DAM SAFETY

POLICY MEMORANDUM #14

TO: Dam Owners, Operators, and Engineers

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

DATE: December 21, 2022

SUBJECT: Cutoff Trenches

Policy Statement

It is the policy of the Maryland Department of the Environment (the Department) that the design of dam embankments consider potential failure modes and incorporate defensive design measures as appropriate. The Department has observed misinterpretations of the criteria for impervious cutoff trenches as written in the USDA, Natural Resource Conservation Service, Maryland Conservation Practice, Standard Pond Code 378, January 2000 (MD378). This policy seeks to clarify the expectations for the design of cutoff trenches for small 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

The primary purpose of the cutoff trench in an earthen embankment is to reduce the loss of impounded water and to prevent potentially destabilizing seepage through the embankment or foundation of the structure. To achieve this, the cutoff trench must be constructed with appropriate materials, designed with appropriate geometry, and intercepted by an impervious stratum to ensure the cutoff is complete.

Foundation Cutoff Geometry

In accordance with MD378, the cutoff trench shall:

- Be provided under the entire length of the dam. Stopping the cutoff trench where it intercepts the impervious core is generally not acceptable;

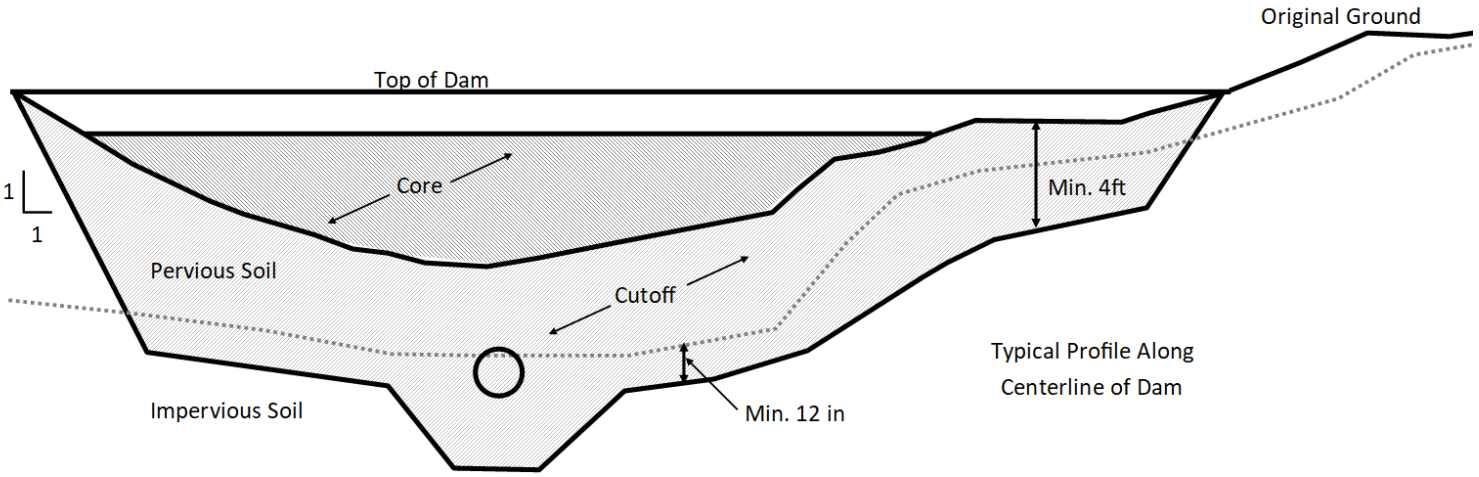
- Be located at or upstream from the centerline of the dam;

- Have a bottom width adequate to accommodate the equipment used for excavation, backfill and compaction operations, with the minimum width being 4 feet;

- Have side slopes no steeper than one horizontal to one vertical (1H:1V); and

- Shall have a minimum depth of 4 feet for soil foundations.
    - The impervious core should be designed to intercept a relatively impervious layer and extend into the impervious layer no less than 12 inches.
    - Where the impervious core does not intercept a relatively impervious layer seepage control must be included. Seepage may be controlled by (1) foundation, abutment or embankment drains; (2) reservoir blanketing; or (3) a combination of these measures. Drains must be located downstream of the dam centerline and outside the limits of the proposed cutoff trench.

The presence of a relatively impervious foundation stratum, or lack thereof, must be determined during the design phase by appropriate geotechnical investigations. Reasonable adjustments to the depth of the impervious cutoff trench may be made during construction by a licensed professional engineer, or their representative, based on natural variability of the subsurface conditions.



Relatively Impervious Material

The "relatively impervious material" prescribed for the cutoff trench and for the natural foundation material shall consist of soils classified in accordance with USCS Soil Types GC, SC, CH, or CL. The relatively impervious material must also meet the following criteria:

- The material must have a minimum of 30% passing the #200 sieve.
- The impervious material used as fill for the cutoff trench must have a maximum dry density not less than 105 pounds per cubic foot as determined by ASTM D698.

Where relatively intact weathered or fresh rock is encountered at the foundation level, the cutoff trench may terminate at the surface of the rock stratum provided it has been properly prepared.

Recommended Notation for Construction Plans

The following language is recommended for construction plan notes:

Provide impervious core and cutoff trench meeting USCS GC, SC, CH, or CL with a minimum of 30% passing No. 200 sieve. Depth and suitability of impervious cutoff trench shall be determined in the field by a Geotechnical Engineer. Cutoff must extend a minimum of 12 inches into impervious foundation material.

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.