

CHAPTER 17

FIELD MARKERS

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17.1 Introduction

The purpose of this chapter is to outline a statewide process of field marking:

- Stormwater treatment facilities such as swales, ponds, filter strips, sedimentation basins, bioslopes, proprietary structures that utilize vaults and oversized manholes or tanks, and pretreatment manholes,
- Stormwater storage facilities such as ponds, tanks, and vaults,
- Low impact development (LID) best management practices (BMPs),
- Underground Injection Control (UIC) systems, and
- Culverts with a span less than 20 feet.

Oregon Department of Transportation (ODOT) owns, operates, and maintains hundreds of stormwater treatment and storage facilities and thousands of culverts across the state of Oregon. A process that includes assigning an identification number, placing field markers to locate and identify, and supports asset management data collected has been created for these ODOT drainage features. Other drainage features may be added to this process and updates would be made to this chapter.



Figure 17-1 Stormwater Facility Field Marker



Figure 17-2 Culvert Field Marker

17.2 Stormwater Treatment and Storage Facility Field Markers

There are three types of markers used to identify ODOT facilities or alert maintenance crews of the location of stormwater facility maintenance areas. A Type S1 marker is used to indicate the start and end of stormwater facility maintenance areas. The purpose of the Type S2 marker is to display the facility drainage identification number. Maintenance crews would be able to reference the appropriate Operation and Maintenance Manual using the ID number assigned to each facility. A Type S3 marker is used to stamp a drainage facility identification number onto the top of access covers of underground treatment and storage facilities that utilize vaults, oversized manholes, and tanks.

17.2.1 Responsibilities

The ODOT Regions or individuals within or outside of the agency have the following responsibilities:

- Project Hydraulics Engineer – Requests stormwater drainage facility IDs. Coordinates marking of new low impact development and conventional best management facilities. Includes drainage facility IDs on Stormwater Report and Operation and Maintenance Manual. Notifies applicable District Managers of all new stormwater facilities.
- District Manager – Coordinates marking existing stormwater facilities, and replacing/repairing damaged markers. Obtains drainage facility ID number(s) for existing stormwater facilities.
- Technical Services Geo-Environmental Section's Senior Hydraulics Engineer – Assigns and issues stormwater drainage facility IDs upon request. Maintains a database of assigned Drainage Facility IDs.

17.2.2 Definitions

Definitions of important terms are listed in this section.

Stormwater Facility Field Marker – Used to identify and locate ODOT stormwater facilities or alerts maintenance crews of stormwater facility maintenance areas. Three stormwater markers are recommended for identifying, locating, or alerting:

Type S1 – Marker using a non-reflective flexible plastic post.

Type S2 – Marker using a white background non-reflective aluminum paddle mounted onto one (1) steel post.

Type S3 – Marker created by stamping the drainage facility ID onto the top of manhole, vault, and/or tank access covers.

Drainage Facility ID (DFI) – A unique “DFI” is assigned to all stormwater treatment and storage facilities. It is used to associate or link the stormwater facility to an Operation and Maintenance Manual. The number is assigned by contacting the Geo-Environmental Section’s Senior Hydraulics Engineer to obtain a unique “DFI”. The Geo-Environmental Section will maintain a database of assigned Drainage Facility IDs.

Engineered Stormwater Treatment and/or Storage Facilities – A treatment or storage facility that requires engineering analysis to determine the hydrology, hydraulics, and design of the structure. Engineered treatment facilities include dry and wet detention basins, swales, treatment wetlands, and proprietary systems. Engineered storage facilities used for stormwater management include dry detention basins, vaults, and tanks.

Low Impact Development (LID) – LID is the concept of designing projects to minimize the effect on natural hydrology and water quality. This is primarily accomplished by minimizing impervious surface areas and applying LID best management practices which provide opportunities for infiltration of stormwater into vegetated soil.

Underground Injection Control (UIC) Systems – An underground injection control is any system, structure, or activity that is created to place fluid below the ground or sub-surface. Common stormwater underground injection systems or activities in Oregon include but are not limited to infiltration galleries, drywells, and subsurface drainfields. These types of facilities are considered stormwater disposal systems, not treatment systems, and have impacted groundwater quality in a number of communities across the nation.

Operation and Maintenance Manual – Summarizes a facility’s inspection schedule and maintenance guidelines. It is prepared to assist personnel who maintain the facility. All engineered stormwater treatment and storage facilities must have an Operation and Maintenance Manual.

Stormwater Facility Footprint – The facility footprint includes the area needed to accommodate the pretreatment structure, storm drain piping, treatment zone (basin or pond, swale, filter strip, etc), primary and auxiliary outlets, outfalls, and a maintenance access road.

