

Techniques in construction of Sediment/storm water basins

Chris Droste, CЕСSCP, CESCO
Senior Erosion Control Specialist
Westmoreland Conservation District
Engineers Workshop March 5, 2021

Keyway and embankment construction

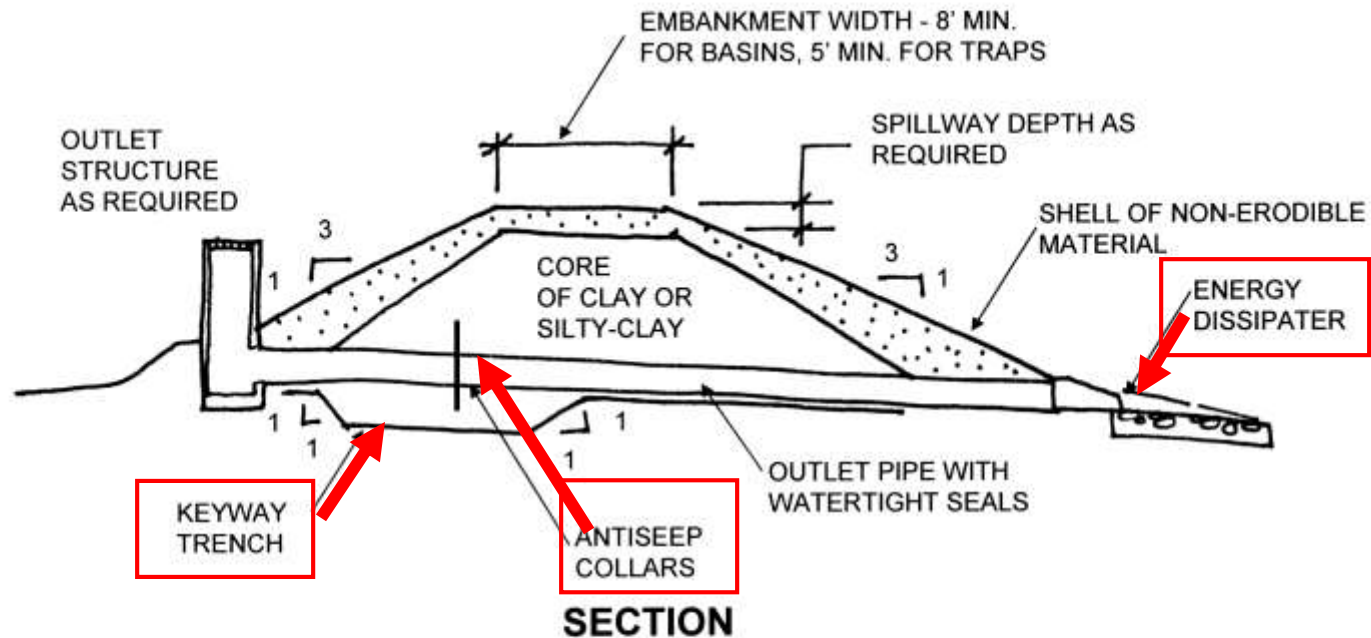
- Location of select material for embankment needs decided early
- Early communication is necessary
- Inspections are critical at this time



Embankment construction

- Soils should be compacted according to plan specs or by an on-site geotechnical engineer.
- Watching the progress is a critical step to ensure embankment is well compacted
- Final slopes should be verified to the plan configuration

