OPERATION & MAINTENANCE MANUAL

WATER QUALITY BIOFILTRATION SWALE

Manual prepared: August 2017

DFI No. D00202

Figure 1: DFI No. D00202, looking South

1. Identification

Drainage Facility ID (DFI):	D00202
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 42V-198
Location:	District: 4
	Highway No.: 091
	Mile Post: 78.66 to 78.81, right

2. Manual Purpose

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

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.

Flow direction: South

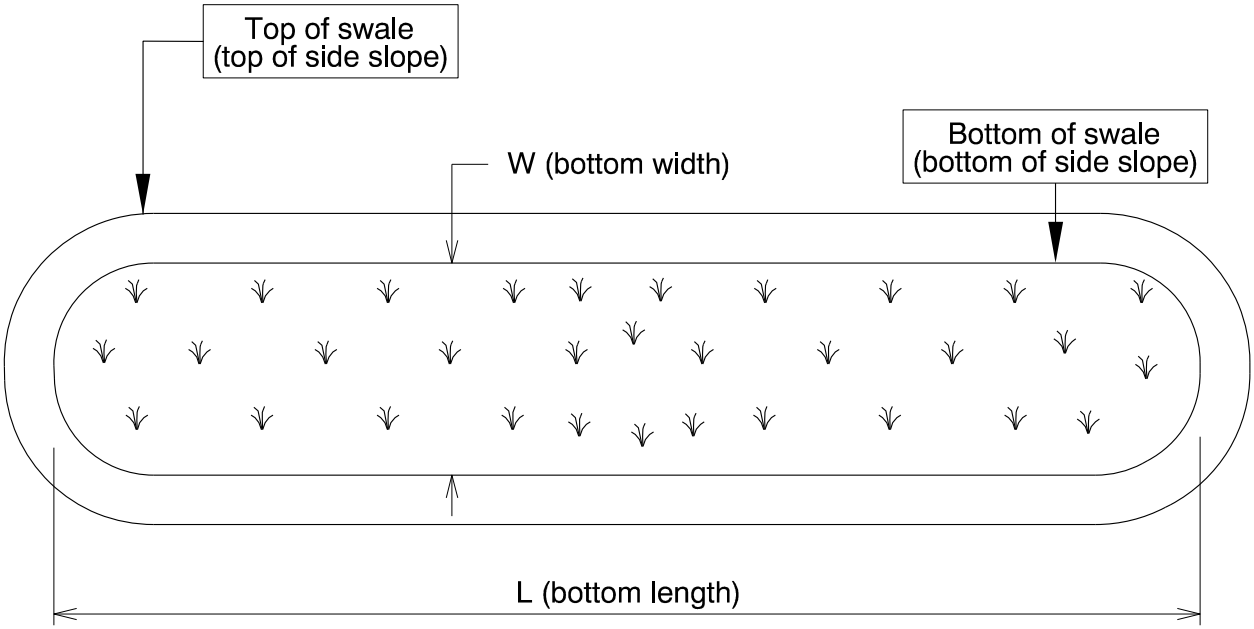
Figure 2: Facility location map

4. Facility Summary

The length and width of a swale is based on the bottom dimensions.

The bottom length and bottom width of the swale is:

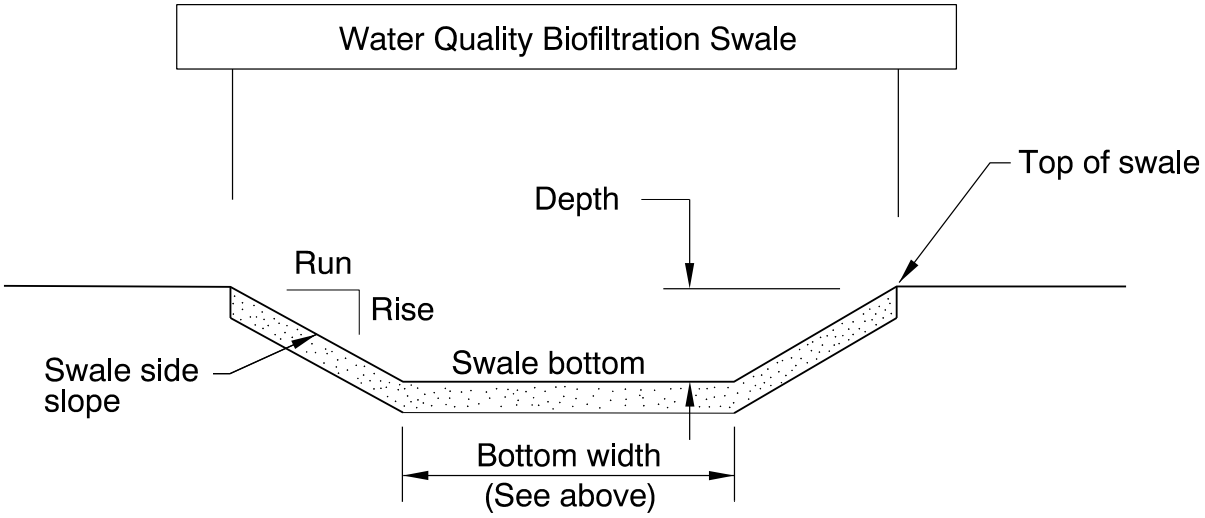
Bottom Length (feet)	Bottom Width (feet)
701	**Varies: 0-2**



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

Depth and side slopes:

Depth (feet)	Rise (feet)	Run (feet)
0.5	**1**	**4**



Site Specific Information: The swale is split into three sections by two driveways. Culverts convey water beneath these driveways. Swale length does not include the driveway widths. See Appendix A for details.

5. Facility Access

Maintenance access to the facility:

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

Figure 3: Facility access via roadside shoulder, looking North

6. Operational Components / Maintenance Items

Classification

This facility is classified as an:

☒ On-line Swale	☐ Off-line Swale
A swale that does not include a high flow bypass component; flow drains into and through the facility	**A swale that treats low/small flows and diverts high flows using a bypass component**

Bypass Component

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 swale. High flows are diverted around the swale using a bypass component**

Operational Components

A swale has many components that assist with treatment, conveyance, and reducing flow velocity to minimize erosion. The components in use can vary depending if the facility was designed to operate on-line or off-line. 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 Water Quality Biofiltration Swales (implemented March 2017) 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/

Operational Plan

The applicable standard operational plan for this facility is:

☒ Operational Plan A	☐ Operational Plan B	☐ Operational Plan C
A standard operational plan illustrates the general facility footprint configuration and explains the purpose of each facility component. Operational plans (A, B, C) are provided in the Standard Operation Manual.		

See Appendix A for the site specific operational plan.

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 below.

