

Modeling and Mapping Non-Accredited Levees: Overtopping Procedure

The Federal Emergency Management Agency (FEMA) has developed a new set of procedures for analyzing and mapping flood hazard on the landward side of nonaccredited levees on Flood Insurance Rate Maps (FIRMs). Non-accredited levee systems are those that do not meet all the requirements outlined in Title 44 of the Code of Federal Regulations (CFR), Section 65.10.

This fact sheet summarizes the *Overtopping* procedure. The *Overtopping* procedure can be used for levee systems, or portions of a levee system, where the crest of the levee is below the 1-percent-annual-chance flood elevation. In addition, information must be submitted that demonstrates that the levee would remain in place during the overtopping event. This procedure was developed to account for levees with crests below the Base Flood Elevation (BFE) that may still provide a measure of flood hazard reduction. The *Overtopping* procedure can be applied to one or more reaches in the levee system or the entire system.

When to Use the Overtopping Procedure

Figure 1 illustrates a levee reach with the top of the levee below the BFE. To use the *Overtopping* procedure, the levee reach should be structurally sound and able to withstand an overtopping event. Specifically, the design must be able to sustain the overtopping flows.

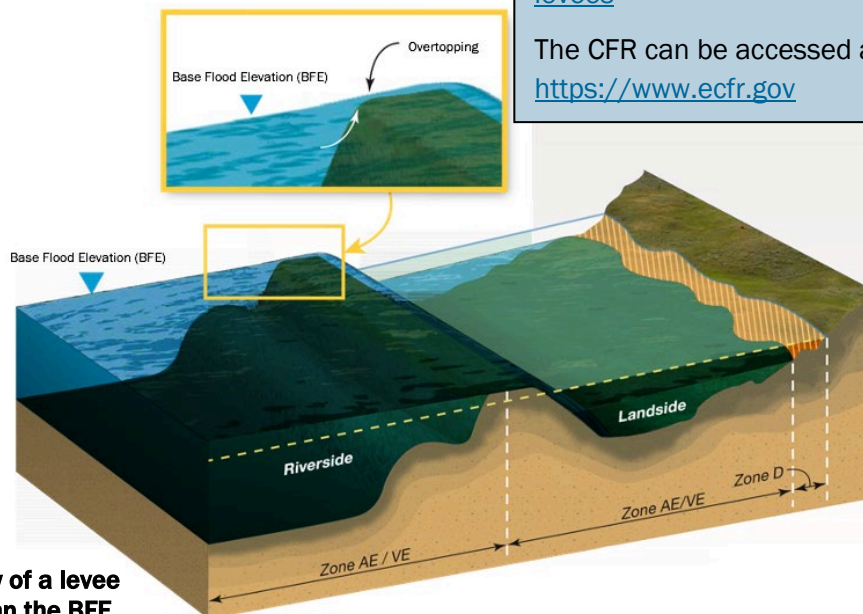


Figure 1. Cross-section view of a levee reach with a crest lower than the BFE

Updated Levee Analysis and Mapping Methodologies

FEMA has developed procedures for analyzing and mapping hazards associated with non-accredited levees shown on FIRMs. An overview is provided in Fact Sheets titled:

1. Dividing Levee Systems into Multiple Reaches
2. Natural Valley Procedure
3. Sound Reach Procedure
4. Freeboard Deficient Procedure
5. Overtopping Procedure
6. Structural-Based Inundation Procedure
7. Understanding the Zone D Designation

For more information, please visit:

<https://www.fema.gov/flood-maps/living-levees>

The CFR can be accessed at:

<https://www.ecfr.gov>



FEMA

Minimum Levee Documentation Requirements

When using the *Overtopping* procedure, levee documentation submitted to FEMA must denote the length of the levee system that is structurally sound and will not fail when overtopped during a 1-percent-annual-chance flood event. Documentation should identify where the top of the levee is below the BFE and demonstrate that the levee system was designed, built, and is maintained to allow overtopping without failing. Submittals must include operations and maintenance information.

A community or levee owner must also provide the following data to allow analysis of the levee reach using the *Overtopping* procedure:

- Survey or as-built data (record drawings) for the levee
- Certified documents showing that the levee reach can withstand overtopping
- Operations and Maintenance Plan
- Inspection Reports

FEMA will review levee documentation received (or currently on file) and perform a completeness check.

Overtopping Analysis and Mapping Procedure

FEMA will map all non-accredited levee systems using the *Natural Valley* procedure (Fact Sheet 2) to establish Zone D flood hazard areas boundaries. The *Overtopping* procedure determines:

- Elevation and location where the levee is overtopped during the 1-percent-annual-chance flood event
- Length of time that overtopping occurs
- The average flow rate overtopping the levee

Figure 2 shows how the flood zones for a portion in a non-accredited levee system may be mapped when analyzed using the *Overtopping* procedure. The results of the reach analysis are combined in Figure 2 with the Zone D designations determined using the *Natural Valley* procedure.

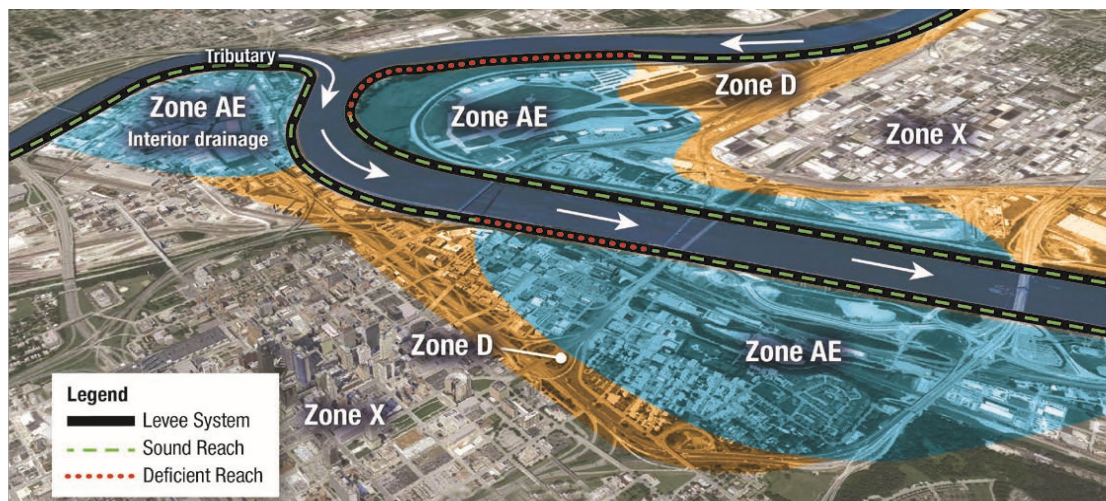


Figure 2. A levee reach mapped using the Overtopping procedure

Documentation should include a statement that no appreciable erosion is expected during overtopping by the 1-percent-annual-chance flood event. **If any erosion is expected during the event, it cannot lead to structural failure of the levee system.**

Riverine Levee Reaches

Should be designed, constructed, operated, and maintained to resist overtopping effects during BFE event.

Coastal Levee Reaches

Should be designed, constructed, operated, and maintained to resist coastal waves, periodic wave splash, storm surge, and other consideration.