



Maryland
Department of
the Environment

Sediment, Stormwater, and Dam Safety Program

DEFINING A DAM

September 16, 2020
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Now what??

Source: MDE photo

Pond MD-378-1

USDA
NATURAL RESOURCES
CONSERVATION SERVICE
MARYLAND

CONSERVATION PRACTICE
STANDARD

POND

CODE 378
(Reported in No.)

DEFINITION

A water impoundment made by constructing a dam or an embankment or by excavating a pit or dugout.

In this standard, ponds constructed by the first method are referred to as embankment ponds, and those constructed by the second method are referred to as excavated ponds. Ponds constructed by both excavation and the embankment methods are classified as embankment ponds if the depth of water impounded against the embankment at the principal spillway storm design high water elevation is 3 feet or more (See Table 1).

This 3 feet shall be measured from the low point on the upstream toe of the embankment to the design high water.

PURPOSE

To provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard spraying, and other related uses, and to maintain or improve water quality. This standard also applies to stormwater management ponds.

CONDITIONS WHERE PRACTICE APPLIES

General - This practice applies where it is

determined that stormwater management, water supply, or temporary storage is justified and it is feasible and practicable to build a pond which will meet local and state law requirements.

This standard establishes the minimum acceptable quality for the design and construction of ponds if:

1. Failure of the dam will not result in loss of life; in damage to homes, commercial or industrial buildings, main highways, or railroads; or interruption of the use or service of public utilities.
2. The product of the storage times the effective height of the dam is less than 3,000. Storage is the volume, in acre-feet, in the reservoir below the elevation of the crest of the emergency spillway.

The effective height of the dam is the difference in elevation, in feet, between the emergency spillway crest and the lowest point on a profile taken along the centerline of the dam, excluding the cutoff trench. If there is no emergency spillway, the top of the dam becomes the upper limit for determining the storage and the effective height.

3. For dams in rural areas, the effective height of the dam (as defined above) is 35 feet or less and the dam is hazard class "a". For dams in urban areas, the effective height of the dam is 20 feet or less and the dam is hazard class "a".

Ponds exceeding any of the above conditions shall be designed and constructed according to the requirements of Technical Release 60.

Exemptions - Soil Conservation District small pond approval is not required for small class "a" structures where the following exists:

1. Ponds or other structures have less than four (4) feet of embankment, or
2. The storage at emergency spillway design

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service

NRCS - MARYLAND *JANUARY 2000*



Title 26 DEPARTMENT OF THE ENVIRONMENT

Subtitle 17 WATER MANAGEMENT ADMINISTRATION

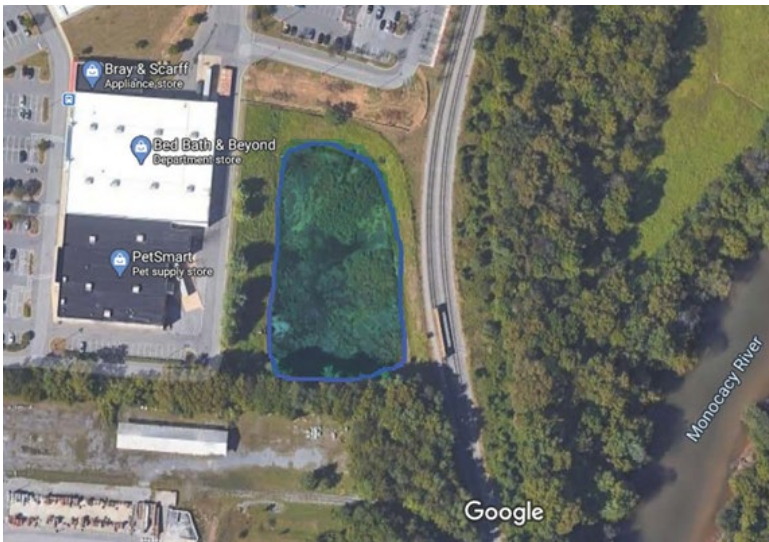
Chapter 04 Construction on Nontidal Waters and Floodplains

.02 Definitions.

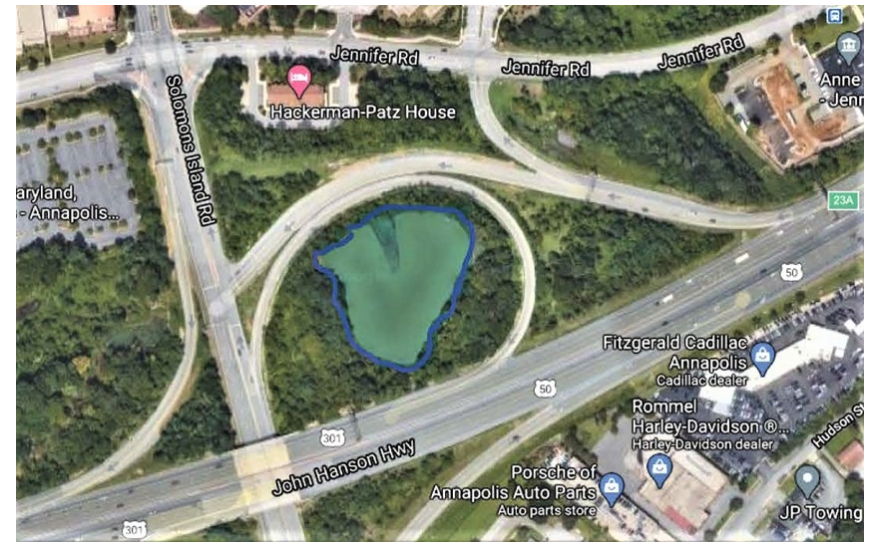
"Dam" means any obstruction, wall, or embankment, together with its abutments and appurtenant works, if any, in, along, or across any stream, heretofore or hereafter constructed for the purpose of storing or diverting water or for creating a pool upstream of the dam, as determined by the Administration.