Stormwater Facility Maintenance Area – The stormwater facility maintenance area includes the stormwater facility footprint. These maintenance areas are applicable to all above ground stormwater treatment and storage facilities. Markers are placed at the start and end of each facility’s maintenance area to alert maintenance crews of special maintenance requirements as outlined in the applicable Operation and Maintenance Manual. See Figure 17-4 for an example of a maintenance area.

17.2.3 General Field Marking Requirements

- All ODOT stormwater treatment and storage facilities must have a unique drainage facility ID. A Drainage facility ID number is not required for pollution control manholes that do not qualify as a water quality structure. See standard drawing RD340.

- Field marking is required when an existing ODOT stormwater facility has a prepared Operation and Maintenance Manual.
- Field marking is optional when an existing ODOT stormwater facility does not have a prepared Operation and Maintenance Manual.
- Field marking is required for all new ODOT conventional stormwater facilities, and low impact development (LID) best management practices or other facilities that require special maintenance activities.

17.2.4 Type S1 Field Markers

A type S1 marker is a non-reflective flexible plastic post embedded into the ground. The purpose of this marker is to alert maintenance crews of the start and end of a stormwater facility maintenance area. A type S1 marker is shown in Figure 17-3. Standard placement of this marker is shown in Figure 17-4.

A type S1 marker color is red or green. A red marker indicates the beginning of a stormwater facility maintenance area. A green marker indicates the end of a stormwater facility maintenance area. Red and green marker coding is implemented with the direction of travel.

Placement of the red and green marker should be 4 to 6 feet from edge of pavement or face of curb. Note that these markers are not part of the mile point system or road delineator markers system.

Material and installation details are shown on Standard Drawing RD399.

17.2.5 Type S2 Field Markers

A type S2 marker uses an aluminum paddle mounted onto one (1) type 1U steel post. The purpose of a type S2 marker is to indicate the assigned facility drainage identification number. A type S2 marker is shown in Figure 17-3. Standard placement of this marker is shown in Figure 17-4.

The aluminum paddle or type S2 marker color will be white (non-reflective).

Placement of the type S2 marker should be at the right-of-way line and at the beginning of a stormwater facility maintenance area. Placement of a Type S2 marker at the end of a stormwater facility maintenance area is required if the facility's length is greater than 100 feet. Do not directly attach paddle to any historic or potentially historic structure when an alternate option is used to mount a paddle. Note that these markers are not part of the mile point system or road delineator markers system.

Installation details, paddle dimensions, and paddle mounting guidance are shown on Standard Drawing RD399.

17.2.6 Type S3 Field Markers

A Type S3 marker is used to mark the drainage facility identification number on an underground stormwater treatment system or facility. A type S3 marker is shown in Figure 17-3. Standard placement of this marker is shown in Figure 17-4.

The Type S3 marker places the drainage facility identification number on the access cover of a vault, manhole or tank for an underground stormwater treatment/storage facility. Ink stamping the drainage facility ID is not allowed on the top of access covers.

Installation details are shown on Standard Drawing RD399.

