

Drainage Program Guide

Green Stormwater Infrastructure (GSI)

Best Management Practice: Detention/Retention Basins

Detention/Retention basins are well suited to capture stormwater from large impervious areas. Detention/Retention basins are excavated stormwater facilities that provide temporary storage of runoff and release the stored water over time to prevent localized and downstream flooding. Detention basins are generally earthen structures constructed either by impoundment of a natural depression or excavation of existing soil. These basins create storage of stormwater by allowing large amounts of stormwater to fill the basin and limit the overflow with a riser structure and orifice openings.

How can I use a detention basin to reduce my drainage charge?

A detention basin that manages stormwater runoff from impervious surfaces can achieve up to a 40 percent peak flow drainage charge credit, depending on the available storage and site conditions. The peak flow credit can be attained for controlling how fast water is leaving the property (evaluated on a case-by-case basis). If the basin is designed to permanently retain water on-site by infiltration, evaporation, or plant uptake, the practice is eligible to receive additional drainage charge volume credits. See *A Guide to Credits for Commonly Used Stormwater Management Practice* on Detroit Water and Sewerage Department's website for further explanation.

NOTE: Residential customers receive an automatic 25 percent credit. If practice does not exceed the 25 percent automatic credit, no additional credit will be applied.

What is the typical cost of a detention basin?

The capital cost of a detention/retention basin is largely dependent on the size of the basin and depth of excavation (excluding any land acquisition costs). Planning level capital costs range between \$10 to \$25 per cubic foot, not including construction, mobilization, engineering, and contingency costs.



Illustration of a retention basin (permanent pool of water) to capture runoff from adjacent parking lot and in some instances, the adjacent building

Design Considerations

Detention/retention basins must be designed by a professional engineer and are typically installed during new development or significant redevelopment of a site.

The following are some common design considerations:

- A forebay, used to remove sediment and debris before entering the detention basin, should be incorporated into the design and is typically 10 to 15 percent of the total volume of the basin.
- Detention/retention basins should be located at a low point on the site, collecting as much of the site runoff as possible.
- Side slopes should be no steeper than 6 horizontal : 1 vertical.
- All basins deeper than 4 feet should have a safety bench or perimeter fence.
- Maximum water depth should be less than 5 feet (temporary and permanent pools)
- An outlet consisting of a riser or pipe must be designed to release stormwater from the basin.
- An emergency spillway must be designed to convey extreme events to protect adjacent buildings and infrastructure.
- The basin should have a minimum of 1 foot of freeboard above the designed water depth.

Detention versus Retention

Detention basins are designed to delay the release of stormwater (e.g., peak flow control). Detention basins do not reduce the volume of stormwater discharged from the site.

Retention basins are designed to infiltrate the majority of stormwater in the basin into the ground (e.g., volume credit) Retention basins both delay the release of stormwater (e.g., peak flow control) and also reduce the volume of stormwater discharged from the site.

Maintenance

Detention/retention basins should have a maintenance plan with regular inspections. Maintenance activities typically include:

- Inspecting the basin for clogging and excessive debris quarterly (more frequently if needed) and after every major storm event.



Retention basin with native plants and community walking path



Detention basin with outlet riser in the forefront of the photo

- ◆ Removal of sediment and debris from the forebay before it reaches 50 percent of forebay capacity. Forebays are typically designed with hardened access and a sediment depth marker to help with maintenance.
- ◆ Inspecting the basin drain inlets and outlets at least once every three months.
- ◆ Inspecting the side slopes for evidence of tunneling or burrowing wildlife (repair damaged side slopes as required).
- ◆ Maintaining and inspecting vegetation along side slopes to ensure continued establishment and ground coverage.

Setback Requirements

- ◆ From property line: 10-foot minimum
- ◆ From building: 10-foot minimum without a waterproof liner
- ◆ From municipal sanitary or combined sewer: 10-foot minimum

Permits and Forms

- ◆ Make sure to identify and avoid utilities by contacting MISS DIG at 811 or 1.800.482.7171 before starting the project.
- ◆ If the project will disturb 1 acre or more, or is within 500 feet of a water of the state, contact Wayne County Environmental Services for a Soil Erosion and Sedimentation Control (SESC) permit.
- ◆ Overflow or sewer pipe connections to a public sewer will require a permit from both the Building, Safety, Engineering and Environmental Department (BSEED) and DWSD (sewer tap permit).
 - ◆ Sewer Tap (DWSD): Contact DWSD at 313.964.9236
 - ◆ Plumbing Permit (BSEED): Any time project work on private property connects to City sewer Contact: BSEED’s Plumbing Inspector at 313.224.3158
 - ◆ Construction and any other required City, State, or Federal permit.
- ◆ Complete engineered drawings stamped by a registered Professional Engineer or Landscape Architect must accompany the Drainage Charge Credit Application. Additional required documentation is found on the application and can be downloaded from www.detroitmi.gov/drainage.



Retention basin with outlet riser in the forefront of the photo



Retention basin with inlet structure in the forefront of the photo

Additional Resources

For Drainage Charge Credit Information and other resources, visit the drainage webpage: www.detroitmi.gov/Drainage

Specific documents to review:

- ◆ Guide to Drainage Credits
- ◆ Guide to Credits for Commonly Used Stormwater Management Practices
- ◆ Credit Calculator
- ◆ Credit Application

Alliance of Rouge Communities. Undated. Maintaining Your Detention Basin: A Guidebook for Private Owners in Southeast Michigan. www.allianceofrougecommunities.com/PDFs/PI/FINALdetentionbasinmanual.pdf

Washtenaw County Water Resources Commissioner. Revised 2016. *Rules and Guidelines Procedures & Design Criteria For Stormwater Management Systems*. Part C – Design Requirements – Storage Facilities

Uncontrolled document when printed. Refer to website for most current version.