

Benefit-Cost Analysis (BCA) Data Documentation Template – Earthquake 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
<input type="checkbox"/>	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.	
<input type="checkbox"/>	Project Information	Project Information includes: <ul style="list-style-type: none"> • Project Number • Analyst Name and Contact Information • Grant Program • Project Point of Contact (POC) 	Information available from the project manager or POC.	
<input type="checkbox"/>	Scope of Work (SOW)	Should include: <ul style="list-style-type: none"> • 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 valid for each project type.	

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		<ul style="list-style-type: none"> • Cost Estimate • Engineering schematics, detailed engineering drawings, or engineering designs 		
<input type="checkbox"/>	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.	
<input type="checkbox"/>	Cost Estimate	<p>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:</p> <ul style="list-style-type: none"> • 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 	Provide contractor or Standard Cost Estimating software estimates. Source should be government representative or professional with relevant expertise.	

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		<ul style="list-style-type: none"> Other acquisition costs, such as appraisals, legal recordation, displacement costs for renters, and maintenance 		
<input type="checkbox"/>	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.	
<input type="checkbox"/>	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.	
<input type="checkbox"/>	Facility Type	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.	Data is available from assessor; owner; local tax, appraiser, or surveyor office; or title documents.	
		Loss of Services facility types include: fire station, hospital, police station, and other. The fire station facility type	Information regarding the number of people served by a facility (or by alternate hospitals) can be obtained	

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		<p>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.</p> <p>Necessary documentation for Loss of Service Facility Type is determined by the Facility Type selected, however, it may include information to support the following data:</p> <ul style="list-style-type: none"> • 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 	<p>from the municipality, facility operations managers, or documents such as annual reports.</p> <p>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.</p> <p>Information regarding the number of police officers can be obtained from the municipality, facility operations managers, or documents such as annual reports.</p> <p>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.</p> <p>Many police stations have emergency plans that outline the number of critical staff needed to serve the area should a police station shut down.</p>	
<input type="checkbox"/>	“Other” Facility Type: Service Name	A structure may provide multiple services. For example, a municipal	Information regarding the annual operating budget can be obtained	

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		<p>building may house a government agency and a library. You may enter additional rows and select all that apply from the drop-down menu.</p> <p>Government – local, municipal, State, Federal, or Indian Tribal government agencies</p> <p>Library – Public information depository</p> <p>Education – Primary, secondary, college, university, or trade school, public or private</p> <p>Once the Service Type is selected, you must enter the annual operating budget of the agency providing the Service.</p>	<p>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.</p>	
<input type="checkbox"/>	Soil Type	<p>Select from drop-down menu of soil types. Selection ranges from soil type A to soil type F.</p> <p>Provide documentation such as soil type data from engineering design documents and engineering geology (geotechnical) reports.</p>	<p>Documentation is available from the project engineer or geotechnical engineers.</p>	
<input type="checkbox"/>	Ground Motion Values	<p>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 location of the structure.</p>	<p>Hazard data is available from the U.S. Geological Survey (USGS).</p>	
<input type="checkbox"/>	Total Building Area	<p>Expressed in square feet. This includes</p>	<p>Documents available from local tax</p>	

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		the total heated, enclosed area in the building. Used in conjunction with displacement costs.	office, appraiser's office, surveyor, or documents showing building footprint.	
<input type="checkbox"/>	Building Replacement Value (BRV)	Enter total cost to build a comparable structure. Acceptable forms of documentation include a letter from a construction company, contracting firm, or local building inspector; photocopies of pages from standard cost reference manuals; or tax records.	Sources can include a local building inspector, construction company, architect, building engineer, or standard cost estimating software. If tax records are used, the source must be an assessor.	
<input type="checkbox"/>	Number of Occupants	Average number of occupants on 24/7/365 basis. Can be based on employment or attendance records.	Documentation is available from the building owner or manager.	
<input type="checkbox"/>	Building Use	Select the primary use of the building from the drop-down menu. Building use may be retail, bank, agricultural, parking, academia, residential dwelling, church, etc.	Information is available from owner, local building inspector, local tax assessor's office, or title documents.	
<input type="checkbox"/>	Percentage of BRV Allocated to Direct Physical Damage Categories	Percentage of BRV is listed by the three direct physical damage categories: <ul style="list-style-type: none"> • Structural Drift-Sensitive (STR) • Non-Structural Element Sensitive to Drift (NSD) • Non-Structural Elements Sensitive to Acceleration (NSA) No documentation is required if the FEMA standard value used. Values	Sources can include consultation with a real estate appraiser, economist, local building inspector, contractor, builder or construction company, architect or building engineer, or planner.	

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		other than FEMA standard values must be documented and the basis of the estimate must be clear.		
<input type="checkbox"/>	Displacement Costs	Costs of occupants displaced to temporary quarters while damage is repaired. Includes rent and other monthly costs, such as furniture rental and utilities, and one-time costs, such as moving and utility hook-up fees. Possible documentation if the default value is overwritten includes: copies of advertisements for local rentals in the community, records of phone contacts with rental agencies, and receipts from similar rentals.	Sources include local community advertisements, rental agencies, and similar rental receipts. Extra commuting costs and day care may be estimated as long as the estimation methodology is explained.	
<input type="checkbox"/>	Loss of Rent	Loss of rent is for rental properties <i>only</i> and does not include one-time costs.	Provide receipts for rent payments or owner's records as documentation.	
<input type="checkbox"/>	Loss of Business Income	Enter lost business income for non-public service facilities.	Provide financial statements from business owner.	
<input type="checkbox"/>	Model Building Type and Number of Stories	Select building type from drop-down menu.	Building type and number of stories should be based on design drawings prepared by architect or building engineer. They should be determined by a registered professional (civil or structural) engineer.	
<input type="checkbox"/>	Design Level	Design levels are descriptors used in	Design level should be based on	

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		<p>the Hazards U.S. Multi-Hazard (HAZUS-MH) risk assessment tool to classify the degree of seismic resistance of a structural system. Design levels include high code, moderate code, low code, or pre-code.</p>	<p>building design information prepared by a registered professional (civil or structural) engineer. Additional guidance is available in the documentation for the HAZUS-MH risk assessment tool.</p>	
<input type="checkbox"/>	Capacity Parameters	<p>Capacity parameters (i.e., design strength, elastic period, elastic damping, damage thresholds, etc.) are initially set based on the building type, number of stories, and the design level.</p> <p>Note: These initial capacity parameters will need to be modified based on the actual characteristics of the structure.</p>	<p>Capacity parameters, such as the design strength, elastic period, and elastic damping, should be modified based on the recommendation of a professional (civil or structural) engineer with seismic design experience.</p>	

