



Rapid Observation of Vulnerability and Estimation of Risk (ROVER), Version 2, User Guide

FEMA P-154 ROVER 2 / September 2014



FEMA



Disclaimer of Software and its Capabilities and Copyright Notice

This ROVER software for “Rapid Observation of Vulnerability and Estimation of Risk” was developed and prepared under Contract HSFEHQ-08-D-0726 between the Federal Emergency Management Agency (FEMA) and the Applied Technology Council (ATC). Any opinions, findings, conclusions, or recommendations expressed in or derived from the software and its documentations do not necessarily reflect the views of FEMA or ATC. Additionally, neither FEMA nor ATC nor any of their employees make any warranty, expressed or implied, nor assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, product, or process in this software and its documentations.

ROVER is based on the 2002 edition of the FEMA 154 report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards, A Handbook* and the 2005 edition of the ATC-20-1 *Field Manual: Postearthquake Safety Evaluation of Buildings*. These methodologies have changed over time and may change in the future. The user is advised to consult with ATC or FEMA on the latest editions of the applicable methodologies. The ROVER software is provided on an "as is" basis. FEMA and ATC have made a good faith effort to rid the program of software defects and bugs. However, FEMA and ATC are not obligated to provide any maintenance, support, updates, enhancements, or modifications. FEMA and ATC may not be held liable to any party for any direct, indirect, special, incidental or consequential damages, including lost profits or downtime arising out of the use of this software, its documentation, or data obtained through the use of this software. FEMA and ATC will also not be held liable for any information input into the system by the user. The user should consult their legal counsel for any restrictions or additional security required by their organization for the data they will be inputting into the ROVER software. By downloading, installing, or using this program, the user acknowledges and understands the purpose and limitations of this software.

The Federal Emergency Management Agency does not hold, or store, data collected using the ROVER 2 software, and is not responsible for the safety of the data.

Disclaimer of Earthquake Information

The data, maps, and products (collectively, “ROVER”) provided through this system will be preliminary and subject to revision. Some ROVER information is computer generated and may not have received human review or official approval. Inaccuracies in ROVER may be present because of instrument or computer malfunctions, inaccurate input, or errors in programming, processing or transmittal. Subsequent review may result in significant ROVER revisions. All efforts have been made to provide accurate information, but reliance on, or interpretation of risk data from a single source is not advised.

ATC-20 Evaluation Forms Copyright Notice

Permission is granted for unlimited, non-exclusive, non-commercial use and distribution of ATC-20 evaluation forms, provided that this Copyright Notice appears on all copies and the Applied Technology Council name shall not be used in any advertising or publicity of Licensee product. Permission is further subject to the following conditions: (1) Licensee does not reprint, repackage or offer these forms for sale or license; and (2) no material gain or financial profit is to be made from any sale or license of these forms. Placards may be used without restrictions for their intended use as building postings. All rights not specifically granted to Licensee are herein reserved by ATC.

Cover Illustration: Assessor using mobile device superimposed on photo of a building undergoing seismic retrofit.

Rapid Observation of Vulnerability and Estimation of Risk (ROVER), Version 2, User Guide

Prepared by

APPLIED TECHNOLOGY COUNCIL
201 Redwood Shores Parkway, Suite 240
Redwood City, California 94065
www.ATCouncil.org

Prepared for

FEDERAL EMERGENCY MANAGEMENT AGENCY
Mai 'Mike' Tong (Project Monitor)
Washington, D.C.

ATC MANAGEMENT AND OVERSIGHT

Christopher Rojahn (Project Executive/Project Manager)
William T. Holmes (Project Technical Monitor)

TECHNICAL CONSULTANTS

Keith A. Porter, Lead Technical Consultant
Sidney Hellman, Software Consultant

SOFTWARE DEVELOPERS

Scott Hunter
Lina Kohandoust
Hal Schechner
Ron Bakerian

INFORMATION TECHNOLOGY (IT) CONSULTANT

Jack Lakes

PROJECT REVIEW PANEL

Jim Barnes
Ronald T. Eguchi
Melinda Gibson
John Price*
Christine Theodoropoulos
Heidi Tremayne
Barry Welliver

*ATC Board Representative

September 2014



FEMA



Notice

Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of the Applied Technology Council (ATC), the Department of Homeland Security (DHS), or the Federal Emergency Management Agency (FEMA). Additionally, neither, ATC, DHS, FEMA, nor any of their employees, makes any warranty, expressed or implied, nor assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, product, or process included in this publication. Users of information from this publication assume all liability arising from such use.

