4.12 Dry Pond SCM

The following chapter from the NCDEQ Stormwater Design manual (Part C-12, last updated 11/20/2020) is accepted in the Charlotte-Mecklenburg SCM Design Manual with the following exceptions:

MDC	Charlotte-Mecklenburg Design Standard
MDC 7: Protection of the Receiving Stream	See Chapter 3 of the Charlotte-Mecklenburg SCM Design Manual, including analysis and requirements for one-year 24-hour storm volume control
MDC 8: Outlet	See Chapter 3 of the Charlotte-Mecklenburg SCM Design Manual, MDC A-5, and the table of exceptions for MDC A for additional requirements.
Recommendation 1: Freeboard	A freeboard of 12 inches above the 100-year peak stage to the top of embankment is required.

C-12. Dry Pond

Design Objective

The primary purpose of dry pond is to attenuate and delay stormwater runoff peaks. Dry ponds hold water immediately after a storm event and drain to be almost complete dry between storm events. Dry ponds are a secondary SCM, but can be used in a treatment train to optimize hydraulic performance of another SCM, such as a bioretention cell. They also can be used to manage peak runoff, since the overall pollutant removal efficiency of dry extended detention basins is low.

Design Volume

The design volume for a dry pond is the volume between the temporary pool elevation and outlet drain elevation that will drawdown within two to five days and is determined by the volume of stormwater that is required to be captured.