Earthen Dam Configurations/Types:

- Excavated Ponds
 - Embankment Ponds
-
- Culverts



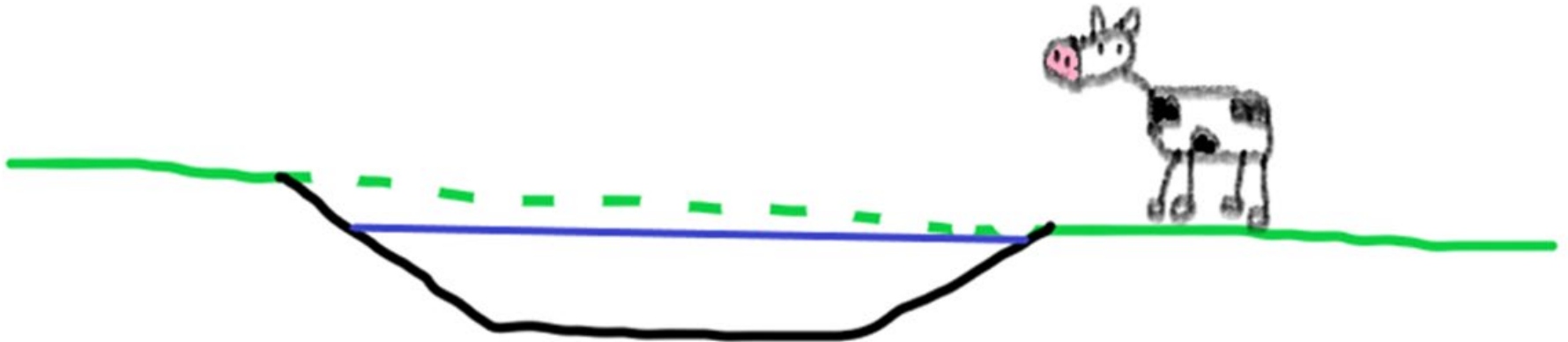
Imagery ©2020 Commonwealth of Virginia, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2020



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Excavated Pond – 1

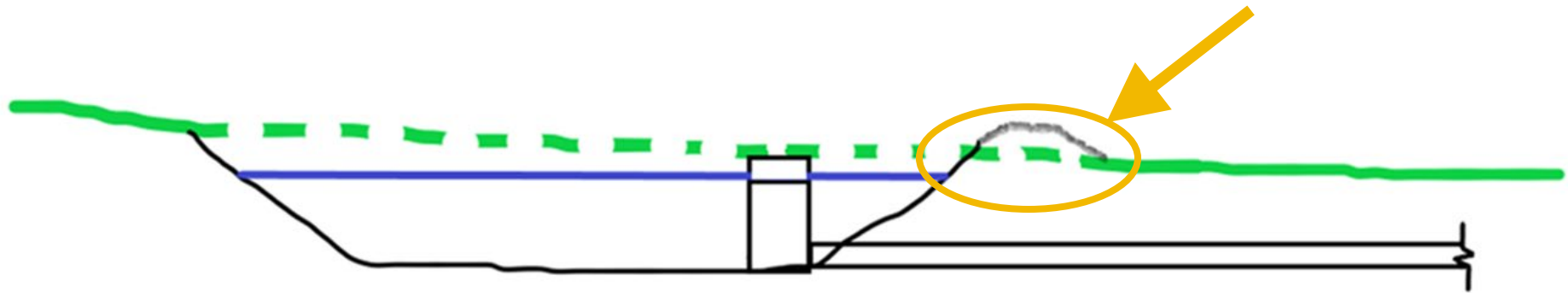
a “dug out” pond with little or no fill around the perimeter and no control structure





Excavated Pond – 2 (new definition needed)