Table 1: Swale Components		ID #
Manholes/Structures		
Pre-treatment manhole	☐	**S1**
Weir type flow splitter/flow splitter manhole	☐	**S2**
Orifice type flow splitter/flow splitter manhole	☐	**S3**
Standard manhole	☐	**S4**
Swale Inlet		
Pavement sheet flow	☒	**S5**
Inlet Pipe (s)	☐	**S6**
Open channel inlet	☐	**S7**
Riprap pad	☐	**S8**
Ground Cover		
Grass bottom	☒	**S9**
Grass side slopes	☒	**S10**
Granular drain rock	☐	**S11**
Plantings	☐	**S12**
Underground Components		
Geotextile fabric	☐	**S13**
Water quality mix	☒	**S14**
Perforated pipe	☐	**S15**
Porous pavers (access grid)	☐	**S16**
Flow Spreader		
Rock basin (used at inlet)	☒	**S17**
Anchored board (midpoint of swale or every 50 feet along swale bottom)	☐	**S18**
Other:	☐	**S19**
Swale Outlet		
Catch basin with grate	☐	**S20**
Outlet Pipe (s)	☒	**S21**
Open channel outlet	☒	**S22**
Auxiliary Outlet:	☐	**S23**
Outfall Type		
Waterbody (**C**reek/**L**ake/**O**cean)	☒ **C** ☐ **L** ☐ **O**	**S24**
Ditch	☐	**S25**
Storm drain system	☐	**S26**
Outfall Components		
Riprap pad	☒	**S27**
Riprap bank protection	☐	**S28**

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 for conditions when maintenance is needed.
c. Keep a record of inspections, maintenance, and repairs.

Maintenance Guide/Maintenance Actions

The ODOT Routine Road Maintenance Water Quality and Habitat Guide (the *Blue Book*) 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 swales:

- Table 1 (General Maintenance): Contains general maintenance and inspection guidelines that are applicable to all ODOT water quality facilities
- Table 3 (Maintenance of Water Quality or Biofiltration Swales): Contains maintenance information for swales

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

8. Limitations

Access grid installed:

☒ No	☐ Yes
There are (Choose applicable weight: no, light, med., heavy) duty porous pavers installed in this swale	

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

Equipment wheels should be kept on the tops and side slopes. Mower arms may be run along the swale bottom.

9. Waste Material Handling

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

http://www.oregon.gov/ODOT/Maintenance/Documents/ems_manual.pdf

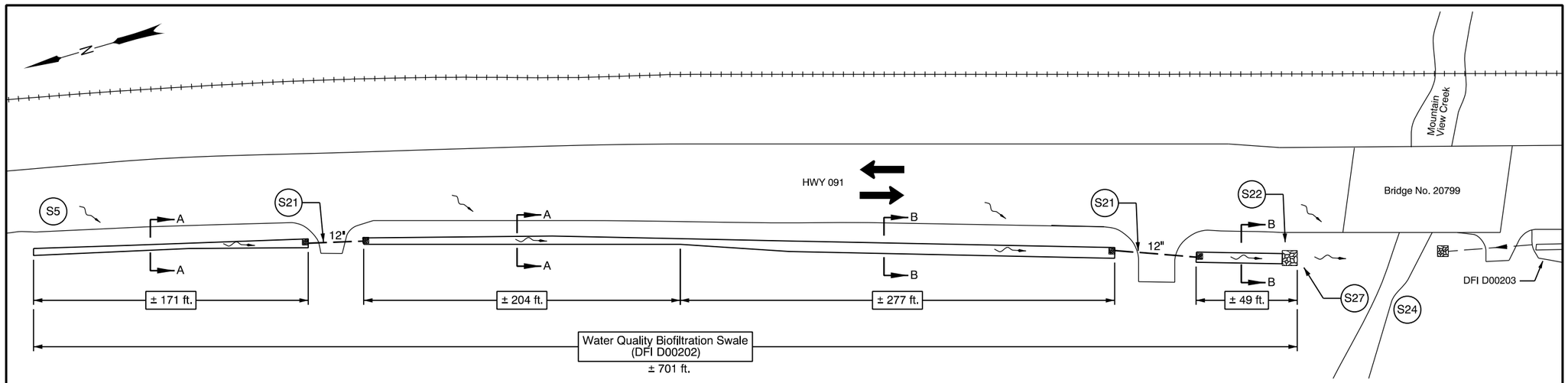
Contact any of the following for more detailed information about management of waste materials found on site:

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

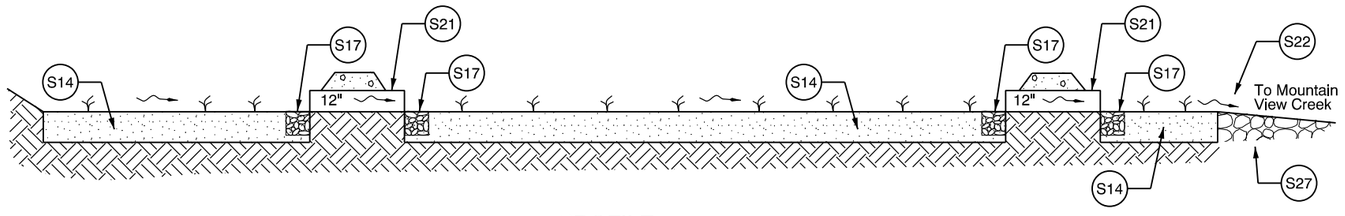
A Appendix A – Site Specific Operational Plan

Contents:

Operational Plan: DFI D00202



PLAN
N.T.S.



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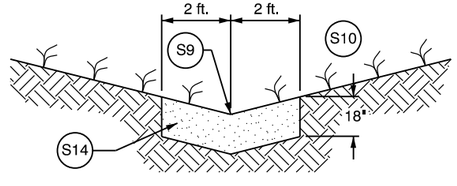
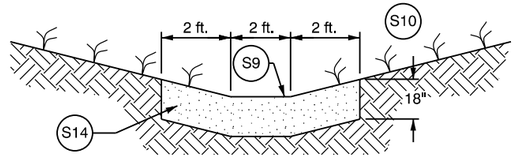
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

LEGEND
- Storm Pipe
- Stormwater Flow Path
- Traffic Flow Direction

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Brooklyn Scholz

Drafted By: Brooklyn Scholz

DFI D00202
MAINTENANCE DISTRICT 4 HWY 091
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 78.66, 78.81
BENTON

DFI_D00202.dgn

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 42V-198

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd. & Std. Drg. Nos.

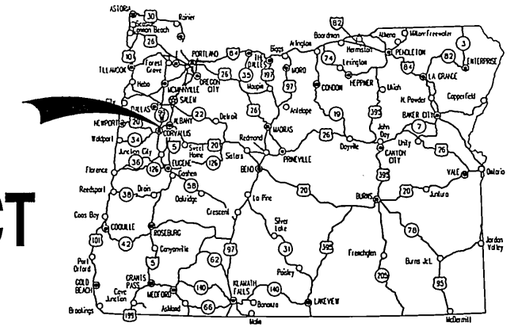
STATE OF OREGON
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT

GRADING, STRUCTURE, PAVING, & GUARDRAIL

OR99W: LOCKE CREEK BRIDGE REPLACEMENT PROJECT

PACIFIC HIGHWAY WEST

ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)



