Data Documentation Template and Checklist

Flood Mitigation (Riverine, Coastal A-Zone, Coastal V-Zone)
Engineering Data Analysis Methodology [Full Data BCA Modules]

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.

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 one of the building types • For the Coastal V Zone module, building type refers to "With-" or "Without" Obstruction.	• How many stories and whether or not there is a basement. • Building type is a major determinant of anticipated damage from floods. • ***With Obstruction*** means that the space below the lowest floor of the building has open lattice breakaway walls and/or small (less than 300 square feet) solid breakaway walls. ***Without Obstruction*** means that the space below the lowest floor of the building is completely free of obstructions or has only light insect screens. • ***Other Building Type*** refers to other buildings with piling systems insufficient to resist water forces or with non-breakaway obstructions below the lowest floor beam that are substantially more vulnerable to V-Zone damage than either the *With Obstruction* or *Without Obstruction* types described above.	• Tax records, appraisals, letters from homeowners, photographs, etc.	• Homeowner, local building inspection department, local tax assessor's office, title documents, etc.

Data Type	Value	Description	Documentation	Source
Finished Floor Elevation [FFE]	Expressed in feet above mean sea level [MSL]	• The FFE is the elevation of the top of the finished flooring of the lowest floor. • The elevation should be measured at the first floor *above grade*, not at the basement level. The FFE is a primary determinant of flood risk.	• Survey, FEMA Elevation Certificate, other formal records. • If estimated, include a description of how derived and copies of all pertinent references, such as topographic maps, surveys, photographs of mud lines, etc. • If estimated, indicate who performed the estimate.	• Engineers, Licensed/Registered Surveyors, Certified Floodplain Managers, local floodplain administrators, insurance agents, and planners with floodplain experience.
Building Floor Area	Expressed in square feet	• The total enclosed area in the building. Used in conjunction with replacement value to determine anticipated flood damages in various potential events.	• Various forms are acceptable, including tax records, appraisals, surveys, estimates from photographs, etc.	• Local tax office or appraiser's office, surveyor, title documents with building footprint, etc. • Homeowner estimates or measured drawings accompanied by photograph, etc.
Building Replacement Value (BRV)	Expressed as dollars per square foot	• The cost for labor and materials to construct a similar building in the same place. • A key determinant of the amount of damage from future floods.	• Letter from construction or contracting firm, letter from local building inspection department, photocopy of page or pages from standard cost reference manuals.	• 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.

Data Type	Value	Description	Documentation	Source
Building Damage (percentage) that would Result in Demolition	Percentage of building replacement value	• FEMA standard value is 50%. • Low cost or poorly maintained buildings may have lower values; buildings of historical or other importance may have higher values. • Lower demolition percentages result in higher BCRs.	• 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.
Contents Value	Expressed as dollars	• The cost to replace the contents of a building. • Contents damage includes items like furniture, office equipment, etc. • 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, appraisals, purchase receipts, estimates based on current market prices for similar contents.

Data Type	Value	Description	Documentation	Source
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 flooded 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. • Extra commuting costs and day care 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].
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.	• Documentation of annual operating budget for public facility. • For critical facilities, see "What is a Benefit?" Guidance.	• Agency providing service.
Continuity Premium	Multiplier on ordinary value of service	• Applies only to services critical to immediate disaster response and recovery (police, fire, etc.)	• 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 organization or agency providing service.

Data Type	Value	Description	Documentation	Source
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.	• If estimated, include a description of how derived.	• Business income statements of finances. • The FEMA HAZUS-MH software loss estimation software has standard values for many classes of business, applicable to all hazards. http://fema.gov/hazus/
Mitigation Measure	Selection one of the mitigation measures	• Select one of the four mitigation measures: Elevation, Acquisition/Relocation, Flood Barriers, or Other • Depending on the mitigation measure selected, the module will prompt a box to enter either how many feet the FFE is being raised or the elevation where the barrier will be overtopped.	• Documentation should include engineering cost estimate along with a narrative or plans for the mitigation measure.	• Government representative or private professional with expertise relevant to the proposed project.
Mitigation Project Useful Lifetime	Years	• Estimated amount of time that mitigation action will be effective. • Includes any maintenance activities that will be done to prolong effectiveness).	• Reference FEMA standard value if utilized. • If FEMA standard value is not utilized 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, Page 27. • BCA Checklist, Page 14. • 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 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. • Should support the value submitted with project application.	• Should support the value submitted with the project application. • Government representative or private professional with expertise relevant to the proposed project. • For maintenance values, see Government representative or private professional with expertise relevant to the proposed project.
Flood Discharge Data	Rate of flow (in cubic feet per second) for the 10-, 50-, 100-, and 500-year floods	• River or stream flow rate for various flood events. • Not applicable for the Coastal A or Coastal V Zone modules.	• Provide copy of discharge table and site source of data.	• FEMA Flood Insurance Study or local flood study. • The FEMA Flood Map Store, http://store.msc.fema.gov

Data Type	Value	Description	Documentation	Source
Flood Elevation Data	Riverine: Elevations of 10-, 50-, 100- and 500-year floods Coastal Zone A and Zone V: require the 1-year flood elevation Coastal Zone V: 100-year with Wave Height Elevation	• Specific values read from flood profile (in the Flood Insurance Study) for the project location along the reach of the flood source (river). • For the Coastal Zone A or Zone V projects, the 1-year flood elevation data entry may be estimated from the highest expected [normally anticipated] annual tide level or from other local flood gauge data. • For the Coastal A- or V-Zone projects, use the Stillwater elevations and the 100-year with Wave Height elevation data (for V-Zone) found in the Flood Insurance Study for the project area.	• Provide copy of flood profile graph and location of project site along the bottom axis of the profile.	• FEMA Flood Insurance Study or local flood study. • The FEMA Flood Map Store, http://store.msc.fema.gov • National Oceanic and Atmospheric Administration (NOAA) http://tidesandcurrents.noaa.gov/ Use the interactive map to find tide predictions.
Expected Annual Number of Floods	Frequency	• Annual probabilities of various flood events.	• If Full Data calculated values are utilized then verify their applicability. • Provide a detailed description of how user-entered values were developed.	• FEMA default values in software or • Estimates based on historical number floods verses flood depth.

