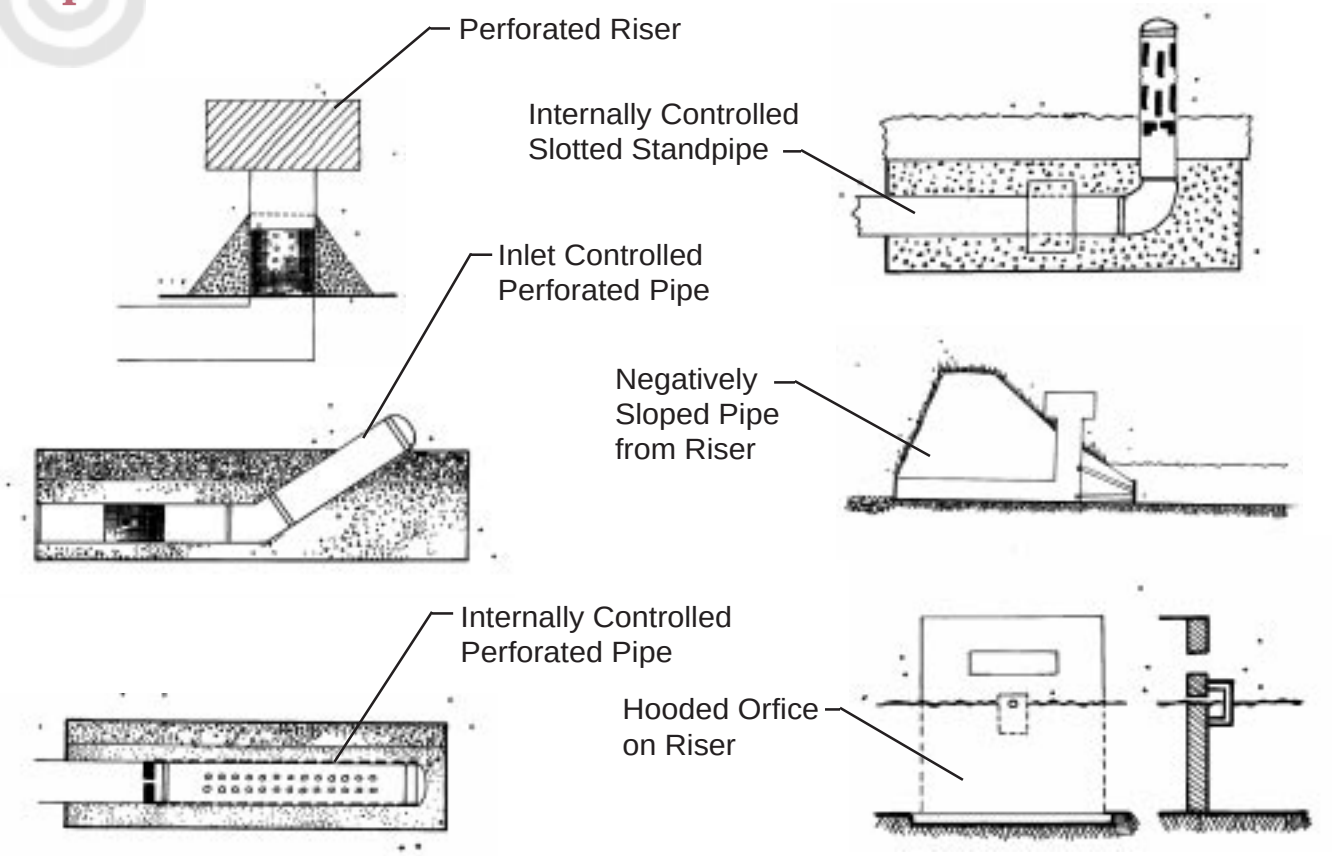
PRIMARY USE: Improve the particulate removal performance of storm water detention ponds.
ADDITIONAL USES: Improve peak flow control of storm water detention ponds.

DETENTION DEVICES FOR DRY/WET PONDS

What is it? Detention time devices are structures attached to the low flow oriface or the riser of a storm water detention pond to reduce the effluent flow rate of the pond.

Purpose

This is a cost effective method to extend detention times in ponds and thus improve performance.



Detention Devices for Dry/Wet Ponds
Section View

Limitations

This practice will not substantially improve removal of soluble forms of nutrients (e.g., nitrogen, phosphorus) in the storm water runoff. Extending detention time may also result in slight increases in nuisance and aesthetic problems and may increase maintenance costs.

Materials

Variable, may include PVC or metal pipe, gravel, and poured concrete.