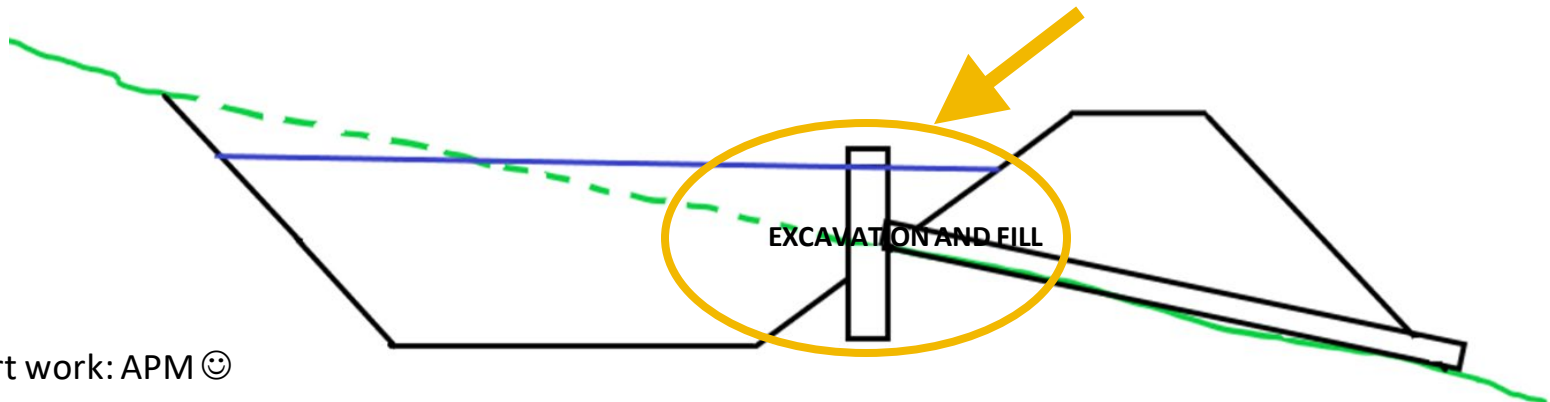
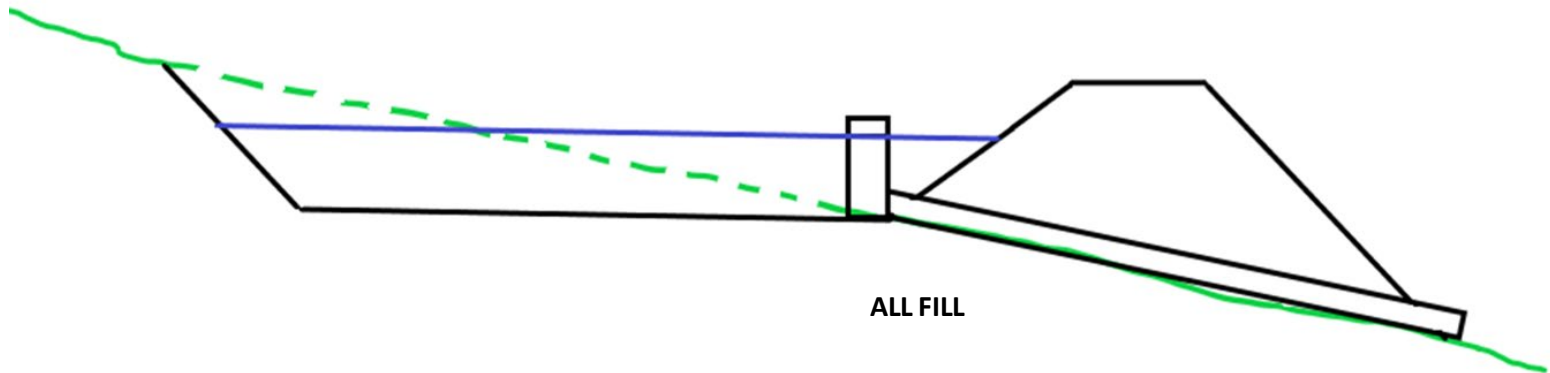
an excavated pond discharging to a closed storm drain system (subject to certain conditions)



Spillway connects to a closed storm drain system

Embankment Pond

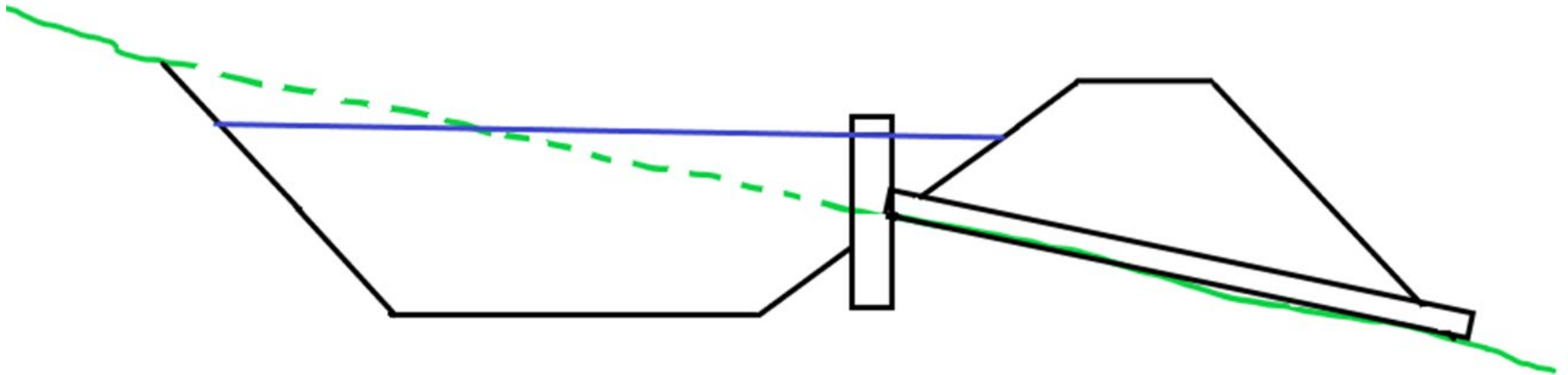
a pond with an embankment that is formed by all fill or by both excavation and fill





