS



SECTION B-B



PLAN

CURB CUT AT HWY US20 / 5TH ST

REGISTERED PROFESSIONAL ENGINEER
14,972
OREGON
JULY 25, 1990
BARRY C. JOHNSON
EXPIRES: 06/30/2023

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OREGON DEPARTMENT OF TRANSPORTATION

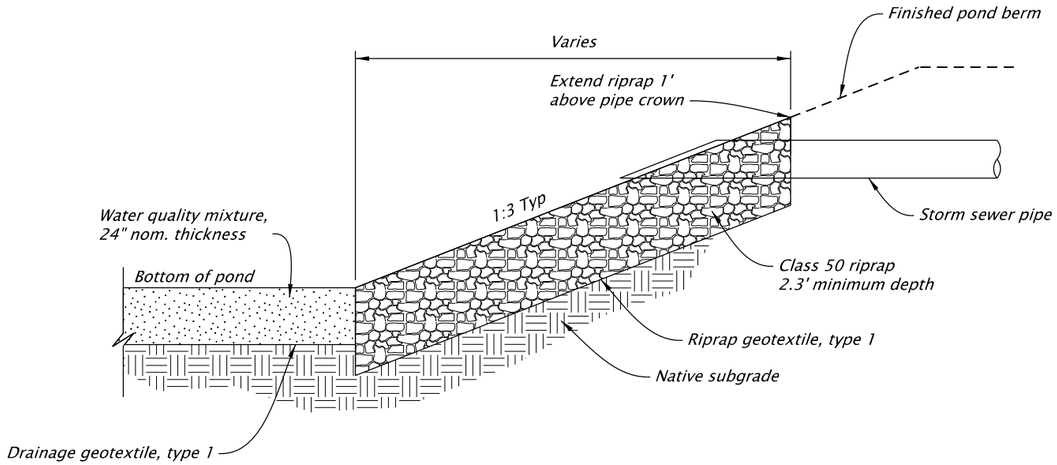
US20: TUMALO - COOLEY RD. (BEND) SEC.
MCKENZIE-BEND HIGHWAY
DESCHUTES COUNTY

Designer: Tyler Van Meter | Reviewer: Barry Johnson
Drafter: Tyler Van Meter | Checker: Shawn Ellis