Installation

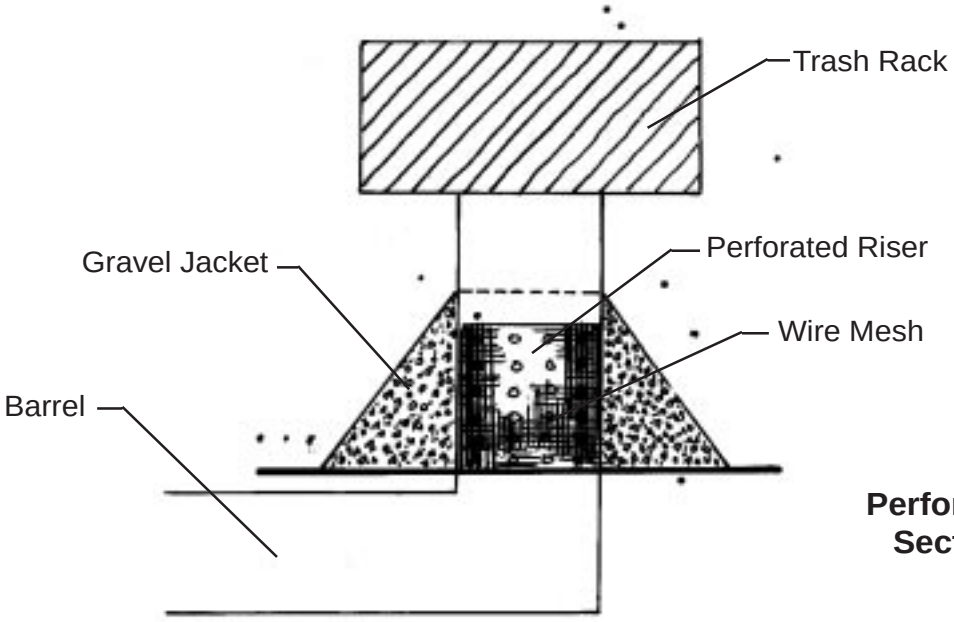
Many different structures have been used to reduce effluent flow rate in detention ponds.

Source: Controlling Urban Runoff, Metropolitan Washington.

DETENTION DEVICES FOR DRY/WET PONDS

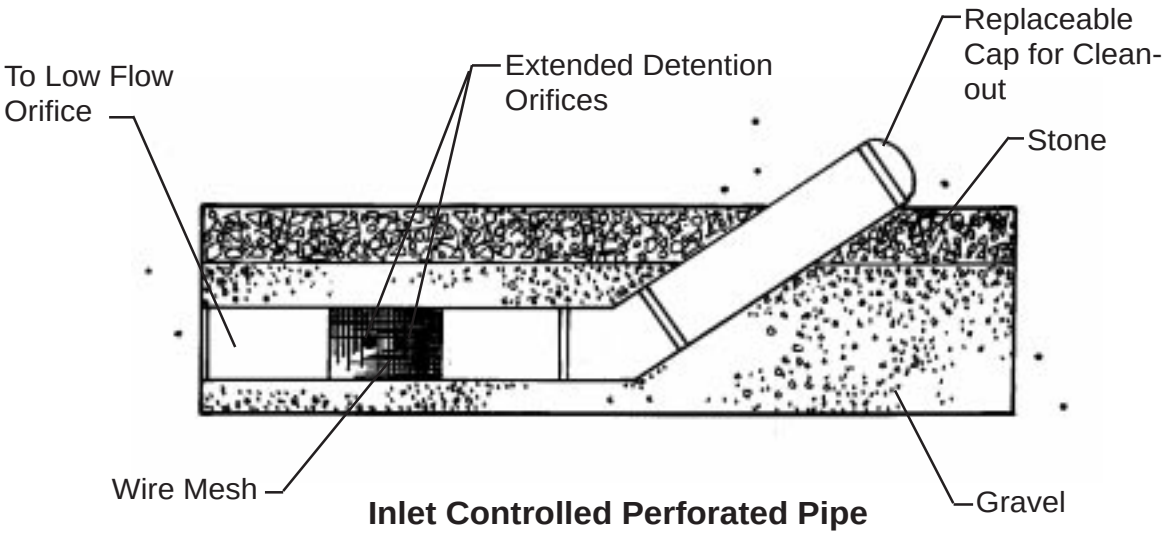
Additional Drawings and Considerations:

Perforated Riser in a Gravel Jacket (suitable for dry ponds)
The standard corrugated metal pipe riser is perforated with small diameter holes and the normal low flow oriface is closed. The total diameter of all the holes regulates the outflow to achieve the desired detention time for storm events smaller than the design storm (controlled by the weir on top). A gravel jacket and wire mesh screen are used to prevent clogging. Drawbacks to this approach: difficult to compute outflow rate in advance for this configuration; gravel jackets may clog in time.