Embankment construction & compaction



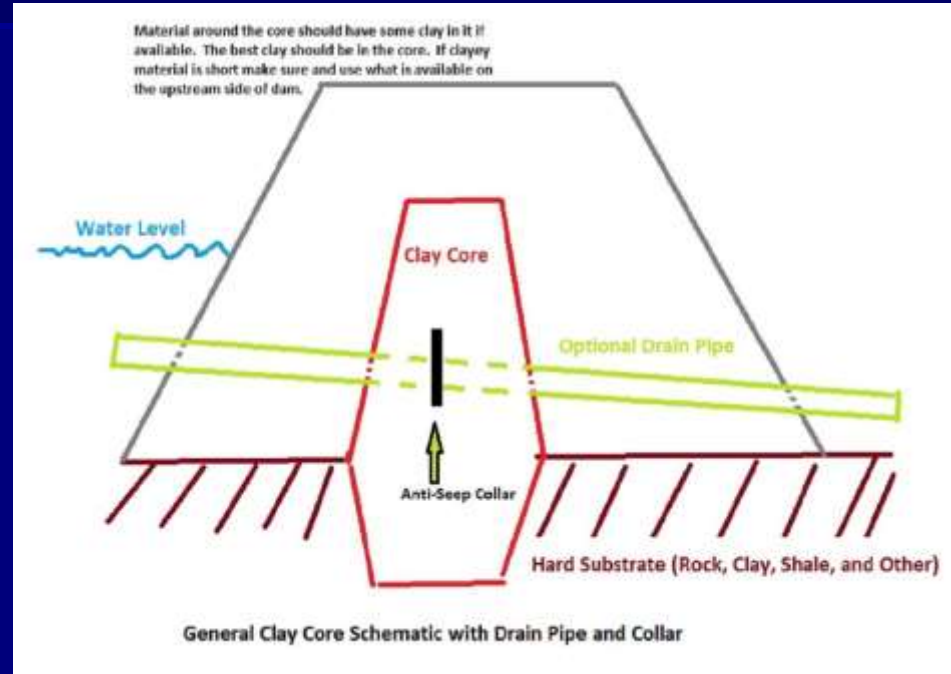
- TOPSOIL SHOULD BE STRIPPED IN AREA OF EMBANKMENT
- EMBANKMENT SHALL BE CONSTRUCTED IN 6" TO 9" LIFTS AND COMPACTED
- EMBANKMENT SHALL BE STABILIZED WITH VEGETATION

EMBANKMENT

Locate suitable soils for embankment



Keyway design and construction



Excavation for keyway



The keyway and any drains need inspected by the Design Professional and possibly accompanied by the Geotechnical Engineer



Material for the embankment core should compose of clay or silty-clay.



Locate the soils drawing to determine about where the soils may be

Slow layering and moving of the earth to establish proper lifts is important to the compaction of the soil



The embankment should be compacted with a NON-vibratory roller or sheep foot roller from suitable materials using 6"-9" lifts



Fill material should not consist of large boulders or
Made entirely of rock shale material.

The design professionals should be present during all Stages of the pond construction



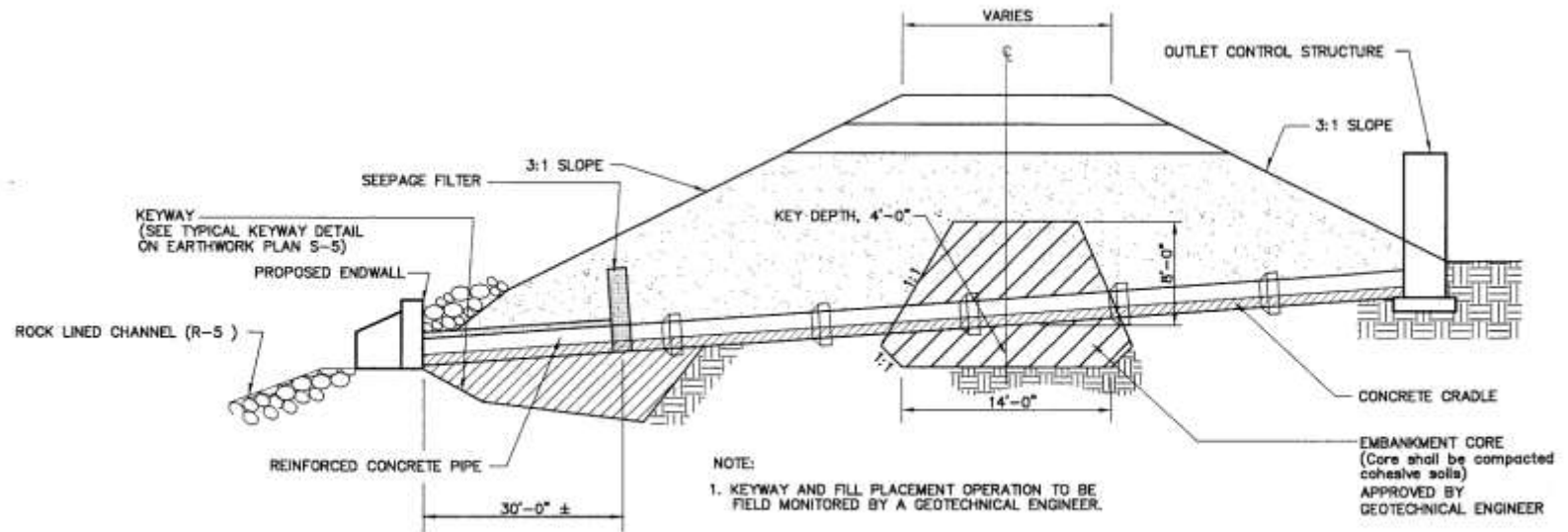
The Final stage



Is the embankment to correct elevation?
Are the slopes 2:1, 3:1?
Is the pond about the right volume?

