

## Data Documentation Template and Earthquake Checklist

### Earthquake Data Analysis Methodology: Non-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 template is intended for Non-Structural Seismic Retrofits, including anchoring/bracing of contents, equipment, racks and library shelves, and non-structural building elements such as parapet walls, chimneys, elevators, HVAC ductwork and equipment, fire sprinkler systems, ceilings, generators etc. For BCA of Non-Structural Mitigation Projects, the Non-Structural Module (not the Full Data Module) must be used.

For Non-Structural Mitigation projects it is always the value and seismic vulnerability (fragility) of only the specific elements being mitigated that are significant. The value and seismic vulnerability of the building as a whole does not enter into the analysis unless the building is so vulnerable to earthquake damage that undertaking non-structural mitigation measures does not make sense.

Data Type	Value	Description	Documentation	Source
<b>Discount Rate</b>	<b>The OMB-mandated discount rate of 7% must be used for all BCAs.</b>	<ul style="list-style-type: none"> <li>The discount rate determines the time-value of money</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Electronic or paper copy of the BCA.</li> <li><b>The OMB-mandated discount rate of 7% must be used for all BCAs.</b></li> </ul>	<ul style="list-style-type: none"> <li><b>The OMB-mandated discount rate of 7% must be used for all BCAs.</b></li> </ul>

Data Type	Value	Description	Documentation	Source
<b>Mitigation Project Useful Lifetime</b>	Years	<ul style="list-style-type: none"> <li>Estimated amount of time that mitigation action will be effective.</li> <li>Includes any maintenance activities that will be done to prolong effectiveness).</li> </ul>	<ul style="list-style-type: none"> <li>Reference FEMA standard value if used</li> <li>If FEMA standard value is not used then include a justification of the value entered.</li> <li>May also attach a letter, e-mail, etc. from credible agency documenting this estimate (if resource other than FEMA standard value).</li> </ul>	<ul style="list-style-type: none"> <li>FEMA BCA Guidance, Page 27.</li> <li>BCA Checklist, Page 14.</li> <li>Government representative or private professional with expertise relevant to the proposed project.</li> </ul>
<b>Mitigation Project Cost (includes data inputs for net mitigation project cost and additional annual maintenance cost (\$/yr) for a project)</b>	Total dollar value	<ul style="list-style-type: none"> <li>Estimated total cost of the proposed mitigation action <b>(not just the Federal share)</b> and any maintenance activities that will be done to prolong effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>Narrative summary in the BCA module should state that this value comes from a potential or submitted project application.</li> <li>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.</li> <li>Should support the value submitted with the project application.</li> </ul>	<ul style="list-style-type: none"> <li>Government representative or private professional with expertise relevant to the proposed project.</li> <li>For maintenance values, consult Government representative or private professional with expertise relevant to the proposed project.</li> </ul>
<b>Item Replacement Value</b>	Dollars	<ul style="list-style-type: none"> <li>The replacement value of the non-structural building elements or contents to be protected by the project.</li> </ul>	Provide description of how derived. This should include references or copies of all pertinent sources utilized.	<ul style="list-style-type: none"> <li>Local building department, builder, contractor, or architect.</li> </ul>

Data Type	Value	Description	Documentation	Source
<b>Seismic Hazard Data</b>		<ul style="list-style-type: none"> <li>Measures of the probability and severity of earthquakes at the site.</li> </ul>	<ul style="list-style-type: none"> <li>If default values in FEMA software are used then provide print out of software.</li> <li>If user-entered values are used provide full documentation of reasons for differences from FEMA default values.</li> </ul>	<ul style="list-style-type: none"> <li>FEMA default values in software or</li> <li>United States Geological Survey -USGS <a href="http://earthquake.usgs.gov/hazmaps/">http://earthquake.usgs.gov/hazmaps/</a></li> <li>seismic hazard reports,</li> <li>State hazard reports</li> <li>Geotechnical reports, etc.</li> <li><b>These values need to be adjusted depending on the site soil type.</b></li> </ul>
<b>Non-Structural Seismic Damage Function</b>	Percent damage for each level of ground shaking.	<ul style="list-style-type: none"> <li>Estimate of damages for each level of ground shaking.</li> <li>Use appropriate page of Non-Structural Module for type of project.</li> </ul>	<ul style="list-style-type: none"> <li>None required if standard values in Non-Structural Module are used.</li> <li>If estimated provide an explanation of source utilized and method applied.</li> </ul>	<ul style="list-style-type: none"> <li>Non-standard seismic damage functions generated by a structural engineer.</li> </ul>
<b>Secondary Damage Estimates</b>	Dollars	<ul style="list-style-type: none"> <li>Failure of some types of non-structural elements (e.g., fire sprinklers) may result in collateral damage to other items in building.</li> </ul>	<ul style="list-style-type: none"> <li>Provide description of how derived. This should include references or copies of all pertinent sources used</li> </ul>	<ul style="list-style-type: none"> <li>Engineering evaluation based on size, weight, other characteristics of non-structural element and characteristics of items in fall or damage zone.</li> </ul>

