FEMA'S BENEFIT COST-ANALYSIS TOOL FOR LANDSLIDE MITIGATION AND SLOPE STABILIZATION PROJECTS

General Guidance

The purpose of this document is to provide potential subapplicants with general guidance on FEMA's Hazard Mitigation Assistance (HMA) benefit-cost analysis (BCA) tool. The BCA is a required subapplication component. This guidance is not intended to provide complete information, but rather to outline basic requirements and considerations as subapplicants begin the analysis process. Cal OES is available to answer technical questions about BCAs and can be contacted by e-mailing HMA@caloes.ca.gov.

Landslide Mitigation and Slope Stabilization Projects Benefit-Cost Analysis

Landslide mitigation and slope stabilization projects are designed to protect infrastructure such as roads, bridges, utilities, and buildings with significant risks from landslides by stabilizing slopes with a history of landslides or slopes that have been identified as having a high probability of future landsides.

BCA Software and Methodology

FEMA requires the use of its BCA software (version 6 for all BCAs). Subapplicants can get the software by visiting FEMA's Benefit-Cost Analysis Guidance and Tools website: https://www.fema.gov/media-library/assets/documents/179903.

The Version 6.0 BCA software includes "Landslides" as one of the hazards that can be selected. Caveat: the 6.0 BCA software does not include any modelled damages for landslide data because there is no national database detailed evaluation of every location subject to landslides. Thus, all of the data inputs for landslides must be entered by the analyst based on historical damages or expected damages and fully documented, using the frequency-damage methodology in the FEMA software. In both cases, it is necessary to establish at least two points with known relationships between event frequencies and historic of projected damages. A BCA for a landslide or slope failure project requires a robust technical understanding of landslide risks. Consultation with an engineering geologist and/or a geotechnical engineer with experience in

evaluating landslide is essential. Sites must be evaluated on a case-by-case basis.

Data used in the Analysis

The following data are necessary to support a landslide BCA (this is not intended as a comprehensive list):

1. Project location (latitude-longitude)
2. Project scope and description.
3. Project useful life. None of the FEMA standard values in

   the 2009 FEMA BCA Reference Guide are directly relevant for landslide projects. The useful life will vary depending on the type of mitigation completed. The engineering geologist or geotechnical engineer may be able to make reasonable estimates.
4. Project cost and annual maintenance cost.
5. Probabilities of landslides or slope failures. These can be based on either historic landslides or slope failures at the same site (or one in immediate proximity, if an engineer validates that it is a reasonable analog), or on site-specific assessments by a qualified engineer or geologist. FEMA prefers that at least two probability-damage pairs are the basis of BCAs.
6. Historic or estimated damages and losses of function related to landslides or slope failures.

Benefits

There is a range of potential benefits of landslide and slope failure mitigation projects, including direct physical damage, interrupted function (roads, bridges, utilities, etc.) and potentially deaths and injuries. It is difficult to determine this accurately for landslide and slope failure hazards, so they often must be estimated by subject matter experts. The basis of any such estimates must be fully explained and (to the extent possible) documented.

Documentation

Cal OES and FEMA require subapplicants to provide documentation for all data that is used in a BCA. This must be included with the materials that are submitted as part of the application package.

Best Practices

Cal OES strongly recommends that each subapplicant BCA be supplemented by a brief technical report that summarizes the approach to the analysis, the data that was used, the sources of the data, and the results of the analysis.

Subapplicants should provide electronic copies of any data sources that are used in a BCA, including tsunami inundation maps, copies of preliminary project designs, geotechnical studies if available, maps showing the collection areas for the tower and GIS data for populations within various distances from the proposed tower location.

Ideally, every data point entered into the software will be explained in a technical report and backed up with written documentation.