The outfall pipe

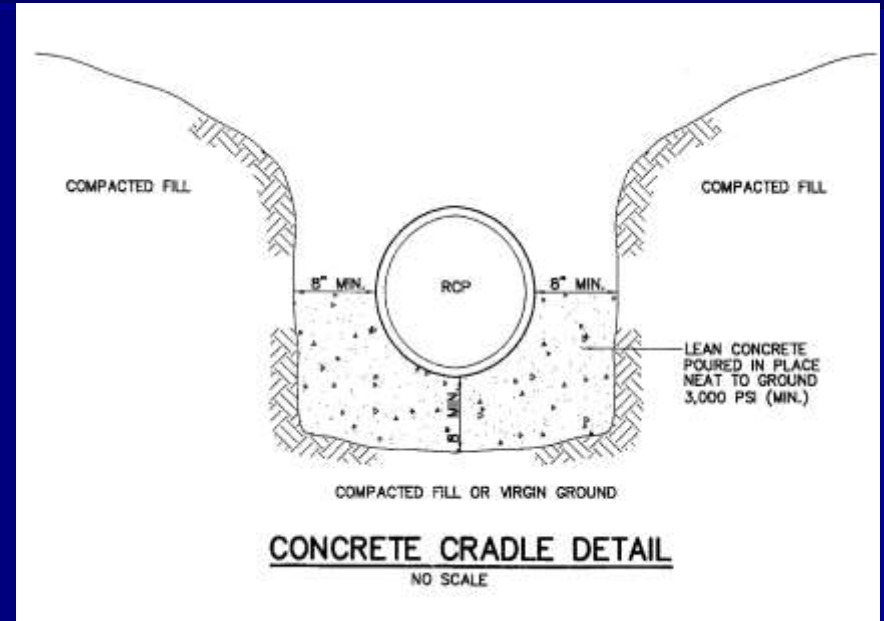
Outfall pipe Cradle Detail



TYPICAL BASIN EMBANKMENT

NO SCALE

The barrel installation



Its best to find clay material
On site to backfill and compact
around the pipes and collars.



