OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: November 2017

DFI No. D00356

Figure 1: DFI No. D00356, looking South-West

1. Identification

Drainage Facility ID (DFI):	D00356
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 37V-014
Location:	District: 05
	Highway No.: 001, Cottage Grove Conn. 1
	Mile Post: 174.69 to 174.69, WB [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.

Facility location type: Roadway shoulder/On ramp

Flow direction: North-East

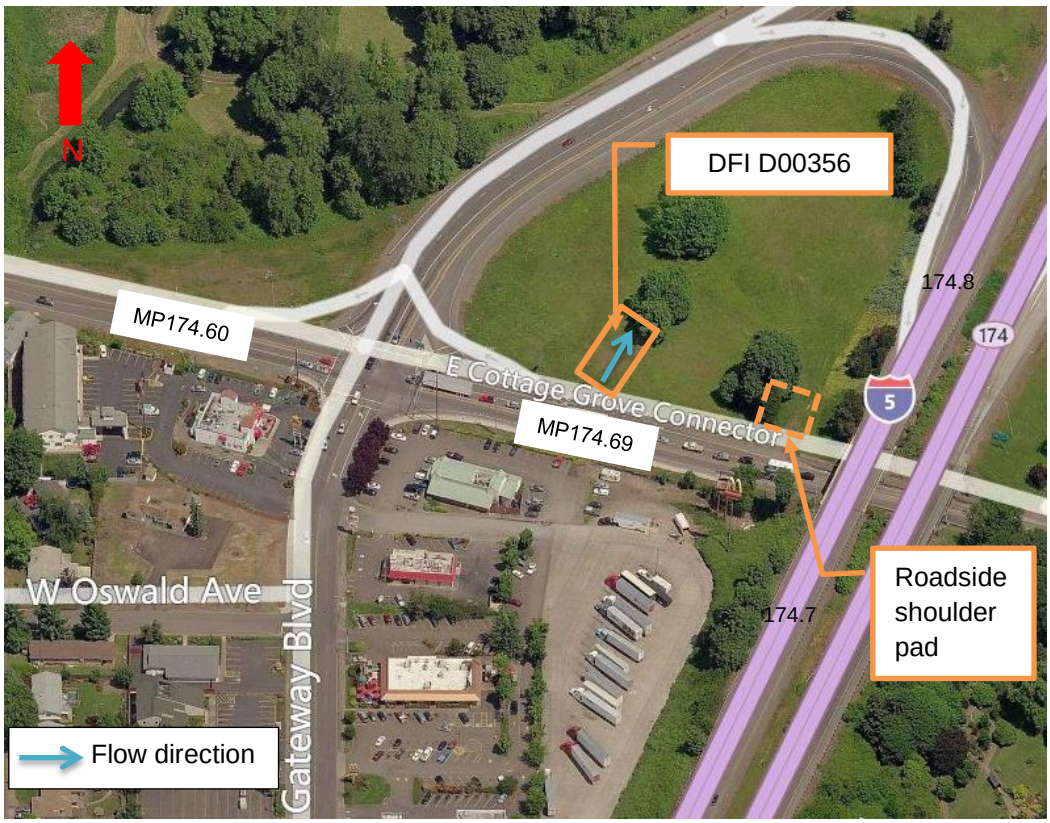


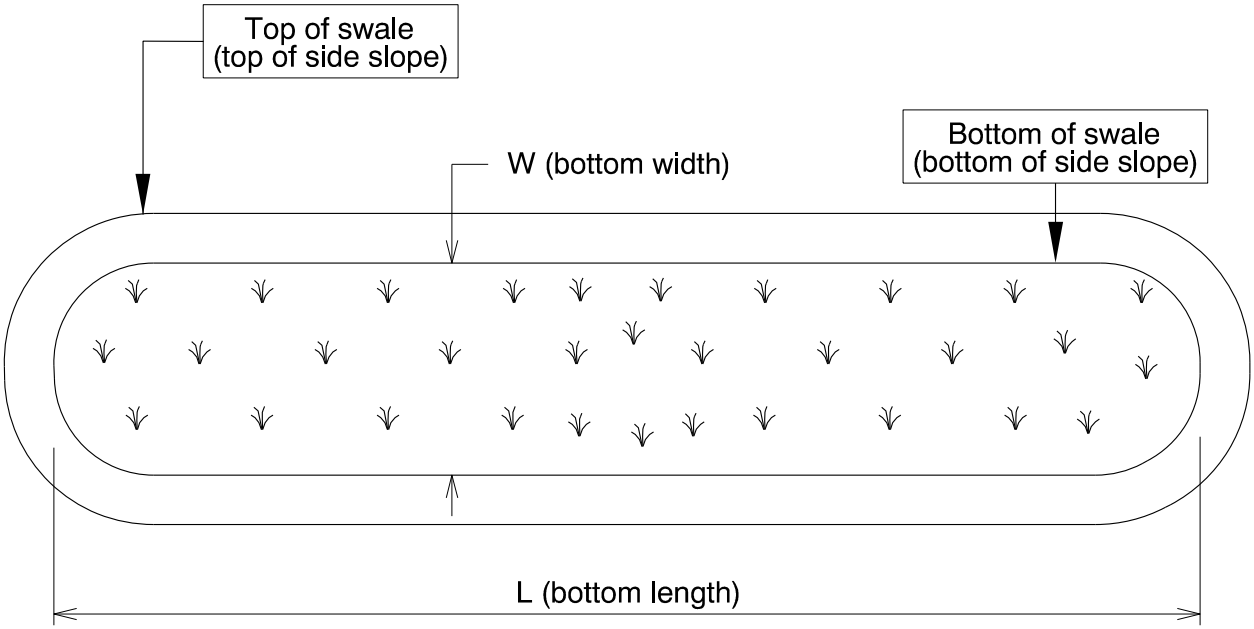
Figure 2: Facility location map

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:

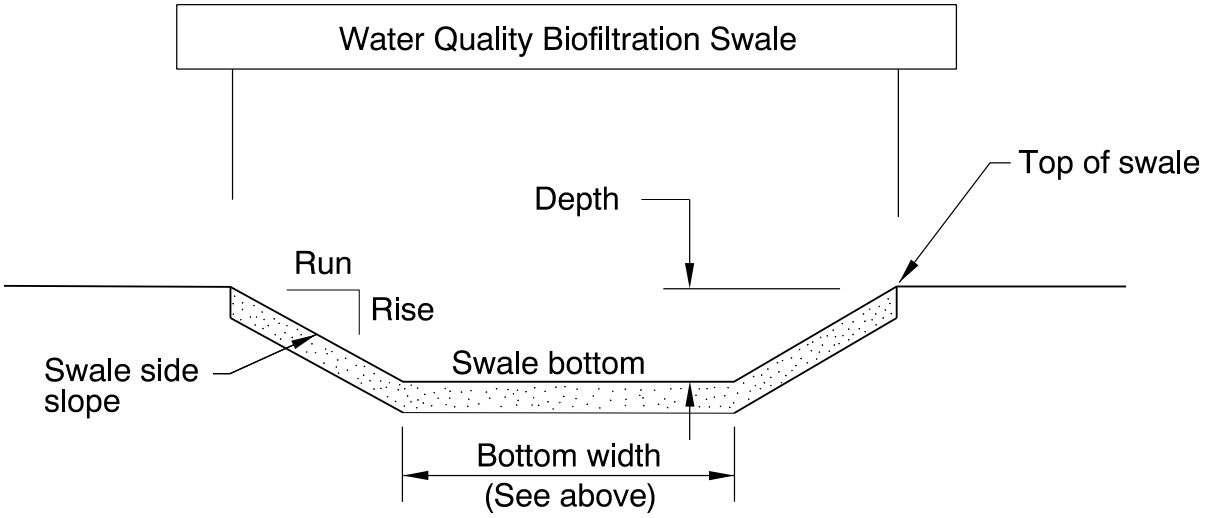
Bottom Length (feet)	Bottom Width (feet)
±72	±4



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)
Varies 2.7 - 3.8	**1**	**4**



Site Specific Information: This facility is functioning as a drainage swale. Water quality treatment soils are not present in this facility.

5. Facility Access

Maintenance access to the facility:

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

Figure 3: Roadside shoulder and pad on E Cottage Grove Con. West bound

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 no 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

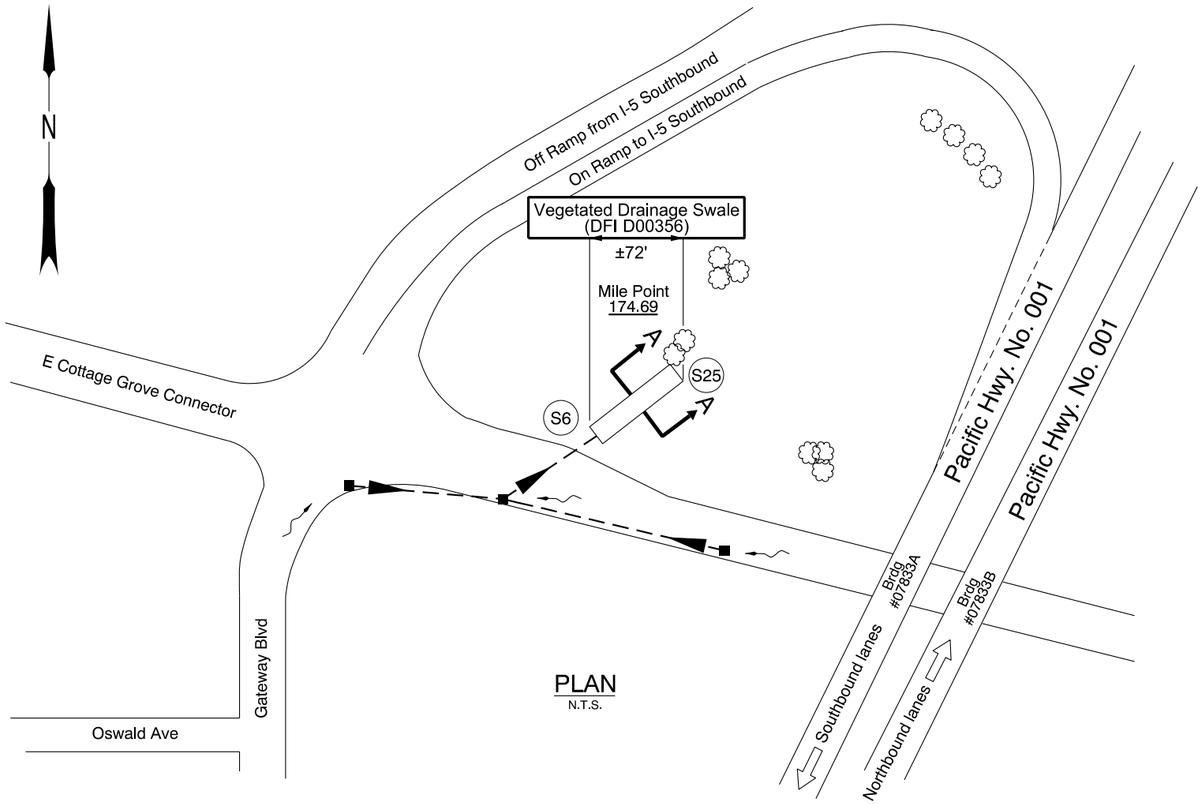
Contact any of the following for more detailed information about management of waste materials found on site:

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

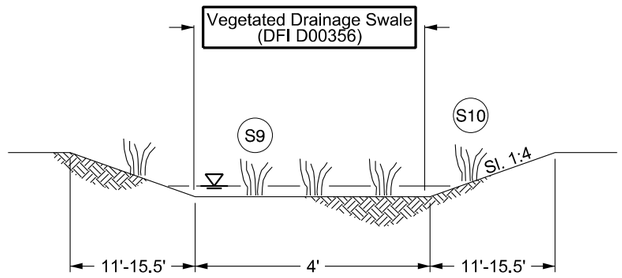
A Appendix A – Site Specific Operational Plan

Contents:

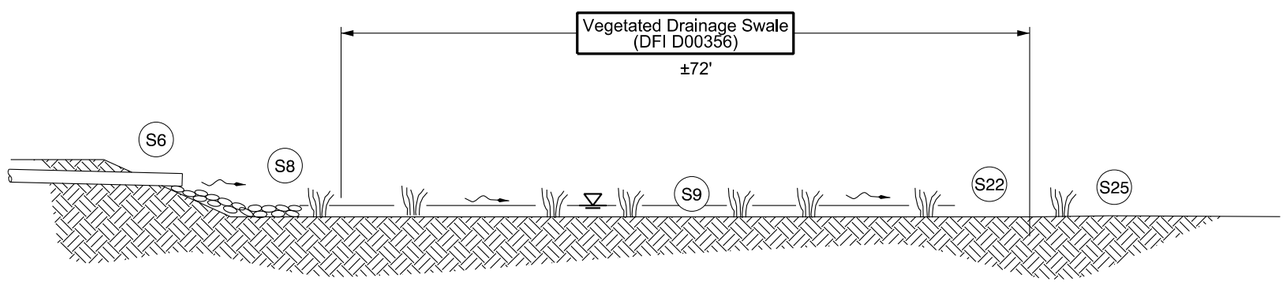
Operational Plan: DFI D00356



PLAN
N.T.S.



SECTION A-A
N.T.S.



PROFILE
N.T.S.

LEGEND

- Stormwater Flow Path
- Catch Basin
- Traffic Flow Direction
- Storm Pipe Flow Direction
- (S#) Swale Component (Table 1)

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Chabeli Arreola

Drafted By: Chabeli Arreola

DFI D00356
MAINTENANCE DISTRICT 05 HWY 001
WATER QUALITY BIOFILTRATION SWALE
HIGHWAY MP 174.69
LANE COUNTY

DFI_D00356.dgn

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B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 37V-014

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37V-14

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.& Std. Drg. Nos.
2, 2A	Typical Sections
2B Thru 2B-4 Incl.	Details
2C Thru 2C-4, Incl.	Traffic Control Plan
2D	Pipe Data
3	General Construction - "MC" Line
3A	Profile - "MC" Line
4, 4A	General Construction - "CGC" Line
4B	Profile - "CGC" Line
4C	Profile - "GWe" & "GW" Line

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

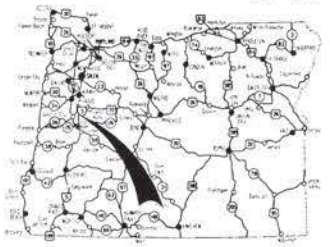
PLANS FOR PROPOSED PROJECT

GRADING, PAVING, SIGNING, ILLUMINATION & SIGNALS

I-5 AT COTTAGE GROVE INTCHGE. SEC.

PACIFIC HIGHWAY

LANE COUNTY
JANUARY 2004



Overall Length Of Project - 0.75 km (0.47 Miles)

BEGINNING OF PROJECT X-IM-S001(165)
STA. "MC" 21+664.326
(M.P. 175.03=3C175.03)

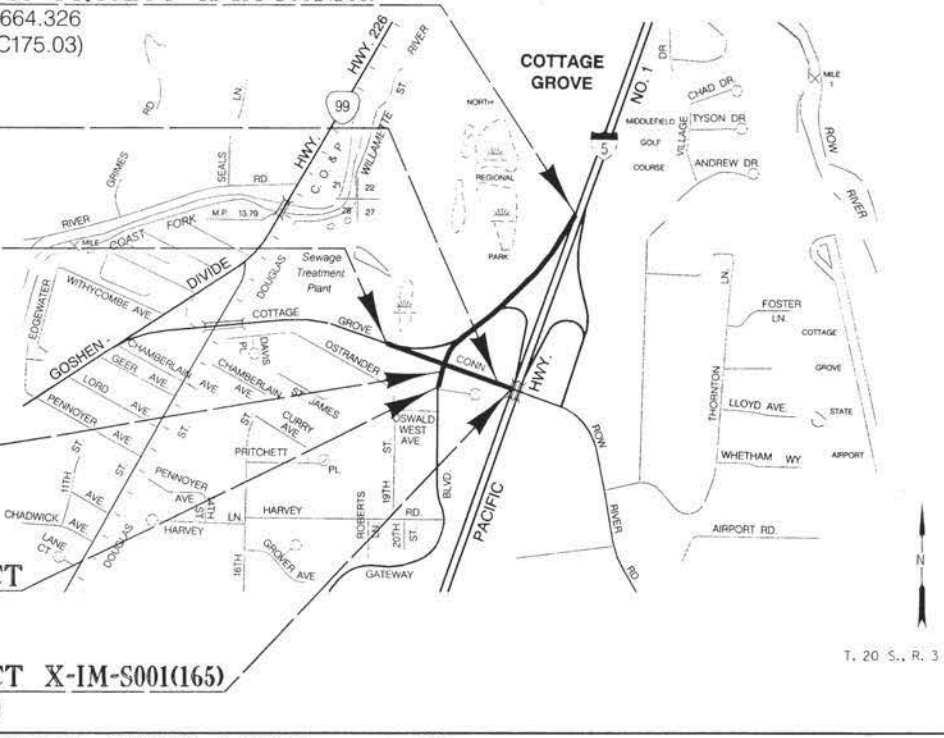
END OF PROJECT
STA. "CGC" 30+640.000
(M.P. 1C174.72)

