

City of Edmonds Development Information



STORMWATER DETENTION SYSTEM SIMPLIFIED SIZING FOR CATEGORY 1 SMALL SITE PROJECTS

This handout provides information on the design, construction, and maintenance of stormwater detention systems for **Category 1 Small Site Projects**. By designing and constructing a detention system using this handout, a Category 1 Small Site can meet the stormwater flow Control requirements in Small Site Minimum Requirement #7. For more details on stormwater management requirements, see Handout #E72, Edmonds Community Development Code (ECDC) Chapter 18.30, including Exhibit A: *Edmonds Stormwater Code Supplement (Supplement)*.

Introduction

Generally, a Category 1 Small Site Project¹ will have between 2,000 and 5,000 square feet of new plus replaced impervious surface area that requires flow control under Small Site Minimum Requirement #7.

If your site is a Category 2 Small Site Project¹ or a Large Site Project¹ that will have stormwater detention system, this handout cannot be used. See the *Supplement* for more details.

A detention system is a drainage system that collects stormwater runoff from roofs, driveways, sidewalks, patios, or other impervious surfaces, stores the runoff in a large underground pipe, then slowly releases the runoff through a small hole (orifice) into an approved discharge point (usually the City's storm drainage system). Figure 1 shows a typical detention system for a Category 1 Small Site Project.

Runoff enters the upstream catch basin where any sediment or other solids sink to the bottom. Regular cleaning of this and other aspects of the detention system is very important to keep the system operating properly (see Maintenance section below). The detention pipe is sloped towards the outlet to keep any solids that make it through the upstream catch basin moving through the system to the downstream catch basin. This downstream catch basin (or manhole) contains the flow control structure. This flow control structure is a riser "tee" with a small hole or orifice on the bottom connected to the outlet pipe. If the topography of the property is such that is not possible to discharge from the outlet catch basin by gravity to the approved discharged point, then the flow control structure may be replaced by a pump system, if approved by the City Engineering Division. See the City Engineering Division Pumping Policy for more details.

Design and Construction Requirements

Table 1 provides a lookup-table for sizing the detention pipe and outlet orifice size based on the amount of impervious surface area draining to the system. This table is based on a flow control standard² for the 10-yr recurrence storm (storm that has a 10% chance of occurring in any given year). To use the table, first determine the impervious surface area draining to the proposed detention system. If your value falls in between values in the first column, use the next highest value (i.e. if you have 2,600 sf or impervious area, use the sizing requirements for 3,000 sf). The "length of pipe" value in the body of the table varies based on the diameter of the pipe chosen for use. The diameter of the pipe chosen will be based on your assessment of site specific factors such as slope, amount of cover over the system, physical constraints, and others. The different shading in the table provides information on the outlet orifice size required for any given combination of pipe length and pipe diameter to meet the flow control standard. Note that detention systems must be located entirely on private property and not in the City's right-of-way or easements.

Table 2 provides the approved material for use as stormwater detention pipes and the required catch basin/manhole sizes (upstream and downstream) based on the size of the detention pipe connecting to it. Figure 1 show a cross section of a typical detention system for Category 1 Small Site Projects. Figure 2 shows a detail of downstream catch basin/manhole and the flow control structure.

¹ See Handout #E72 for site classification.

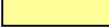
² 0.25 cubic feet per second per acre of impervious area (cfs/acre-impervious).

**Table 1
Detention Pipe Look-Up Table
Category 1 Small Site Projects**

Contributing New Plus Replaced Impervious Surface Area (sf)	Length of Pipe (ft) For Given Inside Diameter			
	18-inch	24-inch	30-inch	36-inch
2,000	41	22	15	11
2,500	49	30	18	12
3,000	61	33	23	16
3,500	74	38	24	17
4,000	81	45	29	20
4,500	95	49	32	23
5,000	112	56	35	25

sf – square feet

Orifice Size:

	= 0.5 (1/2) inch diameter		= 0.75 (3/4) inch diameter
	= 0.625 (5/8) inch diameter		= 0.875 (7/8) inch diameter

- **Outlet pipes (including the flow control structure) shall be at least 8 inch diameter for 2,000 to 4,000 sf of tributary area.**
- **Outlet pipes (including the flow control structure) shall be at least 10 inch diameter for 2,000 to 4,000 sf of tributary area.**

Note: Multiple pipes in parallel connected together (manifolded) can be used to meet length requirements, if site has constraints.

