Benefit-Cost Analysis (BCA) Data Documentation Template – Earthquake Non-Structural

FEMA reviews Benefit-Cost Analyses (BCAs) for all proposed mitigation projects submitted under the FEMA grant programs to determine whether the information provided in the application is:

1. Credible and well-documented
2. Prepared in accordance with accepted FEMA BCA practices
3. Able to demonstrate that the project is cost-effective

The following template can be used to assist in the collection and entering of information to meet these requirements within the BCA Tool. One way to use this tool is to highlight or circle the source and use the last column to record the software input and justification for values that vary from the FEMA standard value (default).

Obtained	Input	Documentation Summary	Potential Sources	Software Input/ Justification
☐	Name, Address, County, and Latitude/Longitude for Each Project Structure	Include contact information and whether building is historic. Include latitude/longitude location for proper earthquake hazard data lookup.	Documents available from homeowner, local building inspector, local tax assessor's office, licensed surveyor, or title documents.	
☐	Project Information	Project Information includes: • Project Number • Analyst Name and Contact Information • Grant Program • Project Point of Contact (POC)	Information available from the project manager or POC.	
☐	Scope of Work (SOW)	Should include: • Problem Description and Proposed Solution • Description of Existing Condition • Work Schedule	The SOW is available from the project manager. BCA Cost Estimation module will walk user through costs that are	

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		• Cost Estimate • Engineering schematics, detailed engineering drawings, or engineering designs	valid for each project type.	
☐	Earthquake Mitigation Project Type	Refer to your project SOW to determine the type of mitigation project. Project types include structural retrofit of a building, anchor/brace non-structural elements of a building, or other.	The project manager or engineer can provide the SOW. Engineering designs can also be a source of this information.	
☐	Cost Estimate	All anticipated project costs should be detailed, including maintenance costs over the useful life of the project. Avoid the use of lump-sum costs. Cost estimate should include: • The source of the estimate and documentation supporting each source • The base year of all cost estimates and any deviations due to the anticipated date of construction • Anticipated environmental resource remediation or historic property treatment measures • Other related construction/demolition/relocation costs, such as survey permitting, site preparation, and material disposal • Other acquisition costs, such as appraisals, legal recordation,	Provide contractor or Standard Cost Estimating software estimates. Source should be government representative or professional with relevant expertise.	

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		displacement costs for renters, and maintenance		
☐	Base Year of Costs	The year in which the mitigation project's cost was estimated. If cost estimates are several years old, they may need to be adjusted by the user to account for inflation in costs between the base year and the present. If cost figures are adjusted provide a description of methodology utilized.	Information available from subapplicant. Analyst can escalate costs in the cost estimating portion of the BCA Tool.	
☐	Project Useful Life (PUL)	The estimated amount of time (in years) that the mitigation action will be effective. The PUL is based on the type of mitigation.	Sources include the PUL table provided in the BCA Tool dynamic help, which provides the FEMA Standard Values. If the FEMA standard values are not used, additional documentation is required from the project manager or the project engineer to justify the PUL.	
☐	Soil Type	Select from drop-down menu of soil types. Selection ranges from soil type A to soil type F. Provide documentation such as soil type data from engineering design documents and engineering geology (geotechnical) reports.	Documentation is available from the project engineer or geotechnical engineers.	
☐	Ground Motion Values	Measures associated with the probability and severity of earthquakes at the site. FEMA ground motion values are based on the correct entry of the latitude/longitude	Hazard data is available from the U.S. Geological Survey (USGS).	

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		location of the structure.		
☐	Non-Structural Element for Mitigation	Choose the non-structural element proposed for mitigation: ceilings (suspended or dropped), electrical cabinets, elevators, fire sprinklers, generators, generic contents and equipment, HVAC ductwork, HVAC fans on isolators, parapet walls and chimneys, and racks and shelves. If applicable, Indicate how the non-structural element is weighted, supported, or anchored before and after mitigation.	Documentation is available from a civil or structural engineer, local building inspector, contractor, builder or construction company, architect or building engineer, or planner.	
☐	Damage State Information	Percent damage associated with a particular damage state (i.e., moderate and extensive) If FEMA default values are not used, provide detailed descriptions of how the value was determined.	Obtain damage state percentages differing from FEMA default values from credible sources such as civil or structural engineers and building officials familiar with damage to non-structural elements in earthquakes.	
☐	Additional Days of Functional Downtime	If FEMA default values are not used, provide detailed descriptions of the means by which the downtime value was assessed. The appropriate functional downtime for non-structural projects is only the additional functional downtime cause by failure of the non-structural items. In most cases, this downtime will be a small number because the non-structural items can be repaired or replaced while	Obtain functional downtime estimates differing from FEMA default values from credible sources such as civil or structural engineers and building officials familiar with loss of function of facilities caused by damage to non-structural elements in earthquakes.	

