Data Documentation Template and Earthquake Checklist

Earthquake Data Analysis Methodology: Structural Retrofits of Buildings

This data documentation template is designed to assist Benefit-Cost (BC) analysts in recording the data and methodologies utilized in their Benefit-Cost Analysis (BCA). BC analysts should keep in mind that a well-documented BCA means that a knowledgeable BC analyst should be able to re-create the BCA from the supporting documentation provided (with a Mitigation application submitted for funding) without any additional explanation. BC analysts should provide an electronic or paper copy of the full BCA to compliment any template or summary submitted to FEMA for review. Check with your State Hazard Mitigation Officer or FEMA Regional office to find out if a completed Data Documentation Template (DDT) is required with your grant application.

This data documentation guidance and the Earthquake Full Data Module are intended for BCA of structural seismic mitigation projects for buildings. For non-structural seismic mitigation projects do <u>not </u>use the Full Data Module. Rather, use the Non-Structural Module and see the non-structural data documentation template.

Data Type	Value	Description	Documentation	Source
Discount Rate	**The OMB-mandated discount rate of 7% must be used for all BCAs.**	• The discount rate determines the time-value of money • In a FEMA benefit-cost analysis, a discount rate is used to calculate a value today (the Net Present Value) of future benefits so that they can be compared to the costs of a mitigation project.	• Electronic or paper copy of the BCA. • **The OMB-mandated discount rate of 7% must be used for all BCAs.**	• **The OMB-mandated discount rate of 7% must be used for all BCAs.**

Data Type	Value	Description	Documentation	Source
Building Type	Selection of one of the building construction types within the module	• Building structural type and number of stories above grade. • Major determinant of anticipated earthquake damage.	• Reference source utilized to determine classification of building type (Ex. engineer, building official).	• Engineer, local building official or person knowledgeable about structural building types
Building Floor Area	Expressed in square feet	• The total heated, enclosed area in the building. Used in conjunction with replacement value to determine potential damages in various wind events.	• Various forms are acceptable, including tax records, signed appraisals, surveys, and estimates from photographs. • Reference or provide a copy of source utilized.	• Local tax office, appraiser's office, surveyor, title and documents with building footprint. • Homeowner estimates or measured drawings accompanied by photographs.
Building Replacement Value (BRV)	Expressed as dollars per square foot	• The cost for labor and materials to build a similar building at the same location. • A key determinant of the amount of damage.	• Letter from local building department or residential builder. • Or, photocopied pages from standard residential cost reference manual for the specific type of building.	• Local building inspector, contractor, builder or construction company, architect or building engineer. • Standard references such as: Marshall & Swift Residential Cost Handbook, RS Means, Means Square Foot Cost Guide, www.buildingcost.com, etc.
Building Damage that would Result in Demolition	Percentage of building replacement value	• FEMA standard value is 50%. • Low cost or poorly maintained buildings may have lower thresholds; buildings of historical or cultural significance may have higher thresholds.	• No documentation required if standard value used. • Provide documentation and the basis of the estimate for values other than 50%.	• Values other than 50% should include consultation with real estate appraiser, economist, local building inspector, contractor, builder or construction company, architect or building engineer, planners, etc.

Data Type	Value	Description	Documentation	Source
Contents Value	Expressed as dollars	• The cost to replace the contents of a building. • Content damages include items such as furniture, office equipment, personal belongings, and non-permanent room dividers. • Contents do not include items that are permanent parts of the building such as electrical and plumbing systems. • FEMA standard value for residential buildings is 30% of the replacement value of the building or $20,000, whichever is greater.	• 30% value for residential buildings: no documentation required. • For other values for residential buildings and for non-residential buildings, provide detailed descriptions of contents, value and the means by which value was assessed.	• No source required if a residential building and FEMA standard is used. • Otherwise, review insurance records, signed appraisals, purchase receipts, estimates based on current market prices for similar contents.
Displacement Costs	Expressed as dollars per square foot per month, and one time and monthly costs.	• The costs borne by occupants during the time when a building is damaged and they are unable to occupy it. • Costs may include rent for alternative living spaces, rent for storage space, additional commuting time, additional day care, unpaid time off work, rental trucks, etc. • All these may be estimated when supported by credible documentation and sources.	• Alternative living space documented by copies of rental costs from realtors, leasing agents or newspapers, among others. • Rental for storage spaces may be supported by copies of advertising, records of contacts with rental companies. • Increased commuting and day care costs may be estimated as long as the estimation methodology is explained.	• Photocopies of ads for rental spaces in the community, records of phone contacts with rental agencies, receipts from similar rentals. • For residential properties, standard displacement costs are $1.00 per square foot per month. Standard other monthly costs and one-time costs are $500 each. • Use standard figures where possible [i.e. dollar amount per mile for additional commute].

