Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook

Third Edition

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Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook

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Notice

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In 2011, the Applied Technology Council (ATC), with funding from the Federal Emergency Management Agency (FEMA) under Task Order Contract HSFEHQ-08-D-0726, commenced a series of projects (ATC-71-4, ATC-71-5, and ATC-71-6) to update the FEMA 154 Report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook* (FEMA, 2002a). The purpose of FEMA 154, which was developed by ATC under contract to FEMA (ATC-21 Project) and published in 1988, was to provide a methodology to evaluate the seismic safety of a large inventory of buildings quickly and inexpensively, with minimum access to the buildings, and determine those buildings that require a more detailed examination. In 2002, FEMA 154 was updated to create a *Second Edition*, based on (1) experience from the widespread use of FEMA 154 by federal, state, and municipal agencies and others; (2) new knowledge about the performance of buildings during damaging earthquakes; (3) new knowledge about seismic hazards; and (4) other then-new seismic evaluation and performance prediction tools, such as the FEMA 310 report, *Handbook for the Seismic Evaluation of Buildings - A Prestandard* (FEMA, 1998). Both the original FEMA 154 *Handbook* and the *Second Edition* were accompanied by a *Supporting Documentation* report (FEMA 155), which described the technical basis for the scoring system and other guidance provided in FEMA 154.

Since the publication of the second edition of FEMA 154, there have been several initiatives that have advanced the state-of-the-art in rapid visual screening of buildings for seismic risk. One of these was the development of the FEMA P-154 *Rapid Observation of Vulnerability and Estimation of Risk* (ROVER) software for use on smart phones (FEMA, 2014), which enables users to document and transmit data gathered in the field. The rapid visual screening application of FEMA P-154 ROVER is based on the second edition of FEMA 154 and incorporates several improvements made possible by the electronic calculation capability of the device (e.g., site-specific determinations of the seismic shaking hazard). In addition, users in Oregon and Utah have suggested modifications to the FEMA 154 screening process in the course of performing extensive seismic screenings of schools and other buildings.
The objective of the Third Edition remains the same as its predecessors: to identify, inventory, and screen buildings that are potentially hazardous. Although some sections of the text remained unchanged from the Second Edition, the Third Edition incorporates several major enhancements, including:

- Update of the Data Collection Form, and the addition of an optional more detailed page to the form,
- Update of the Basic Scores and Score Modifiers,
- Update of the ground motion definitions,
- Preparation of additional reference guides,
- Inclusion of additional building types that are prevalent,
- Inclusion of additional considerations, such as nonstructural hazards, existing retrofits, building additions, and adjacency,
- Addition of an optional electronic scoring methodology, and
- Additional information on how to run an effective screening program.

The technical basis for the rapid visual screening procedure is documented in the FEMA P-155 report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: Supporting Documentation*, (FEMA, 2015), which was also updated to the Third Edition. Note that per FEMA’s current report numbering system, the third editions of FEMA 154 and FEMA 155 are now referred to as FEMA P-154 and FEMA P-155, respectively.

ATC is indebted to the leadership of Bret Lizundia, Project Technical Director, and to the members of the ATC-71-4, ATC-71-5, and ATC-71-6 Project Teams for their efforts in developing this updated Handbook. The Project Technical Committee, consisting of Michael Griffin, William Holmes, Brian Kehoe, Keith Porter, and Barry Welliver, managed and performed the technical development efforts. Updated scores were developed by Charles Kircher. Sarah Durphy, as a Project Working Group member, provided special assistance in the development of the updated Handbook. Andrew Bishop, Brian Kehoe, and Scott Hiner prepared the illustrations for the report. Nicolas Luco and Kenneth Rukstales prepared the seismicity maps in the document. The Project Review Panel, consisting of Charles Scawthorn (chair), Timothy Brown, Melvyn Green, Laura Kelly, Stephanie King, John Osteraas, Steven Sweeney, and Christine Theodoropoulos, provided technical review, advice, and consultation at key stages of the work. A workshop of invited experts was convened to obtain feedback on the updated Handbook, and input from this group was
instrumental in shaping the final methodology and report. The names and affiliations of all who contributed to this report are provided in the list of Project Participants.

ATC also gratefully acknowledges Michael Mahoney (FEMA Project Officer), Mai Tong (FEMA Task Monitor), Erin Walsh (FEMA Task Monitor), and John Gillengerten (FEMA Technical Monitor) for their input and guidance in the preparation of this document. Ayse Hortacsu and Thomas McLane managed the project and Amber Houchen and Peter N. Mork provided report production services.