Overall Length Of Project - 0.26 Miles

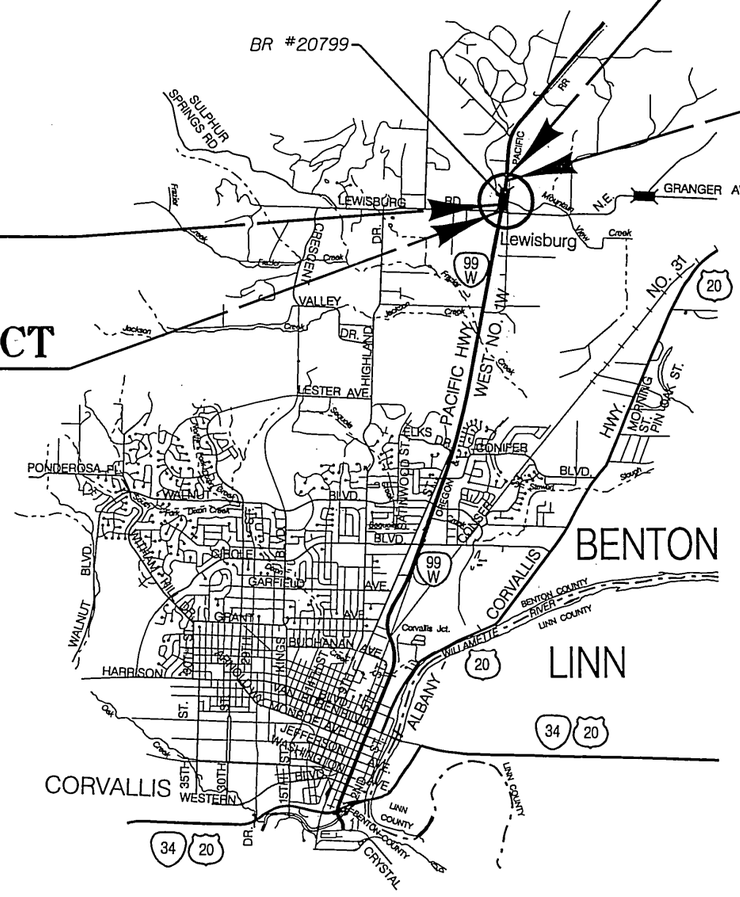
BENTON COUNTY
NOVEMBER 2009

BEGINNING OF CONTRACT PROJECT
STA. "A" 327+62.00 (MP 78.54)

BEGINNING OF PROJECT
STA. "A" 334+68.00 (MP 78.67)

END OF PROJECT
STA. "A" 348+29.70 (MP 78.93)

END OF CONTRACT PROJECT
STA. "A" 354+14.50 (MP 79.04)



T. 11S., R. 5W., W.M.

OREGON TRANSPORTATION COMMISSION

Gail Achterman	CHAIRMAN
Michael Nelson	VICE CHAIRMAN
Janice Wilson	COMMISSIONER
Alan Brown	COMMISSIONER
David Lohman	COMMISSIONER
Matthew Garrett	DIRECTOR OF TRANSPORTATION

These plans were developed using ODOT design standards. Exceptions to these standards, if any, have been submitted and approved by the ODOT Chief Engineer or their delegated authority.

Approving Authority: Randy G. Hinderer 9/24/09
Signature & date

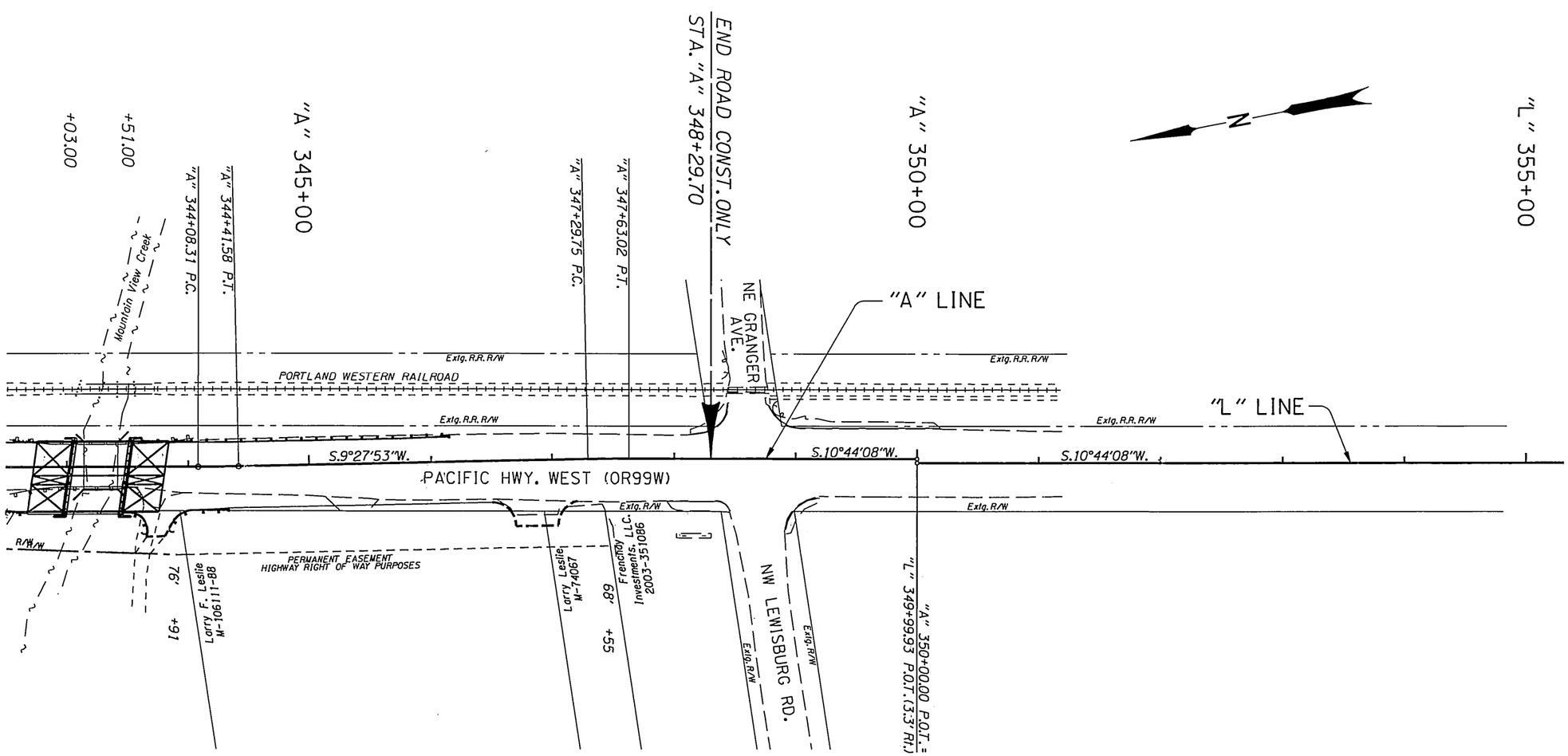
Randy G. Hinderer P.E.
Print name and title

Concurrence by ODOT Chief Engineer

OR99W: LOCKE CREEK BRIDGE REPLACEMENT PROJECT
PACIFIC HIGHWAY WEST
BENTON COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-BRO-S091 (035)	1

Sec. 12, T. 11S, R. 5W. W.M.
PACIFIC HIGHWAY WEST



OREGON DEPARTMENT OF TRANSPORTATION

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Phone (503) 586-0100 FAX (503) 589-9538

REGISTERED PROFESSIONAL ENGINEER
61440PE
OREGON
JAN. 23, 2001
RANDY G. HINDERER
EXPIRATION DATE: 06-30-2011

OR99W: LOCKE CREEK BRIDGE REPLACEMENT PROJECT

PACIFIC HIGHWAY WEST

BENTON COUNTY

Reviewed By - Randy G. Hinderer
Designed By - Chee Yeun Lay
Drafted By - Ryan Berger

