



DAM SAFETY
POLICY MEMORANDUM #3

TO: Dam Owners, Operators, and Engineers

FROM: Sediment, Stormwater, and Dam Safety Program
Water and Science Administration

DATE: May 23, 2019

SUBJECT: Excavated or Partially Excavated Impoundments Adjacent to Steep Slopes

Policy Statement

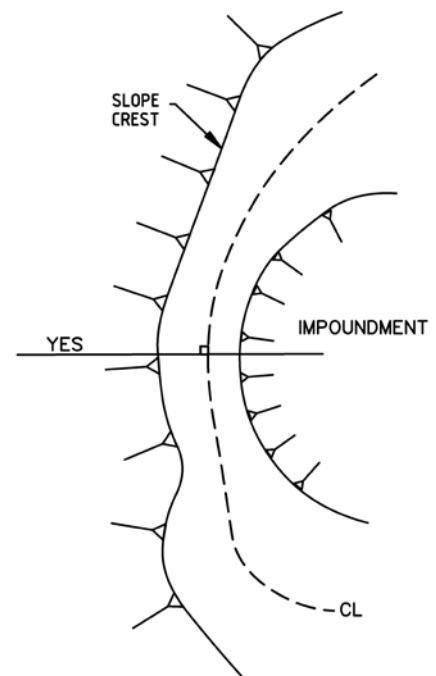
It is the policy of the Maryland Department of the Environment (the Department) that impoundments formed by cut or a combination of cut and fill adjacent to steep slopes shall be adequately setback to ensure a sufficient bulk of soil and/or rock exists such that seepage or slope instabilities do not present a potential failure mode for the impoundment. This policy defines minimum setback requirements and slope geometry and supplements all other design requirements for construction of dams and impoundments.

Background

Impoundments constructed by cut or a combination of cut and fill and located near steep slopes (20% slope or greater) may pose an additional failure hazard if there is insufficient natural, undisturbed rock/earth materials to safely support the impounded water. The following lateral bulk requirements must be met where impoundments are located near steep slopes. In all cases, the design engineer must perform adequate geotechnical investigations and analyses as the local geologic conditions and project design warrant to ensure a stable slope.

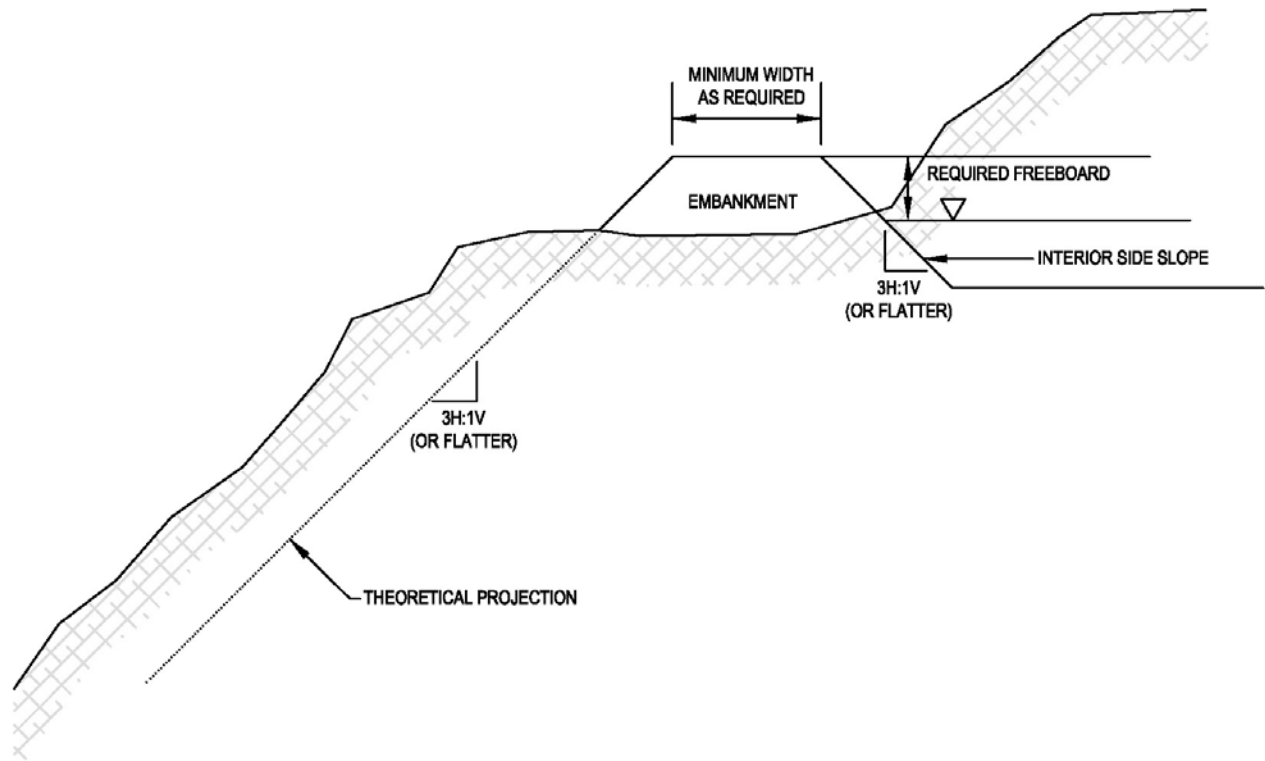
Lateral Bulk Requirements

The following requirements must be met for all cross sections perpendicular to the centerline of the embankment. (Refer to adjacent figure).

