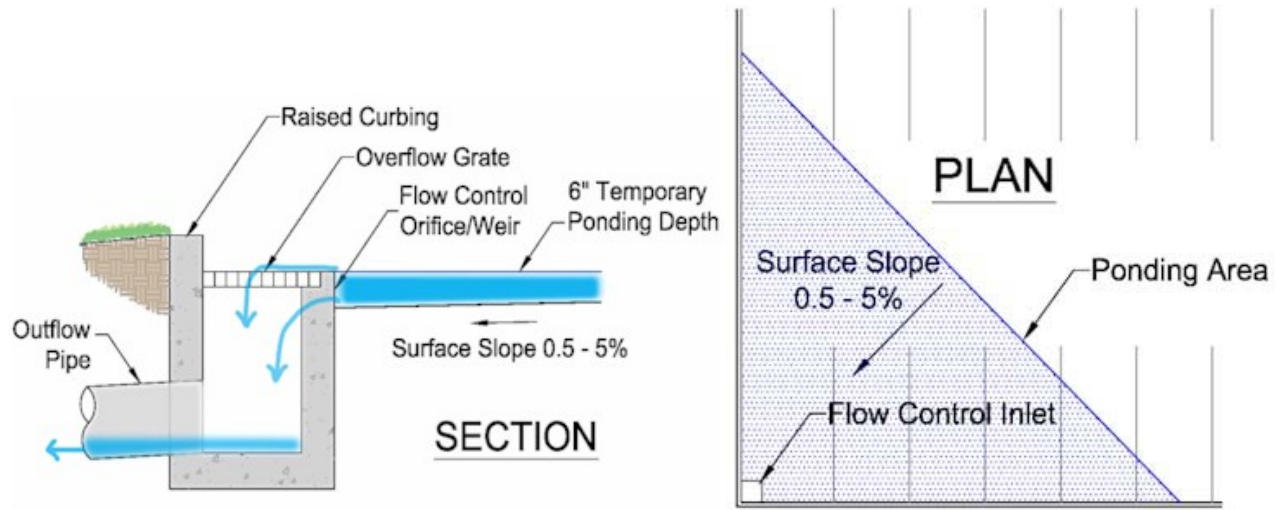


## BMP 6.8.2: Special Detention Areas – Parking Lot, Rooftop



Areas such as parking lots and rooftops that are primarily intended for other uses but that can be designed to temporarily detain stormwater for peak rate mitigation.

<p style="text-align: center;"><b><u>Key Design Elements</u></b></p> <ul style="list-style-type: none"> <li>▪ Almost entirely for peak rate control</li> <li>▪ Water quality and quantity are not addressed</li> <li>▪ Short duration storage; rapid restoration of primary uses</li> <li>▪ Minimize safety risks, potential property damage, and user inconvenience</li> <li>▪ Emergency overflows</li> <li>▪ Maximum ponding depths</li> <li>▪ Flow control structures</li> <li>▪ Adequate surface slope to outlet</li> <li>▪ Waterproofing (rooftop storage)</li> </ul>	<p style="text-align: center;"><b><u>Potential Applications</u></b></p> <p>Residential: Limited                  Commercial: Yes                  Ultra Urban: Yes                  Industrial: Yes                  Retrofit: Yes                  Highway/Road: Limited</p> <hr/> <p style="text-align: center;"><b><u>Stormwater Functions</u></b></p> <p>Volume Reduction: Very Low                  Recharge: Very Low                  Peak Rate Control: Med./Low                  Water Quality: Low</p> <hr/> <p style="text-align: center;"><b><u>Water Quality Functions</u></b></p> <p>TSS: 0%                  TP: 0%                  NO3: 0%</p>
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## Description

Special Detention Areas are places such as parking lots and rooftops that are primarily intended for other uses but that can be designed to temporarily detain stormwater for peak rate mitigation. Generally detention is achieved through the use of a flow control structure that allows runoff to temporarily pond. In most cases, ponding depths should be kept less than one foot. Special Detention Areas can be very effective at reducing peak rates of runoff but do little in terms of water quality and almost nothing to reduce the volume of runoff. Therefore, Special Detention Areas should be combined with other BMPs that address water quality, quantity, and groundwater recharge.