Sandstone is not suitable material
For backfill around the pipe

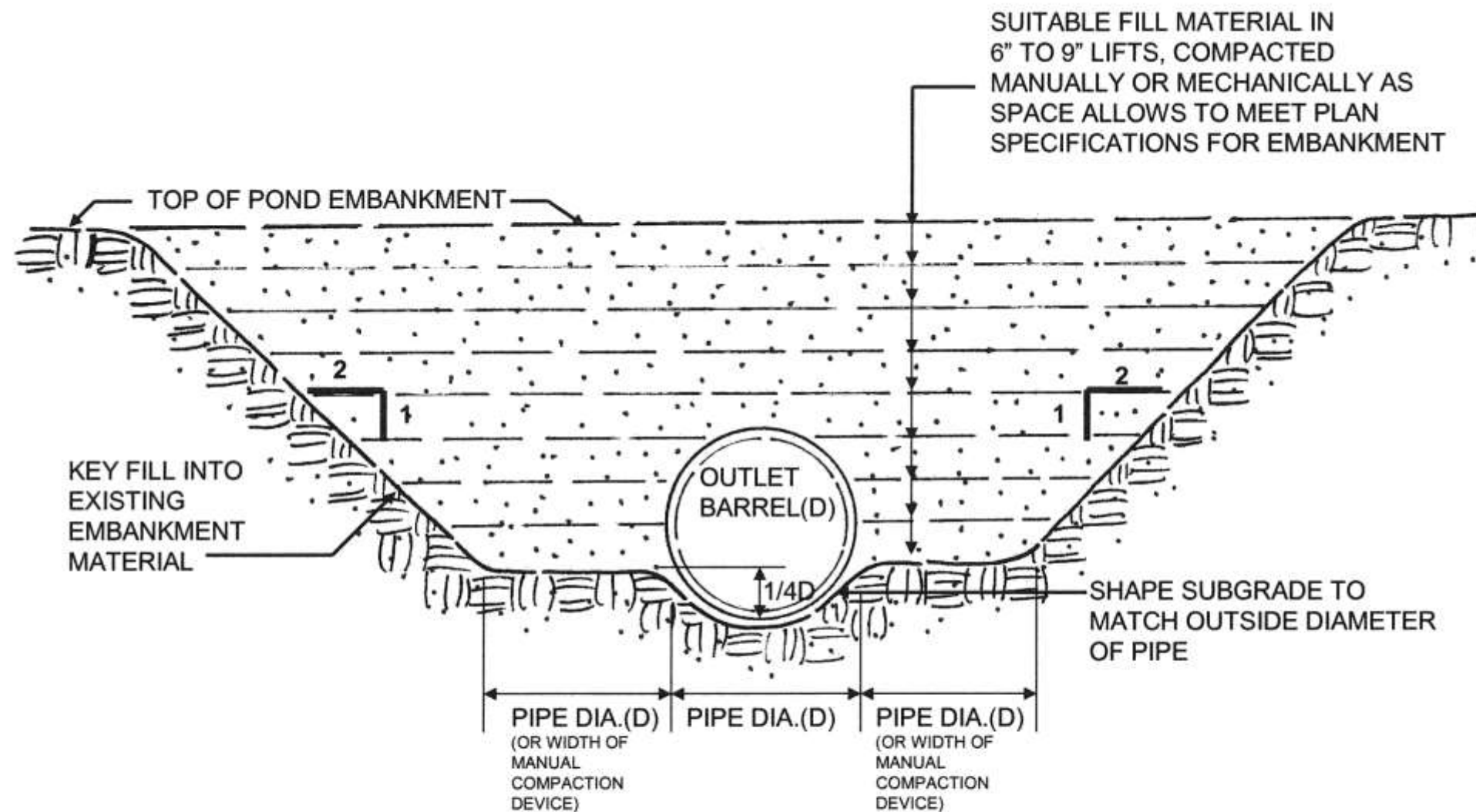


Surrounding the envelope
Of the pipe with 2A modified
Is a good idea as it hardens
Like concrete.

Use a jumping jack to compact
The 2A around the base of pipe.

Cutting through the embankment to install the outfall pipe

- Ponds in Cut material will need the outfall slot Cut in order to install the pipe.
- The excavation of this area can be the weakest point of the pond.
- Methods to reduce a blowout are to Key in Backfill material into the existing material and compact in lifts.



Typical Outlet Barrel Installation in a Pond Embankment

Examples of anti-seep collars





Forms should be created to pour a
Good standing collar. Rebar is used
In the concrete.



The collars should be slotted and poured into cut grooves of the existing material