ALIGNMENT

SHEET NO. 4

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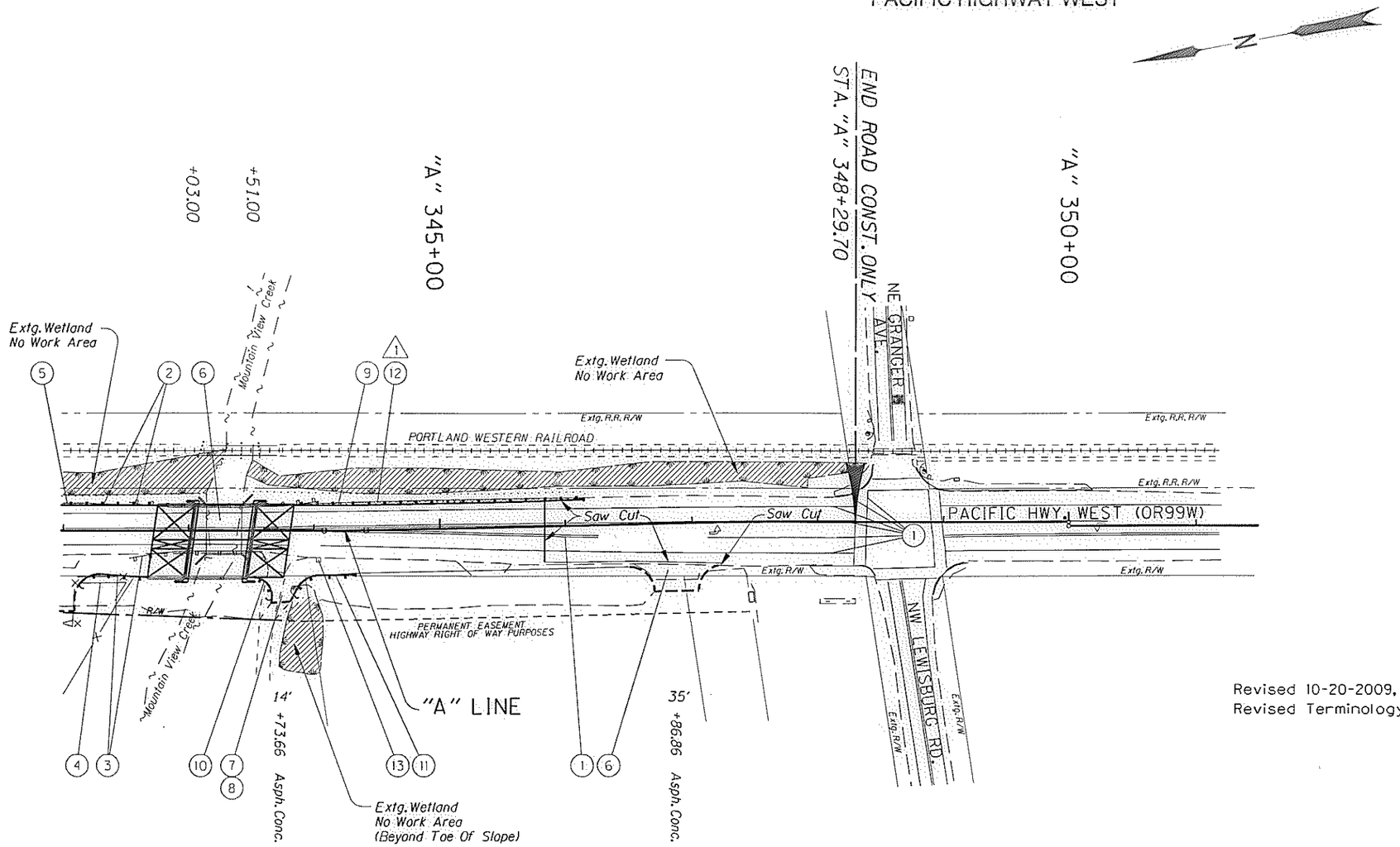
PACIFIC HIGHWAY WEST

42V-198



(1) See Note 2, Sht. 3A.

(2) See Note 4, Sht. 3A.

(3) See Note 5, Sht. 3A.

(4) See Note 6, Sht. 3A.

(5) See Note 7, Sht. 3A.

(6) Bridge No. 20799
Remove Extg. Bridge
Construct Structure - 107.3'
Rdwy. Width 60' With 0' Walk
And Reinf. Panel At Bridge Ends
(For Details, See Bridge Plans)

(7) Construct Type "A-1" Roadway Approach - 2

(8) Reconstruct Extg. Dwy. Within Right Of Way Limits
(See Drg. RD715)

(9) Sta. "A" 343+84.12, 20.0' Lt. To Sta. "A" 346+15.71, 21.2' Lt.
Construct Guardrail - 193.5' (Type 2A)
Construct Guardrail - 12.5' (Type 3)
Construct Guardrail Terminal, Non-Flare (Test Level 2) - 25'
Construct Guardrail To Conc. Bridge Rail Transition

(10) Sta. "A" 343+45.72, 37.3' Rt. To Sta. "A" 343+66.76, 53.4' Rt.
Construct Guardrail - 12.5' (Type 4)
Install Type 1 Modified Anchor
Install Type B End Piece
Construct Guardrail To Conc. Bridge Rail Transition
(See Detail, Sht. 2B)

(11) Sta. "A" 343+84.76, 50.1' Rt. To Sta. "A" 344+33.40, 35.4' Rt.
Construct Guardrail - 31' (Type 2A)
Construct Guardrail Terminal, Non-Flare (Test Level 2) - 25'
Install Type 1 Modified Anchor
Install Type B End Piece

Revised 10-20-2009,
Revised Terminology, Note 12 (1)

(12) Sta. "A" 343+84.00 To Sta. "A" 346+15.00, Lt.
Remove Extg. Surfacings - 66 Sq. Yds.

(13) Sta. "A" 344+03.74, 27.1' Rt.
Relocate Existing Mail Box
Remove Existing Mail Box Support
Install New Mailbox Support
Contractor To Coordinate With United States Postal Service
For Relocation
(See Drg. RD100, RD101)

REVISIONS	
(1)	Revised 10-20-2009 Addendum #1

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OREGON
JAN. 23, 2001
RANDY G. HINDERER
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OR99W: LOCKE CREEK BRIDGE REPLACEMENT PROJECT

PACIFIC HIGHWAY WEST

BENTON COUNTY

Reviewed By - Randy G. Hinderer
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Drafted By - Ryan Berger