**Table 2
Approved Detention Pipe Material and Catch Basin/Manhole Structure Sizing**

Detention Pipe Inside Diameter (inches)	Detention Pipe Material	WDOT Catch Basin/Manhole
18	All types in list below table	Type 1L Catch basin
24	All types in list below table	Type 2, 48-inch diameter manhole
30	All Metal & RPP	Type 2, 48-inch diameter manhole
	All Concrete & CPEP	Type 2, 54-inch diameter manhole
	PVCP	Type 2, 60-inch diameter manhole
36	Metal & RPP	Type 2, 54-inch diameter manhole
	All concrete, CPEP, & PVCP	Type 2, 60-inch diameter manhole

WDOT – Washington Department of Transportation

List of Approved Pipe Materials for Detention

Metal:

ACSP – Aluminized Corrugated Steel Pipe (Type 2 meets AASTO designations M274 and M36)

ASRP - Aluminum Spiral Ribbed Pipe (16 gauge or better)

CAP –Corrugated Aluminum Pipe (16 gauge or better)

DIP – Ductile Iron Pipe (Class 50 or better)

Concrete:

PCP – Plain Concrete pipe

RCP – Reinforced Concrete Pipe

Plastic:

PVCP – Polyvinyl Chloride Pipe (SDR 35 or better)

CPEP – Corrugated Polyethylene Pipe (smooth interior wall, or N-12[®] pipe)