STORMWATER DETAILS

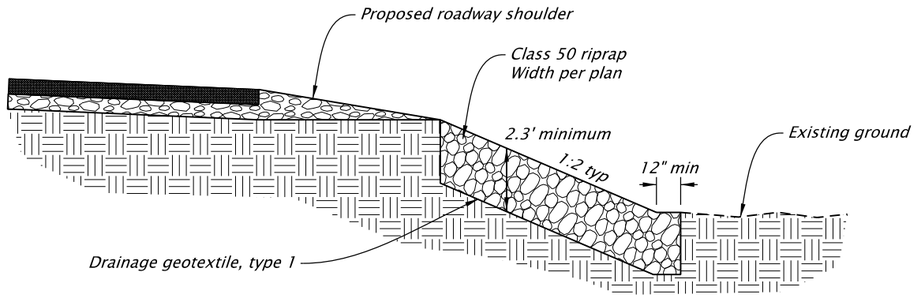
SHEET NO. HA01

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

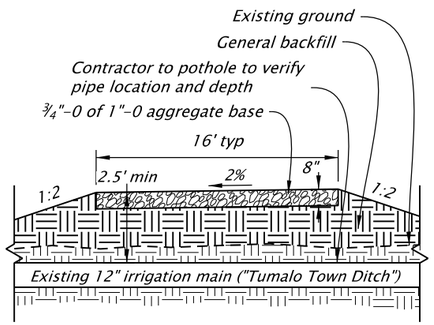


Notes:
1. Riprap pad to be centered on pipe outfall
2. See ODOT std. dwg. RD317

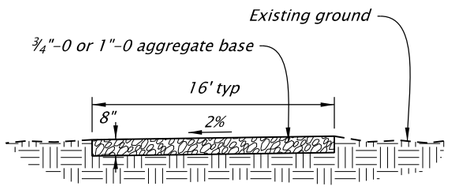
POND ENERGY DISSIPATOR



LOOSE RIPRAP SLOPE PROTECTION

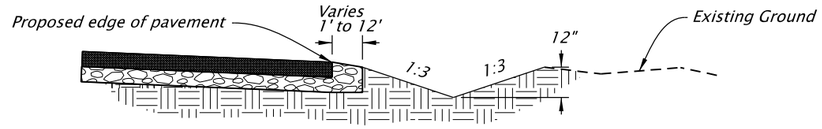


TUMALO TOWN DITCH OVERCROSSING

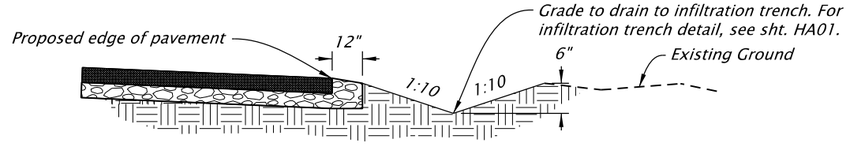


TYPICAL ACCESS ROAD

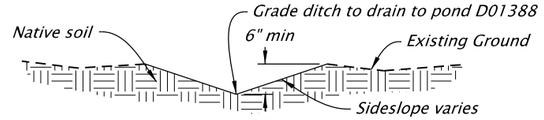
POND MAINTENANCE ACCESS ROAD



BAILEY RD



WOOD AVE



NORTH POND

V-DITCH

FACILITY ID MARKER TABLE

Facility Location		DFI Number	Type S2 Marker		Type S1 Marker	
Station	MP		Begin	End	Red	Green
"L" 95+49 Rt.	14.45	D01388	✓		✓	
"L" 92+90 Rt.	14.40	D01388		✓		✓
"L" 95+05 Rt.	14.44	D01388	✓			
"L" 93+57 Rt.	14.41	D01388		✓		
"C" 53+51 Lt.	14.68	D01389	✓		✓	
"C" 54+35 Lt.	14.66	D01389		✓		✓
"C" 53+50 Lt.	14.67	D01389	✓			
"C" 54+37 Lt.	14.68	D01389		✓		
"OB" 48+42 Lt.	14.70	D01390	✓		✓	
"OB" 45+97 Lt.	14.71	D01390		✓		✓
"OB" 47+78 Lt.	14.69	D01390	✓			
"L" 112+21 Rt.	14.76	D01392	✓		✓	
"L" 115+86 Rt.	14.83	D01392		✓		✓
"L" 112+44 Rt.	14.77	D01392	✓			
"L" 115+74 Rt.	14.83	D01392		✓		