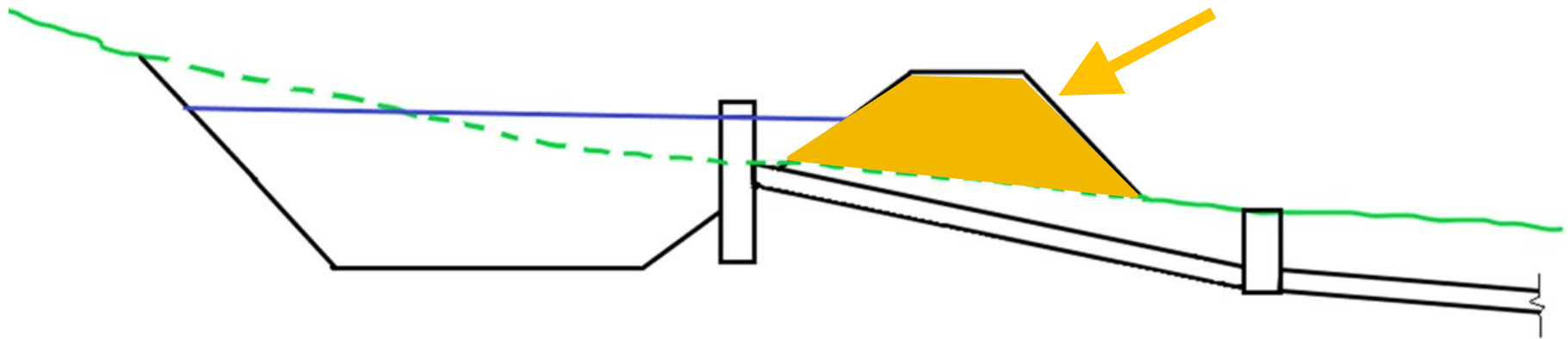
Principal Spillway Configuration – 1

pipe spillway outlets to a surface drainage way



Principal Spillway Configuration – 2

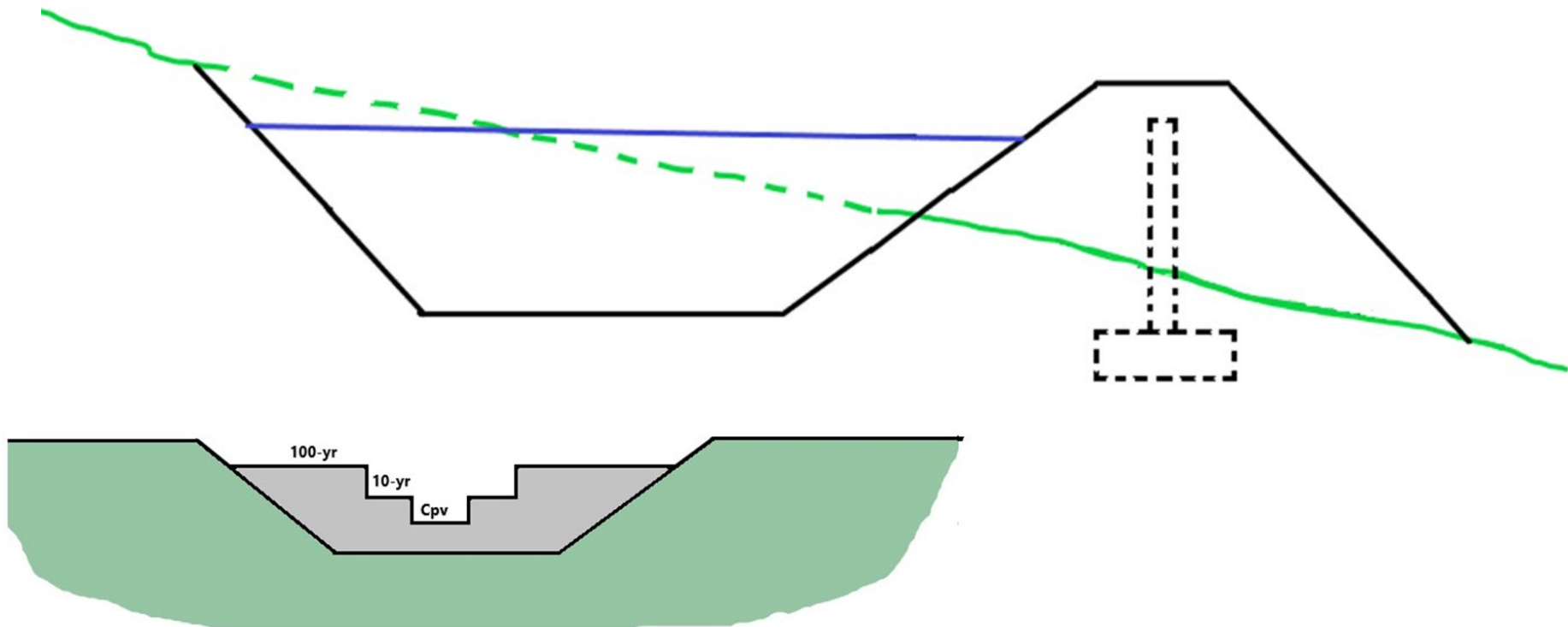
pipe spillway outlets to storm drain system



projection $L > 10H + 20$ ft but not an excavated pond

Principal Spillway Configuration – 3

weir spillway



Best Management Practices

Types of “BMPs”

- Micro-bioretenention
- Landscape infiltration
- Submerged gravel wetland
- Infiltration basin
- Surface sand filter
- Bioretention
- Wetland pond
- Wet pond
- Dry pond