Data Type	Value	Description	Documentation	Source
Building Depth-Damage Function	Expressed as the percent damage of the building replacement value at each flood depth.	• Estimate of building damages at each flood depth. • Relationship between flooding depth in feet and damages in dollars; as the flood depth increases, damages will typically increase.	• 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 • Estimates based on historical losses and engineering judgment.
Content Damage	Expressed as the percent damage of the building contents value at each flood depth.	• Estimate of content damages at each flood depth. • Relationship between flooding depth in feet and content damages in dollars; as the flood depth increases, damages will typically increase.	• 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 • Estimates based on historical losses and engineering judgment
Displacement Time	Days, increases with flood depth (building percent damage)	• The time period for which occupants are expected to be displaced to temporary quarters due to flood damage	• No documentation required if FEMA standard values are used for residential and other ordinary buildings use typical values. • Provide data derivation method for techniques used.	• See "What is a Benefit?" guidance for residential and critical facilities.
Functional Downtime	Days, increases with flood depth (building percent damage)	• The time period for which public or commercial services are lost from a building.	• For ordinary buildings, default values in FEMA software. • For critical buildings, use "What is a Benefit?" guidance.	• No local source required if FEMA default values are used. • Developing non-standard values may involve working with organization or agency providing service.

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).

3.2   Riverine Flood Control Project

3.2.1   Identify the source of the flood hazard data:

(a) A copy of the Flood Insurance Study (FIS), marked up to show the project location, should be submitted with the application. Data should include the Flood Insurance Rate Map (FIRM) title block and map scale and the appropriate flood profile from the FIS report.

(b) If flood data from another agency is used, provide the agency name, the report title, the name of the watercourse studied, and the date of the report. (A photocopy of the report cover may be submitted to provide some of this information.)

(c) If flood data were developed by an engineer or hydrologist, provide the name, registration number (for an engineer), date of the analyses, and methodology used (hand calculations or a specific computer model such as TR-20 or HEC-RAS).

3.2.2   Provide an SOW for the project that is consistent with the information provided in the grant application and for the engineering review.

3.2.3   Describe the existing flood conditions for the project site.

3.2.4   Briefly describe how the proposed mitigation project will provide protection for the facility.

3.2.5   Identify the proposed level of flood protection for the mitigation project (i.e., "The project will protect the pump station for up to a 50-year flood event on Smith Creek."). This value MUST be included in the project application to verify the effectiveness of the mitigation project.

3.2.6   Provide a detailed work schedule and breakdown of the complete project costs, disregarding who will pay the costs (FEMA or another state or local funding source).

3.3   Projects Based on the Limited Data Module
For the entire BCA Checklist, refer to the BCA_Checklist.doc located on the BCA Mitigation Toolkit
(BCA Mitigation Toolikt\4 – BCA TOOLS\CHECKLIST AND DATA DOCUMENTATION TEMPLATES).

3.4   **Coastal Flood Protection Projects**

The FEMA Coastal A- or V-Zone BCA modules should be used for evaluating and determining the cost-effectiveness of coastal flood protection projects. Data for coastal projects are based on information similar to that used in the FEMA Riverine Full Data module and the requirements described in Section 2.0. The text below discusses the data differences between the two modules.

<u>Coastal A-Zone Mitigation Projects</u>

3.4.1   The **Flood Hazard Data** is based on information provided in the "Summary of Stillwater Elevation Tables" from a FEMA FIS. This table provides the stillwater elevations for the 10-, 50-, 100- and 500-year flood events. The *FEMA Mitigation BCA Toolkit* CD contains the manual for the Coastal A-Zone module. Page 7-2 in the Coastal A-Zone Manual states, "the '1-year' flood elevation data entry may be estimated from the highest expected (normally anticipated) annual tide level or from other local flood gauge data." The National Oceanic and Atmospheric Administration (NOAA) Center for Operational Oceanographic Products and Services Web site (http://tidesandcurrents.noaa.gov/) contains tidal prediction data that may be useful. Use the interactive map to find the tide predictions.

<u>Coastal V-Zone Mitigation Projects</u>

3.4.2   The **Building Data** for a building in a V-Zone considers whether the building has an obstruction (i.e., wall or structural member) below the elevation of the lowest floor or horizontal member.

3.4.3   For **Building Data**, the elevation of the lowest floor is based on the lowest horizontal structural member.

3.4.4   Similar to the Coastal A-Zone **Flood Hazard Data,** the Coastal V-Zone data are based on information provided in the "Summary of Stillwater Elevation Tables" from the FIS. This table provides the stillwater elevations for 10-, 50-, 100-, and 500-year flood events. Based on the data, the BCA module will automatically compute the elevations with the wave height. Depending on the location of the project, the module allows for a user-entered elevation for the 100-year flood, which may be

determined from the FIRM. The 1-year flood elevation data entry may be estimated from the highest expected (normally anticipated) annual tide level or from other local flood gauge data. The NOAA Center for Operational Oceanographic Products and Services Web site (http://tidesandcurrents.noaa.gov/) contains tidal prediction data that may be useful. Use the interactive map to find the tide predictions.