GENERAL CONSTRUCTION

SHEET NO. 4A

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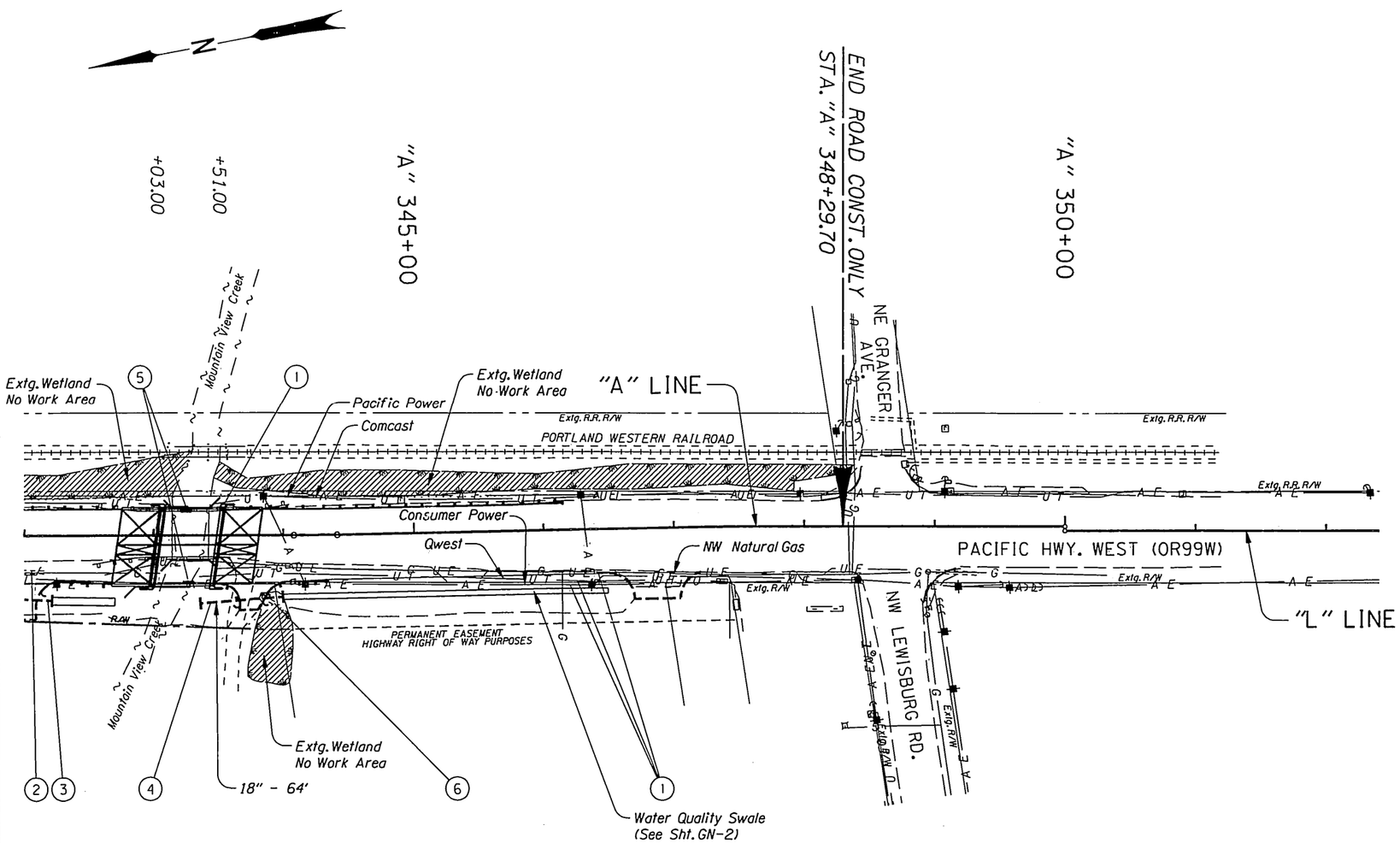
PACIFIC HIGHWAY WEST



(1) Remove and Reinstall Extg. Utilities (By Others)

(2) See Note 3, Sht. 3B

(3) See Note 4, Sht. 3B

(4) Sta. "A" 343+24.00, 52.0' Rt. To Sta. "A" 343+87.42, 59.6' Rt.
Install 18" Culvert Pipe - 64'
5' Depth
S = 0.0469'/Ft.
I.E. (In) - 235.86'
I.E. (Out) - 232.86'
Construct Sloped End (Inlet Only)
Install 12" Thick Class 50 Riprap Embankment Protection
At Both Pipe Ends - 1.5 Cu. Yds.

(5) Bridge Drain System
(For Details, See Bridge Plans)

(6) Remove Extg. Culvert - 12'

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OR99W: LOCKE CREEK BRIDGE REPLACEMENT PROJECT
PACIFIC HIGHWAY WEST
BENTON COUNTY

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Drafted By - Ryan Berger

DRAINAGE & UTILITIES

SHEET NO. 4B

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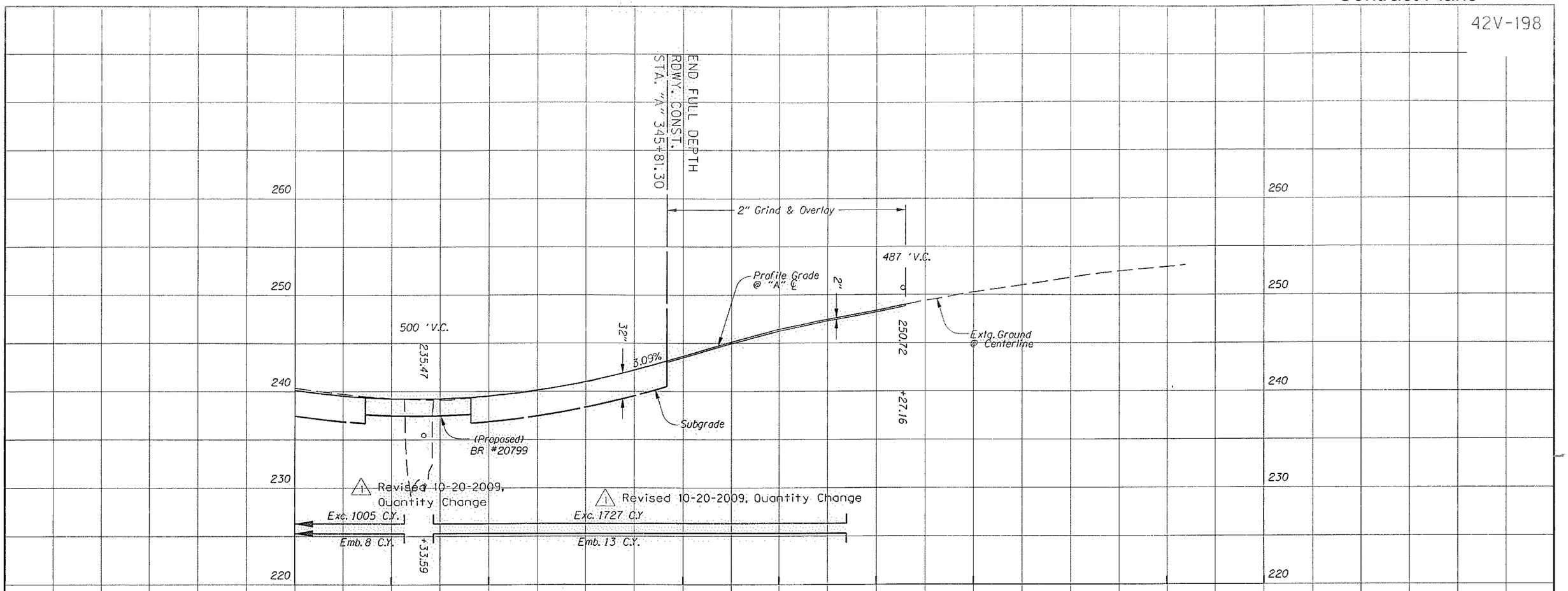
42V-198