Important Links

Rule 15A NCAC 2H .1062. MDC for Dry Ponds

SCM Credit Document, C-12. Credit for Dry Ponds

Figure 1: Dry Pond Example: Plan View

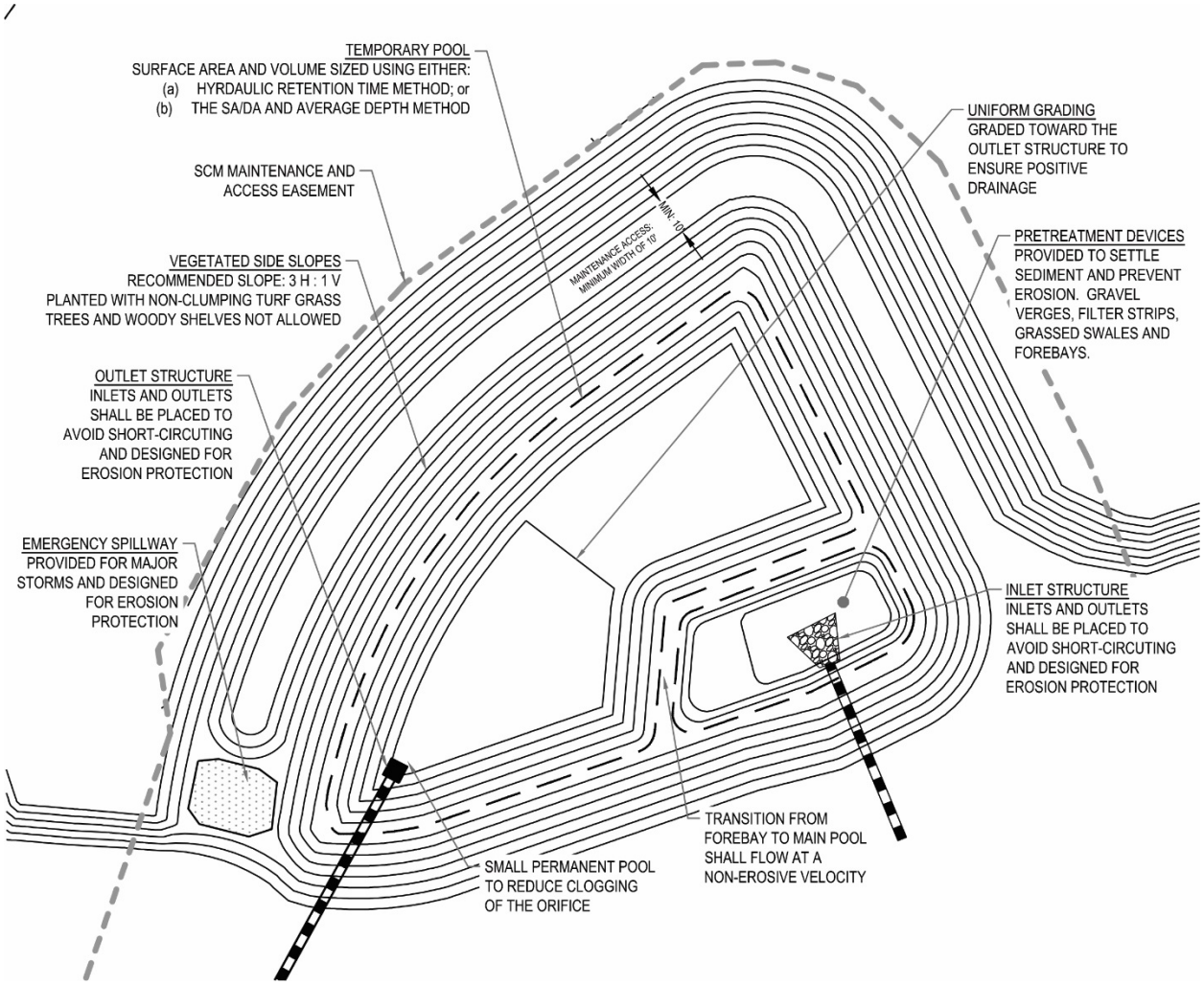


Figure 1: Dry Pond Example: Cross-Section

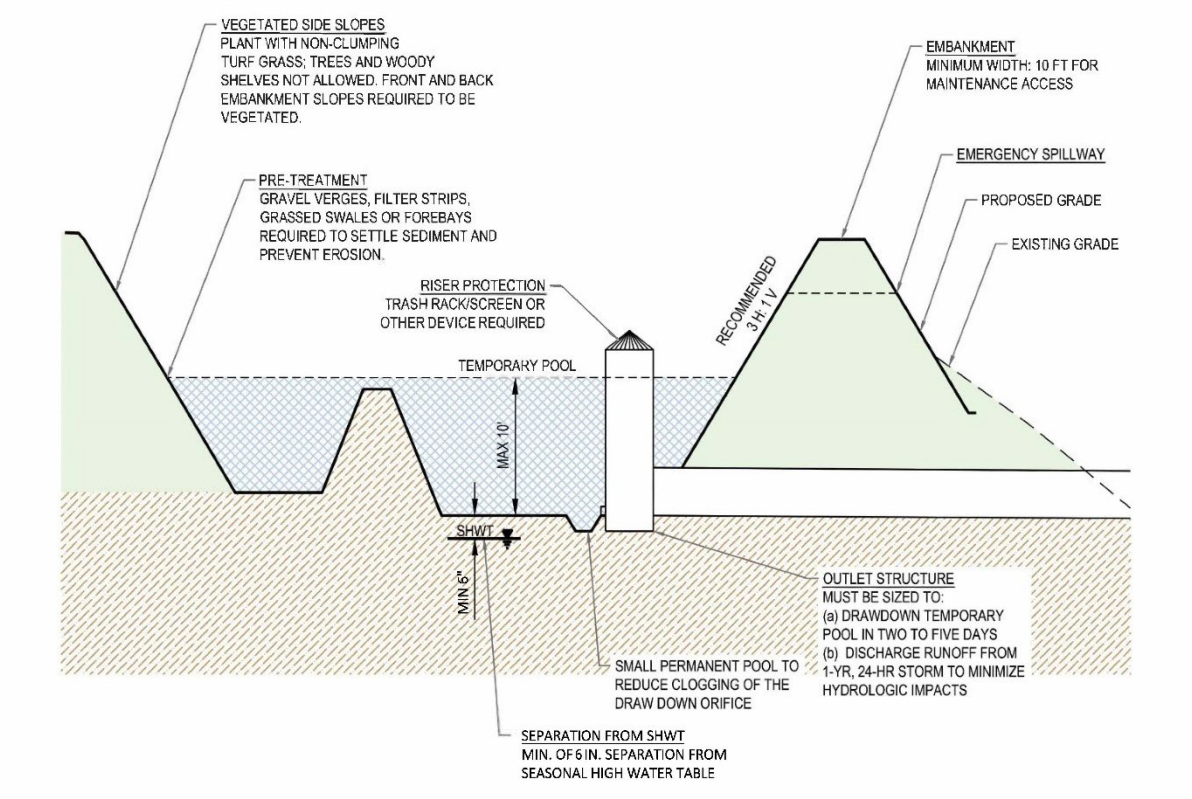
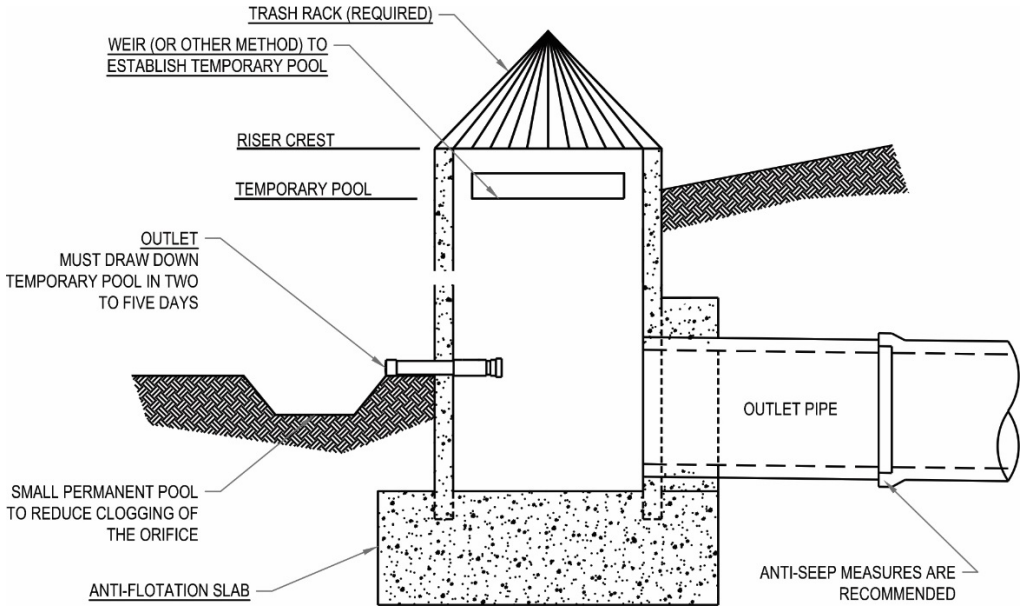