## Variations

Special Detention is especially suited for:

- Large gently-sloping parking lots



- Flat rooftops



- Recessed plazas



- Athletic fields



## Applications

Detention areas can be created in parking lots in depressed areas or along curbs by controlling flow at stormwater inlets and/or using raised curbing. Rooftop runoff storage can be achieved by restricting flow at scuppers, drains, parapet wall openings, etc. Recessed plazas and athletic fields can be designed with detention through the use of flow control structures and/or berms (for fields). Special Detention Areas can be used effectively to attenuate flows reaching other BMPs and thereby increase their performance; they can also be used to meet release rate requirements from Act 167 plans or municipal ordinances.

## Design Considerations

### 1. General

- a. Emergency overflows should be designed to prevent excessive depths from occurring during extreme events or if the primary flow control structures are clogged. Emergency overflows should be designed to safely convey flows downstream.
- b. Storage areas should be adequately sloped towards outlets to ensure complete drainage after storm events.
- c. Flow control structures should be designed to discharge stored runoff in a timely manner so that the primary use of the area can be restored.
- d. Care should be taken to ensure against ice build-up in the pooled area.

### 2. Parking Lot Storage

- a. Locate storage in areas so that ponding will not significantly disrupt typical traffic or pedestrian flow. Remote areas of large commercial parking lots, overflow parking areas, and other under-utilized parking areas are prime locations.
- b. Minimize potential safety risks and property damage due to ponding. Detention areas should be identified with signage or pavement markings or their use should be restricted during storms.
- c. Storage depths must be no greater than 1 foot.
- d. The area used for detention should be sloped towards the flow control structure at a least 0.5% to ensure adequate drainage after storms. Slopes greater than 5% tend to be inefficient because storage volume is much lower for a given ponding depth.

### 3. Rooftop Storage

- a. The roof structure must be able to support the additional load created by ponded water. Most roofs designed for snow load will be able to support runoff storage.
- b. Ponding depths should generally be less than 6 inches and stored water should not cause damage to any HVAC equipment on the roof.
- c. The areas utilized for storage must have adequate waterproofing.
- d. Emergency overflows can be provided by openings in the parapet wall or by additional drains.

## Detailed Stormwater Functions

### Volume Reduction Calculations

Special Detention Areas generally do not achieve significant volume reduction.

### Peak Rate Mitigation Calculations

Peak rate of runoff is reduced in Special Detention Areas through the transient storage provided. See in Section 9 for Peak Rate Mitigation methodology.

### Water Quality Improvement

Although they may provide some quality improvement through settling, Special Detention Areas do not appreciably address water quality.

## Construction Sequence

Not applicable.

## Maintenance Issues

Special Detention Areas generally require little maintenance. Maintenance activities should include semiannual inspection and cleaning of flow control structures, clearing debris/sediment from detention areas (as necessary), and inspecting waterproofing in rooftop storage areas.

## Cost Issues

Special Storage Areas can be a very economical means of reducing peak rates of runoff because they require little additional material and take up no additional space on a site.

## Specifications

The following specifications are provided for information purposes only. These specifications include information on acceptable materials for typical applications, but are by no means exclusive or limiting. The designer is responsible for developing detailed specifications for individual design projects in accordance with the project conditions.

### 1. Flow Control Structures

- a. Flow control structures shall be constructed of non-corrodible material.
- b. Structures shall be resistant to clogging by debris, sediment, floatables, plant material, or ice.
- c. Materials shall comply with applicable specifications (PennDOT or AASHTO, latest edition)

### 2. Waterproofing

- a. Waterproofing shall prevent all water migration into the building.
- b. Waterproofing must comply with applicable state and local building codes.
- c. Waterproofing shall have an expected service life of at least 25 years.

## References

2001, Georgia Stormwater Management Manual; Volume Two: Technical Handbook

2003, Ontario Stormwater Management Planning & Design Manual

Iowa Statewide Urban Design Standards Manual

1992, Michigan - Index of Individual BMPs