



HYDRAULIC STAFF OUTFALL INVENTORY INSTRUCTIONS

INTRODUCTION

This guide was created to provide a systematic procedure for recording basic stormwater outfall information collected when Hydraulics reports are prepared so that stormwater outfall information can be entered into Washington State Department of Transportation's (WSDOT) Stormwater Database. This data is used to comply with stormwater regulations and help WSDOT meet maintenance, as well as future programming, planning and project design needs.

BACKGROUND AND HISTORY

In order to meet federal, state, and local regulations related to controlling contaminated stormwater runoff and reducing peak stormwater flows, WSDOT initiated a Stormwater Outfall Inventory and Field Screening Project starting in approximately 1993. The inventory was designed to meet permitting requirements of the National Pollution Discharge Elimination System (NPDES), and to assist WSDOT in complying with the Puget Sound Highway Runoff Rule [Washington Administrative Code (WAC) 173-270]. This rule requires WSDOT to identify sources of stormwater runoff and develop a program of best management practices (BMPs) to treat or manage stormwater pollution sources.

OVERVIEW OF OUTFALL INVENTORY PROCESS

WSDOT has a complex drainage system composed of open channels, pipes, catch basins, dry wells, and other structures to direct or treat stormwater. These conveyance structures become outfalls when they discharge stormwater out of the WSDOT right-of-way (ROW) to surface water bodies, connect to municipal stormwater systems, or detain stormwater so that it will infiltrate into the ground.

Global positioning system (GPS) equipment will be used to obtain precise latitude, longitude, and elevation coordinates for inventoried outfalls. The information from the GPS data logger and the stormwater inventory database is later downloaded to **WSDOT's Geographic Information System GIS Workbench**.

OUTFALL IDENTIFICATION

An outfall can be any structure (man-made or natural) where stormwater from WSDOT highways is conveyed off of the ROW.

- **Pipes and Culverts.** All culverts and pipes that convey stormwater from the highway to a location off WSDOT ROW, or into water bodies within WSDOT ROWs should be inventoried. Culverts that discharge directly into surface water (e.g., drains from bridges to rivers) should also be inventoried.
- **Open Channels Discharging to Surface Waters or Leaving ROW.** Channels, or ditches, that convey water off WSDOT ROW, or to water bodies within the ROW, should be inventoried. These may be lined with vegetation, soil, or an impermeable material such as asphalt or concrete. As in Location 1 above, the point of interest is where an



open channel conveys concentrated surface water off the ROW or to the water body within the ROW.

- **Existing BMPs.** Existing BMPs such as ponds that infiltrate highway runoff inside the WSDOT ROW should be inventoried.
- **Interconnections of Municipal Storm Drain Systems with WSDOT's Drainage.** This includes ditches and pipes where local jurisdictions' drainage conveyances discharge onto, or pass through the ROW. The three potential situations include:
 1. A WSDOT pipe/ditch discharging into a municipal storm drain, and the municipal pipe surfaces (goes from an enclosed pipe to open channel) onto highway ROW,
 2. A WSDOT pipe/ditch connects to a municipal pipe and the municipal pipe leaves the ROW without surfacing, and
 3. Pipe to Pipe – Closed system to closed system.

DATA COLLECTION

During the inventory effort, information will be collected and recorded onto the Outfall Inventory spreadsheet found on the WSDOT Stormwater/Water Quality website at: <http://www.wsdot.wa.gov/environment/WaterQuality>

Follow the data collection and naming conventions. Call Corey Simon at 360-570-2589 or Richard Tveten at 360-570-6648 if assistance is required in applying the instructions. If anomalous site conditions warrant minor variations from the inventory instructions, note those variations on the Outfall Inventory spreadsheet for quality control and information management purposes.

Outfall Identifier: The outfall identifier is composed of the five identifying components making up the associated outfall location: state route, milepost, back indicator, direction of traffic, offset direction, offset distance, and any potential Related Roadway Type (RRT) and/or the Related Roadway Qualifier (RRQ). See Appendices for possible RRT and RRQ details.

State Route (SR): The State Route number is entered in a three-digit format (e.g., 005 for I-5, and 099 for SR 99).

Milepost (MP): The Milepost number should be provided in decimal format to the 1/100th, and the whole value of the MP in three-digit format. For example, MP 42.1 on Interstate-5 would be recorded as MP 042.10.

Direction: Indicates the direction of SR being inventoried. Mileposts increase when traveling the roadway in the increasing direction, decrease when traveling the roadway in the decreasing direction.

Offset (L/R): The Offset Indicator is a recorded reference relative to the increasing direction of travel on the SR (increasing mile post).

Potential values are: Right (R), Right Center (RC), Center (C), Left (L), Left Center (LC).

Offset Distance: Provide the Offset Distance in feet, as measured from the right or left fog line (shoulder edge). Center offset default value is 0 feet.

After the above information is collected, it should be compiled to create the outfall ID. The outfall ID format follows: SR-Milepost-Offset-Offset Distance. Example, an inventoried outfall on SR 2, milepost 15.54 that is located on the left shoulder of the road in increasing roadway direction that is 50 feet from the fog line would have an Outfall ID of 002-015.54-L-50. This should be recorded onto the Hydraulic Staff Outfall Inventory spreadsheet.

Geographic Coordinates: A GPS unit in the field can provide both a latitude and longitude reading for a given location as well as the approximate elevation above mean sea level (MSL) of the outfall. The source of the latitude and longitude coordinates should be recorded on the Inventory spreadsheet. See Appendix A for GPS details.