Perforated Riser
Section View

Perforated Extension of Low Flow Oriface, Inlet Controlled (suitable for dry ponds)
In this approach, the low flow oriface is extended and capped. Small diameter holes are drilled into the extended PVC pipe, which are protected by wire mesh and a layer of gravel and stone. An elbow is used to extend the pipe above the sediment surface for clean out. This device is prone to clogging and requires frequent clean out.

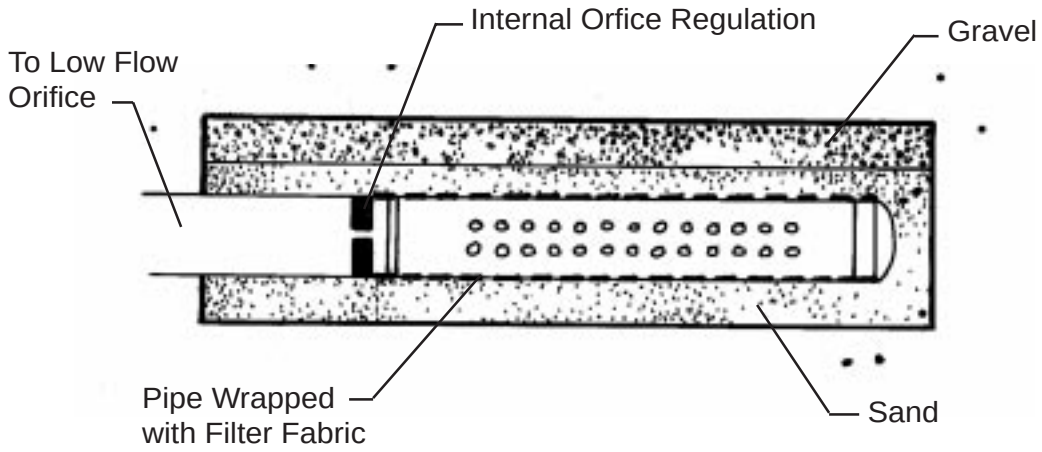


Inlet Controlled Perforated Pipe
Section View

Source: Controlling Urban Runoff, Metropolitan Washington.

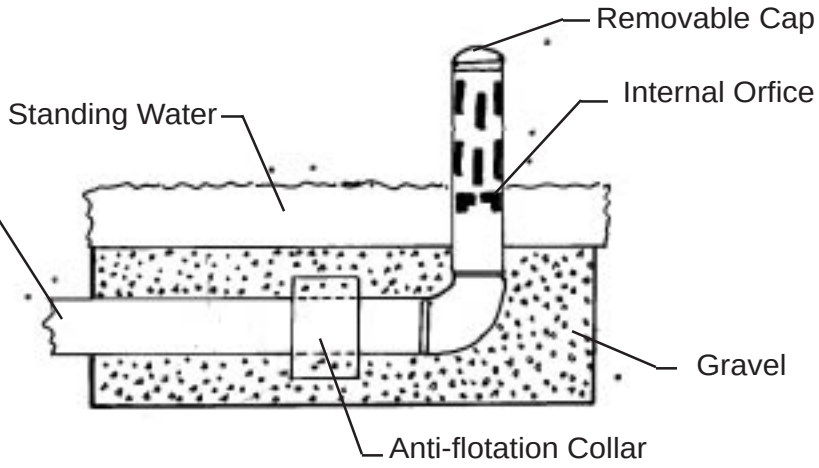
DETENTION DEVICES FOR DRY/WET PONDS

Perforated Extension of Low Flow Oriface, Outlet Controlled (suitable for dry ponds)
This device also employs a perforated PVC extension on the low flow oriface. In this case, the release rate is regulated by an internal flange within the pipe, rather than holes drilled through the pipe. This provides additional protection against clogging, as a large number of holes can now be drilled through the PVC pipe side up stream from the flange. Partial blockage of some of the exterior holes will not appreciably reduce outflow as flow is regulated by the flange inside of the pipe. Gravel and cloth filters are still used to prevent clogging of exterior holes.



Internally Controlled Perforated Pipe
Section View

Slotted Standpipe from Low Flow Oriface, Inlet Control
(dry pond, shallow wet pond, or shallow marsh)
An elbow and a PVC extension is used to extend the low flow oriface above the sediment level. An oriface plate is located within the PVC which internally controls release rate. The vertical slots help to prevent clogging.