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STORMWATER DETAILS

SHEET NO.
HA02

FINAL ELECTRONIC DOCUMENT
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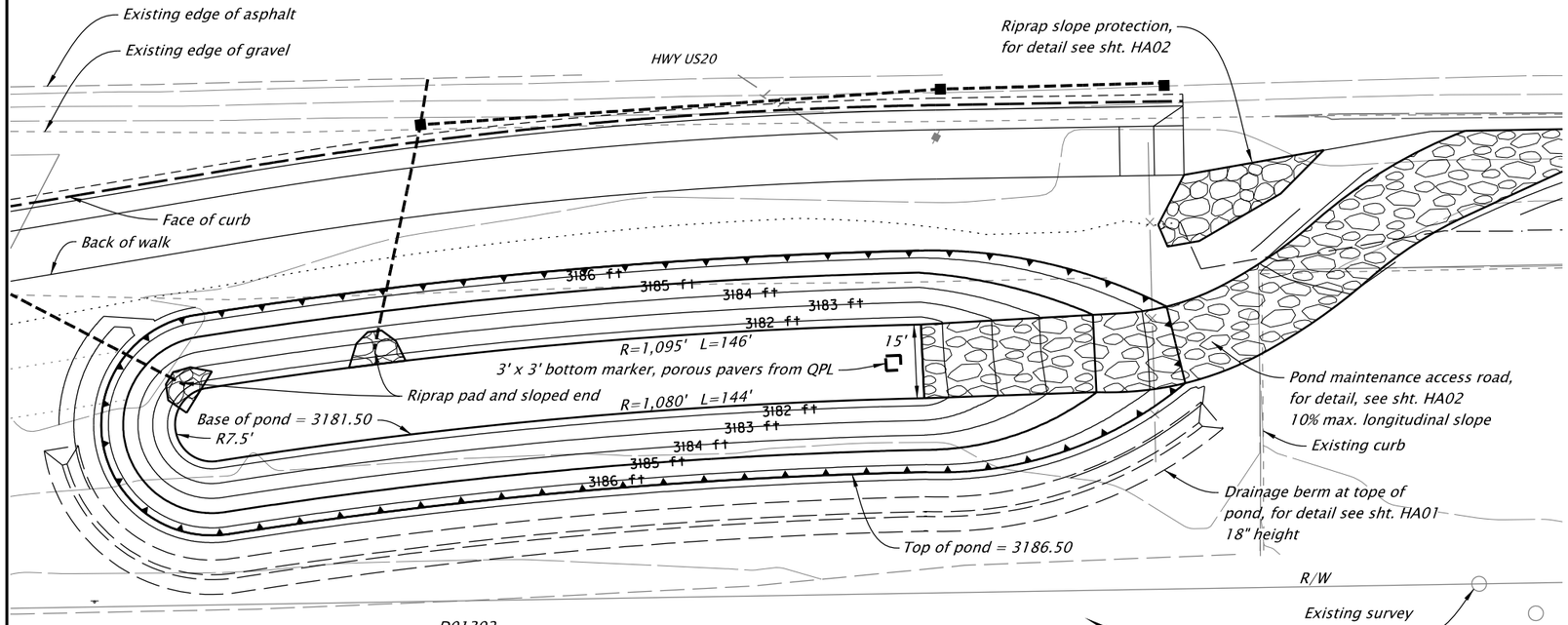
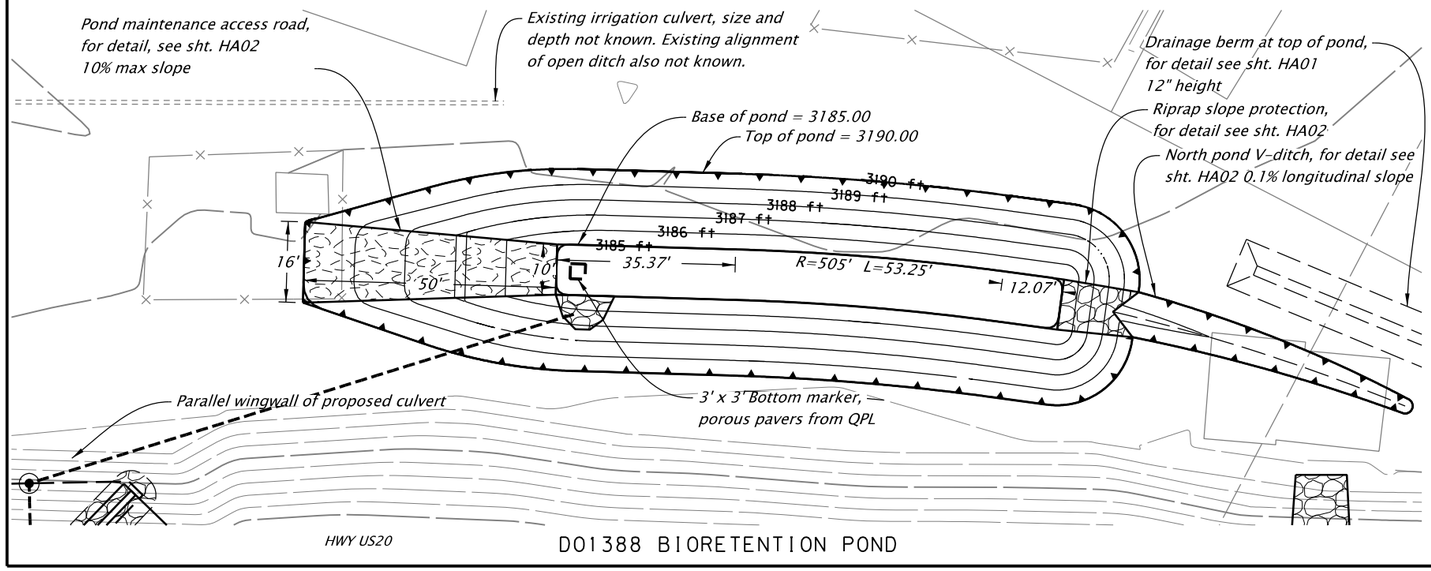