REVISIONS	
1	Revised 10-20-2009 Addendum #1

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EXPIRATION DATE: 06-30-2011

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PACIFIC HIGHWAY WEST

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PROFILE

SHEET NO. 4C

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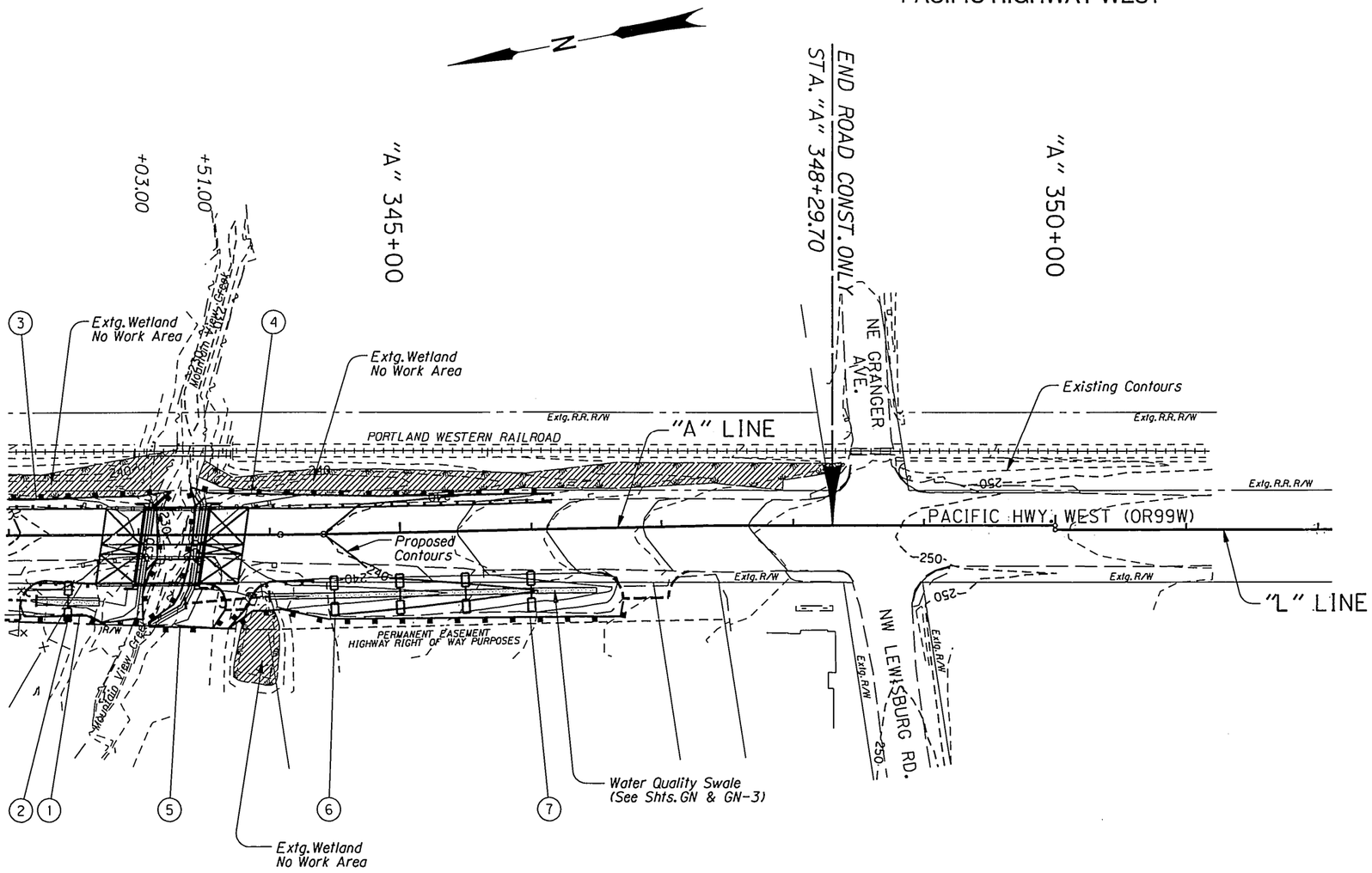

1 See Note 5, Sht. GA-2.
2 See Note 6, Sht. GA-2.
3 See Note 7, Sht. GA-2.
4 Sediment Fence Unsupported - 277'
5 Sediment Fence Unsupported - 185'
6 Const. Type 2 Check Dam - 4
7 Sediment Fence Unsupported - 328'

Check Dam

Sediment Fence (Unsupported)

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PACIFIC HIGHWAY WEST
BENTON COUNTY

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EROSION CONTROL

SHEET NO. GA-3

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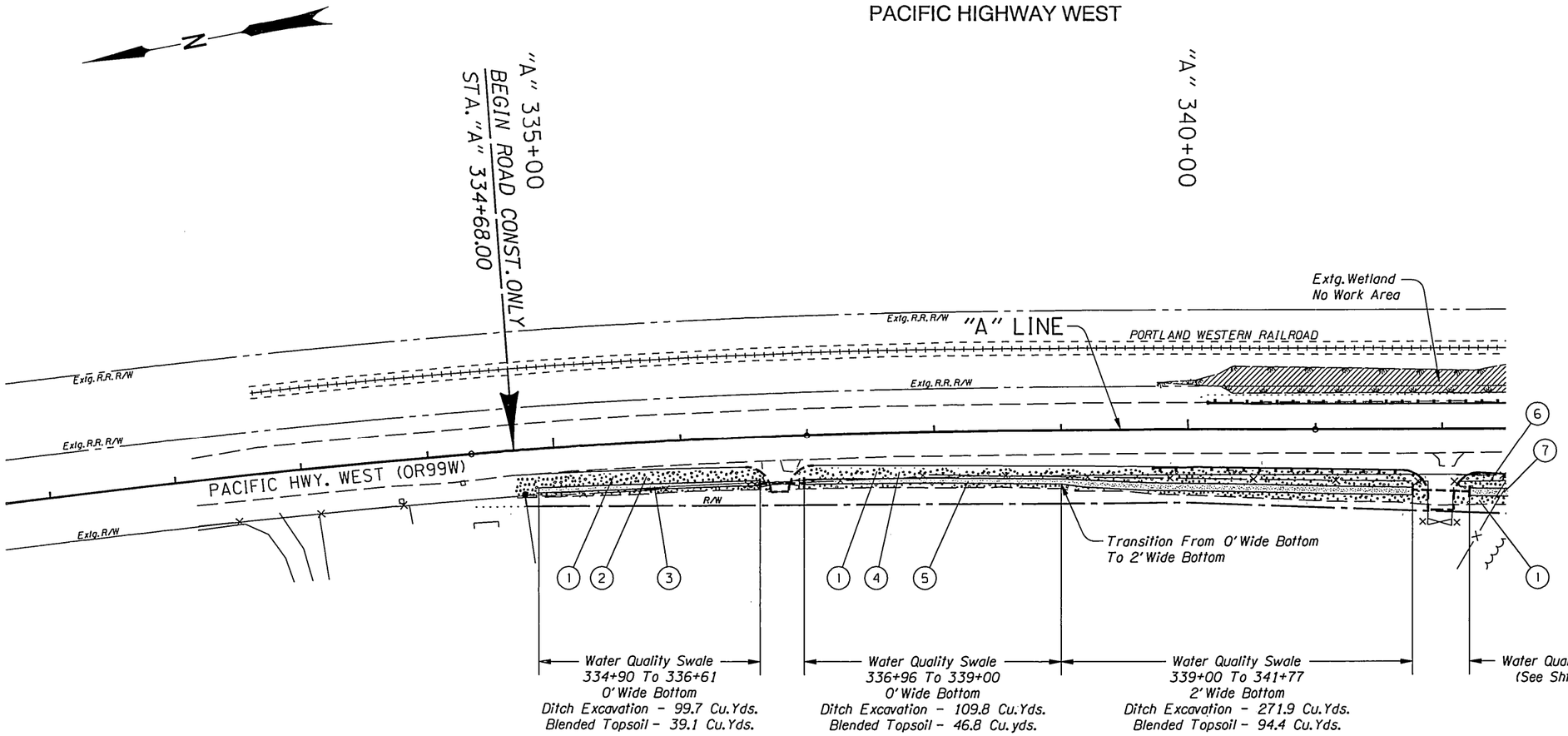
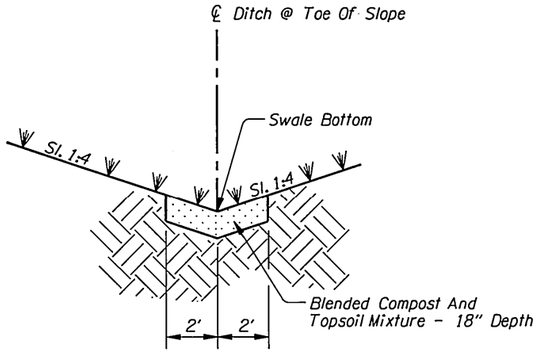
PACIFIC HIGHWAY WEST