Source: MDE photo



Possible Design Categories:

- Exempt from Code 378
- Code 378 Pond
 - Embankment pond
 - Excavated pond
 - Special roadway embankment or “superwide” pond
- Dam
- Culvert



DESIGN CATEGORY = \mathcal{F} (configuration, size, hazard class)



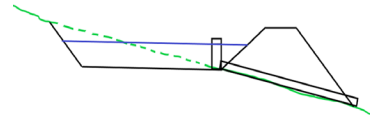
Source: free clip art



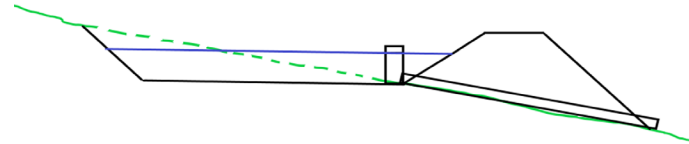
SIZE SIZE SIZE SIZE

Embankment Ponds:

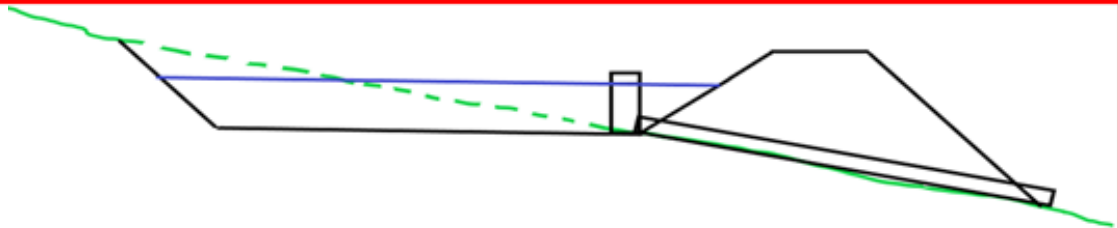
- ESD micro-scale pond



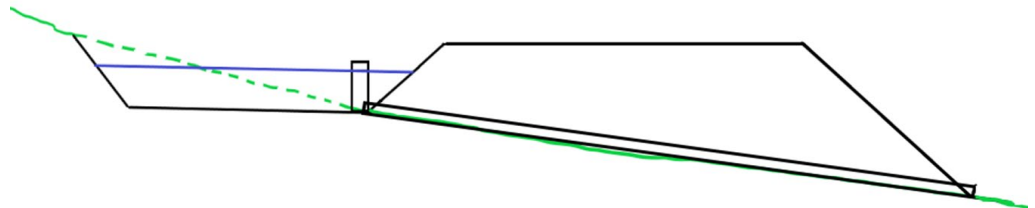
- “Chapter 3 pond”



- Code 378 pond



- Roadway Embankment
“Superwide”



SIZE SIZE SIZE SIZE

Embankment Ponds:

- ESD micro-scale pond

Drainage area $< 1/2$ acre
Storage volume typically $< 10,000$ cf
Intent to EXEMPT from Code 378

- “Chapter 3 pond”

Height < 4 ft or
Height ≤ 6 ft and $V \leq 40,000$ cf
EXEMPT from Code 378

- Code 378 pond

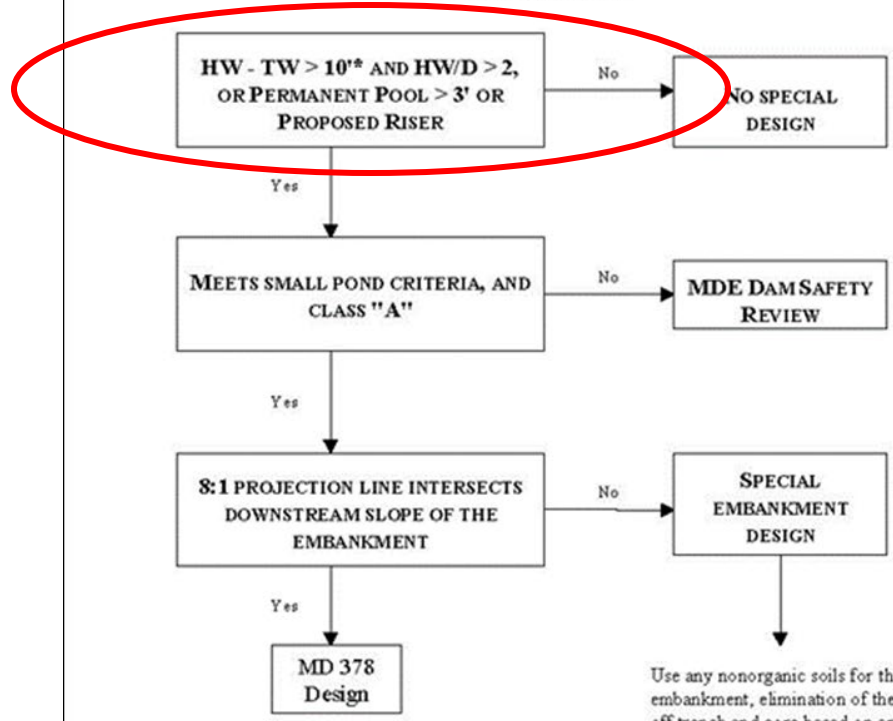
Height ≥ 4 ft and < 20 ft
Height > 6 ft and $V > 40,000$ cf
 $V < 50$ ac-ft
DA < 640 acres
Code 378