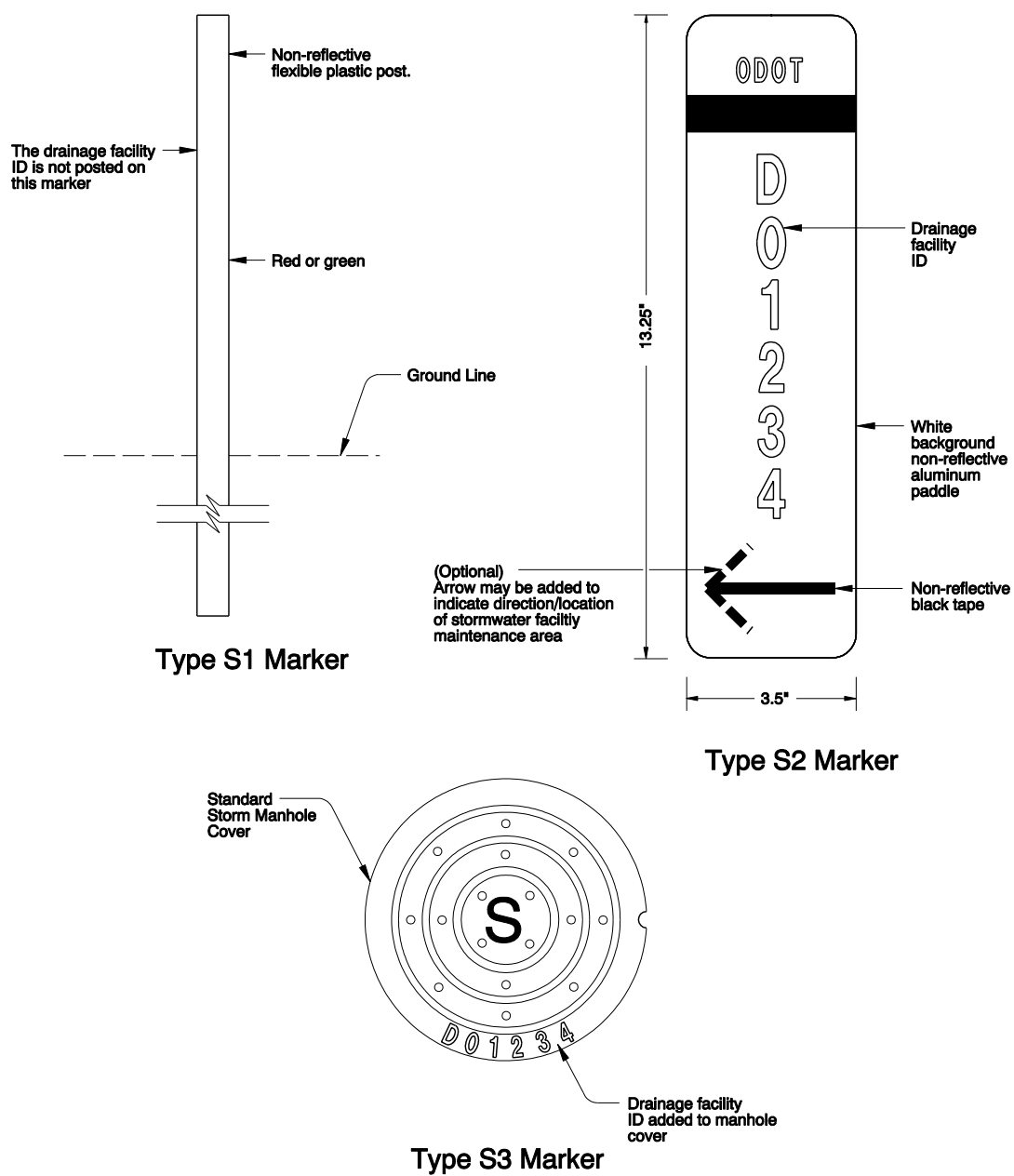


Figure 17-3 Example of Stormwater Facility Field Marker

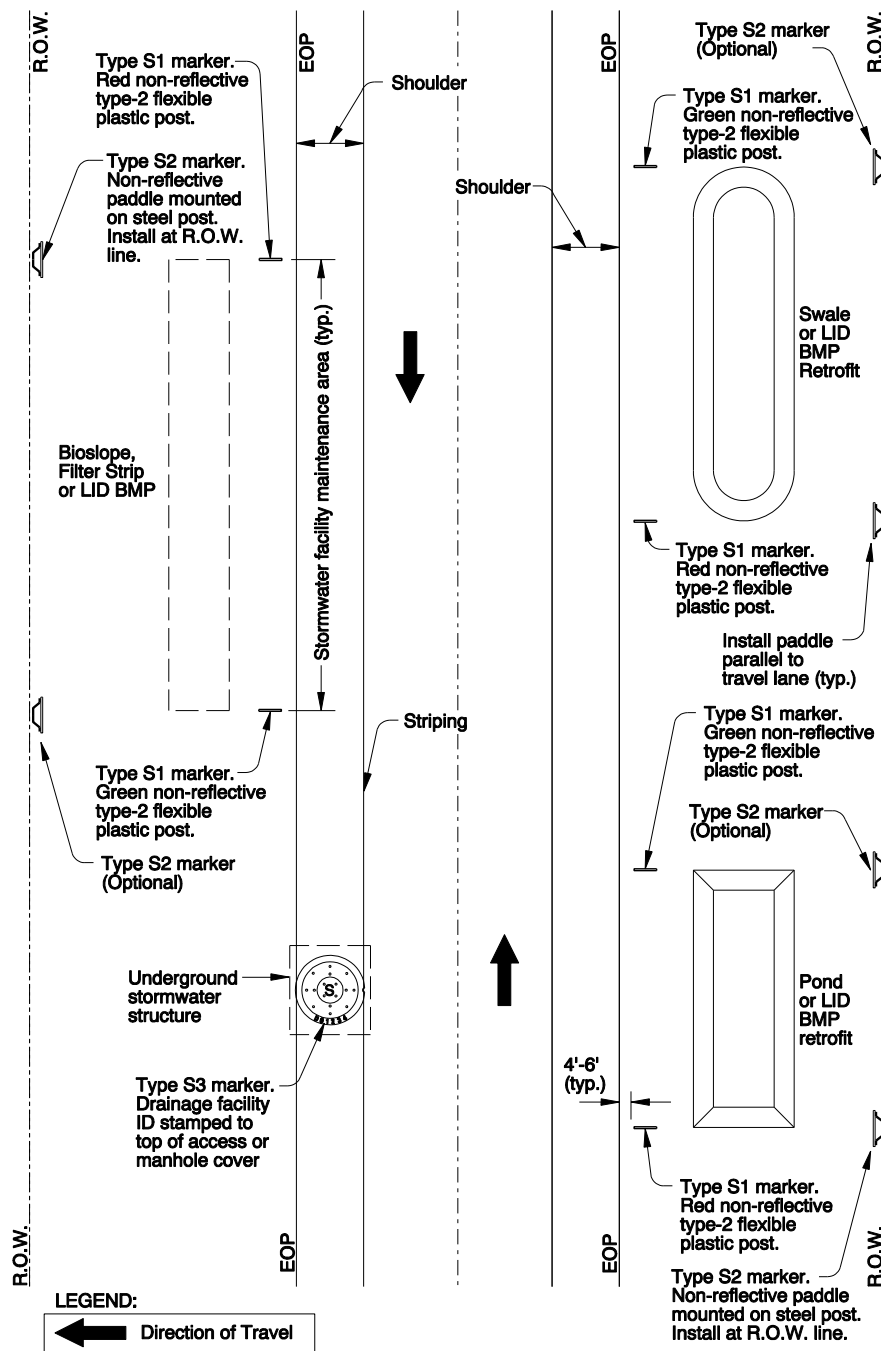


Figure 17-4 Example of Stormwater Facility Field Marker Location



Figure 17-5 Stormwater Facility Field Markers (Swale along Hwy 22)

17.2.7 Stormwater Treatment and Storage Facility Field Marking Procedure

The procedure for marking new and existing stormwater facilities and/or structures is outlined below:

New Facilities

Step 1 - The project hydraulics engineer requests drainage facility IDs when proposing engineered facility or low impact development systems.

Step 2 - Provide the following information for each facility needing a drainage facility ID:

- facility type(s)
- highway name
- highway number
- route number
- milepost when using a Type 3 marker or mileposts that equal the start and end of a stormwater facility maintenance area when applicable

- side of highway (side of highway is determined Right or Left in the direction of increasing mile points)
- is the facility a proprietary structure (yes or leave the cell blank)
- county
- region
- district, and
- requestor

Submit this information for each facility in an excel spreadsheet per Table 17-1.

Facility Type	Hwy Name	Hwy #	Route #	Milepost (Begin)	Milepost (End)	Side of Highway	Proprietary	County	Region	District	Requested by
Swale	Redwood Hwy	25	US 199	10.81	10.93	Right		Josephine	3	8	D. Sharp

Table 17-1 Example Excel Spreadsheet Drainage Facility ID Request Information

Submit information to the Geo-Environmental's Senior Hydraulics Engineer and a drainage facility ID number(s) will be assigned to the requestor. Email address is available at the following website:

<http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/hydraulics1.shtml>

- Step 3 -** Include drainage facility ID number(s) in the project Stormwater Report, Operation and Maintenance Manual, and appropriate Stormwater Control Special Provision(s).
- Step 4 -** Include drainage facility ID number(s) on Geo-Hydro stormwater plan sheets (Sheeting numbering: GJ). Reference Contract Plans Development Guide, Volume 1, Table 2-1).
