



FEMA

Reengineered FEMA BCA Earthquake Structural Module (Version 4)

Comparison Between BCA Software Version 3 and Version 4

The FEMA Earthquake Structural Module, initially developed in the early 1990s as part of the Benefit-Cost Analysis (BCA) program, is used to determine the cost-effectiveness of proposed earthquake mitigation projects for buildings. FEMA recently issued Version 4 of the module, a reengineered version of the software with improved accuracy and efficiency. In Version 4, the hazard data, calculations, values, guidelines, and policies have been updated, and new technology has been incorporated. The result is a more effective BCA earthquake tool that produces more accurate and realistic estimates of cost-effectiveness.

FEMA recognizes that Version 4 may produce results substantially different from the outcomes produced by earlier versions of the module however; the Earthquake Structural Module Version 4 results have been compared to national studies and found to be consistent with successful retrofit projects. In reengineering the module, FEMA collaborated with applicants and subapplicants, including State Hazard Mitigation Officers, local officials, consultants and contractors, nationally recognized subject matter experts, and FEMA HQ and Regional staff.

Improved Features

The following table shows the improvements made in version 4 as compared with the prior version.

Version 3	Version 4
Outdated U.S. Geological Survey (USGS) ground motion data for only three return periods (475, 975, and 2,475 years).	Current USGS ground motion data for return periods ranging from a 10-year event through a 10,000-year event.
Extrapolation of ground motion data is required to estimate ground motion for return periods more frequent than the 475-year return period and less frequent than the 2,475-year return period.	Extrapolation is not necessary because of the range of return periods.
Simplified version of the HAZUS-MH earthquake damage model (using peak ground accelerations).	Complete HAZUS-MH earthquake damage model including ground motions represented by a spectrum and updated casualty rates.
Limitations for representing the before- and after-mitigation vulnerability of any specific building, using properties unfamiliar to most civil and structural engineers.	Accurate vulnerability characterization using structural engineering properties for each building, before and after mitigation. Cost-effective vulnerability characterization when using data readily determined by the civil or structural engineer involved in developing the scope of work.

- For more information on the BCA Earthquake Structural Module, contact the BC Helpline at <http://www.bchelpline.com>.