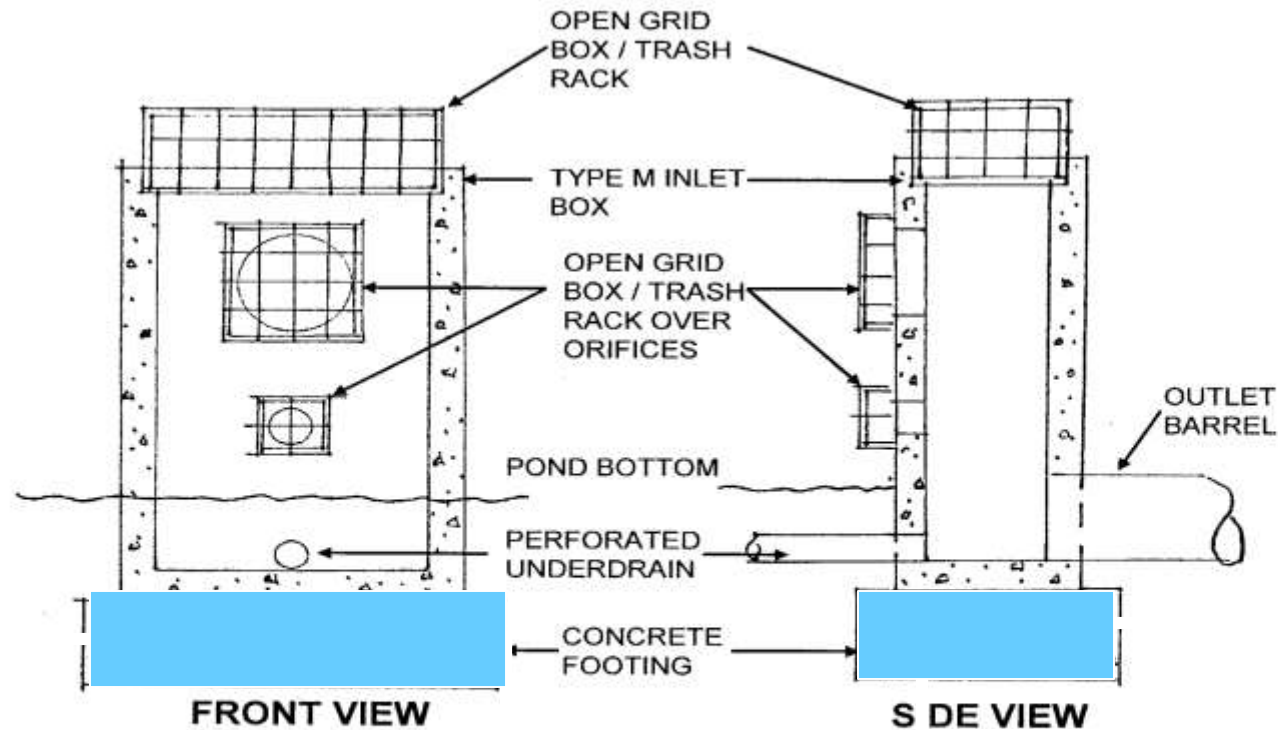


Seep collars should be inspected prior to backfill by the design professional or representative inspector



Riser installation and emergency spillway construction

Outlet risers require footing and trash racks



TRASH RACK FOR TYPE M INLET BASIN RISER

Concrete footing for (Type M) outlet riser



Riser/outlet barrel should be properly sealed



The outfall pipe should be sealed with concrete around the box opening to ensure water is not entering from the back of the box. Concrete should be poured under the pipe. The pipe connection should be also grouted on the inside.



Emergency spillway



Ensure the rock does not fill in the entire spillway

Cutoff walls in spillway



Make sure weir is poured as to not block the flow of water

Vegetative spillways: Problems



Dense TRM's are sometimes made to be "soil Filled"
Vegetation did not grow through the fabric.

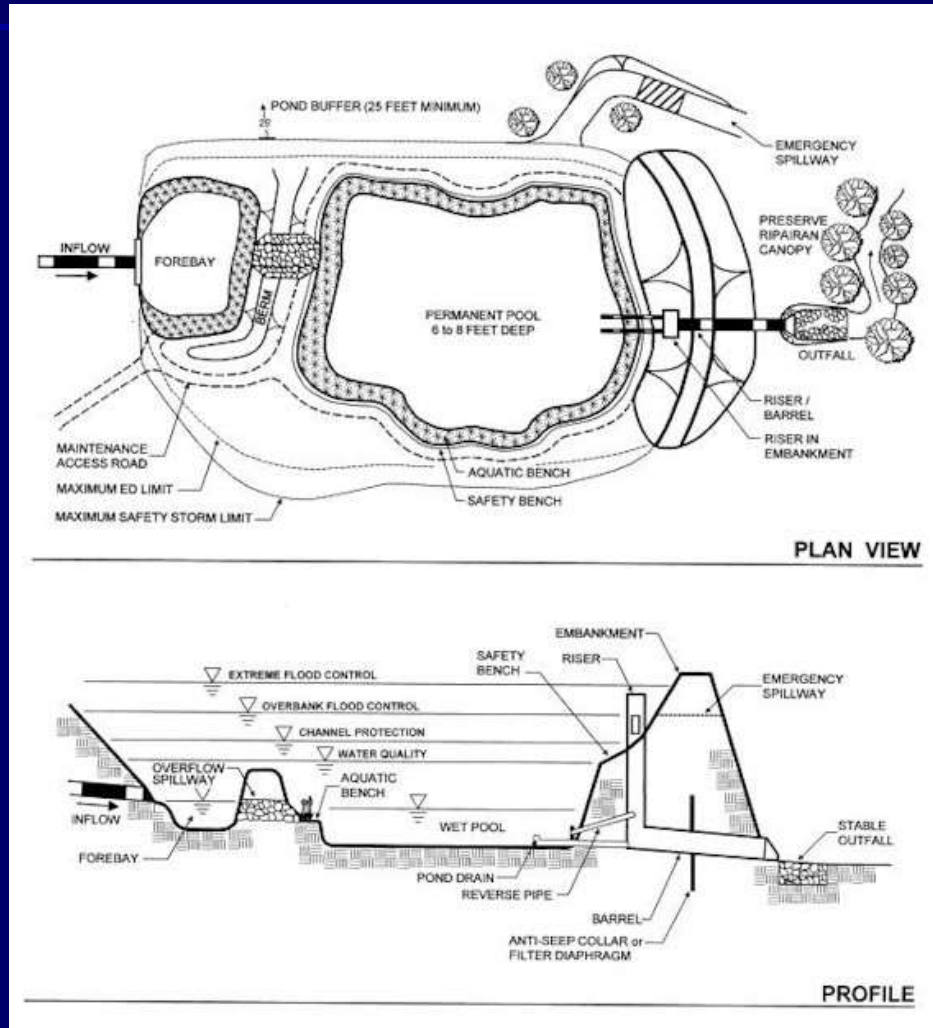
The result was a unstable soils that eroded Filling the Riprap at the base