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# Table of Contents

Preface........................................................................................................... iii  
List of Figures............................................................................................. xiii  
List of Tables .............................................................................................. xxv  

1. **Introduction** ...................................................................................... 1-1  
   1.1 Summary of Rapid Visual Screening ....................................... 1-1  
   1.2 Screening Procedure Purpose, Overview, and Target  
       Audience................................................................................... 1-5  
   1.3 Role of FEMA 154 in the Spectrum of Seismic Evaluation  
       Tools.............................................................................................. 1-8  
   1.4 History of FEMA 154............................................................. 1-11  
   1.5 Third Edition Updates to FEMA 154 ..................................... 1-12  
   1.6 Rapid Visual Screening Procedures ....................................... 1-14  
   1.7 Optional Electronic Scoring ................................................... 1-14  
   1.8 Using ROVER to Perform RVS............................................. 1-14  
   1.9 Uses of RVS Survey Results .................................................. 1-15  
   1.10 Advantages and Limitations of the RVS Method .......... 1-16  
       1.10.1 Advantages ................................................................. 1-16  
       1.10.2 Limitations ................................................................. 1-16  
   1.11 Companion FEMA P-155 Report ........................................... 1-17  
   1.12 Organization of This Handbook ............................................. 1-17  

2. **Planning and Managing a Successful Rapid Visual Screening Program**  
   ............................................................................................................ 2-1  
   2.1 Planning and Implementing an RVS Program ......................... 2-1  
   2.2 Selecting the RVS Program Manager and the Supervising  
       Engineer................................................................................... 2-2  
   2.3 Defining the Scope of the RVS Program ................................. 2-4  
       2.3.1 Determining Resources Needed for the RVS  
       Program................................................................................... 2-4  
       2.3.2 Deciding Which Buildings to Screen .......................... 2-6  
       2.3.3 Combining Level 1 and Level 2 Screening ................. 2-7  
       2.3.4 Determining Screeners ................................................ 2-8  
       2.3.5 Extent of Pre-Field Data Collection ......................... 2-9  
       2.3.6 Electronic Scoring.......................................................... 2-9  
       2.3.7 Updating Existing Second Edition Screening  
       Programs................................................................................. 2-10  
   2.4 Budget Development and Cost Estimation ........................... 2-11  
   2.5 Pre-Field Planning................................................................. 2-12  
   2.6 Selection and Optional Modification of the Data Collection  
       Form ........................................................................................... 2-14  
       2.6.1 Determination of Seismicity Region ............................ 2-14  
       2.6.2 Optional Modification of the Data Collection  
       Form ........................................................................................ 2-15
3. Completing the Level 1 Data Collection Form

