Floodplain Administrator Report

Introduction

The BCA evaluates the avoided damages to structures after elevation. The project analyzed 13 properties in the City of El Lago in Harris County Texas and compares the avoided damages to the estimated cost to elevate these properties. We used FEMA's BCA Version 6.0 Flood Module and the Damage Frequency Assessment to calculate present value of future damages that are estimated to occur over the useful life of the project, in our case, 30 years (the **Benefits**). **Costs** were estimated based on data from similar projects in your area. The Benefit/Cost Ratio (BCR) must be equal to or greater than 1.0 to be eligible for FEMA funding.

Benefits

The estimated future damages are based on prior losses where the module estimates a frequency for each loss and predicts future losses based on those damages. In general, the more damaging and frequent events that a project has, the more benefits will be generated. If prior losses are not available or not significant, flood depth data contained in the Harris County Flood Insurance Study dated 2017 were used to predict future losses based on structural information obtained from the Harris County Central Appraisal District and data from the City and homeowners. The analysis generates a Depth Damage Curve that predicts how much damage each structure will experience based on the depth of flooding and the probability of each flood taking place.

Using the highest possible benefit value for each individual property, the total benefits were calculated to be $1,419,728.00.

Project Costs

We are implementing other home elevation projects in the area. The homes on this application are similar to the homes in our on-going programs. We used the cost per sqft data from these programs (based on Lift Height, Foundation Type, number of stories) to estimate the cost to elevate each home. The $/sqft ranged from $106.75/sqft to $120/sqft. This value was multiplied by the vertical footprint of the home to be lifted to determine cost to elevate each property.

In addition to the costs to elevate the structures, the following costs were added to each structure:

Temporary Housing (13@ $8,100)	$105,300.00
Project Management (13@ $5,500)	$71,500.00
Potential ADA Lifts (13 @ $12,500)	$162,500.00
Elevation of 13 Homes	$3,873,007.00

For this project, the damages that would be avoided by elevating the homes are less than the cost to elevate the homes. With overall benefits ($1,419.728.00) coming in well under overall costs ($3,873,007.00), the program is not considered cost effective and therefore will not be funded by FEMA.

BCA background

BCA is the method by which the future benefits of a mitigation project are determined and compared to its costs. A BCA always involves looking at damages and losses twice: "Before vs. After" or "With vs. Without" to determine the project's impact. The end result is a Benefit-Cost Ratio, which is calculated by a project's total benefits divided by its total project costs. The BCR is a numerical expression of the "cost-effectiveness" of a project. A project is considered to be cost-effective when the BCR is 1.0 or greater.

This discussion looks at the two elements of the equation: the benefits and the costs.

First let's look at the benefits. Benefits are any future costs that can be avoided as a result of completing a mitigation project. That's why mitigation benefits are often called "losses avoided." Benefits can include:

- Reducing physical damages
- Avoiding loss of function
- Preventing casualties, and
- Reducing emergency management costs

Now let's talk about the other element of the equation: project costs. As with benefits, all project costs must be calculated to determine the total cost for your project. Here's what to consider:

- Cost estimates must be accurate because when your application is approved; those estimates become the basis for the amount of the grant. In addition, the costs must be realistic. Otherwise, you may find yourself with unfinished tasks and little of the grant remaining to complete them.
- Make sure you have a well-developed Scope of Work. The Scope of Work is the blueprint for calculating all project costs and ensures a complete and accurate total cost.
- Also, don't overlook additional costs. For example, when buying homes in a flood-prone area, the price of the house may not be its total cost. There may be a property appraisal, legal fees, a title search, closing costs, and demolition and restoration.

We've covered the main elements of the BCR equation: Benefits and Costs. Remember: divide Benefits by Costs to get the Benefit-Cost Ratio. If the result is one or greater, the project is cost-effective.

The Flood Module was once called the "Full Data Flood Module" because it analyses risk entirely on numbers, regardless of past flood damage history. The Flood Module calculates a flood depth, which is calculated based on the still water elevations for the 10-, 50, 100-, and 500-year events and subtracts the Lowest Floor Elevation (LFE) of the structure. For this reason, locations outside of a coastal floodprone area (e.g., stormwater flooding) with no floodplain map, Flood Insurance Study, or other flood data will likely not have the data necessary to use the Flood Module.

With the flood depth known, physical damage to the building, contents, and displacement costs can be calculated using a depth damage function (DDF), which the user selects according to the structure type (e.g., one story without basement, two or more stories with basement, etc.). Since the height of the four still water elevations is also a recurrence interval (for example, a 100-year flood is the same as saying 1% annual chance flood), the probability of the flood elevations is also factored.

Information about the structure(s) being mitigated is also important because the inputs help inform the dollar amount of damage. The inputs include, the size of the building, replacement value, building type. Damages may be assessed for residential or non-residential structures, but the inputs and the methodology for calculating damages is slightly different.

The Damage Frequency Assessment (DFA) Module calculates benefits based on the frequency and severity of the damages of the hazard event(s) that the project seeks to mitigate. In general, the more frequent and more damaging events that the project mitigates will return more benefits. The DFA Module is appropriate for use in the following circumstances:

- When there is a lack of data to use the hazard-specific module. For example, flood mitigation projects for which the Flood Module cannot be used because of missing flood data (e.g., flood elevations, first floor elevation, streambed elevation).
- When the mitigation activity is for a non-building, such as a road, bridge, or utility.
- Project benefits come from mitigating the loss of function of critical facilities like a hospital, police station, or fire station.

The DFA Module assesses the amount of damage and how frequently damage occurs to determine an annualized damage value, which is then projected forward over the project useful life if the project is not completed (damages before mitigation). Then the user provides the project effectiveness information in the Damages After Mitigation section to show how well the completed project is expected to reduce the damage.

The damage-frequency relationship can be based on Historical Damages and Professional Expected Damages. Historical Damages looks at damages from past events and may or may not include recurrence intervals. Professional Expected Damages looks at events that are likely to happen in the future and assesses estimated losses for recurrence intervals. This is a more advanced technique, which is why professionals like engineers and architects are required to offer their expert opinion as documentation for event frequencies and loss amounts.