BEGINNING OF PROJECT
STA. "CGC" 30+340.000
(M.P. 1C174.52)

END OF PROJECT
STA. "GW" 40+030.490

END OF CONTRACT PROJECT
STA. "GW" 40+060.490

END OF CONTRACT PROJECT X-IM-S001(165)
STA. "CGC" 30+700 (M.P. 1C174.74)



T. 20 S., R. 3 W., W.M.

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.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Papé	COMMISSIONER
John Russell	COMMISSIONER
Bruce A. Warner	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
13,704
OREGON
JULY 16, 1987
CATHERINE M. NELSON
Expires Dec. 31, 2004

Catherine M. Nelson
TECHNICAL SERVICES MANAGING ENGINEER

I-5 AT COTTAGE GROVE INTCHGE. SEC.
PACIFIC HIGHWAY
LANE COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-IM-S001(165)	1

METRIC

PE000302-011

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INDEX OF SHEETS, CONT'D.	
SHEET NO.	DESCRIPTION
	PERMANENT PAVEMENT MARKINGS
ST-1, ST-2	Striping Plans
	EROSION CONTROL
GHA-1, GHA-2	Erosion Control Plans
	PERMANENT SIGNING
S-6468, S-6469	Signing Plans
S-6470, S-6471	Sign Details
S-6472, S-6473	Sign & Post Data Tables
	ILLUMINATION
I-0960	Illumination Plans
	SIGNALS
13260	Signal Plan Legend
13261	Pole Entrance Chart
13262	Signal Removal & Temp. Signal Plan
13263	Signal Plan
13264	Detector & Interconnect Plan

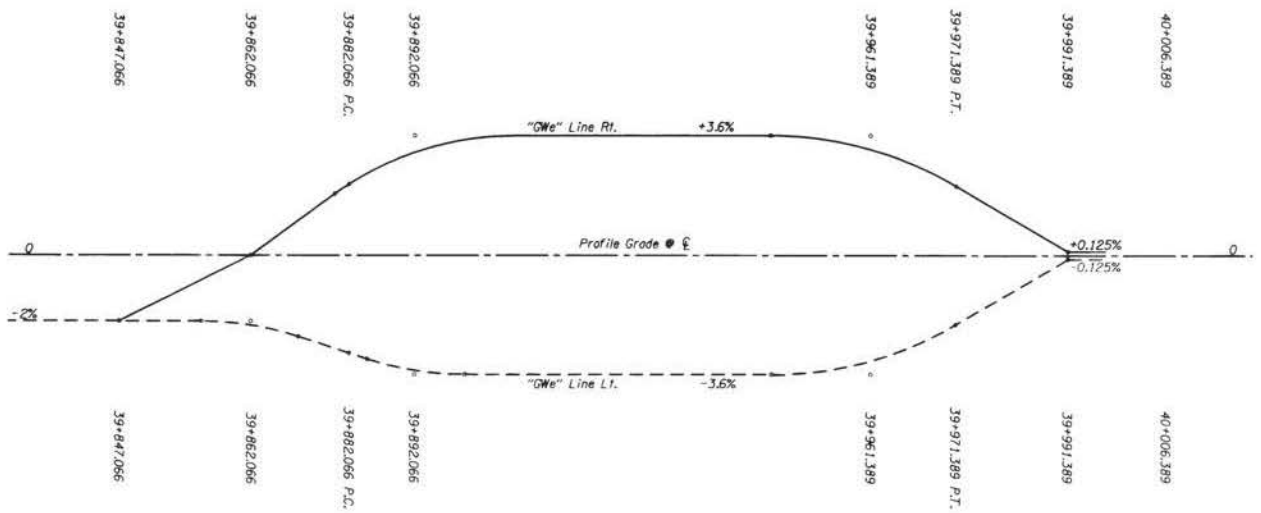
Standard Drg. Nos.

RD215, RD220	- Channelization & Intersection Details
RD300	- Trench Backfill
RD302	- Street Cut
RD318	- Sloped Ends For Conc. Pipe
RD322	- Safety End Section Metal Pipe
RD336	- Storm Sewer Manhole
RD366	- Conc. Inlets Type CG-1, CG-2, & Curb Inlet
RD380, RD384, RD386	- Pipe Fill Height Tables
RD400, RD405, RD415 RD420, RD450	- Guardrail
RD610	- Asphalt Pavement Details
RD700	- Curbs
RD705	- Islands & Traffic Separators
RD710	- Accessible Route Islands
RD720	- Sidewalks
RD755	- Sidewalk Ramp Details
RD760	- Sidewalk Ramp Placement
RD900, RD905, RD910, RD945 RD950	- Traffic Control Plans - Barricades
RD1000, RD1010, RD1035	- Erosion Control
BR906	- Triangular Base Breakaway
BR963, BR966	- Traffic Signal Supports