RPP- Ribbed Polyvinylchloride Pipe

FIGURE 1
 CROSS-SECTION of TYPICAL DETENTION SYSTEM
 CATEGORY 1 SMALL SITE PROJECTS

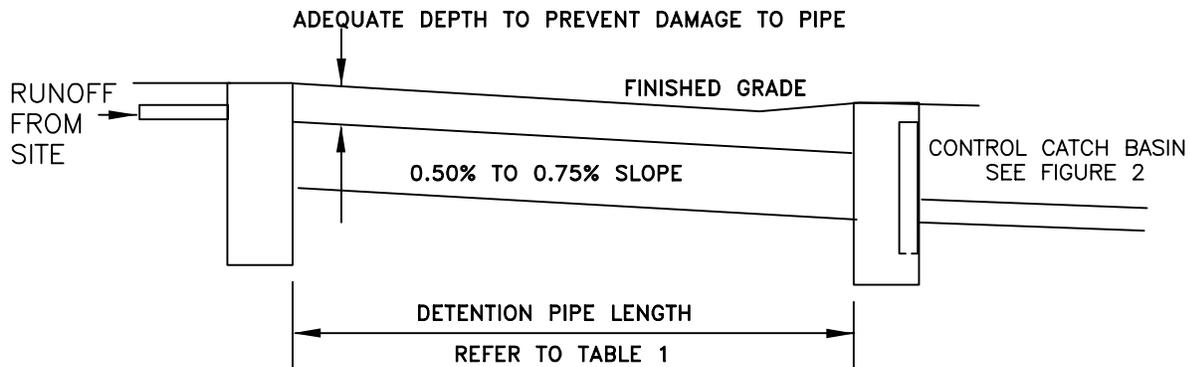
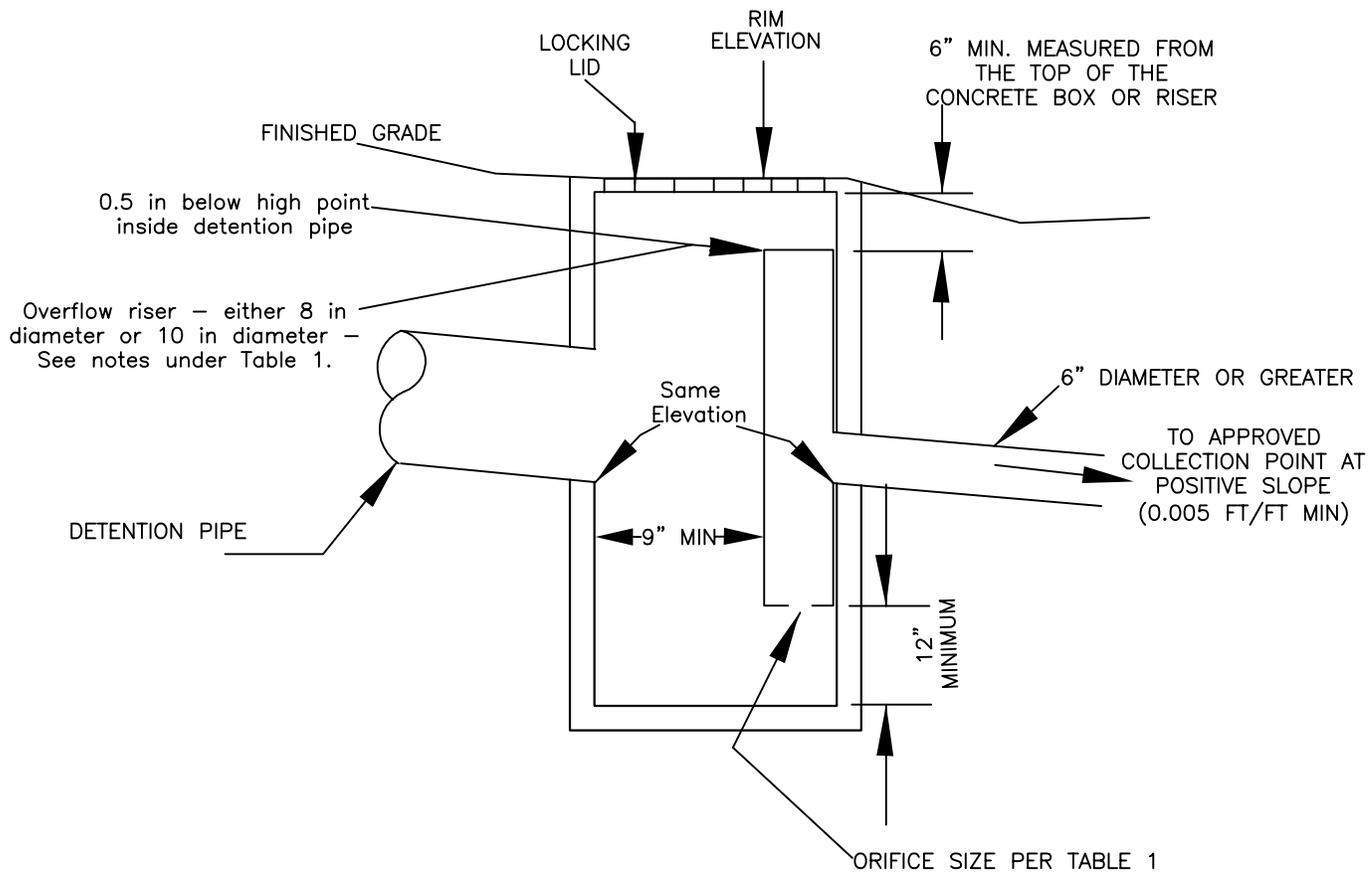


FIGURE 2
 DETAIL OF CONTROL CATCH BASIN



Maintenance Requirements

ECDC Section 18.30.090 requires privately-owned stormwater management facilities, such as detention systems, to be properly maintained. The owner of the property is the responsible party for such maintenance. The system must be kept in good working order by regularly removing build-up of sand, silt or other solids that may accumulate in the catch basins or the detention pipe. The entire system should be inspected once per year and cleaned as necessary. Keeping the flow control orifice clear of debris is of particular importance and it should be inspected on a regular basis and cleared, if necessary. A plugged orifice can defeat the function of a detention system and may cause private property or street flooding.

The City may make periodic inspections of detention facilities to ensure they are operating properly. ECDC Section 18.30.100 contains the enforcement provisions the City can use to ensure the system is properly maintained.

References

City of Edmonds. 2010. Edmonds Community Development Code (ECDC) Chapter 18.30 (including Exhibit A: Edmonds Stormwater Code Supplement).

Herrera. 2009. Basis for Updated Stormwater Management Standards for New Development and Redevelopment Projects in the City of Edmonds. Technical Memorandum prepared for City of Edmonds. Herrera Environmental Consultants. July 10, 2009.

Washington Department of Transportation. 2010a. Standard Specifications for Road and Bridge Construction. M 41-10.

Washington Department of Transportation. 2010b. Standard Plans. M 21-01. August 2, 2010.