



Land & Water Conservation Division

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Erosion Control and Stormwater Management

DESIGN AID: DETERMINING OUTLET SIZING (FOR EXTENDED DETENTION VOLUME)

Extended Detention Volume is the volume above the permanent pool that is released slowly in order to obtain a minimum reduction of 80% of the total suspended solids load from the runoff volume generated by the drainage area on an average annual basis. The Extended Detention Volume shall be the runoff volume produced by a 1-yr., 24-hr. design storm or as computed by an approved model.

Outlet Design – Shall allow for the release of the extended detention volume over a period of 24 hr. or greater.

The following steps can be used as a guide in order to determine proper outlet sizing for the Water Quality component of the Erosion Control and Stormwater Management Ordinance and the Wet Detention Basin Standard #1001 (DNR).

1. Determine flood elevation in the basin from the one-year, 24-hour storm event assume no outflow by:
 - Calculating the runoff depth based on the rainfall from the one-year, 24-hour storm and the runoff curve number. Use the post development curve number. (The relationship of runoff to precipitation is shown in Table 5 of the Wet Detention Basin Standard #1001.)
 - Multiply runoff depth (converted to feet) by watershed area in square feet. This is your total runoff volume in cubic feet.
 - Compute height (head) of runoff volume above the permanent pool in your stormwater basin.
2. Determine average range of outflow capacity of outlet by:
 - Dividing total runoff volume (in cubic feet) by 24-hour release (86,400 seconds). This is the average outflow capacity in cubic feet per second for the minimum release rate.
 - Do the same using a 48-hour release (172,800 seconds). This is the average outflow capacity for a longer release rate, which would exceed the minimum trapping efficiency required in the standard. (Note: Release rates longer than 72 hours are not recommended due to possible impacts on surrounding vegetation.)
3. Determine orifice or pipe size using average outflow capacity:
 - The final outlet design is up to you, however the outflow capacity of the outlet must be within the range of the average outflows from step 2 using a 70% head pressure from Step 1.
 - In other words, if an orifice is used as the control for the outlet pipe. The orifice diameter should be sized using a head equal to 70% of the actual head from the total runoff volume from Step 1. The outlet capacity of this orifice should be within the range of average outflows calculated in step 2.

Note: The above noted outlet design will meet the requirements for trapping sediment both during and after the construction phase.