- Roadway Embankment
“Superwide”

Height ≥ 4 ft and < 20 ft
Pond embankment is formed by roadway
8:1 projection line does not intercept downstream slope
Control Structure
HW/D and HW-TW indicate dam
Code 378, with allowance for special embankment design



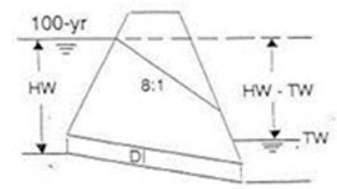
ROADWAY EMBANKMENT DESIGN CRITERIA



Use any nonorganic soils for the embankment, elimination of the cut-off trench and core based on approval of geotechnical engineer and acceptable to local jurisdictions.

Filter diaphragm is required.

All other MD 378 criteria apply.

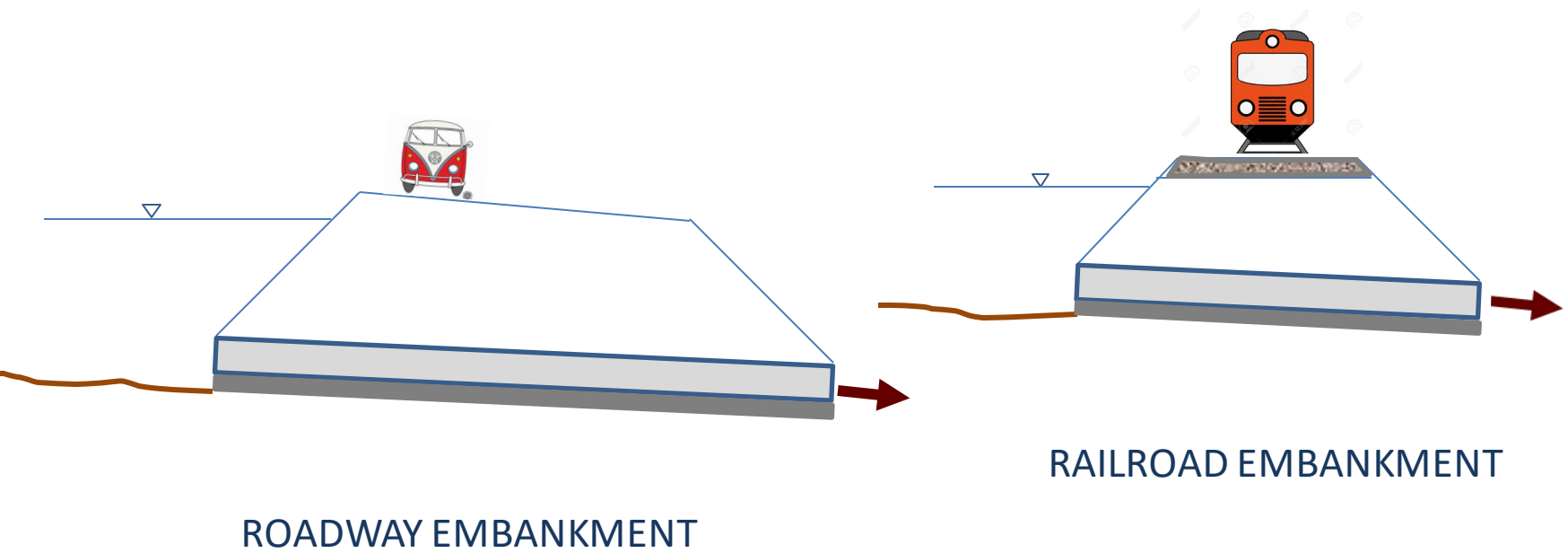


* Use HW when TW is below the inlet invert elevation.

Culverts...



Potential Dams:





Culvert Criteria

A conduit penetrating a roadway or railroad embankment is considered a culvert when all four of these conditions are met:

- a. $HW-TW \leq 10$ feet or $HW_{depth}/D \leq 2$;
- b. Permanent pool ≤ 3 feet;
- c. There is no structure to control water surface elevations; and
- d. The embankment height is ≤ 35 feet

Policy Memo #2 - Roadway/Railroad Embankments with Culvert Crossings



Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor
Ben Crumbyles, Secretary
Horacio Tablada, Deputy Secretary

DAM SAFETY POLICY MEMORANDUM #2

TO: Dam Owners, Operators, and Engineers
FROM: Sediment, Stormwater, and Dam Safety Program
Water and Science Administration
DATE: June 11, 2019 (Updated October 9, 2019)
SUBJECT: Roadway/Railroad Embankment with Culvert Crossing

Policy Statement

It is the policy of the Maryland Department of the Environment (the Department) that linear embankments constructed as transportation ways should be designed to avoid impounding water excessively, for any purpose, through the use of adequately sized culverts, bridges or similar elements. Where linear embankments impound excessive depths of water, they will be classified as dams and must be designed, constructed, and operated as such.

Conditions Where this Policy Applies

The criteria below are used to determine whether a roadway or railroad embankment is functioning as a dam. These criteria apply irrespective of embankment width and may be applied to hiker/biker paths, golf cart paths, and narrow access roads. The criteria provide a measure for adequately sizing the culvert crossing to limit the impounded water and eliminate the embankment from being considered a dam. Application for a dam safety permit is required for embankments higher than 35 feet. For roadways, the embankment height is measured from the lowest point of excavation or fill on the upstream slope of the embankment to the incipient point of overtopping. For railroads, the embankment height is measured from the lowest point of excavation or fill on the upstream slope of the embankment to the subballast at the incipient point of overtopping.