- Step 5 -** Include Standard Drawing RD399 in the project design plans.
- Step 6 -** Provide project drafter the following information for each facility: facility stationing, milepoints, drainage facility IDs, paddle locations, red (begin) flexible plastic post locations, and green (end) plastic post locations. This information will be incorporated into a stormwater field marker table and added to the Geo-Hydro stormwater plan sheet section. The table can be found in the "hydro.cel" library within Microstation. See Table 17-2.

STORMWATER FIELD MARKER TABLE						
FACILITY LOCATION		DFI #	TYPE S2 MARKER LOCATION		TYPE S1 MARKER	
STATION	MP		BEGIN	END	RED	GREEN
NB 13+800	12.45	D01234	✓		✓	
NB 14+800	12.64	D01235		✓		✓

✓ Check where appropriate
 Red = Beginning of facility
 Green = End of facility

Table 17-2 Example Stormwater Field Marker Table

Step 7 - Type 1, Type 2, and Type 3 markers are specified in Special Provision 00842.

Existing Facilities

Step 1 - District Manager requests drainage facility IDs for an existing facility from Geo-Environmental Section's Senior Hydraulics Engineer. Provide the information for each facility needing a drainage facility ID as described in Step 2 for NEW Facilities.

Step 2 - District Manager orders Type S2 markers from the ODOT Sign Shop according to the marker specifications outlined in Standard Drawing RD399. Provide a list of drainage facility IDs when submitting the sign request to the Sign Shop.

Step 3 - District Manager coordinates installation of markers as outlined in Section 17.2.

17.3 Culvert Field Markers

The purpose of the culvert field markers is to set a consistent statewide standard for marking culverts from twelve inches to twenty feet in culvert span. The underlying principle for the placing of the field markers is to provide a convenience to maintenance crews, scoping teams and asset management in locating culverts openings. The installation of culvert drainage markers is optional and will be installed as determined by persons listed in the responsibility section below. Each maintenance district and project team should consider installing drainage markers for all culverts, excluding private approaches.