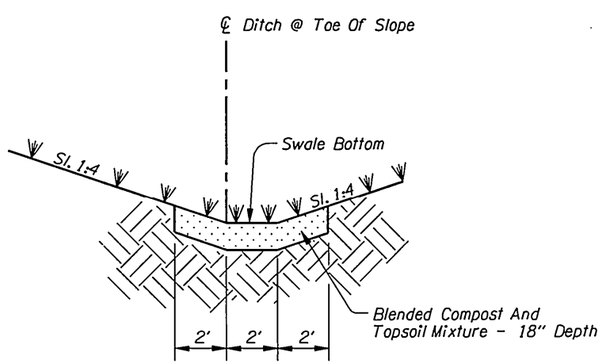


1. Remove Extg. Vegetation As Necessary For Construction.
2. Apply Permanent Seed Mix Approx. 0.06 Ac.
3. Apply Water Quality Seed Mix Approx. 0.02 Ac. (For Seed Mix, See Table Below)
4. Apply Permanent Seed Mix Approx. 0.18 Ac.
5. Apply Water Quality Seed Mix Approx. 0.05 Ac. (For Seed Mix, See Table Below)
6. Apply Permanent Seed Mix Approx. 0.03 Ac.
7. Apply Water Quality Seed Mix Approx. 0.01 Ac. (For Seed Mix, See Table Below)

Note:
Excavation & Blended Topsoil Quantities Shown Are Approximate.



WATER QUALITY SWALE - 0' WIDE BOTTOM
CROSS SECTION



WATER QUALITY SWALE - 2' WIDE BOTTOM
CROSS SECTION

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JAN. 23, 2001
RANDY G. HINDERER
EXPIRATION DATE: 06-30-2011

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PACIFIC HIGHWAY WEST
BENTON COUNTY

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ROADSIDE DEVELOPMENT

SHEET NO.
GN

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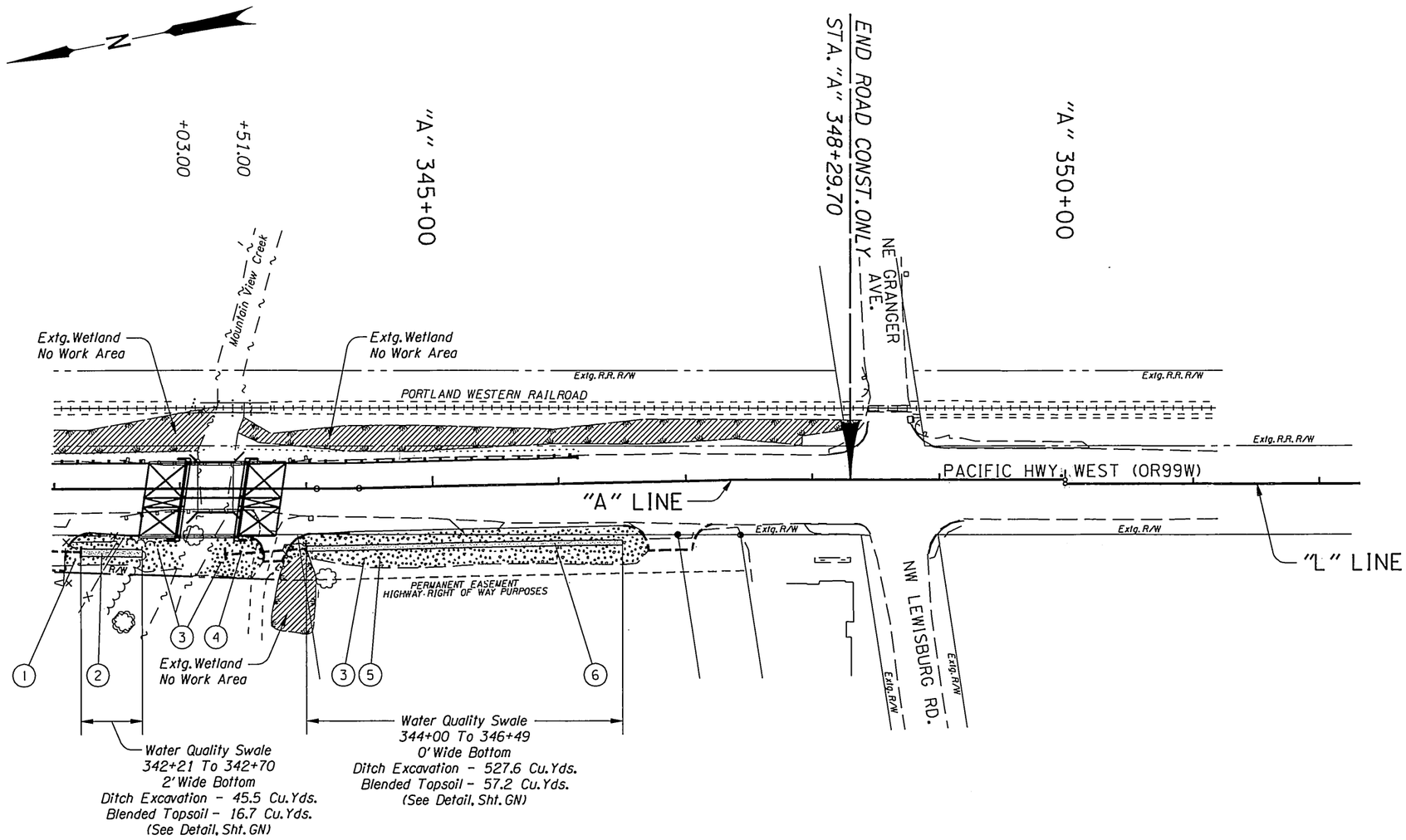
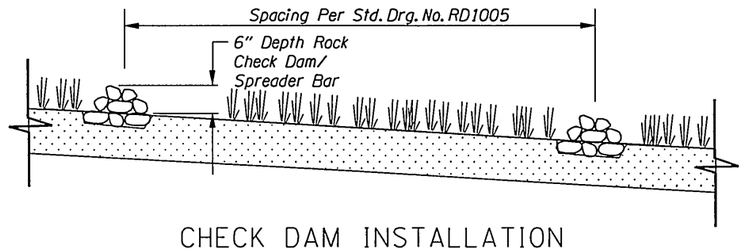
PACIFIC HIGHWAY WEST



1. See Note 6, Sht. GN.
2. See Note 7, Sht. GN.
3. Remove Extg. Vegetation As Necessary For Construction.
4. Apply Permanent Seed Mix Approx. 0.03 Ac.
5. Apply Permanent Seed Mix Approx. 0.16 Ac.
6. Apply Water Quality Seed Mix Approx. 0.02 Ac. (For Seed Mix, See Sht. GN)

Note:
Excavation & Blended Topsoil Quantities Shown Are Approximate.