Due to 2018 Rain events, this spillway was used
Frequently and deteriorated resulting in failure

Fore bay construction

Wet Pond with Forebay Detail



Is the weir constructed according to the drawings and rock placed correctly?



Forebay weirs



Make sure to extend spillway to bottom of pond

Is the weir functioning well?



Forebays with inlet overflows



Use basket style overflow grates



Flat Grates will Block

Utilize Raised Frame Grates



Conversion from sediment basin to permanent storm water basin



Pond conversion

- Mow embankments short so inspection can occur.
- Let pond dry out, find a location to take the sediment to.
- Establish the elevations for bottom of pond, over-excavation may need to occur and clean material brought in.
- Repair slope gullies and remove any trees and brush from embankments, and spillways.
- Seed the pond with proper seed if not established.

Process of conversion

- Remove any baffles, clean out to elevations on plans
- Install or repair trash rack, remove covers over orifices in box risers.
- Inspect outfall barrel for deflection (plastic), ensure seals are good around all connections and joints
- Perform a final elevation survey of the embankment, emergency spillway, and principal outlet structures.

Pre- cleanout inspection
Of sediment basin ready
To convert.



This pond accumulated 2-3 feet of sediment



Signs that the ponds needs cleaning out is sediment buildup around riser



Bottom elevation for this pond was the invert of lower hole

June/ July is a good time to perform the conversions



Is the outlet structure acceptable?



Possible piping going on

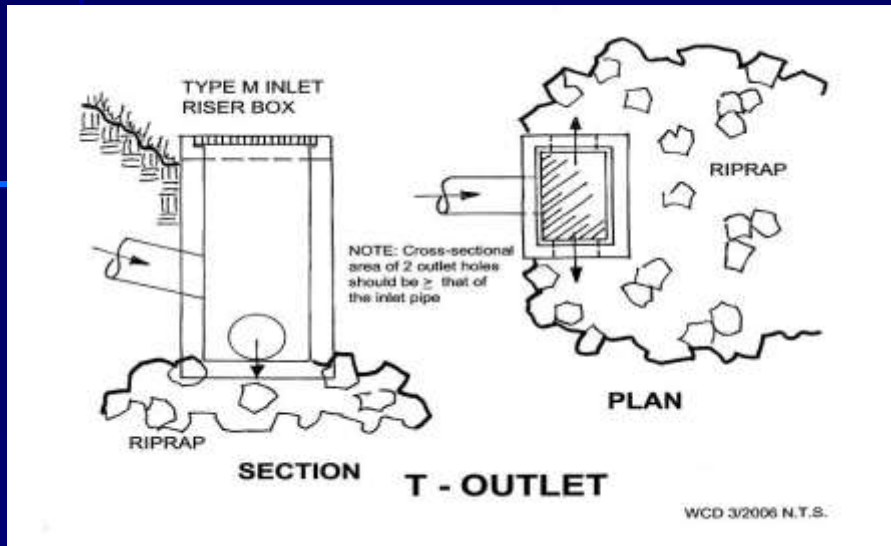
Inspection and measurement of the orifices is very important to the functionality of the pond



Energy Dissipaters entering and exiting ponds



Are the aprons to the correct size?



Rock is too small here



Rock is too large and not depressed



ROCK SIZING



This is a mixture that will work

Level Spreader outlets from ponds





Swale fills up on each side and pours evenly over concrete wall

Vegetation should be at least 70% or better before a final inspection and permit release can occur





This pond was converted and could then be turned to the Municipality, if they are ready to accept it.

A joint inspection should occur to see if everything is satisfied.



Questions?

For more information:
Contact Chris Droste
Chris@wcdpa.com