1. Headwater and tailwater conditions are based on the 100-year, 24 hour storm event. Headwater depth (HW_{depth}) is measured from the upstream toe of fill to the upstream hydraulic grade line (HGL) or 100-year water surface elevation (HW_{elev}) assuming there is no velocity head. Tailwater depth (TW_{depth}) is measured from the downstream toe of fill to the downstream HGL (TW_{elev}). In the equations below, "HW-TW" refers to the differential between headwater and tailwater elevations. When the 100-year TW_{elev} is lower than the

Dam Safety Policy Memorandum #2
Hazard Classification: Small Impoundments
June 11, 2019 (Updated October 9, 2019)
Page 2

elevation of the pipe invert at the upstream end, the HW_{depth} shall be substituted for "HW-TW". D is the diameter of the culvert. For box culverts, twin culverts, and elliptical pipes, consider D to be the height of the opening. Refer to Figures 1 and 2 for illustration of the definitions provided above.

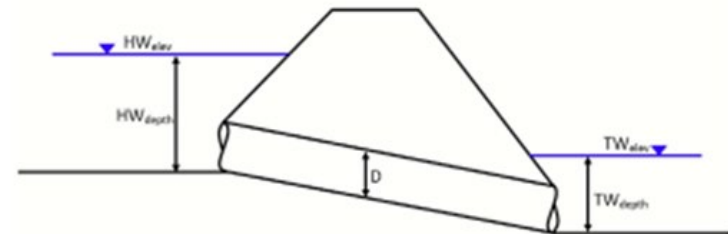


Figure 1: Illustration of condition where TW_{elev} is higher than upstream invert elevation;
use $HW-TW = HW_{elev} - TW_{elev}$

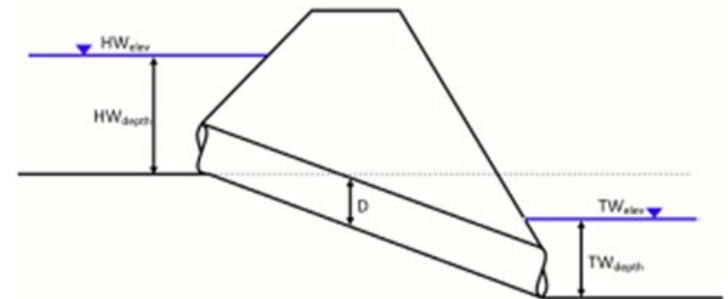


Figure 2: Illustration of condition where TW_{elev} is lower than upstream invert elevation;
use $HW-TW = HW_{depth}$



The engineer's wife

A wife asks her husband, an engineer, "Darling, can you please go to the shop, buy one pint of milk, and if they have eggs, get a dozen!"

Off he goes. Half an hour later the husband returns with 12 pints of milk.

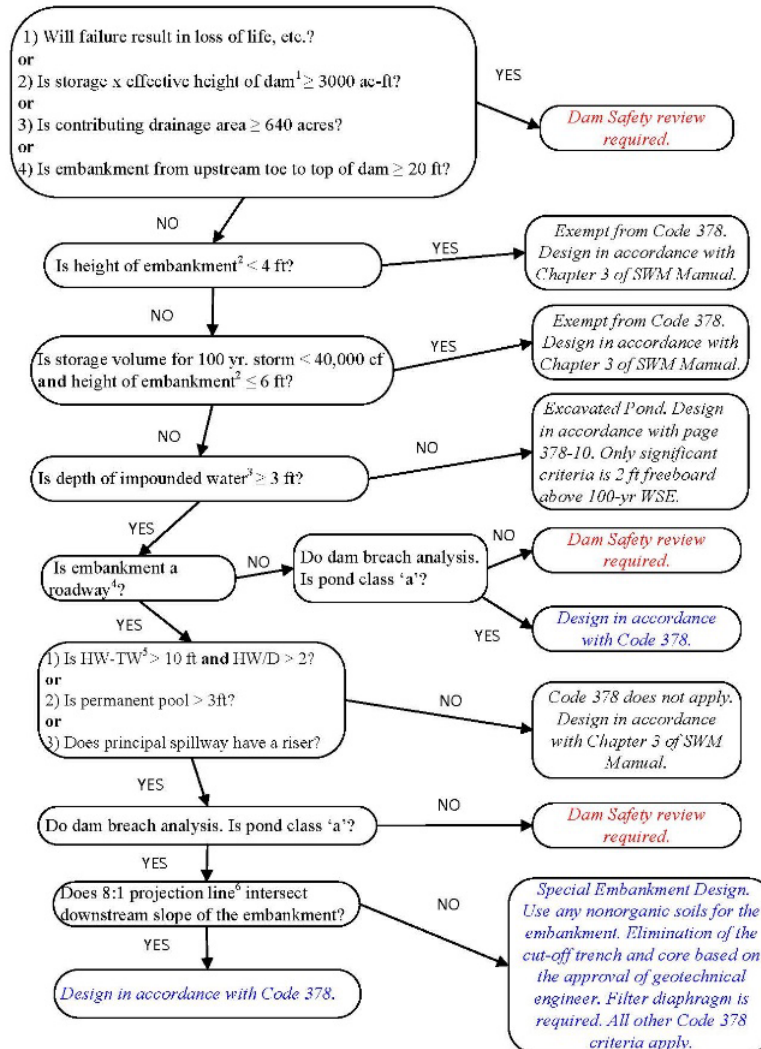
His wife stares at him and asks, "Why on earth did you get 12 pints of milk?"