CHECK DAM INSTALLATION
IN WATER QUALITY SWALE

REGISTERED PROFESSIONAL ENGINEER
61440PE
OREGON
JAN. 23, 2001
RANDY G. HINDERER
EXPIRATION DATE: 06-30-2011

OREGON DEPARTMENT OF TRANSPORTATION

LOCHNER
CONSULTING ENGINEERS AND PLANNERS
2001 Front St. NE Suite 120 Salem, Oregon 97301
Phone (503) 586-0100 FAX (503) 589-9538

OR99W: LOCKE CREEK BRIDGE REPLACEMENT PROJECT
PACIFIC HIGHWAY WEST
BENTON COUNTY

Reviewed By - Randy G. Hinderer
Designed By - Chee Yeun Loy
Drafted By - Ryan Berger

ROADSIDE DEVELOPMENT

SHEET NO. GN-2

P:\2456 OR99W Locke Creek Bridge\28 Plan Sets\Roadway\11_Roadside Dev\14839f.rd2 :: Basemap 8/26/2009 11:17:56 AM rberger

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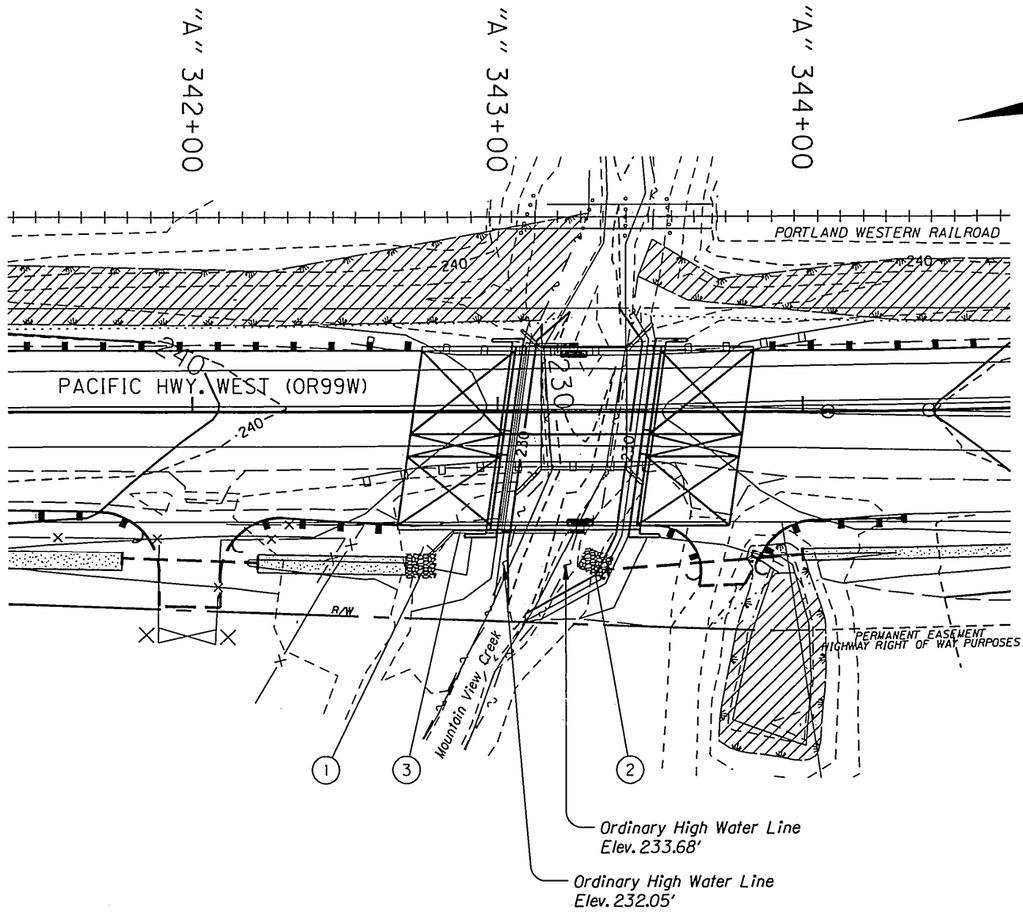
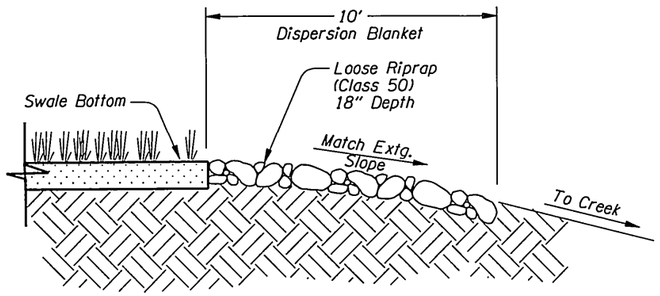


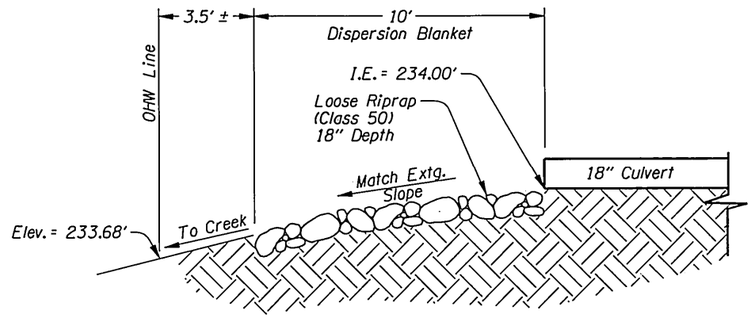
1. Construct Dispersion Blanket
   8' Wide x 10' Long x 18" Deep
   Place Above Ordinary High Water Line
   (See Detail Below)

2. Construct Dispersion Blanket
   8' Wide x 10' Long x 18" Deep
   Place Above Ordinary High Water Line
   (See Detail Below)

3. Bridge Drainage System
   Place Drain Outlet At Dispersion Blanket
   (See Bridge Plans For Drainage System Details)



WATER QUALITY SWALE
DISPERSION BLANKET SECTION



CROSS CULVERT OUTLET
DISPERSION BLANKET SECTION

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PACIFIC HIGHWAY WEST

BENTON COUNTY

Reviewed By - Randy G. Hinderer
Designed By - Chee Yeun Lay
Drafted By - Ryan Berger

ROADSIDE DEVELOPMENT

SHEET NO.
GN-3

1:600