DAM SAFETY

POLICY MEMORANDUM #13

TO: Dam Owners, Operators, and Engineers

FROM: Stormwater, Dam Safety, and Flood Management Program
Water and Science Administration

DATE: April 24, 2023

SUBJECT: Excavated Ponds

Policy Statement

It is the policy of the Maryland Department of the Environment (the Department) that the design of dam embankments must consider potential failure modes and incorporate defensive design measures as appropriate. The Department has observed misinterpretations of the criteria for excavated ponds as written in the USDA, Natural Resource Conservation Service, Maryland Conservation Practice, Standard Pond Code 378, January 2000 (MD-378). This policy seeks to clarify the expectations for the design and approval of excavated ponds. The criteria provided herein are minimums, and it remains the responsibility of the designer to determine if and where more conservative approaches are warranted.

Background

Excavated, or "dugout" ponds, are those created by excavation in a generally level area where a small storage volume is necessary. As originally anticipated in early design criteria, these structures were anticipated to have little or no embankment and discharge managed by sheet flow or shallow open channel flow. Typically, the pond hydrology was dominated by sheet flow or is spring fed. These structures were generally intended for livestock watering, irrigation, or fire suppression.

Concurrent with the current stormwater regulations in the State of Maryland, excavated ponds with a controlled release structure have become increasingly prevalent, requiring clarification to the criteria presented in MD-378

Definition of Excavated Ponds

An excavated pond is defined as one meeting the below criteria:

- The pond is low hazard (class "a"). A truly excavated pond has limited potential failure modes, and therefore a dam breach analysis is not applicable. If the engineer believes that there is a potential hazard, then the pond is unlikely to be considered excavated;
- Embankment fill to complete the constructed top of dam is no greater than 2 feet in height above the natural ground surface; and
- The projection of L horizontally downstream from the pond bottom is below the existing or proposed ground, where L = 10H + 20 and H = height from the pond bottom to the constructed top of the dam, and the existing or proposed downstream ground slope within the projection of L does not exceed 10% at any point below the design storm water surface elevation plus one foot. The configuration noted in Figure 2 intends to allow for a traditionally sloped embankment, but is limited to keep wit the intent of the criteria.

The depth of impounded water is not a factor when determining whether a pond is considered to be excavated.

Refer to Figures 1 and 2 for examples of configurations that are defined as excavated.