3.1 Introduction

3.2 Building Identification Information

3.2.1 Building Identification

3.2.2 Latitude and Longitude and Site Seismicity

3.2.3 Screener Identification

3.3 Building Characteristics

3.3.1 Number of Stories

3.3.2 Year Built and Code Year

3.3.3 Total Floor Area

3.3.4 Buildings with Additions or Multiple Parts

3.4 Photographing the Building

3.5 Sketching the Building

3.6 Building Occupancy

3.6.1 Occupancy Classes

3.6.2 Additional Designations

3.7 Soil Type

3.8 Geologic Hazards

3.9 Adjacency

3.10 Irregularities

3.10.1 Vertical Irregularities

3.10.2 Plan Irregularities

3.11 Exterior Falling Hazards

3.12 Damage and Deterioration

3.13 Comments Section

3.14 Identifying the FEMA Building Type and Documenting the Related Basic Score

3.14.1 FEMA Building Types Considered and Basic Scores

3.14.2 Identifying the FEMA Building Type

3.14.3 Interior Inspections

3.14.4 Screening Buildings with More Than One FEMA Building Type

3.14.5 Screening Buildings with Additions

2.6.3 Determination of Key Seismic Code Adoption Dates

2.6.4 Determination of Cut-Off Score

2.7 Qualifications and Training for Screeners

2.8 Acquisition and Review of Pre-Field Building Data

2.8.1 Assessor’s Files

2.8.2 Building Department Files

2.8.3 Sanborn Maps and Parcel Maps

2.8.4 Municipal Databases

2.8.5 Previous Studies

2.8.6 Soil Information

2.8.7 Using Resources from the Internet and Other Available Tools

2.9 Review of Construction Documents

2.10 Field Screening of Buildings

2.11 Quality Assurance

2.12 Filing the Field Data in the Record-Keeping System
3.15 Score Modifiers ............................................................... 3-53
  3.15.1 Vertical Irregularity .................................................. 3-54
  3.15.2 Plan Irregularity ...................................................... 3-55
  3.15.3 Pre-Code ............................................................... 3-55
  3.15.4 Post-Benchmark ..................................................... 3-55
  3.15.5 Soil Type .............................................................. 3-55
  3.15.6 Minimum Score, $S_{MIN}$ .......................................... 3-56
3.16 Determining the Final Level 1 Score .............................. 3-56
3.17 Documenting the Extent of Review .................................. 3-57
3.18 Documenting the Level 2 Screening Results ....................... 3-57
3.19 Documenting Other Hazards .......................................... 3-57
3.20 Determining the Action Required ..................................... 3-59
  3.20.1 Detailed Structural Evaluation .................................. 3-59
  3.20.2 Detailed Nonstructural Evaluation ............................ 3-60

4. Completing the Optional Level 2 Data Collection Form ......... 4-1
  4.1 Introduction ............................................................... 4-1
  4.2 Building Information and Adjusted Baseline Score for Level 2 ......................................................... 4-3
  4.3 Reviewing the Level 2 Statements and Recording Score Modifiers .............................................................. 4-3
    4.3.1 Vertical Irregularities ............................................. 4-3
    4.3.2 Plan Irregularities .................................................. 4-9
    4.3.3 Redundancy .......................................................... 4-11
    4.3.4 Pounding .............................................................. 4-11
    4.3.5 Consideration of Building Additions ....................... 4-13
    4.3.6 Building Type Specific Statements ......................... 4-16
    4.3.7 Retrofits ............................................................. 4-17
  4.4 Determining the Final Level 2 Score ................................ 4-19
  4.5 Other Observable Conditions ........................................ 4-19
    4.5.1 Damage and Deterioration ..................................... 4-19
    4.5.2 Other Conditions .................................................. 4-20
  4.6 Observable Nonstructural Hazards ................................ 4-20
  4.7 Comments ................................................................... 4-22
  4.8 Transferring the Level 2 Results to the Level 1 Form ........ 4-22

5. Using the RVS Procedure Results ...................................... 5-1
  5.1 Using the RVS Procedure Results .................................. 5-1
  5.2 Interpretation of RVS Score ........................................... 5-2
  5.3 Selection of RVS Cut-Off Score ..................................... 5-2
  5.4 Prior Uses of the RVS Procedure ................................... 5-4
  5.5 RVS and Seismic Advocacy .......................................... 5-8
    5.5.1 Overview ............................................................. 5-8
    5.5.2 Audience Types ................................................... 5-9
    5.5.3 RVS Program Types .............................................. 5-9
    5.5.4 Use of RVS Inventories in Advocating Seismic Safety .......................................................... 5-11
    5.5.5 Using RVS Results in Advocating for Seismic Safety .......................................................... 5-11
    5.5.6 Additional FEMA Tools for Supporting Mitigation Programs ................................................. 5-12
  5.6 Other Possible Uses of the RVS Procedure ....................... 5-13
5.6.1 Using RVS Scores as a Basis for Hazardous Building Mitigation Programs .......................... 5-13
5.6.2 Using RVS Data in Community Building Inventory Development ........................................... 5-14
5.6.3 Using RVS Data to Plan Postearthquake Building-Safety-Evaluation ........................................ 5-15
5.6.4 Resources Needed for the Various Uses of the RVS Procedure .................................................. 5-15

6. Optional Electronic Scoring .......................................................... 6-1
6.1 Introduction .................................................................................. 6-1
6.2 Changes from and Comparisons with the Paper Forms ...................... 6-1
6.3 Concepts in Electronic Scoring......................................................... 6-1
6.3.1 Site-Specific Seismicity .......................................................... 6-3
6.3.2 Soil Type Effects ...................................................................... 6-3
6.4 How to Implement the Optional Electronic Scoring Approach .......... 6-3
6.4.1 General Electronic Scoring Approach ....................................... 6-4
6.4.2 Refined Electronic Scoring Approach for Soil Types C and D .. 6-6
6.5 Comparisons between Electronic Scoring and Paper-Based Scoring .... 6-7