Data Type	Value	Description	Documentation	Source
Occupancy	Number of occupants	• Average (not peak) occupancy on 24/7/365 basis	• Provide description of estimates methodology used (to establish number of employees and visitors at different times of days and days of week).	• Building owner or manager
Dollar Value for Minor/Major Injuries	**2006** Dollars (present year value per person) Major injury = $18,085 Minor injury = $1,808	• Average of the estimated values for the treatment of major and minor injuries per person. • Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value. • 2001 Casualty = $2,710,000	• If standard values in FEMA software are used then provide print out of software. • Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value.	• FEMA "What is a Benefit?" guidance, Section 2.3.
Dollar Value of a Casualty	**2006** Dollars (present year value per person) Casualty = $3,141,633	• Estimated value of the loss of one person. • Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value. • 2001 Major injury = $15,600 • 2001 Minor injury = $1,560	• If standard values in FEMA software are used then provide print out of software. • Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value.	• FEMA "What is a Benefit?" guidance, Section 2.3.
Value of Loss of Service	Dollar value of loss of public services	• For public services, daily value of service is estimated by the daily cost of providing service.	• Provide copy or reference the annual operating budget for public facility. • For critical facilities, see What is a Benefit? guidance.	• Agency providing service (annual operating budget for public facility).

Data Type	Value	Description	Documentation	Source
Continuity Premium	Multiplier on ordinary value of service	• Applies only to services critical to immediate disaster response and recovery (police, fire, and emergency responders).	• No documentation required if FEMA standard values are used. • Exception to standard values requires detailed explanation of source used and method applied.	• See "What is a Benefit?" guidance for standard values. • Developing non-standard values may involve working with the organization or agency providing service.
Loss of Business Income	Net (not gross) business income	• For commercial facilities, loss of net business income is the measure of loss of function when damage results in closure of the facility.	• No documentation required if FEMA standard values are used. • If estimated, include a description of how derived.	• The FEMA HAZUS earthquake loss estimation software has standard values for many types of business that are applicable to all hazards.
Mitigation Project Useful Lifetime	Years	• Estimated amount of time that mitigation action will be effective. • Includes any maintenance activities that will be done to maintain and prolong effectiveness.	• Reference FEMA standard value if used • If FEMA standard value is not used then include a justification of the value entered. • May also attach a letter, e-mail, etc. from credible agency documenting this estimate (if resource other than FEMA standard value).	• FEMA BCA Guidance. • BCA Checklist. • Government representative or private professional with expertise relevant to the proposed project.

Data Type	Value	Description	Documentation	Source
Mitigation Project Cost (includes data inputs for net mitigation project cost and additional annual maintenance cost ($/yr) for a project)	Total dollar value	• Estimated total cost of the proposed mitigation action **(not just the Federal share)** and any maintenance activities that will be done to maintain and prolong effectiveness.	• Narrative summary in the BCA module should state that this value comes from a potential or submitted project application. • Sub-applicant should provide a detailed cost breakdown, rather than a lump sum value, from an engineering cost estimate. • Must document source and reasoning in estimate of maintenance activity cost.	• Government representative or private professional with expertise relevant to the proposed project. • For maintenance values, consult Government representative or private professional with expertise relevant to the proposed project.
Seismic Hazard Data		• Measures of the probability and severity of earthquakes at the site.	• If default values in FEMA software are used then provide print out of software. • If user-entered values are used provide full documentation of reasons for differences from FEMA default values.	• FEMA default values in software or • United States Geological Survey -USGS • http://earthquake.usgs.gov/research/hazmaps/ • seismic hazard reports, • State hazard reports • Geotechnical reports, etc. • **These values need to be adjusted depending on the site soil type.**