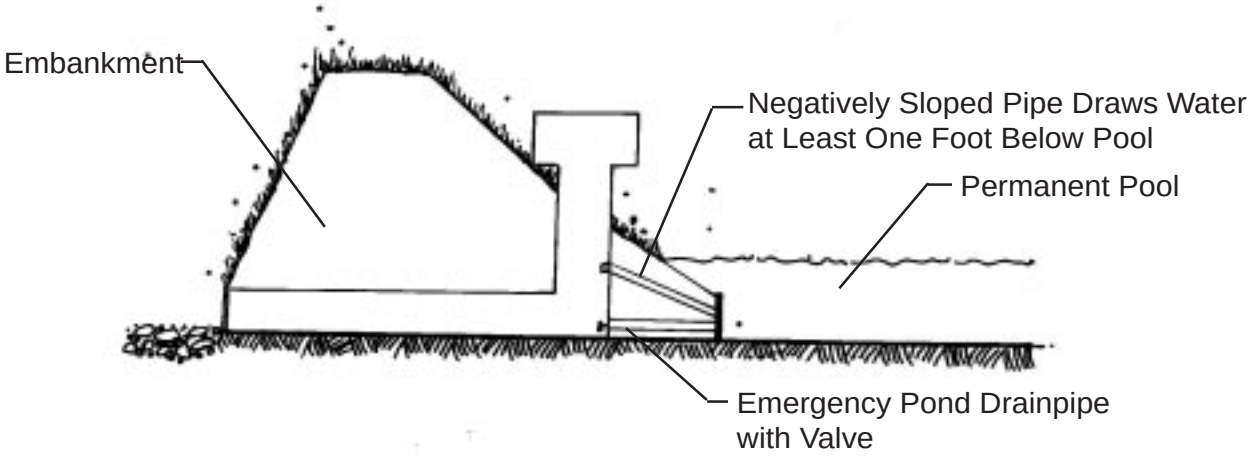


Internally Controlled
Slotted Standpipe
Section View

Source: Controlling Urban Runoff, Metropolitan Washington.

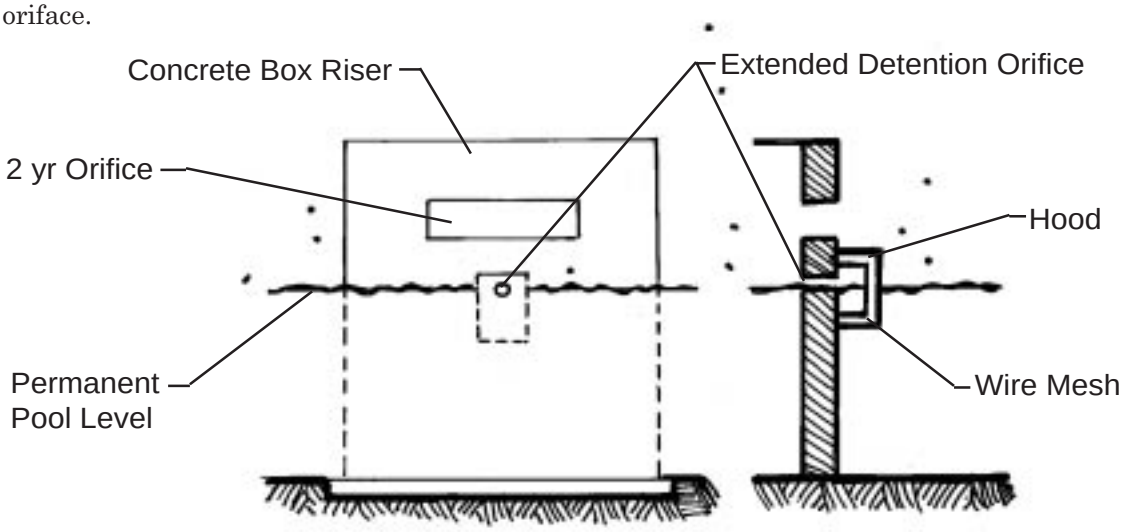
DETENTION DEVICES FOR DRY/WET PONDS

Negatively sloped Pipe from Riser (suitable for wet ponds or shallow marshes)
The releases rate is governed by the oriface of the pipe. The risk of clogging is reduced by locating the opening of the pipe at least one foot below the pond water surface, protecting the opening from floating debris. Also, the negative slope reduces the chance that debris will be pulled into the opening by suction. Wire mesh may also be placed across the pipe opening for additional protection.



Internally Controlled Slotted Standpipe Section View

Hooded Riser (suitable for wet ponds)
In this design, the extended detention oriface is located on the face of the riser near the top of the permanent pool elevation. The oriface is protected by the hood and wire mesh, which prevents floating debris from clogging the oriface.



Hooded Orifice on Riser Front and Side Views

Source: Controlling Urban Runoff, Metropolitan Washington.