Figure 3: Dry Pond Example: Outlet Structure



Guidance on MDC

MDC 1. SEPARATION FROM THE SHWT.
The lowest point of the dry pond shall be a minimum of six 6 inches above the SHWT.

Less separation distance makes the dry pond vulnerable to developing ephemeral pools of standing water during wet-weather periods.

MDC 2: TEMPORARY POOL DEPTH.
The maximum depth of the temporary pool shall be 10 feet.

The depth limitation is provided to help protect the vegetation growing within the dry pond, and actually setting the temporary pool lower than ten feet will better promote plant growth within the dry pond. Healthy plants within the dry pond will improve the pollutant removal and aesthetics of the dry pond.

MDC 3: UNIFORM GRADING AND POSITIVE DRAINAGE.
The bottom of the dry pond shall be graded uniformly to flow toward the outlet structure without low or high spots other than an optional low flow channel.

Uniform grading will prevent water from ponding within the dry pond, which can promote mosquitos, kill vegetation and look unsightly.

MDC 4: LOCATION OF INLET(S) AND OUTLET.
The inlet(s) and outlet shall be located in a manner that avoids short circuiting.

Short-circuiting can interfere with the function of the pond outlet system and should therefore be minimized. The simplest way to prevent short-circuiting is to maximize the distance between the inlet(s) and the outlet. Larger length to width ratios should be used if sedimentation of particulates during low flows is desirable. Irregularly shaped ponds appear more natural. If a relatively long, narrow facility is not suitable at a given site, baffles constructed from gabions or other materials can be placed in the basin to lengthen the flow path. A sinuous low-flow channel may be constructed through the basin to transport dry-weather flows and minor storm flows.

MDC 5: PRETREATMENT
Pretreatment devices shall be provided to settle sediment and prevent erosion. Pretreatment devices may include measures such as gravel verges, filter strips, grassed swales, and forebays.