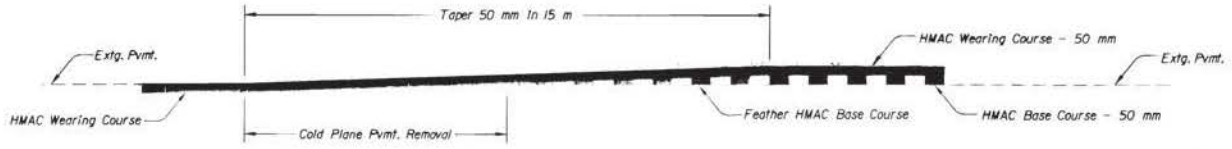
TM100	- Temp. Wood Post Sizing Charts
TM105	- Orange Flag Board Mounting Details
TM200, TM201, TM202, TM205	- Sign Installation Details
TM206, TM207	- Sign Mounting Details
TM211	- Signing Details
TM214, TM215	- Perm. Wood Post Sizing Charts
TM216	- Sign Installation Br. Mount Details
TM217	- Route Markers & Secondary Assemblies
TM218	- Secondary Signing Mounting Details
TM219	- Steel Pole Mounted Sign Details
TM223, TM224	- Directional Sign Layout
TM225	- Exit No. & Gore Signing Details
TM230, TM233	- Mounting Details Removable Legend
TM239	- Square Tube Sign Support
TM400	- Temp. Signal Details
TM403	- Mast Arm Pole Details
TM404	- Span Wire Details
TM405	- Pole Foundations & Grounding
TM406, TM407, TM408	- Vehicle Signal Details
TM409, TM410	- Pedestrian Signals
TM411	- Crosswalk Closure Details
TM415	- Mast Arm Mounted Warning Sign
TM416	- Overhead Sign Details
TM417, TM418	- Junction Boxes
TM419	- Loop Details
TM421	- Color Code Charts
TM422	- Miscellaneous Details
TM423	- Controller Cabinet & Related Details
TM424	- Post & Pedestal Cabinets
TM428	- Terminal Cabinets
TM435	- Interconnect
TM500, TM501, TM502	- Pavement Markings
TM511	- Bike Lane Pavement Markings
TM530	- Urban Intersection Pavement Markings
Tm537	- Channelized Intersection Pavement Markings
TM539	- Left Turn Pavement Markings

PE000302-011

I-5 AT COTTAGE GROVE INTCHGE. SEC. PACIFIC HIGHWAY LANE COUNTY		
METRIC		
FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	X-(M-S003(165)	1A



SUPER ELEVATION CHART
"GWe" LINE RAMP



ASPH. CONC. PAVEMENT FEATHERING ON GATEWAY BLVD.
STA. "GW" 40+030.490 To STA. "GW" 40+060.490

All Dimensions Are In Meters (m) Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER
19,186
OREGON
JULY 15, 1997
JAMES H. HALLORAN
Expires Jun. 30, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5 AT COTTAGE GROVE INTCHGE. SEC.
PACIFIC HIGHWAY
LANE COUNTY

Design Team Leader - Steve Cooley
Designed By - Jim Halloran
Drafted By - Karen L. Wright

DETAILS

SHEET NO. 28

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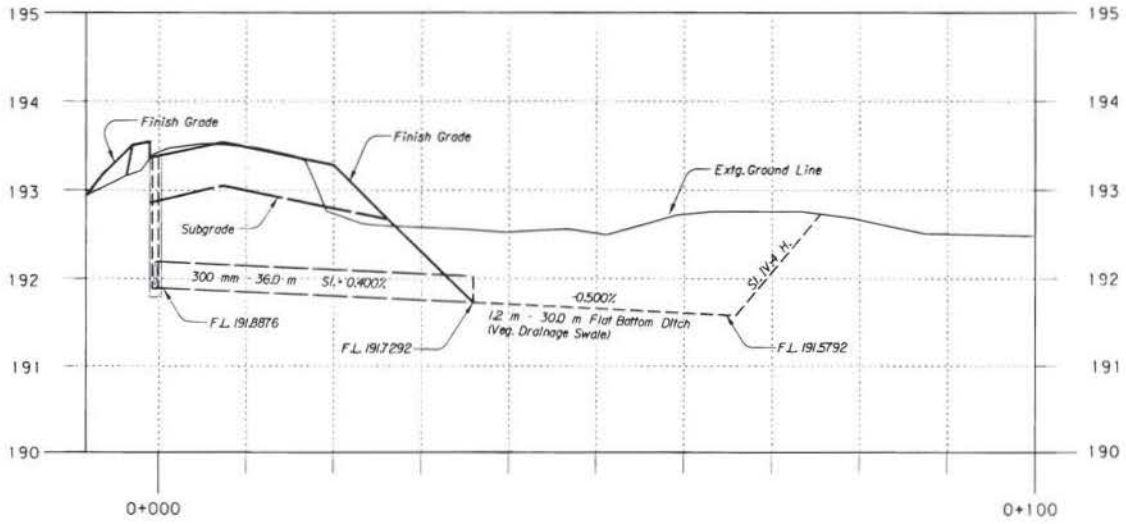
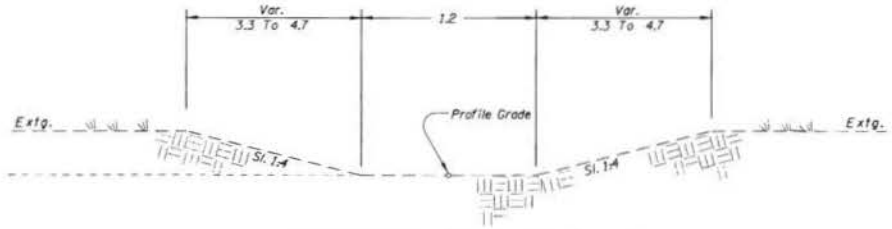


OUTFALL PIPE & DRAINAGE SWALE

STA. "CGC" 30+610.572, Rt. TO STA. "CGC" 30+632.874, Lt.



VEGETATED DRAINAGE SWALE

STA. "CGC" 30+610 To STA. "CGC" 30+632

LENGTH - 30.0 m

(For Location, See Sht. 4, Note 14)

All Dimensions Are In Meters (m) Unless Otherwise Noted.