17.3.1 Responsibilities

The ODOT Regions or individuals within or outside of the agency have the following responsibilities:

- Project Hydraulics Engineer – Determines location for Type 1 markers for culverts with a span greater than four feet. Coordinates with District Manager to determine the placement of the Type 2 markers. Requests culvert drainage facility ID's for the Type 2 markers.
- Project Roadway Engineer – Determines location for Type 1 markers for culverts with a span of four feet and less. Coordinates with District Manager to determine the need and placement of the Type 2 markers. Requests culvert drainage facility ID's for the Type 2 markers.
- District Maintenance Manager – Coordinates with project hydraulic engineer and roadway engineer during development of new projects to determine Type 2 marker needs and placement in relation to the culvert. Coordinates marking existing culverts that are not project related and replacing and repairing damaged Type 1 and Type 2 markers. Obtains drainage facility ID number(s) for Type 2 markers for existing culverts.
- Technical Services - Geo-Environmental Section's Culvert-Hydraulic Engineer – Assigns and provides approved drainage facility ID numbers upon request.

17.3.2 Definitions

Definitions of important terms are listed in this section.

Culvert Field Marker - Used to locate and identify culverts along the ODOT's transportation system. Two types of culvert field markers can be used for identifying and locating culverts:

Type 1 – A green performed fused thermoplastic tape installed along the inlet edge of pavement.

Type 2 – Marker using a white background non-reflective aluminum paddle with back lettering and green strip that is mounted onto a steel post or permanent feature.

Drainage Facility Management System (DFMS) – A database developed by ODOT to track information on culverts within the transportation system. DFMS includes a graphical user interface that allows users to add, track and update information on culverts. DFMS is a web based system that can be accessed from any ODOT network.

Drainage Facility ID (DFI) – The Drainage Facility ID is used in DFMS to uniquely identify culverts within ODOT's highway system. The approved DFI will be either a Bridge Structure number or a DFI that begins with a 'D'. The DFI will default to the bridge structure number if one is assigned and entered into DFMS.

Cross Culvert – Culvert that crosses underneath the roadway.

Pipe Left and Pipe Right - Culverts that run perpendicular, parallel or at a skew to the highway but do not cross any travel lanes.

Public Approach Left & Right - Culverts that pass under public approach roads are termed 'Public Approach Left' & 'Public Approach Right'. These do not include private roadway or field approaches.

Bridge Structure Number – Identifying number of the ODOT Bridge Data System. Bridge structure numbers are given to culverts who bridge span is six feet and greater.

17.3.3 Field Marking Parameters

The Type 1 and Type 2 culvert markers are only to be used for cross culverts, pipe left and pipe right installations, and public approaches. These three categories can encompass many different kinds of culverts such as, streams, roadside drainage, and cattle passes. When marking culverts include those with grated or drop inlets with an open end at the outlet of the culvert.

Culverts that connect to other systems by means of manholes or blind connections are not to be located using the culvert markers. The following types of culverts are not be marked with the Type 1 and Type 2 culvert field markers:

- Slotted drains or perforated pipes
- Sanitary systems
- Stormwater systems attached via manholes.
- Private roadway or field approaches
- Culverts smaller than twelve inches in span.

17.3.4 Type 1 Field Markers

The Type 1 marker is a green preformed fused thermoplastic tape that measures from six to twelve inches in length by four inches wide. The marker is installed along the inlet edge of the pavement for quick identification of the culvert location from the road surface. Type 1 markers do not need a drainage facility ID before installation. A Type 1 drainage marker is shown in Figure 17-6.

Type 1 Placement Requirements:

The long portion of the pavement marking will be perpendicular to the center line of the highway and located at the inlet edge of the pavement. Place the pavement marking directly in line with the culvert inlet. Typical placement is shown in Figure 17-7.

- When there are three or more culverts within 50 feet of each other then mark the first and last drainage facility only.
- On non-divided highways place the pavement marker only on the culvert inlet side of the highway.

- For divided highways place the pavement marker on the culvert inlet side of the highway. Marking the culvert outlet side of the highway is optional.
- Do not place the pavement marker over the fog line or in the travel lane.

Material and installation details are shown on Standard Drawing RD398 and specified in Special Provision 00842.

17.3.5 Type 2 Field Markers

The Type 2 marker is a white background non-reflective aluminum paddle with black lettering that is mounted to a steel post or attached to a permanent feature. The paddle is marked with the facility's drainage ID, mile point, and a green strip near the top. All Type 2 markers must have an approved drainage facility ID and mile point from DFMS. A Type 2 marker is shown in Figure 17-6. The three different installation options for the Type 2 marker are listed below.

