

Structural-Based Inundation Procedure Modeling and Mapping Non-Accredited Levees

LEVEE ANALYSIS AND MAPPING PROCEDURES OVERVIEW

The Federal Emergency Management Agency's (FEMA) responsibilities include educating and helping a community understand their flood risk. One of the ways FEMA does this is by creating maps to help communities understand their flood risk and define this as high, moderate, or low risk of flooding. When FEMA conducts a flood mapping project and a non-accredited levee system is involved, there are specific considerations to take into account.

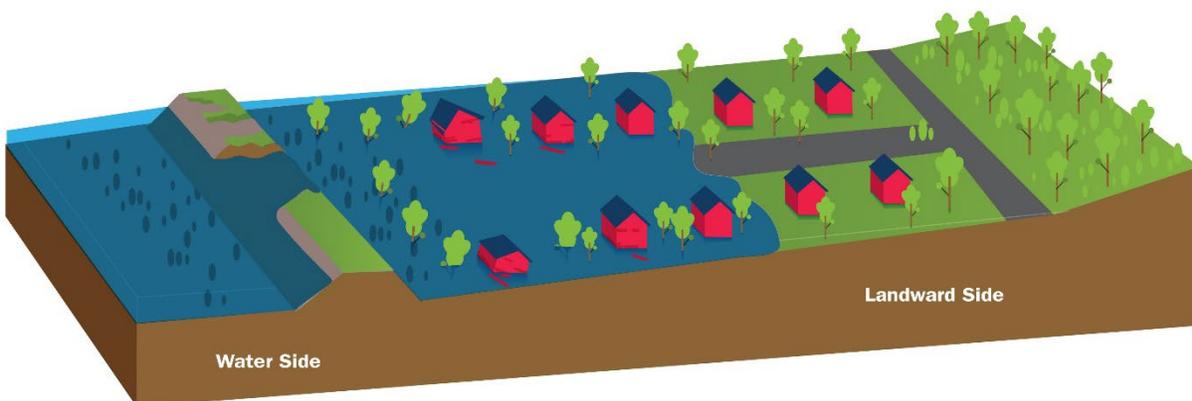
FEMA created a set of procedures for non-accredited levees to more accurately analyze and depict the flood hazard in an area impacted by a levee system. These procedures, known as the "levee analysis and mapping procedures," offer five different ways to analyze a levee reach (or section of levee). By applying one of these procedures, the community can more accurately understand their risk and take steps to reduce that risk. The Code of Federal Regulations (CFR) Section 65.10, is the procedure guidance followed and will be referenced throughout this document.

PROCEDURE OVERVIEW

One such procedure, called **Structural-Based Inundation**, applies to levee reaches that do not meet the structural standards outlined by 65.10, but may still provide a measure of flood risk reduction.

This procedure can be used when the levee reach's structural integrity is diminished or unknown. Essentially, the volume or pressure from the water could cause the levee reach to collapse, forming a breach that allows the water to flow through the damaged section and into the impacted area. This could also result in water seeping under the levee from piping or leakage, causing a piping type failure and breach.

In the simplest terms, Structural-Based Inundation is used for levee reaches where structural issues exist and the levee could be breached, overtopped, or destroyed.



This image shows that the levee has breached. There includes a gap in the middle that has deteriorated, in addition to other deterioration on the top left of the levee reach.

RESULTING ZONE DESIGNATION

When the **Structural-Based Inundation** procedure is used, the flood hazard area will usually be designated as Zone A or AE, a “Special Flood Hazard Area” or SFHA. The Zone A/AE designation carries a mandatory flood insurance requirement for structures with mortgages from federally regulated or insured lenders. These zone designations determined in each reach may be impacted by flooding from adjacent or other reaches, and also localized interior drainage flooding.

Given the mandatory insurance requirement, there are several options to help keep insurance costs low:

- **Newly Mapped Procedure:** This cost-saving rating option helps reduce the financial impact of a map change for properties newly mapped as high-hazard.
- **Grandfathering:** This rating option may provide a lower cost by locking in the insurance rate associated with the current moderate- or low-risk to flood zone or Base Flood Elevation (BFE) when the policy renews in the future. The easiest way to take advantage of grandfathering is to buy a policy before the new flood maps take effect.
- **Community Rating System (CRS) credits:** This program recognizes communities for their additional efforts beyond the minimum standards to reduce flood damage to insurable property. Under the CRS, communities that choose to participate may reduce the flood insurance premium rates for property owners in the community by taking these additional actions.

To purchase flood insurance, individuals need to contact their insurance agent. Property owners with questions about flood insurance can call the National Flood Insurance Program, toll free, at 1-888-FLOOD29 (356-6329) or visit floodsmart.gov. See the [Levees and Flood Insurance Fact Sheet](#) for more information.

OTHER CONSIDERATIONS

The **Structural-Based Inundation** procedure does not require the same documentation from levee owners or communities as some of the other procedures. For communities with limited resources and data, this could be a reasonable path forward. However, information from the levee owners and communities on past events and levee failures will provide important information related to using this procedure.

Since Zone A/AE is a high-hazard area/designation, property owners are encouraged to take proactive steps to reduce their risk, especially when it comes to floodplain management, building codes and zoning. See the [Levee Risk and Mitigation Fact Sheet](#) for more information.

Factors Affecting Structural Integrity

The structural integrity of a levee system can be impacted in a variety of ways.

The following types of issues can affect structural integrity:

- Encroachments into the embankment structure, such as vegetation (trees, brush, etc.), animal burrows, and construction of structures (buildings, boat ramps, docks, etc.)
- Erosion and overtopping
- Piping and sand boils during times of high water

Structural-Based Inundation Procedure Documentation

Levee documentation for this reach submitted to FEMA may include, but not be limited to:

- Elevation information for the top of the levee.
- Operations and Maintenance Plan information.
- Structural design information.
- Inspection Reports.

FEMA will use the documentation received to assist in applying this procedure.

An “interior drainage” analysis must be conducted for all levee systems. Interior drainage represents all water runoff, seepage (water going under the levee) and water collection on the landward side of the levee system. The analysis must identify and demonstrate the potential runoff paths from the impacted drainage area. Any areas of residual risk and interior drainage flooding that fall within these areas are mapped as an SFHA, regardless of whether the levee system is accredited or not. This is a critical analysis because it shows that risk can still exist, even if the levee meets certain 65.10 requirements.

***For more information on other procedures for analyzing and mapping hazards associated with non-accredited levees, visit:
<https://www.fema.gov/media-library/assets/documents/33587>.***

The Code of Federal Regulations can be accessed at: <https://www.govinfo.gov/help/cfr>