

Chapter 1

Introduction to the FEMA Loss Estimation Methodology

1.1 Background

The Technical Manual describes the methods for performing earthquake loss estimation. It is based on a multi-year project to develop a nationally applicable methodology for estimating potential earthquake losses on a regional basis. The project has been conducted for the National Institute of Building Science (NIBS) under a cooperative agreement with the Federal Emergency Management Agency (FEMA).

The primary purpose of the project is to develop guidelines and procedures for making earthquake loss estimates at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery. A secondary purpose of the project is to provide a basis for assessing nationwide risk of earthquake losses.

The methodology development and software implementation has been performed by a team of earthquake loss experts composed of earth scientists, engineers, architects, economists, emergency planners, social scientists and software developers. The Earthquake Committee has provided technical direction and review of work with guidance from the Project Oversight Committee (POC), a group representing user interests in the earthquake engineering community.

1.2 Technical Manual Scope

The scope of the *Technical Manual* includes documentation of all methods and data that are used by the methodology. Loss estimation methods and data are obtained from referenced sources tailored to fit the framework of the methodology, or from new methods and data developed when existing methods and data were lacking or were not current with the state of the art.

The *Technical Manual* is a comprehensive, highly technical collection of methods and data covering a broad range of topics and disciplines, including earth science, seismic/structural engineering, social science and economics. The *Technical Manual* is written for readers who are expected to have some degree of expertise in the technical topic of interest, and may be inappropriate for readers who do not have this background.

As described in Chapter 2, a separate *User Manual* describes the earthquake loss estimation methodology in non-technical terms and provides guidance to users in the application of the methodology. The methodology software is implemented using Geographical Information System (GIS) software as described in the *Technical Manual*.

1.3 Technical Manual Organization

The *Technical Manual* contains sixteen chapters. Chapter 2 describes the overall framework of the methodology and provides background on the approach developed used to meet the project's objectives. Chapter 3 discusses inventory data, including classification schemes of different systems, attributes required to perform damage and loss estimation, and the data supplied with the methodology. Sources and methods of collection of inventory data are not covered in Chapter 3, but may be found in the *User Manual*.

Chapters 4 through 16 cover, respectively, each of thirteen major components or subcomponents (modules) of the methodology. Each of the major components and subcomponents are described in Chapter 2. A flowchart is provided in Chapter 2 as a "road map" of the relationships between modules of the methodology. This flowchart is repeated at the beginning of each chapter with the module of interest high-lighted to show input from and output to other modules of the methodology.