- Steel Posts: Aluminum paddle with the unique drainage facility ID and mile point mounted onto a Type 1U steel post.
- Guardrail Areas: Aluminum paddle with the unique drainage facility ID and mile point mounted on wood guardrail posts.
- Concrete Feature Areas: Aluminum paddle with the unique drainage facility ID and mile point mounted on a concrete culvert headwall or concrete barrier.

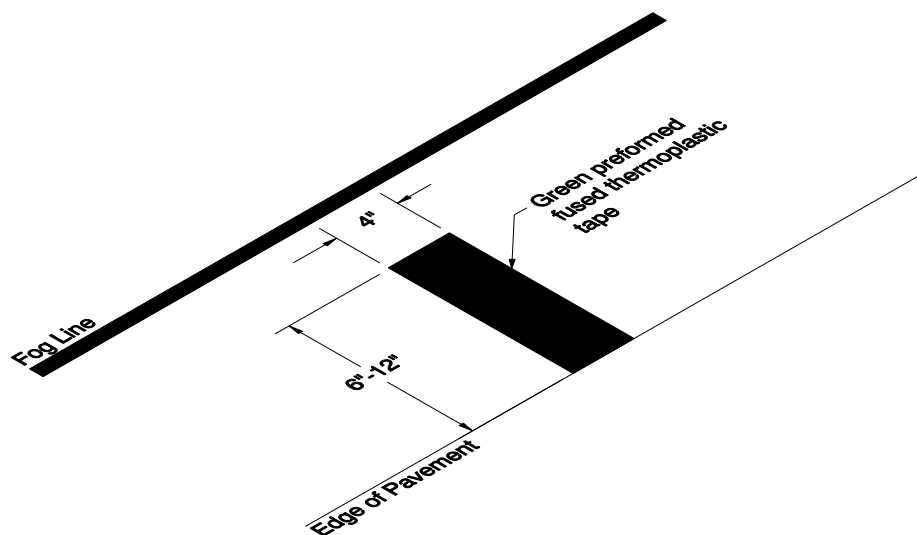
Type 2 Placement Requirements:

Drainage Markers are not part of the mile point system or road delineator marker system. The drainage markers will be located so that they are not noticed or conspicuous to the traveling public. Type 2 markers will not be attached directly to any historic structures which may include headwalls, bridges, and retaining walls. The markers only purpose will be to help identify the location of culverts for ODOT personnel. Typical placement is shown in Figure 17-7.

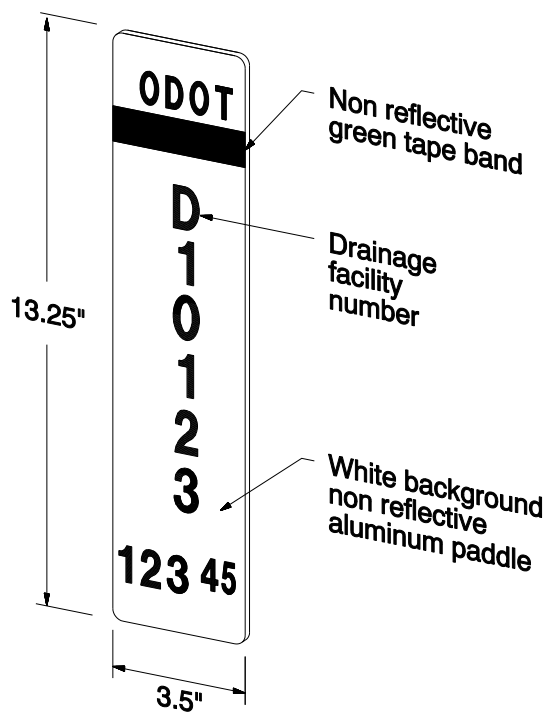
- When the Type 2 marker is mounted on a Type 1U steel post install the marker parallel to the travel lane.
- On non-divided highways place the Type 2 marker only on the culvert inlet side of the highway.
- For divided highways place the Type 2 marker on the culvert inlet side of the highway. Marking the culvert outlet side of the highway is optional.

Material and installation details are shown on Standard Drawing RD398 and specified in Special Provision 00842.

Material and installation details are shown on Standard Drawing RD398.