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PACIFIC HIGHWAY
LANE COUNTY

Design Team Leader - Steve Cooley
Designed By - Jim Halloran
Drafted By - Karen L. Wright

DETAILS

SHEET NO. 2B-2

25-SEP-2003 13:16
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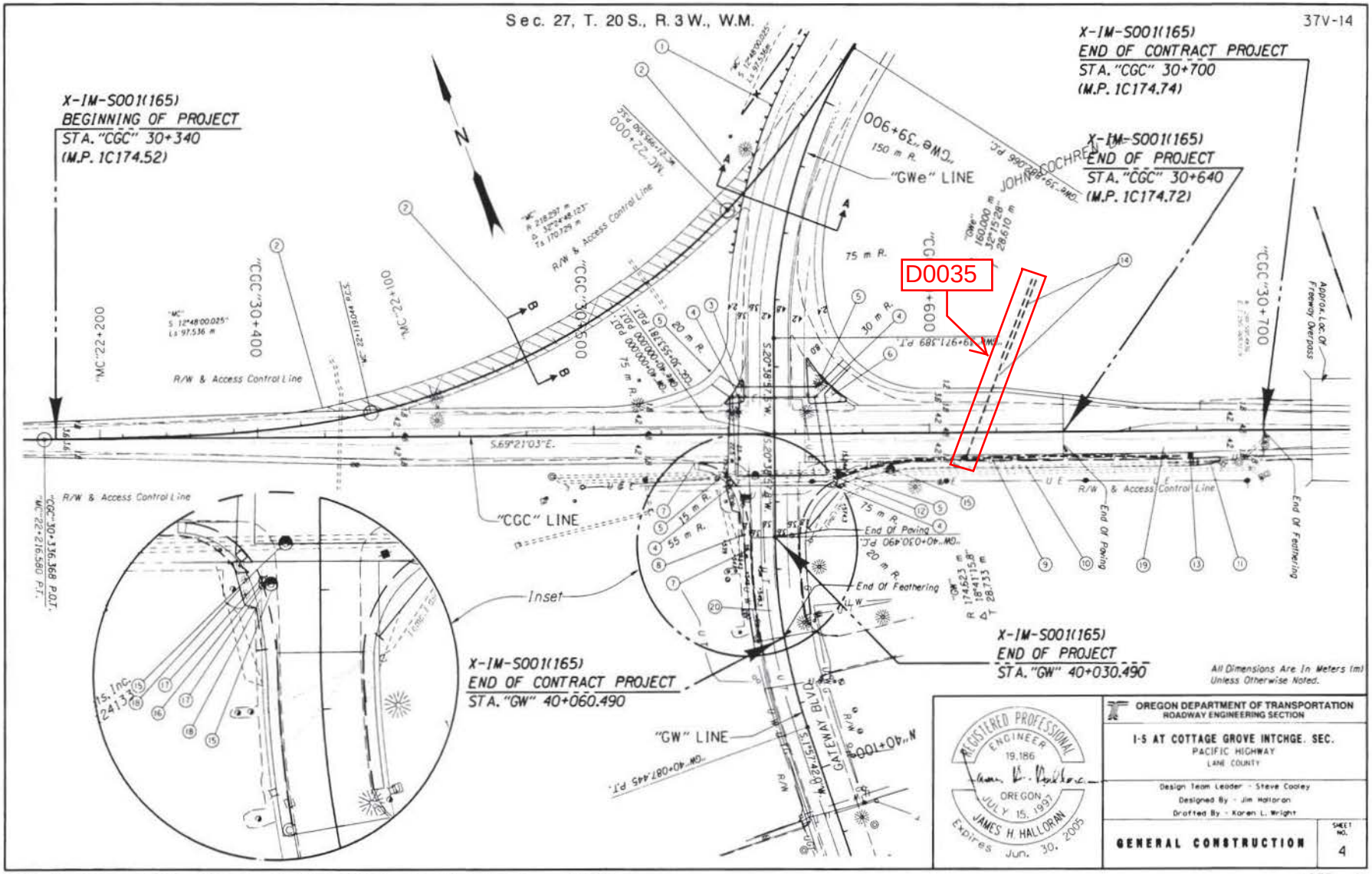
Sec. 27, T. 20 S., R. 3 W., W.M.
37V-14
X-IM-S001(165)
BEGINNING OF PROJECT
STA. "CGC" 30+340
(M.P. 1C174.52)
X-IM-S001(165)
END OF CONTRACT PROJECT
STA. "CGC" 30+700
(M.P. 1C174.74)
X-IM-S001(165)
END OF PROJECT
STA. "CGC" 30+640
(M.P. 1C174.72)
D0035
"GWe" LINE
"CGC" LINE
"GW" LINE
Inset
X-IM-S001(165)
END OF CONTRACT PROJECT
STA. "GW" 40+060.490
X-IM-S001(165)
END OF PROJECT
STA. "GW" 40+030.490
GATEWAY BLVD.
R/W & Access Control Line
End Of Paving
End Of Feathering
Approx. Loc. Of Freeway Overpass
All Dimensions Are In Meters (m) Unless Otherwise Noted.
OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION
I-5 AT COTTAGE GROVE INTCHGE. SEC.
PACIFIC HIGHWAY
LANE COUNTY
Design Team Leader - Steve Cooley
Designed By - Jim Halloran
Drafted By - Karen L. Wright
GENERAL CONSTRUCTION
SHEET NO. 4
REGISTERED PROFESSIONAL ENGINEER
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JULY 15, 1997
JAMES H. HALLORAN
Expires Jun. 30, 2005

(1) See Sht. 3, Note 2

(2) Sta. "MC" 22+120 To Sta. "MC" 21+980
Remove Extg. Roadway Shown Thus: 
Shape Area To Drain
(For Details, See Sht. 2B-3)

(3) Const. Type "C" PC Conc. Island (Non-Mountable) - 21.0 m²
With 1.8 m Cut Through Assessible Route - 2
With Simulated Grid Pattern
(See Drg. Nos., RD705 & RD710)

(4) Inst. Traffic Signal System
(For Sht. Nos., See Index Sht.)

