

CHAPTER 8: GLOSSARY

Avoided Future Damages and Losses	The avoided future damages and losses are the net present value of the reduced losses due to the rehabilitation project. Avoided future damages and losses reflect the extent to which the rehabilitation project is effective in reducing expected future damages and losses, and counted in the benefit-cost analysis.
Building Damages	Building damages are the expected damages to the structure as a percentage of the building's replacement value for earthquakes of each MMI or PGA range. Structural damages include both structural and non-structural elements, including mechanical, electrical, and plumbing systems but excluding the building's contents.
Contents Damages	Contents damages are the expected damages to the building's contents as a percentage of the total contents' replacement value for earthquakes of each MMI or PGA range. Contents damages include furniture, office equipment, light fixtures, flooring, and other items specific to individual tenants' usages, but exclude mechanical, electrical, and plumbing systems.
Continuity Premium	Some government services, such as emergency response or emergency medical care, may be more valuable than normal in the post-earthquake time period. A post-earthquake continuity premium is the dollar amount agencies would be willing to pay to maintain agency functions after the earthquake.
Deaths Avoided	The annual value of avoided earthquake death losses is determined by the building size, average occupancy, the change in the expected death rate between unrehabilitated and rehabilitated buildings, and the dollar value assigned to a statistical human life, approximately \$1.74 million, based on several Federal Agency studies.
Default Values	Default or reference values are the estimated "typical" values "built-in" to the model which, if used, will facilitate a rough benefit-cost analysis. However, since few, if any, specific buildings are "typical" in all areas relevant to seismic rehabilitation benefit-cost analysis, applying the results of a "typical" building analysis to a specific building may yield inaccurate results.

Demolition Threshold Damage Percentage	The demolition threshold damage percentage is the level of damage (expressed as a percentage of the building's replacement value) at which the building will be demolished rather than repaired. This percentage usually varies by the type, style, and/or age of the structure.
Discount Rate	The discount rate, entered as a percentage, calculates the present value of benefits and costs which occur in the future. Increasing the discount rate lowers the present value of future benefits and lowers benefit-cost ratios. Conversely, assuming a lower discount rate raises the present value of future benefits and increases benefit-cost ratios.
Exceedance Probability	The exceedance probability is the probability of exceeding a particular value in a stated time period. For example, in a particular location there may be a 10% probability of exceeding a given PGA in 50 years.
Expected Annual Damages	The expected annual damages are the statistical average amount of damages expected from earthquakes for an "average" year at the building's site before any proposed rehabilitation project.
Expected Annual Avoided Damages	The expected annual avoided damages are the annual number of expected earthquakes multiplied by the expected effectiveness of the proposed rehabilitation project in reducing damages. Expected annual avoided damages are the expected annual benefits of the benefit-cost analysis.
Expected Annual Residual Damages	The expected annual residual damages are the difference between the expected annual damages and the expected annual avoided damages after rehabilitation.
Functional Downtime	Functional downtime is the time that an agency is unable to provide its services due to earthquake damage. If an agency's building is badly damaged in an earthquake, an agency would likely re-establish its function in temporary, alternate quarters, thus minimizing the loss of its function, or functional downtime.
Government Services Lost	The value of government services lost when the building becomes unusable during an earthquake are valued by estimating what an agency spends each month to provide services from a given building. This includes salaries and benefits, utilities and other non-wage operating costs, and either rent or a rent-proxy (if the building is agency-owned). This method is known as Quasi-Willingness-to-Pay (QWTP).

Major Injuries	Major injuries are defined as those which require hospitalization. The default average value for major injuries included in the benefit-cost model is \$10,000.
Mean Damage Function (MDF)	The mean damage function is the expected amount of damage which a particular building will sustain over the range of possible ground motions. The expected damage is listed separately by MMI and PGA bins as a percentage of building replacement value.
Minor Injuries	Minor injuries are defined as those which do not require hospitalization. The default average value for minor injuries in the benefit-cost model is \$1,000.
MMI bin	Modified Mercalli Intensity scale ratings, arranged in bins from I-XII. As the MMI number increases, so does the expected intensity of the shaking from an earthquake. The MMI bins, or intensity rankings, parallel the Percent of G (PGA) intervals.
Modified Mean Damage Function (MMDF)	The modified mean damage function is the expected damage to a structure (as a percentage of the building's replacement value) after including the demolition threshold damage percentage (DTDP). If the default or user-entered values are greater than the DTDP, then the benefit-cost model assumes that all values equal to or greater than the DTDP are 100%, i.e., the building will be demolished.
Net Present Value	The net present value of benefits and costs accounts for the time value of money. Dollars received in the future are worth less than dollars received immediately due to risk and uncertainty. Benefits are expected to accrue in the future. Thus, the expected net present value of a seismic rehabilitation project is the sum of the present value of net benefits expected to accrue each year over the life of the project, minus the net costs of the rehabilitation project.
PGA	Effective peak ground acceleration, or PGA, is a quantitative measure of the level of ground shaking, expressed as a percentage of g, the acceleration of gravity.
Planning Horizon	The planning horizon, or useful lifetime, of the rehabilitation project varies depending on the type of project, with 30 to 50 years being common for building projects.
Quasi-Willingness to Pay (QWTP)	For public sector buildings, the value of government services lost when the building becomes unusable during an earthquake must be included. Government services are valued using the Quasi-Willingness to Pay (QWTP) model. QWTP assumes that government services are worth what is paid to provide the services.

Rental Income Losses	Rental income losses are lost payments paid by private tenants for all or a portion of the building. Inter- or intra-agency rents within the Federal Government are not counted because such payments are generally transfers and their loss does not represent a true economic loss. Other private sector economic losses (such as lost wages) are not considered because they are assumed to be generally negligible for Federal Government buildings.
Relocation Expenses	Relocation expenses occur when a structure is damaged badly enough in an earthquake to require repairs before it is usable. Relocation expenses are defined as the product of relocation costs per month and the expected period for which the building will be unusable due to seismic damage.
Scenario Damages	Scenario damages are the total damages per earthquake of a given MMI (or range of effective peak ground acceleration, PGA) to the building and contents, the relocation costs, rental income losses, and the value of lost governmental services.
Soil Types	S0 - Hard rock S1 - Rock S2 - Very dense soil S3 - Stiff soil S4 - Soft soil
Spectral Acceleration	A quantitative measure of ground motion, including the frequency of motion, used in NEHRP maps.
Value of Life	The value of life is the value placed on a statistical life. A consensus value for a statistical human life is approximately \$1.74 million, based on several Federal Agency studies.