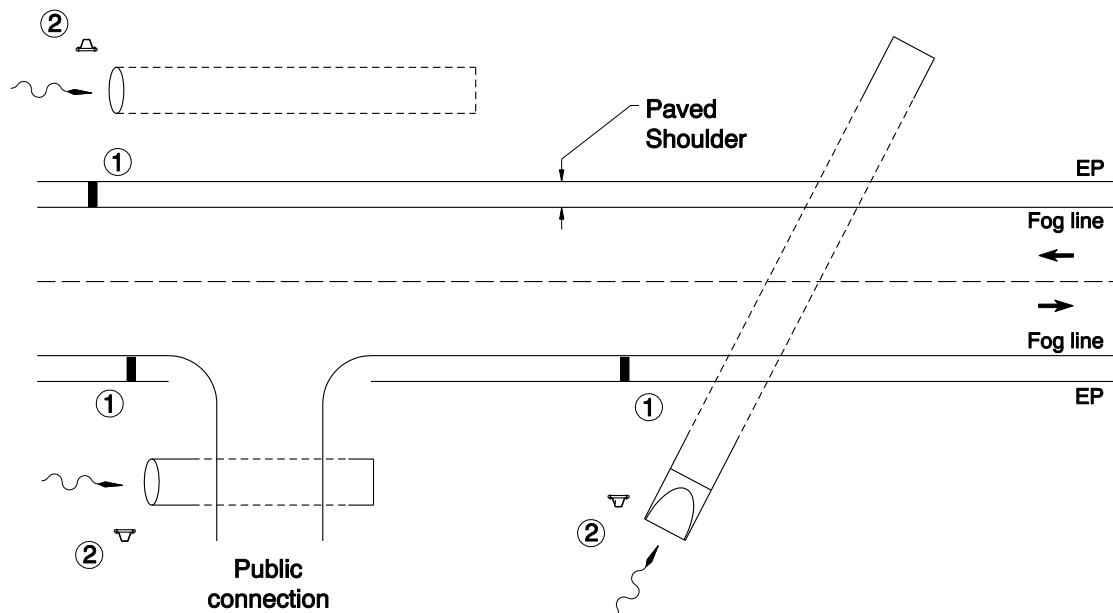


Type 1 Marker



Type 2 Marker

Figure 17-6 Example of Culvert Field Marker



- ① Type 1 Marker - Green preformed fused thermoplastic tape. Place in-line with culvert inlet between edge of pavement and fog line.
- ② Type 2 Marker - Non reflective paddle mounted on steel post. When used in conjunction with type 1 marker place type 2 marker near inlet.

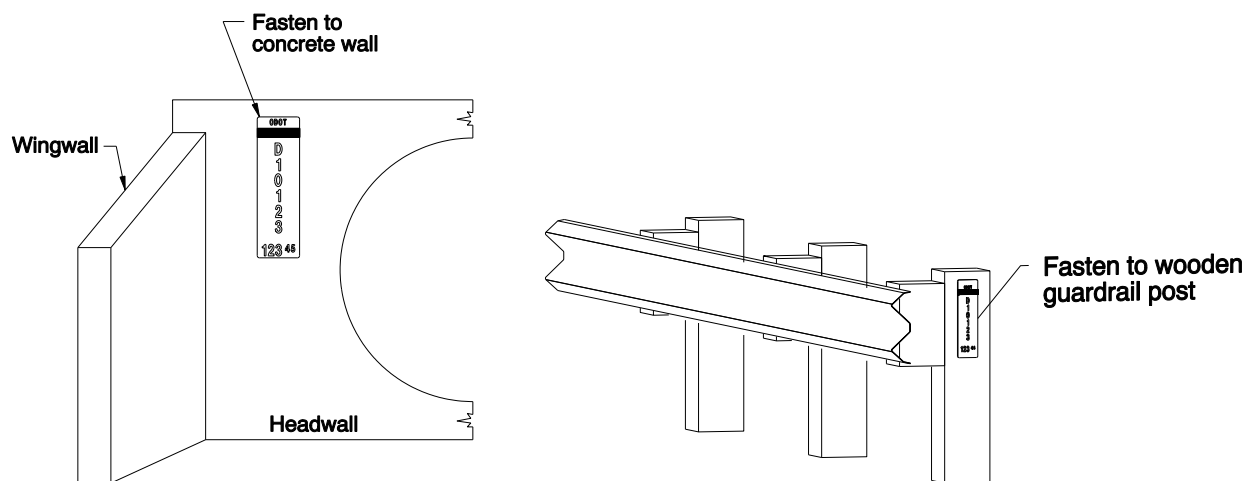


Figure 17-7 Example of Culvert Field Marker Location

17.3.6 Culvert Field Marking Procedure

The Type 1 and Type 2 culvert markers can be used independently or in combination with each other to provide additional culvert information and location. The procedure for marking new and existing culverts is outlined below:

Project Based Culverts

Type 1 Culvert Marker:

1. Provide project drafter with culvert stationing, milepoint(s), and inlet / outlet location(s) of the Type 1 marker. The project drafter will complete the DFI culvert marker table, located in the Microstation Workspace under the hydro cell library, and place in the roadway plan sheet section. Type 1 markers do not need a drainage facility ID before installation.
2. Include Standard Drawing RD398 in the project plans.