(5) Inst. Temp. Traffic Signal System
(For Sht. Nos., See Index Sht.)

(6) Const. Type "C" Conc. Island (Mountable) - 74.0 m²
With 1.8 m Cut Through Assessible Route - 2
With Simulated Grid Pattern

(7) Const. Curb And Gutter - 56.0 m
Const. Curb Ending
Match Extg. Curb
(See Drg No. RD700)

(8) Const. P.C. Conc Walk - 109.0 m²
Const. Sidewalk Ramp - Option A
Match Extg. Sidewalk
(See Drg. Nos., RD720, RD755 & RD760)

(9) Curb And Gutter - 223.0 m
Const. Curb Ending
Match Extg. Curb

(10) Const. P.C. Conc Walk - 280.0 m²
Const. Sidewalk Ramp - Option A
Match Extg. Sidewalk

(11) Const. Asph. Path - 8.0 m²
Match To Extg. Path
Const. Sidewalk Ramp

(12) Sta. "CGC" 30+572 To Sta. "CGC" 30+610.5, Rt.
Const. Type "CG-2" Inlet
Inst. 300 mm Storm Sew. Pipe, 1.5 m Depth - 60.0 m
(See Drg. No. RD366)

(13) Sta. "CGC" 30+610.5 To Sta. "CGC" 30+678, Rt.
Const. Type "CG-2" Inlet - 2
Inst. 300 mm Storm Sew. Pipe, 1.5 m Depth - 66.0 m

(14) Sta. "CGC" 30+610.5, Rt. To Sta. "CGC" 30+621.7, Lt.
Const. Type "CG-2" Inlet
Inst. 300 mm Storm Sew. Pipe, 1.5 m Depth - 36.0 m
Const Drainage Swale - 78.0 m³
Tr. Resurfacing - 16.0 m²
(For Details, See Sht. 2B-2)

(15) Reconstruct Manhole - 3
(See Drg. No. RD336)

(16) Remove Waterline Tap
By Others

(17) Adjust Valve Box - 2

(18) Relocate Fire Hydrant
By Others

(19) Sta. "CGC" 30+640 To Sta. "CGC" 30+700
Const. Roadway Widening And
Features As Shown In Applicable
Notes And Typical Sections.
Feather at Locations As Shown
(See Drg. No. RD610)

(20) Sta. "CGC" 40+030 To Sta. "CGC" 40+060
Const. Roadway Features As Shown In
Applicable Notes And Typical Sections.
Const. Asph. Conc. Pavement Feathering
(See Details, Sht. 2A & 2B)

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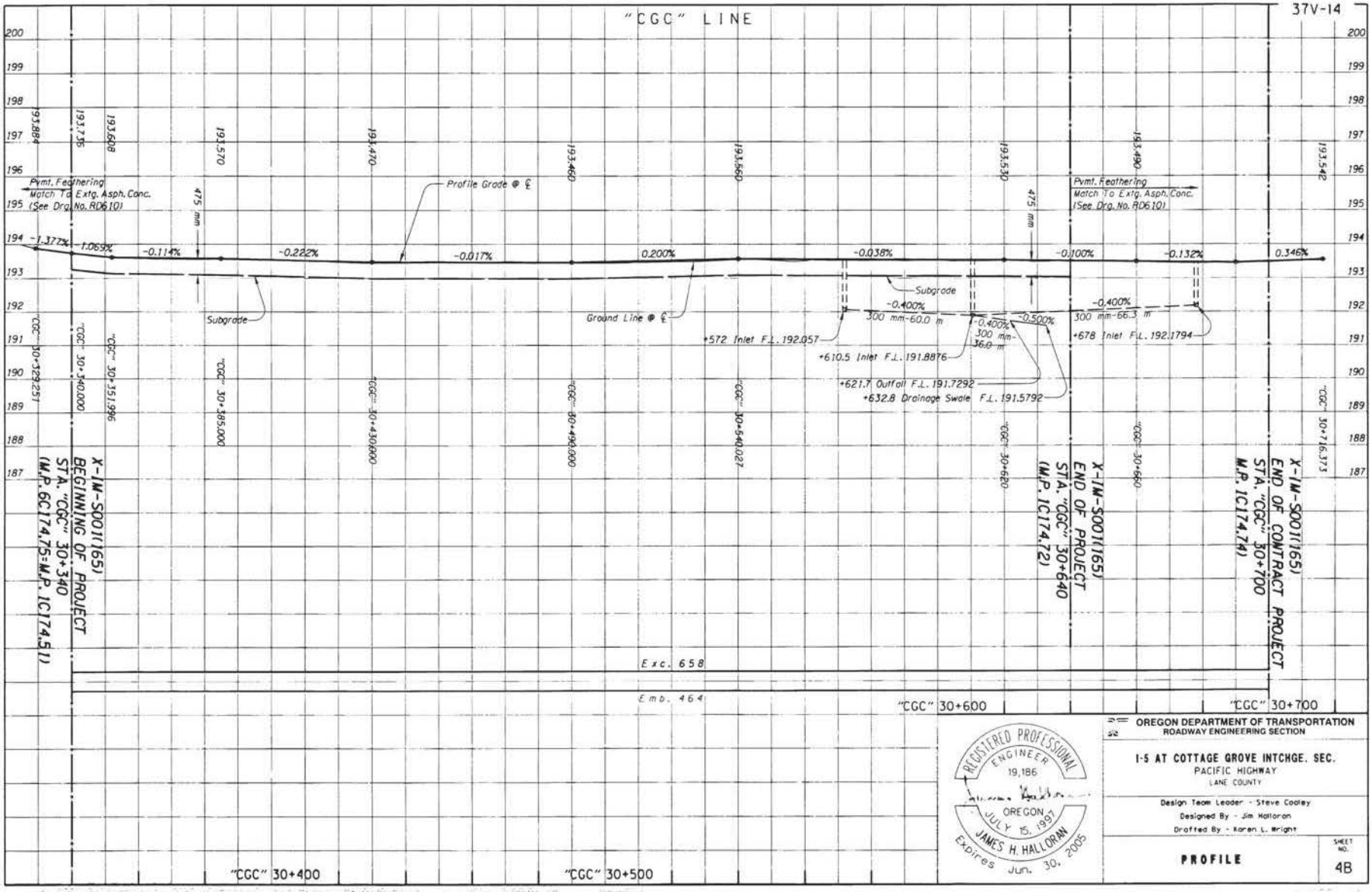
OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5 AT COTTAGE GROVE INTCHGE. SEC.
PACIFIC HIGHWAY
LANE COUNTY