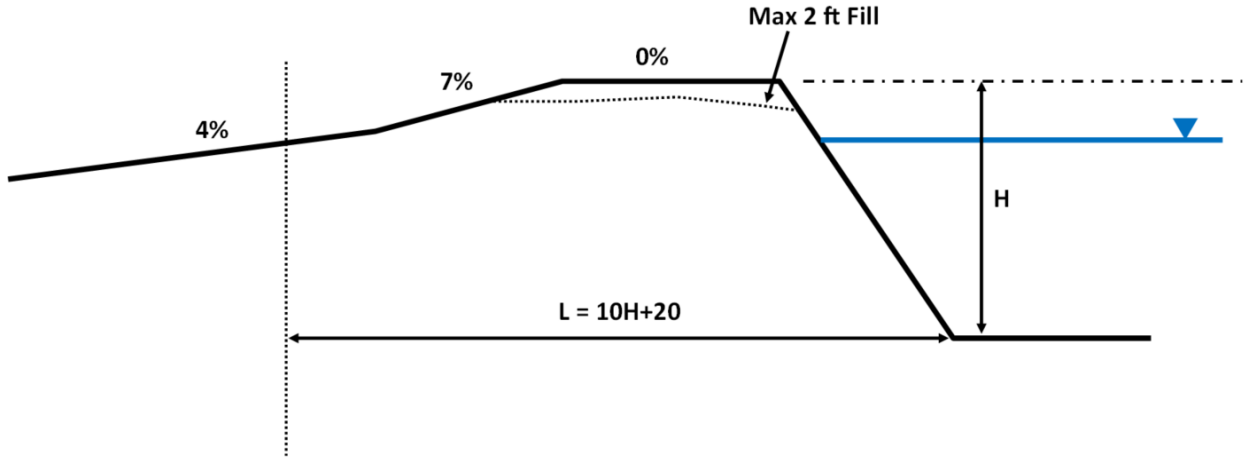

Figure 1

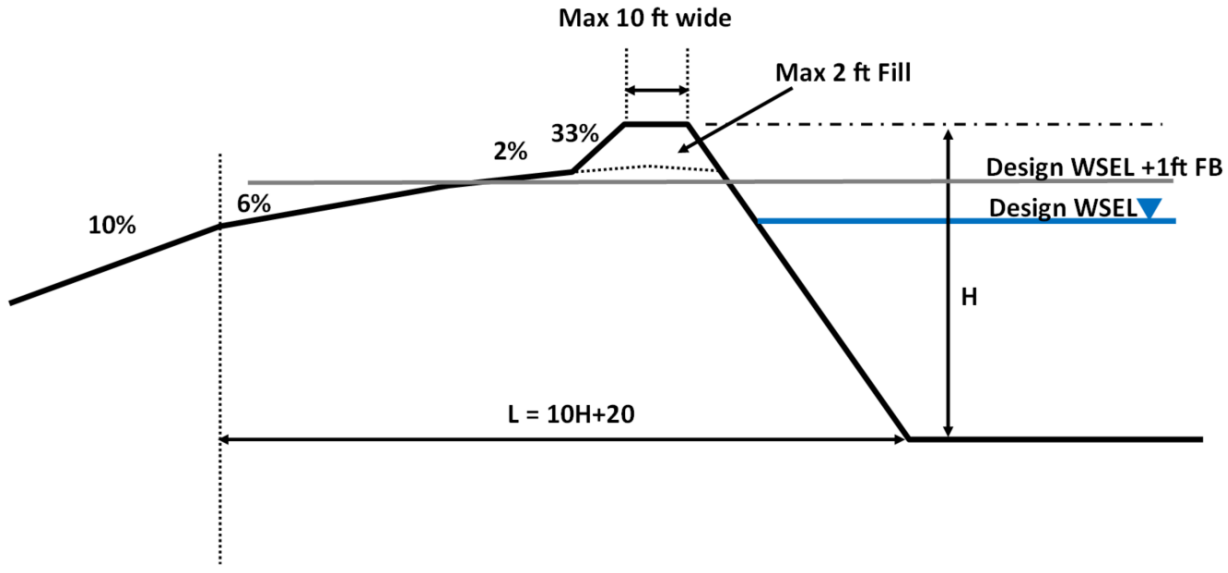

Figure 2

Where the pond bottom is offset greater than or equal to 10 feet from the upstream slope toe, the pond bottom for the purposes of the above calculations shall be the upstream slope toe (Refer to Figure 3).

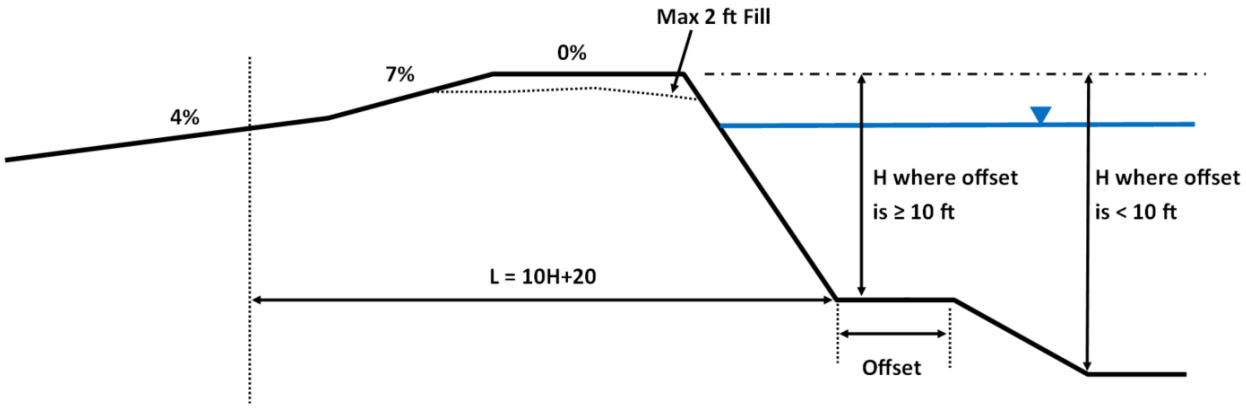

Figure 3

Small Pond Approvals

Excavated ponds meeting the above-mentioned criteria do not require small pond approval from the Department, the local Soil Conservation District (SCD), or the Department's designee. These structures may require other approvals including, but not limited to stormwater management, erosion and sediment control, wetlands, and local grading permits.

Where a pond does not meet the definition of an excavated pond, it must be designed in accordance with COMAR 26.17.04.05, MD-378, and the Departments policies. A Small Pond Approval must be sought from the Department, the local SCD, or the Department's designee prior to construction.

Excavated Pond Design Criteria

General

Excavated ponds shall be designed based on sound engineering judgment. Design storm and freeboard criteria for the design of excavated ponds is provided below:

- Excavated ponds constructed for stormwater management purposes shall be designed based on the local stormwater management design storm or the 10-year, 24-hour duration storm, whichever is greater.

- Excavated ponds in a rural area that are not constructed for stormwater management shall be designed using a 25-year, 24-hour duration storm event.

- Excavated ponds in an urban area that are not constructed for stormwater management shall be designed using the local stormwater management design storm or the 10-year, 24-hour duration storm, whichever is greater.

- The minimum required freeboard above the design storm water surface elevation is one (1) foot. The normal pool elevation (if any) shall be below the natural ground surface.

Side Slopes and Embankment

- Side slopes of excavated ponds shall be such that they will be stable and shall not be steeper than two horizontal to one vertical (2H:1V). Flatter slopes are to be utilized where safety for children or livestock watering, etc. is a design factor.
- Fill material for the reservoir rim shall conform to Unified Soil Classification GC, SC, SM, MH, ML, CH, or CL. No cutoff trench is required.
- Woody vegetation is prohibited on a constructed embankment rim, within 15 feet of a constructed embankment rim, within 25 feet of riser, and within 15 feet of principal spillway within the projection of L.

Spillway

- Material and construction specifications for the principal spillway shall be in accordance with MD-378 (e.g., ASTM C-361 pipe).
- The principal spillway and riser shall include anti-flotation, anti-vortex, and track-rack designs.
- Trenching for spillway pipe shall be at 2H:1V slopes and backfilling shall follow MD-378 Structure Backfill. “Stair-step” or “saw tooth” benching of the excavation slopes is required.
- For excavated dams/small ponds, seepage control (e.g., filter diaphragms, anti-seep collars) is not required, but may be incorporated in the design if determined appropriate by the design engineer or approval authority.

Inlet Protection

When the excavated pond is a bypass type facility, and water is being diverted from a stream, the minimum size inlet line shall be a 4-inch diameter pipe. Adherence to all state laws concerning water use and downstream rights shall be strictly maintained. Where surface water enters the pond in a natural or excavated channel, the side slopes and bottom of the pond shall be protected against erosion.

Outlet Protection

An excavated pond shall be designed to ensure a stable outfall for the full discharge capacity of the spillway(s) at the design storm.

Additional Information

Questions about this policy or other items relating to ponds and dams can be directed to the Chief of the Dam Safety Permits Division at 410-537-3552.