Type 2 Culvert Marker:

Culverts with a span of 6 feet and less than 20 feet:

1. The project hydraulic engineer requests a bridge structure number from ODOT Bridge Section. The drainage facility ID will default to the bridge structure number when assigned and placed on the Type 2 marker.
2. Include bridge structure number(s) on Geo-Hydro culvert plan sheets (Sheet numbering: GE). Reference Contract Plans Development Guide, Volume 1, Table 2-1. Use DFI title block cell located in the Microstation Workspace under the hydro cell library.
3. Provide project drafter the following information for each culvert: stationing, milepoint, bridge structure IDs, and Type 2 and Type 1 locations. The project drafter will complete the DFI culvert marker table, located in the Microstation Workspace under the hydro cell library, and place in Geo-Hydro culvert plan sheet section.
4. Include Standard Drawing RD398 in the project plans.
5. Provide the drainage facility ID and hydraulics plan sheet(s) to the Culvert-Hydraulic Engineer in Geo-Environmental Section.

Culverts with a span less than 6 feet:

1. The project hydraulic engineer / project roadway engineer requests a drainage facility ID from ODOT Geo- Environmental Section.

2. Provide the following information for each facility needing a drainage facility ID:

- Highway number and milepoint
- Frontage / Connection ID if needed; ex: 001AB
- Number of Barrels
- Barrel Rise, Span and Shape
- Length of culvert
- Material
- Inlet side
- Height of cover over inlet and outlet
- Stream Name
- Facility Usage
- Stream Name
- Requestor

3. Submit information to the Geo-Environmental's Culvert-Hydraulic Engineer and a drainage facility ID number(s) will be assigned to the requestor. Email address is available at the following website:

http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/culvert_dfms.shtml

4. Include drainage facility ID number(s) on appropriate sheet:

- a. Geo-Hydro culvert plan sheets (Sheet numbering: GE) - Reference Contract Plans Development Guide, Volume 1, Table 2-1. Use DFI title block cell located in the Microstation Workspace under the hydro cell library. Use for culverts with a span greater than 48 inches.
 - b. Roadway drainage plan sheets – (Sheet numbering: 3) - Reference Contract Plans Development Guide, Volume 1, Table 2-1. Place drainage facility ID, marker type and location in culvert note. Use for culverts with a span 48 inches and less.
5. Provide project drafter the following information for each culvert: stationing, milepoint, drainage facility IDs, and Type 2 and Type 1 locations. The project drafter will complete the DFI culvert marker table, located in the Microstation Workspace under the hydro cell library, and place in the appropriate plan sheet section.
6. Include Standard Drawing RD398 in the project plans.

Existing Culverts

Type 1 Culvert Marker:

1. District Manager coordinates installation of markers as outlined in Section 17.3. Type 1 markers do not need a drainage facility ID before installation.
2. Place Type 1 marker using installation details shown on Standard Drawing RD398.

Type 2 Culvert Marker:

1. District Manager requests drainage facility IDs for an existing facility based on culvert span.
 - a. Culverts with a span of 6 feet and less than 20 feet: Request a bridge structure number from ODOT Bridge Section. The drainage facility ID will default to the bridge structure number when assigned and placed on the Type 2 marker.
 - i. Provide the drainage facility ID and location(s) to the Culvert-Hydraulic Engineer in Geo-Environmental Section.
 - b. Culverts with a span of less than 6 feet: Request a drainage facility ID from ODOT Geo-Environmental Section's Culvert-Hydraulic Engineer. Provide the information for each culvert needing a drainage facility ID as described in Project Based Type 2 Culvert Marker.
2. District Manager orders Type 2 markers from the ODOT Sign Shop according to the marker specifications outlined in Standard Drawing RD398.
3. District Manager coordinates installation of markers as outlined in Section 17.3.

17.3.7 Drainage Facility ID Guidelines for Type 2 Culvert Markers

The drainage facility ID is used to uniquely identify culverts within ODOT's highway system. Culverts that are signed with a Type 2 marker will include the approved drainage facility ID and milepoint from the DFMS. The approved drainage facility ID will be either a Bridge Structure number or a drainage facility ID that begins with a 'D'. The drainage facility ID will default to the bridge structure number if one is assigned and entered into DFMS.

Drainage Facility ID	Culvert Span	Asset ID	Identifier Example	Type 2
DFMS Culvert (ID assigned by Geo-Environmental - DFMS)	12 in < X < 72 in	DFI 'D'	D026906	Yes
Bridge Structure (ID assigned by ODOT's Bridge Section)	6 ft < X < 20 ft	Bridge Structure No.	16199 or 03037A	Yes
Bridge Structure (ID assigned by ODOT's Bridge Section.	X > 20 ft	Bridge Structure No.	16199 or 03037A	No
Temporary culverts will begin with a 'T' in the first position (These represent culverts that have been migrated over to DFMS).	1 ft < X < 20 ft	-----	T002904	No

Table 17-3 Example of Culvert Drainage Facility IDs for Type 2 Marker