Data Type	Value	Description	Documentation	Source
Soil Type	Soil classification used in building codes, and important factor in seismic hazard level at project site.	• There are two common classification systems, S0, S1, S2, S3 and S4 in the old Uniform Building Code and a newer system with A, B, C, D, E F for soils varying from rock to very soft soils, used in the International Building Code.	• Provide copies or reference source soil type map used. (local engineering studies, county or state).	• Geotechnical engineers, State geological surveys. • USDA – Natural Resources Conservation Service • http://soils.usda.gov/survey/online_surveys/ •
Building Seismic Damage Function	Percent damage of building replacement value for each level of ground motion. (for consistency with next column, If indeed they do mean the same thing.)	• Estimate of building damages for each level of ground motion • Use software wizard in the module for Seismic Hazard Damage Functions. • If user-entered values are used, provide full documentation of reasons for differences from FEMA default values. Follow calculation procedures in Earthquake Data Derivation Chapter Estimate.	• For structural retrofit of bridges or utility systems, damage functions must be generated by structural engineer	• FEMA default values in software or • Earthquake Data Derivation Chapter in the Mitigation BCA Toolkit CD. • Or use building (facility) specific seismic damage function generated by a structural engineer

Data Type	Value	Description	Documentation	Source
Content Seismic Damage Function	Percent damage of building content value for each level of ground motion.	• Estimate of building damages for each level of ground motion • Use software wizard in the module for Seismic Hazard Damage Functions. • If user-entered values are used, provide full documentation of reasons for differences from FEMA default values. Follow calculation procedures in Earthquake Data Derivation Chapter Estimate.	• No documentation required if FEMA standard values are used for residential and other ordinary buildings use standard values.	• FEMA default values in software or • Earthquake Data Derivation Chapter in the Mitigation BCA Toolkit CD.
Displacement Time	Days, increases with wind damage (building percent damage)	• The time period for which occupants are expected to be displaced to temporary quarters due to seismic damage. • If user-entered values are used, provide full documentation of reasons for differences from FEMA default values.	• No documentation required if FEMA standard values are used for residential and other ordinary buildings use standard values. • Provide data derivation method for techniques used.	• FEMA default values in software or • See "What is a Benefit?" guidance? for residential and critical facilities.
Functional Downtime	Days, increases with wind damage (building percent damage)	• The time period for which public or commercial services are lost from a building. • If user-entered values are used, provide full documentation of reasons for differences from FEMA default values.	• For ordinary buildings, default values in FEMA software. • For critical buildings, use "What is a Benefit?" guidance.	• Local source not required if FEMA default values are used. • Developing non-standard values may involve working with organization or agency providing service.

Appendix II
FEMA BCA Checklist

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For the entire BCA Checklist, refer to the BCA_Checklist.doc located on the BCA Mitigation Toolkit (BCA Mitigation Toolkit\4 – BCA TOOLS\CHECKLIST AND DATA DOCUMENTATION TEMPLATES).

3.7   Seismic Mitigation Project

3.7.1   A seismic structural engineer should be consulted for designing structural or non-structural seismic mitigation projects.

(c)   For FEMA statistical values for injuries and deaths, use the Inflation Calculator (located in the BCA Tools main folder) to inflate values from the 2001 values listed in Section 2.3 of the *FEMA "What is a Benefit?"* document ($2,710,000 for a death, $15,600 for major injury, and $1,560 for minor injury) to the current year. If the FEMA standard values are over-ridden, the application will need to include documentation on the source of the data and justification of why the data is more appropriate than the standard data. However, if the default values for injuries and deaths are only adjusted to the current year values, no documentation is required.