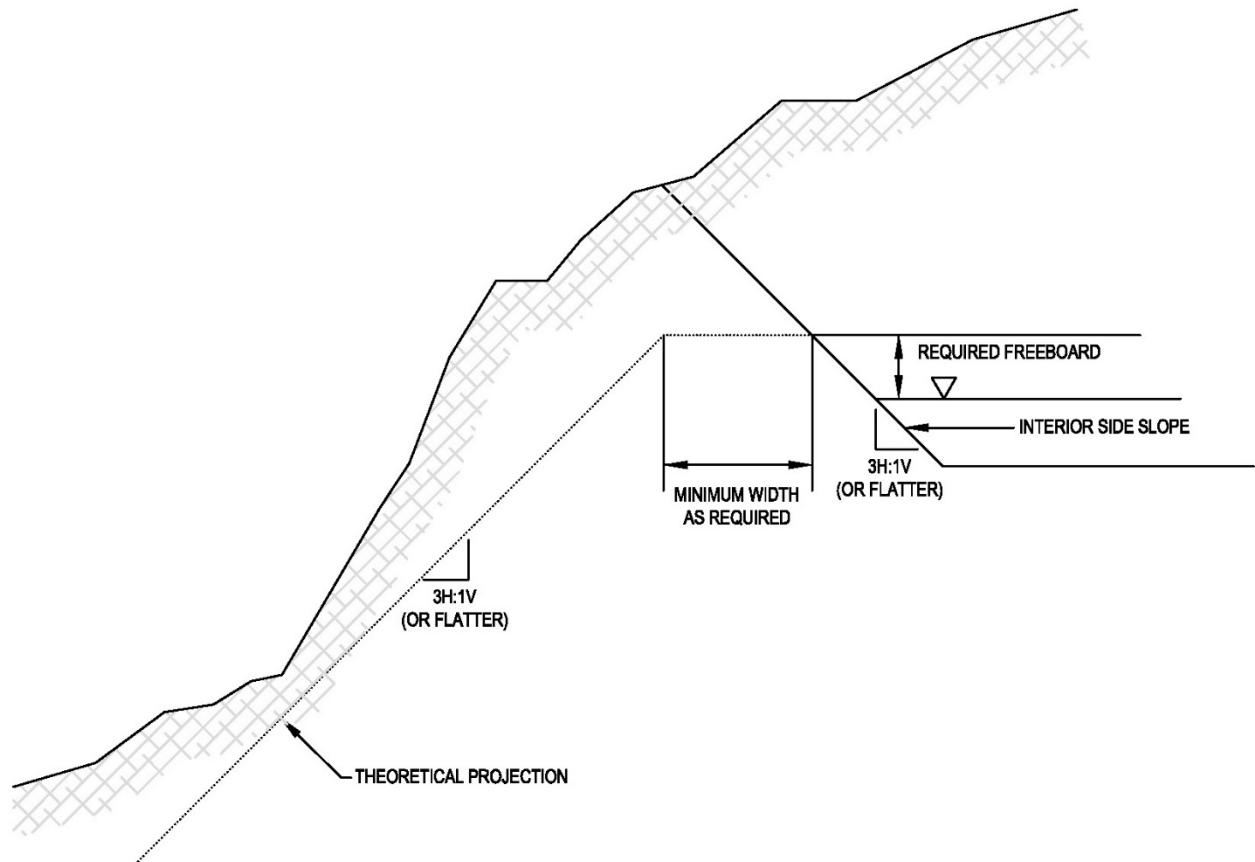


1. The side slope within the impoundment (interior) shall be three (3) horizontal (H) to one (1) vertical (V) [3H:1V] or flatter;
2. If embankment fill is proposed between the impoundment and the steep slope, the following requirements apply (see Example 1):
 - a. The top of the embankment must be at or above the minimum required elevation to ensure adequate freeboard associated with the design storm (e.g., one (1) foot above the peak 100-year water surface elevation for a low hazard dam with an emergency spillway);
 - b. The top width of the embankment must be at least 25 feet for structures with a storage volume greater than one (1) acre-foot. For structures capable of impounding no more than one (1) acre foot, the minimum top width must be 15 feet. The storage volume criteria indicated above must include the volume of “free” water and any water within filter media (if any). Storage shall be computed to the low point on the dam crest (excluding the emergency spillway); and
 - c. In the plane of the cross section, ensure that a theoretical 3H:1V slope projected downward from the top edge of the embankment fill nearest the steep natural slope does not fall outside the ground surface at any point.
 - d. The embankment fill must be constructed in accordance with the Departments policies and regulations.
3. Where embankment fill is not proposed between the impoundment and the steep slope, ensure that the theoretical projection defined below does not fall outside the ground surface at any point (see Example 2):