7. Example Rapid Visual Screening Programs .................................... 7-1
7.1 Introduction ................................................................................ 7-1
7.2 RVS Program Scenario A: Level 1 Screening in Anyplace, USA .......... 7-1
7.2.1 Step 1: Defining the Scope of the Program .............................. 7-1
7.2.2 Step 2: Budget and Cost Estimation ....................................... 7-2
7.2.3 Step 3: Pre-Field Planning ..................................................... 7-2
7.2.4 Step 4: Selection and Review of the Data Collection Form .......... 7-5
7.2.5 Step 5: Acquisition and Review of Pre-Field Data ..................... 7-6
7.2.6 Step 6: Review of Construction Documents ............................ 7-9
7.2.7 Step 7: Training for Screeners ............................................... 7-9
7.2.8 Step 8: Field Screening of Buildings ....................................... 7-10
7.2.9 Step 9: Review by the Supervising Engineer ............................ 7-20
7.2.10 Step 10: Transferring the RVS Field Data to the Electronic Building RVS Database .............. 7-22
7.3 RVS Program Scenario B: Level 1 and Level 2 Screenings of K-12 School Buildings in Any State, USA .... 7-24
7.3.1 Step 1: Budget and Cost Estimation ....................................... 7-24
7.3.2 Step 2: Selection of Building Subset ....................................... 7-26
7.3.3 Step 3: Pre-Field Planning ..................................................... 7-26
7.3.4 Step 4: Selection and Review of the Data Collection Form .......... 7-27
7.3.5 Step 5: Qualifications and Training of Screeners ....................... 7-27
7.3.6 Step 6: Acquisition and Review of Pre-Field Data ..................... 7-27
7.3.7 Step 7: Field Screening of Buildings ....................................... 7-28
7.3.8 Step 8: Review by the Supervising Engineer ............................ 7-37
7.3.9 Step 9: Report to State Legislature ........................................... 7-37
7.3.10 Example Level 1 and Level 2 Screening Using Electronic Scoring .............. 7-40
Appendix A: Maps Showing Seismicity Regions

Appendix B: Data Collection Forms and Reference Guides
B.1 Level 1 and Level 2 Forms for Very High, High, Moderately High, Moderate, and Low Seismicity
B.2 Quick Reference Guide
B.3 Level 1 Building Addition Reference Guide
B.4 Level 1 Pounding Reference Guide
B.5 Vertical Irregularity Reference Guide
B.6 Plan Irregularity Reference Guide
B.7 Level 2 Building Addition Reference Guide

Appendix C: Review of Design and Construction Drawings

Appendix D: Exterior Screening for Seismic System and Age
D.1 Introduction
D.2 What to Look For and How to Find It
D.3 Identification of Building Age
D.4 Identification of FEMA Building Type
D.5 Characteristics of Exposed Construction Materials

Appendix E: Characteristics and Earthquake Performance of FEMA Building Types Used in RVS
E.1 Introduction
E.2 Wood Frame (W1, W1A, W2)
   E.2.1 Characteristics
   E.2.2 Typical Earthquake Damage
   E.2.3 Common Retrofit Techniques
E.3 Steel Frames (S1, S2)
   E.3.1 Characteristics
   E.3.2 Typical Earthquake Damage
   E.3.3 Common Retrofit Techniques
E.4 Light Metal (S3)
   E.4.1 Characteristics
   E.4.2 Typical Earthquake Damage
E.5 Steel Frame with Concrete Shear Wall (S4)
   E.5.1 Characteristics
   E.5.2 Typical Earthquake Damage
   E.5.3 Common Retrofit Techniques
E.6 Steel Frame with Unreinforced Masonry Infill (S5)
   E.6.1 Characteristics
   E.6.2 Typical Earthquake Damage
   E.6.3 Common Retrofit Techniques
E.7 Concrete Moment-Resisting Frame (C1)
   E.7.1 Characteristics
   E.7.2 Typical Earthquake Damage
   E.7.3 Common Retrofit Techniques
E.8 Concrete Shear Wall (C2)
   E.8.1 Characteristics
   E.8.2 Typical Types of Earthquake Damage
   E.8.3 Common Retrofit Techniques
E.9 Concrete Frame with Unreinforced Masonry Infill (C3)