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		other repairs are being made.		
☐	Item Replacement Value	Replacement cost for non-structural items that is used to estimate physical damage. Expressed in terms of a unit price (i.e., $/foot, $/each) and the number of units (i.e., linear feet, area)	Documentation is available from a civil or structural engineer, local building officials, contractors, suppliers, architect or building engineer, or planner.	
☐	Fall Impact Area	Expressed in square feet. This is the area upon which a non-structural element may fall as a result of an earthquake. It is used in conjunction with the total building area and occupancy data to estimate casualties.	Documentation is available from a civil or structural engineer, local building inspector, contractor, builder or construction company, architect or building engineer, or planner.	
☐	Total Building Area	Expressed in square feet. This includes the total heated, enclosed area in the building. Used in conjunction with occupancy data.	Documents available from local tax office, appraiser's office, surveyor, or documents showing building footprint.	
☐	Occupancy Data	The total building occupancy is the number of persons (residents, employees, and visitors) present in the building during the day, evening, and night for weekdays and weekends.	Documentation is available from the building owner or manager or can be based on employment or attendance records	
☐	Casualty Rates	Number of minor injuries, major injuries, and deaths per 1,000 occupants. If FEMA default values are not used, provide detailed descriptions of casualty rates and the means by which these values were derived.	Obtain casualty rates differing from FEMA default values from credible sources such as civil or structural engineers and building officials familiar with casualties resulting from damage to non-structural elements in earthquakes.	
☐	Secondary Damages Before and After	Secondary damages are quantified damages that must be associated with a	Documentation must be from a credible source that considers the	

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	Mitigation	seismic intensity level Secondary damages may include additional damages resulting from non-structural element failure, such as fire damage and hazardous material spills.	probability that secondary damage will occur as a result of a non-structural element failure. For example, a shelf supporting chemical containers may fall and cause a chemical spill. Another example is damage to an electrical cabinet that causes a fire. Sources may Include documented historic damage and engineering analyses.	
☐	Facility Type – Loss of Services	Choose one or more facility types for loss of service: fire station, hospital, police station, or other. Provide photocopies of tax records, hard copy or electronic photos, appraisals, or maps. Loss of Services facility types include: fire station, hospital, police station, and other. The fire station facility type includes fire fighting, search and rescue, public shelter, and Emergency Medical Services, if they are located in the same facility. The hospital facility type includes in-patient hospitals and emergency rooms. Other medical facilities, such as nursing homes, are included in the "other" facility type. Necessary documentation for Loss of Service Facility Type is determined by the	Data is available from assessor; owner; local tax, appraiser, or surveyor office; or title documents. Information regarding the number of people served by a facility (or by alternate hospitals) can be obtained from the municipality, facility operations managers, or documents such as annual reports. Information regarding the distance (in miles) between the facility and alternate facility can be obtained from facility operations managers or municipal officials. Local maps or GPS software can be used as documentation of the distance. Information regarding the number of police officers can be obtained	

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		Facility Type selected, however, it may include information to support the following data: • The number of people served by the facility • The type of area served by a fire station or a police station • The distance (in miles) between the facility type and alternate facility • The number of police officers working a particular facility • The number of police officers that would serve the area if a police station was shut down	from the municipality, facility operations managers, or documents such as annual reports. Information regarding the number of police officers that would serve the area if a police station were shut down can be obtained from municipal officials or facility operations managers who can provide the appropriate number on official letterhead. Many police stations have emergency plans that outline the number of critical staff needed to serve the area should a police station shut down.	
☐	"Other" Facility Type: Service Name	A structure may provide multiple services. For example, a municipal building may house a government agency and a library. You may enter additional rows and select all that apply from the drop-down menu. Government – Local, municipal, State, Federal, or Indian Tribal government agencies Library – Public information depository Education – Primary, secondary, college, university, or trade school, public or private Once the Service Type is selected, you	Information regarding the annual operating budget can be obtained from the agency providing the service or it can be obtained from an annual report. If an agency has multiple facilities, enter only the portion of the budget that pertains to the location of the proposed mitigation.	

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		must enter the annual operating budget of the agency providing the Service.		