 - a. The theoretical projection must project horizontally from a level at or above the minimum required elevation to ensure adequate freeboard associated with the design storm (e.g., one (1) foot above the peak 100-year water surface elevation for a low hazard dam with an emergency spillway);
 - b. The horizontal distance of the theoretical projection must be at least 25 feet for structures with a storage volume greater than one (1) acre-foot. For structures capable of impounding no more than one (1) acre foot, the minimum top width must be 15 feet. The storage volume criteria indicated above must include the volume of “free” water and any water within filter media (if any). Storage shall be computed to the low point on the dam crest (excluding the emergency spillway); and
 - c. In the plane of the cross section, ensure that a 3H:1V slope projected downward from the top edge of the theoretical projection nearest the steep natural slope does not fall outside the ground surface at any point.

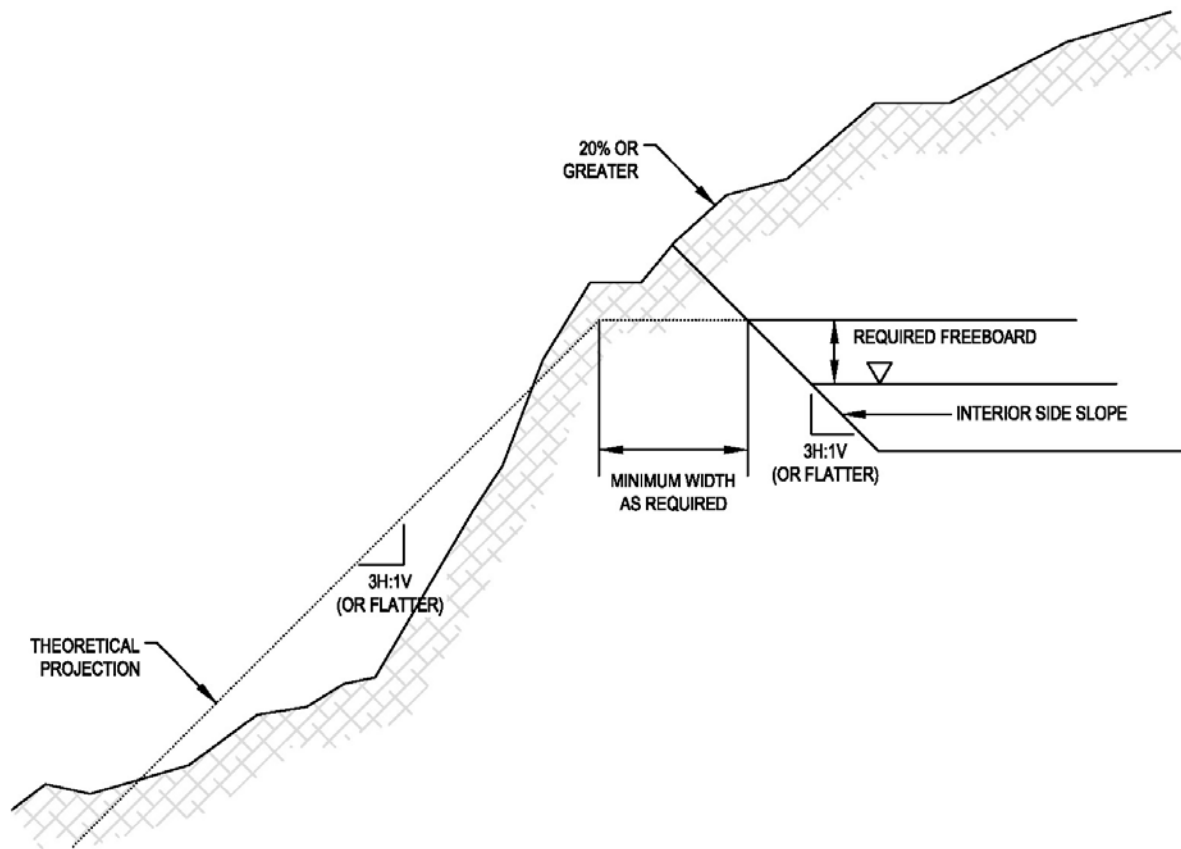
The figures provided below provide examples of designs that do and do not comply with these lateral bulk requirements.



Example 1: Impoundment constructed with cuts and fills. Acceptable.



Example 2: Projection completely within "cut". Acceptable.



Example 3: Projection breaks through slope face. Not acceptable.

Additional Information

Questions about this policy or other items relating to ponds and dams can be directed to the Chief of the Dam Safety Division at 410-537-3538.