Design Team Leader - Steve Cooley
Designed By - Jim Holloran
Drafted By - Karen L. Bright

GENERAL CONSTRUCTION

SHEET NO. 4A



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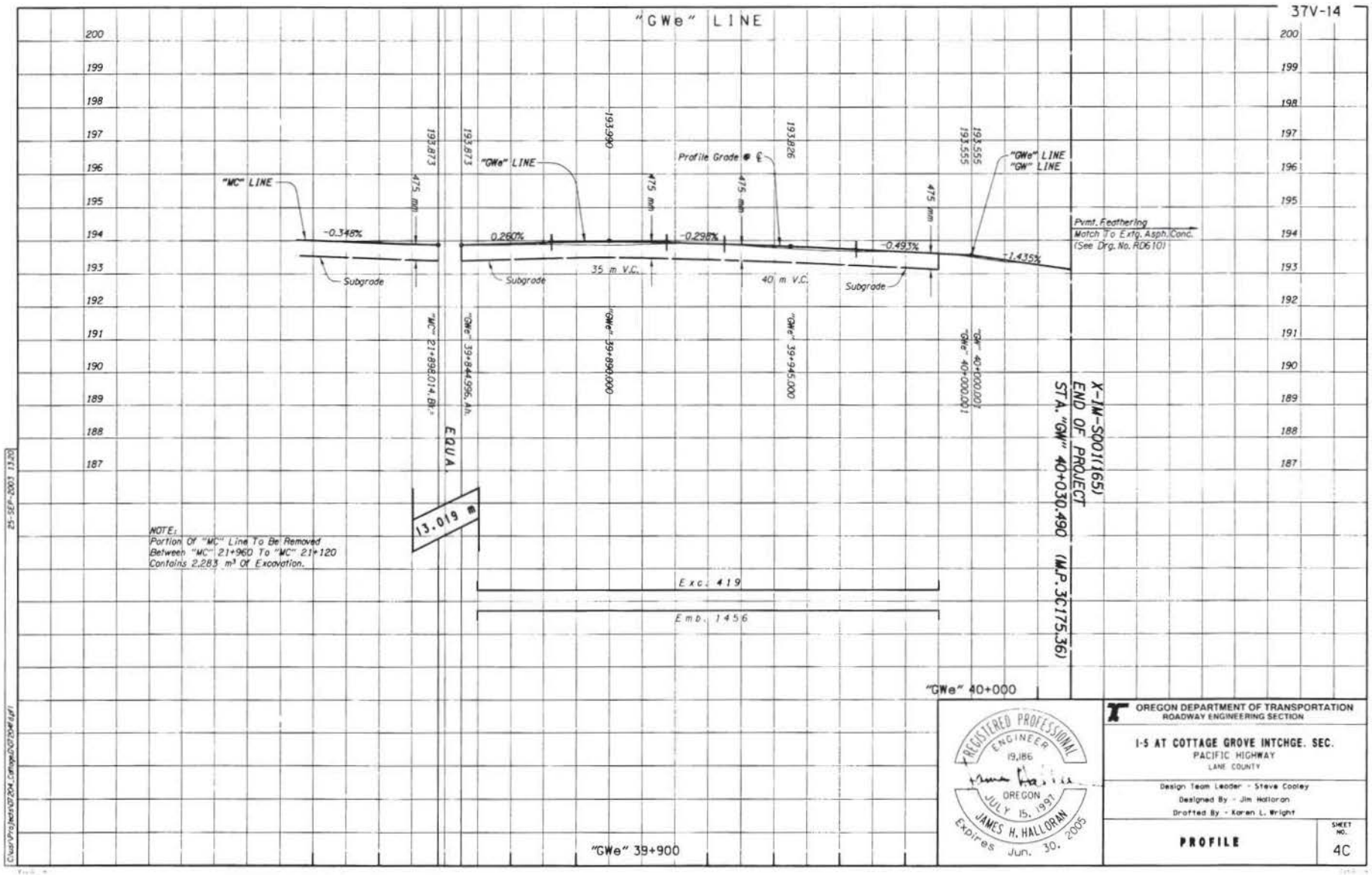
PACIFIC HIGHWAY
LANE COUNTY

Design Team Leader - Steve Cooley
Designed By - Jim Halloran
Drafted By - Karen L. Wright

PROFILE

SHEET NO. 4B



25-SEP-2003 13:20

REGISTERED PROFESSIONAL ENGINEER
19,186
OREGON
JULY 15, 1997
JAMES H. HALLORAN
Expires Jun. 30, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5 AT COTTAGE GROVE INTCHGE. SEC.
PACIFIC HIGHWAY
LANE COUNTY

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PROFILE

SHEET NO. 4C