"Well... they had eggs" he replied.



Old Flow Chart

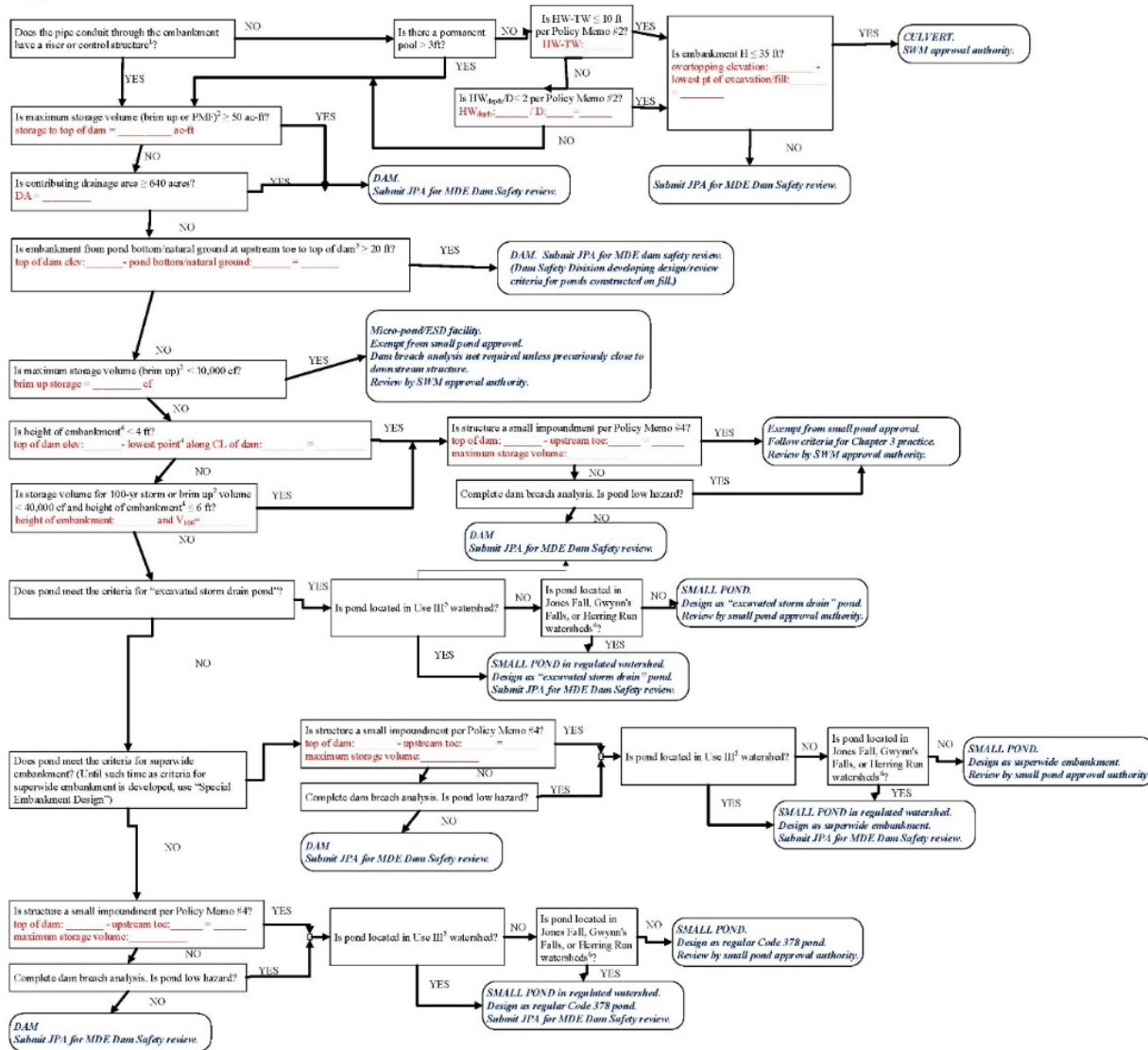
Determine Design Category of Pond Embankment





New Flow Chart - DRAFT

MDE Sediment, Stormwater, and Dam Safety Program Flow Chart for Determining Embankment Design Category and Approval Authority





Embankment Approval Authority

Stormwater Management Approval Authority

- Structures exempt from Code 378
- Culverts through embankments \leq 35 feet

Small Pond Approval Authority (SCDs and MDE Plan Review Division)

- Code 378 and hazard class “a” **

***Unless in Use III watershed or Jones Falls/Gwynns Falls/Herring Run watersheds or Baltimore City*

MDE Dam Safety Permits Division

- Code 378 ponds not approved by the SCDs including those in Use III watersheds or Jones Falls/Gwynns Falls/Herring Run watersheds or Baltimore City
- Larger than Code 378 or significant/high hazard classification
- Non-earth dam
- Culverts through embankments $>$ 35 feet



Thank you

Questions?

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