Latitude/Longitude: Be sure and include all the decimal places noted on the GPS unit. The format of the latitude and longitude should be as follows:

Latitude: XX.XXXXXXXXXX (e.g., 44.6879864)
Longitude: -XXX.XXXXXXXX (e.g., -122.6873645)
Elevation: Recorded in feet above MSL.

Lat/Long source: Describe whether GPS unit or map was used.

Date: Record the outfall inspection date on the reporting spreadsheet using the mm/dd/yyyy format, for example 09/29/2004.

Region: Record the WSDOT region the outfall is located in. Possible choices include: NW (Northwest Region), SW (Southwest Region), OR (Olympic Region), NC (North Central Region), SC (South Central Region) and ER (Eastern Region).

Milepost (MP): Record the milepost location of the outfall in decimal format to the 1/100th, and the whole value of the MP in three-digit format. For example, MP 42.1 would be recorded as MP 042.10.

State Route: Record the state route number in a three-digit format (e.g., 005 for I-5, and 099 for SR 99).

Structure Type: Identify the type of conveyance structure of the outfall. Include pipe type and material details from the following tables, if applicable. Identify the shape and dimensions of the outfall structure while in the field. Be sure to include all associated dimensions for each pipe type. Circular pipes will require only a diameter dimension; where as some other types will also require a rise and span measurement.

PIPE TYPES		
Culvert	Pipe to Storm Sewer	Dry Well
Open Channel	Other	Sheet Flow (no piping)

MATERIAL OPTIONS		
Corrugated Metal	Concrete	Aluminum
Plastic	Other	Aluminum/Steel

Hydraulics Report Title: Record the title of the Hydraulics Report that is being created in association with inventoried outfalls.

Observers/Inspectors: Record the name(s) of the field inspector(s) on the reporting spreadsheet.

Access instructions: Include all necessary information (parking locations, walking access, safety concerns, etc.) that would allow a different individual to locate the site in the future.

RECORDING AND SUBMITTING THE DATA

After entering the collected information into the Excel spreadsheet described above, e-mail those spreadsheets to WSDOT Water Quality staff at either simonc@wsdot.wa.gov or tvetenr@wsdot.wa.gov. The spreadsheets will be entered into the Stormwater Database by Water Quality staff.

APPENDIX A

GLOBAL POSITIONING SYSTEM (GPS)

One of the objectives of the outfall inventory process is to survey the outfalls in order to be able to produce accurate maps showing individual outfall locations. GPS points collected in the field are a critical link between the Stormwater Outfall Database and the WSDOT GIS-Workbench. Latitude, longitude and elevation should be collected for all outfalls.

GPS Field Data Collection:

1. Make sure that the GPS unit has been re-charged prior to leaving for the field. In most cases the GPS unit can be re-charged overnight.
2. Use the below table to program settings (refer to user manual).
3. Open a new file in the GPS unit for the day. The daily initial set-up procedures are specific to the type of GPS unit in use (please refer to the user manual provided with the unit). Initial set-up data should include date, time, and weather conditions.



4. Stand over or next to the outfall being inventoried and begin taking GPS points. Record 10 to 20 positions for all outfall locations. It is critical that you do not move while points are recording.
5. Complete the Field Inventory form either in the field on a hardcopy of the spreadsheet or when you return to the office. Be sure to include qualifying explanations for all inputs, as necessary. The more consistent the data, the easier one outfall location can be compared to another.

Required GPS Settings:

Coordinates		Units (as available)	
System:	Latitude/Longitude	Distance:	Feet
Datum:	NAD 1983 (Conus)	Area:	Square Feet
Altitude reference:	MSL	Velocity:	Miles per hour
Geoid:	DMA 10x10 (Global)	Angle:	Degrees
Altitude Units:	Feet	Declination:	Auto
		Offset Distance:	Horizontal & Vertical
		Precisions:	Feet
		Confidence:	99% Precisions
Formats		GPS Precision (Custom Settings)	
Language:	English	PDOP Mask:	6.0
Offset:	Horz/Vert	SNR Mask:	6.0
Degrees:	DD MM SS.ss	Elevation Mask:	15 degrees
Date:	MM/DD/YYYY	Minimum Satellites:	at least 4 (6 to 8 preferred)
Time:	12 Hour		
Time zone:	Pacific Std. USA (-08:00)		
Coordinate order:	Lat/Long		

These parameter titles are those commonly used within Trimble products – users of other brand GPS will need to correlate parameters within their equipment. Note: Some of the above parameters are found on the data loggers and others in the post-processing software, depending on the equipment.

Naming Convention: Using a standard Trimble unit, each file opened in the field is automatically named in the following format: for a point measured on 14 June 2003 at 9:15 AM the file would be named R061409A. If this file were associated with an outfall located on SR9 at MP 8.84 R 20, the file should be renamed as R0614_08_84_R20 and placed in an appropriate file folder designated by the SR name.

Field data processing – Upon Return to the Office:

1. Download the GPS files to a local computer.
2. Using the GPS Pathfinder Software, post-process each GPS file collected in the field; this will improve the accuracy to sub-meter.
3. Save/export the corrected location values from the GPS post-processing software to an ASCII file. Name or re-name the output file as discussed in the “Naming Conventions” section



above, move the file(s) to a shared network location, and e-mail the location of these files with the rest of the data delivery to the Water Quality staff.