Forebays (described in Part A of the stormwater design manual) are the most recommended type of pretreatment, particularly for dry ponds that treat 20,000 or more cubic feet. Forebays trap sediment, simplify maintenance, and extend the life of dry ponds. For smaller dry ponds, a plunge pool, rip-rap, or other energy-dissipating and erosion control measures may suffice as pretreatment.

MDC 6: DRAWDOWN TIME.
The design volume shall draw down between two and five days.

The applicable design storm must be detained not less than 2 days and not greater than 5 days.

MDC 7: PROTECTION OF THE RECEIVING STREAM.
The dry pond shall discharge the runoff from the one-year, 24-hour storm in a manner that minimizes hydrologic impacts to the receiving channel.

Eventually, there will be more technical information available on this MDC. For now, it is being researched at NCSU.

MDC 8: OUTLET.
The dry pond shall include a small permanent pool near the outlet orifice to reduce clogging and keep floating debris away from the orifice. A screen or other device shall be provided to prevent large debris from entering the outlet system.

In addition to meeting specific hydraulic requirements for runoff detention and peak attenuation, outlets also must be functionally simple and easy to maintain. Floating trash and debris shall not pass through the dry pond outlet.

MDC 9: VEGETATION.
The dam structure, including the front and back embankment slopes shall be planted with non-clumping turf grass, and trees and woody shrubs shall not be allowed.

The dry pond should be stabilized within 14 days after the end of construction. The stabilization might be the final vegetation or a temporary stabilization measure until the vegetation becomes established.

Recommendations

RECOMMENDATION 1: FREEBOARD.
At least one foot of freeboard above the maximum stage elevation should be provided.

A minimum of one foot of freeboard is recommended between the design flow pool elevation and the emergency overflow invert to minimize the risk of overtopping the dam structure and to protect structural integrity of the dry pond.

Maintenance

Important maintenance procedures:

- The drainage area will be managed to reduce the sediment load to the dry pond.
- Immediately after the dry extended detention basin is established, the vegetation will be watered twice weekly if needed until the plants become established (commonly six weeks).
- After the initial fertilization to establish vegetation in the dry pond, fertilizer will not be applied to the dry pond.
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- The vegetation in and around the basin will be maintained at a height of approximately six inches.
- At least once annually, a dam safety expert will inspect the embankment. Any problems that are found will be repaired immediately.

After the dry pond is established, it will be inspected **quarterly and within 24 hours after every storm event greater than 1.0 inches (or 1.5 inches if in a Coastal County)**. Records of operation and maintenance will be kept in a known set location and will be available upon request.

Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

Table 1: Sample Operation and Maintenance Provisions for Dry Ponds

SCM element:	Potential problems:	How to remediate the problem:
The entire SCM	Trash/debris is present.	Remove the trash/debris.
The perimeter of the dry pond	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, plant ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The inlet device	The pipe is clogged (if applicable).	Unclog the pipe. Dispose of the sediment in a location where it will not cause impacts to streams or the SCM.
	The pipe is cracked or otherwise damaged (if applicable).	Repair or replace the pipe.
	Erosion is occurring in the swale (if applicable).	Regrade the swale if necessary and provide erosion control devices such as reinforced turf

		matting or riprap to avoid future erosion problems.
The forebay	Sediment has accumulated to a depth greater than the original design depth for sediment storage.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the SCM.
	Erosion has occurred.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	Weeds are present.	Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
The main treatment area	Sediment has accumulated to a depth greater than the original design sediment storage depth.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the SCM.
	Water is standing more than 5 days after a storm event.	Check the outlet structure for clogging. If it is a design issue, consult an appropriate professional.
	Weeds and noxious plants are growing in the main treatment area.	Remove the weeds, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
The embankment	Shrubs have started to grow on the embankment.	Remove shrubs immediately.
	Evidence of muskrat or beaver activity is present.	Consult a professional to remove muskrats or beavers and repair any holes or erosion.

	A tree has started to grow on the embankment.	Consult a dam safety specialist to remove the tree.
	An annual inspection by an appropriate professional shows that the embankment needs repair.	Make all needed repairs immediately.
The outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment in a location where it will not cause impacts to streams or the SCM.
	The outlet device is damaged	Repair or replace the outlet device.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Repair the damage and improve the flow dissipation structure.
	Discharges from the dry pond are causing erosion or sedimentation in the receiving water.	Contact the local NCDEQ Regional Office.