<b>Data Type</b>	<b>Value</b>	<b>Description</b>	<b>Documentation</b>	<b>Source</b>
<b>Occupancy</b>	Number of occupants	<ul style="list-style-type: none"> <li>• Average 24/7/365 occupancy</li> <li>• Relevant occupancy is ONLY occupancy in the fall or damage area for the non-structural element – NOT the entire building occupancy.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide description of estimates methodology used (to establish number of employees and visitors at different times of day and days of week).</li> </ul>	<ul style="list-style-type: none"> <li>• Building owner or manager</li> </ul>
<b>Dollar Value of a Casualty</b>	<p>2006 Dollars (present year value per person)</p> <p>Casualty = \$3,141,633</p>	<ul style="list-style-type: none"> <li>• Estimated value of the loss of one person.</li> <li>• Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value.</li> <li>• 2001 Casualty = \$2,710,000</li> </ul>	<ul style="list-style-type: none"> <li>• If standard values in FEMA software are used, then a print out of BCA module is sufficient documentation. .</li> <li>• Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value.</li> </ul>	<ul style="list-style-type: none"> <li>• FEMA “What is a Benefit?” guidance, Section 2.3.</li> </ul>
<b>Dollar Value for Minor/Major Injuries</b>	<p>2006 Dollars (present year value per person)</p> <p>Major injury = \$18,085</p> <p>Minor injury = \$1,808</p>	<ul style="list-style-type: none"> <li>• Average of the estimated values for the treatment of major and minor injuries per person.</li> <li>• Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value.</li> <li>• 2001 Major injury = \$15,600</li> <li>• 2001 Minor injury = \$1,560</li> </ul>	<ul style="list-style-type: none"> <li>• If standard values in FEMA software are used, then a printout of BCA module is sufficient documentation.</li> <li>• Use the Inflation Calculator found in the BCA Tools Folder to inflate the FEMA standard values from 2001 to present day value.</li> </ul>	<ul style="list-style-type: none"> <li>• FEMA “What is a Benefit?” guidance, Section 2.3.</li> </ul>
<b>Other Data</b>	Varies by type of non-structural mitigation project	<ul style="list-style-type: none"> <li>• See separate pages in Non-Structural Module for different types of projects.</li> </ul>	<ul style="list-style-type: none"> <li>• No documentation required if FEMA standard values in module are used.</li> <li>• If estimated provide an explanation of source used and method applied.</li> </ul>	<ul style="list-style-type: none"> <li>• FEMA standard values in BCA module or</li> <li>• Analysis by engineer</li> </ul>

## *FEMA BCA Checklist*

### Appendix II FEMA BCA Checklist

*Last Updated June 28, 2006*

**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**

3.7.2 The Limited Data module for non-structural seismic hazard mitigation projects allows users to evaluate mitigation projects for common non-structural items including:

- Equipment
- Cable Elevators
- Contents
- Chimneys
- Ductwork
- Fire Sprinklers
- Electrical Junction Boxes
- Generators
- HVAC Fans
- Library Shelves
- Parapet Walls
- Storage Racks
- Suspended Ceilings

The following precautions must be taken when using this module:

- (a) Verify and document values related to building occupancy rates, estimated dollar value of deaths, and value of lost services per day. This is critical because most benefits for non-structural mitigation projects are due to avoided deaths and avoided loss of function.
- (b) In the **Seismic Hazard** section, input the expected annual number of earthquakes with values from the Earthquake Full Data Structural module. Include documentation to support user-entered values not derived through the Earthquake Full Data Structural module.

- (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.