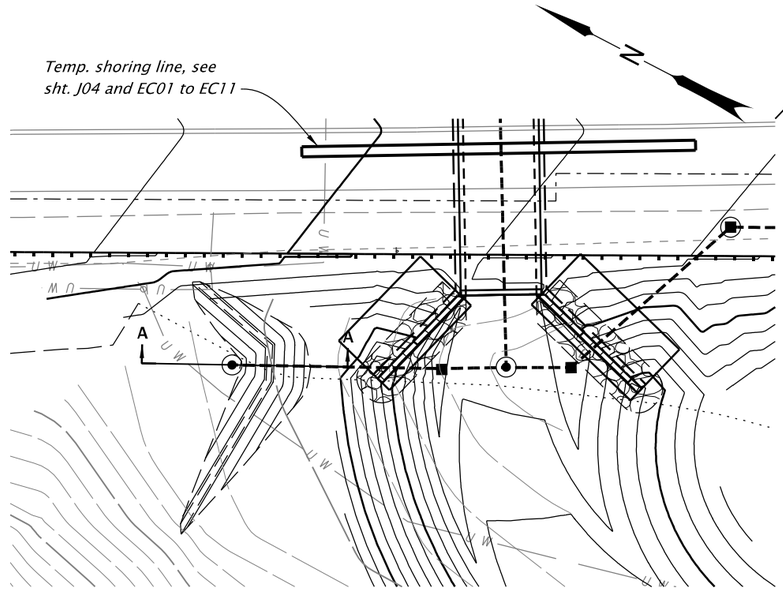
D01392 BIORETENTION POND

D01392
Bottom of pond
Area: 251 sq yd
Elevation: 3181.50
Top of storage (100-yr event)
Area: 858 sq yd
Elevation: 3185.50
Top of pond
Elevation: 3186.50
Area: 1,021 sq yd

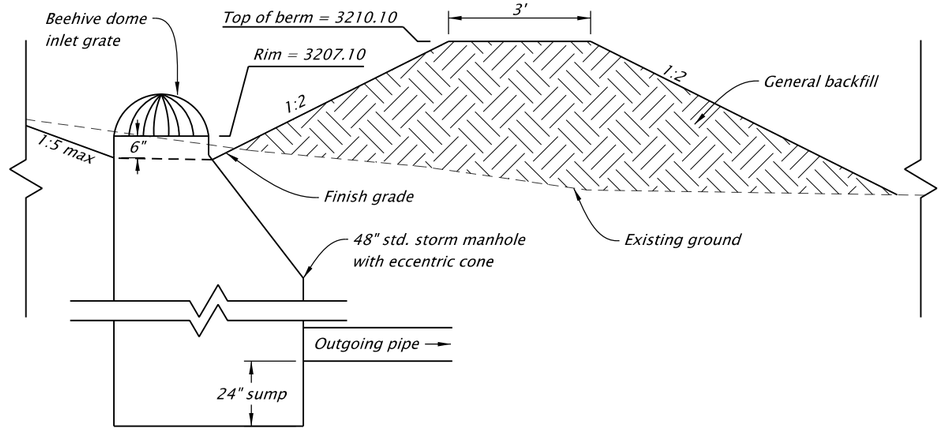
D01388
Bottom of pond
Area: 111 sq yd
Elevation: 3185.00
Top of storage (100-yr event)
Area: 594 sq yd
Elevation: 3189.40
Top of pond
Elevation: 3190.00
Area: 669 sq yd



D01388 BIORETENTION POND



PLAN



SECTION A-A

DRAINAGE BERM AT CULVERT WINGWALL

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STORMWATER DETAILS

SHEET NO. HA04

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