Foreword

The Federal Emergency Management Agency's mission is to support citizens and local responders to protect, prepare for, respond to, recover from, and mitigate against all hazards. Following this mission and for those citizens and communities exposed to high earthquake risks, FEMA's National Earthquake Hazard Reduction Program has taken the responsibility in assisting communities to assess their at-risk building stocks and to plan for appropriate mitigation measures. This second version of the mobile software Rapid Observation of Vulnerabilities and Estimation of Risks (ROVER) is developed as an information technology-based tool for screening and inventory of seismically vulnerable buildings in a rapid and cost effective manner.

There are several significant improvements incorporated in this version of the ROVER software. It is now a world-wide-web-based server software completely independent of the operating systems used by today's smartphones and mobile computers. Users can access the system through any information device running a web browser. The software has been tested through several projects for its applicability across all software platforms and improved user interface. An included utility program helps to import any user developed initial building information into the server for easier project planning. In addition, a RedROVER add-on program allows the inventory data to be exported to HAZUS.

FEMA and the project officer wish to express the gratitude to the members of the ROVER development team and the Project Review Panel for their persistent effort to improve the tool and dedicated professional services to support the users. We are also delighted and encouraged to see many of the communities have begun to take advantage of this tool to assess their earthquake risks and plan for mitigation actions.

Federal Emergency Management Agency

Preface

In September 2012 the Applied Technology Council (ATC), with funding from the Federal Emergency Management Agency (FEMA) under Task Order Contract HSFEHQ-08-D-0726, commenced the development of the second executable version of mobile software for Rapid Observation of Vulnerability and Estimation of Risk (ROVER). ROVER Version 2, which replaces Version 1 (issued in June 2011), is a free software suite containing two modules that enable execution of the pre-earthquake and post-earthquake hazard reduction procedures documented in two well-known and widely used resources: (1) FEMA 154, *Rapid Visual Screening of Buildings for Potential Seismic Hazards, A Handbook, Second Edition* (FEMA 2002), and (2) the ATC-20-1 *Field Manual: Postearthquake Safety Evaluation of Buildings, Second Edition* (ATC, 2005).

This *User Guide* provides an overview of the ROVER 2 software suite and its capabilities, as well as details on how to use the software, including guidance for installation of the software, management of the process for executing the procedures, and use of the software in the field by FEMA 154 screeners and ATC-20 inspectors.

ROVER 2 is entirely browser based. The software works on Android, iPhone, iPad or any mobile device with a browser, so there is no need to download an application (app) onto your phone or tablet. This means you must have an active data connection, but 3G and 4G coverage is increasingly common. Version 2 adds unlimited photo upload capability for both the FEMA 154 and ATC-20 modules. The software also automatically accommodates screen size, enables geolocation by street address, and allows the assignment of named screeners and inspectors to new or existing sites.

ATC is indebted to the broad range of individuals who contributed to the development of the ROVER 2 software suite and this *User Guide*. These individuals consisted of Keith A. Porter (Lead Technical Consultant), Sidney Hellman (Software Consultant), Jack Lakes (IT Consultant), and the following software developers: Scott Hunter, Lina Kohandoust, Hal Schechner, and Ron Bakerian. In addition, ATC is pleased to acknowledge the input and guidance provided by the Project Review Panel, which consisted of Jim Barnes, Ronald T. Eguchi, Melinda Gibson, John Price

(ATC Board representative), Christine Theodoropoulos, Heidi Tremayne, and Barry Welliver.

ATC also gratefully acknowledges the input, support, and guidance provided by Mai (Mike) Tong (FEMA Project Monitor), the foresight of Cathleen Carlisle, who served as the FEMA Project Monitor during the initial development of ROVER, and the report production efforts of Amber Houchen.

The affiliations of all of the above cited individuals are provided in the list of Project Participants.

Christopher Rojahn
ATC Executive Director

Table of Contents

Foreword.....	iii
Preface.....	v
List of Figures.....	xi
List of Tables	xv
1. Introducing the ROVER 2 Application Suite	1-1
1.1 About this Guide	1-1
1.1.1 Who Should Use this Guide?	1-1
1.1.2 Additional Resources and Updates.....	1-2
1.2 Benefits of the ROVER 2 Application Suite	1-2
1.2.1 ROVER 2 in the Disaster Cycle	1-2
1.2.2 Module Integration to Meet Your Needs.....	1-3
1.2.3 ROVER 2 Server Benefits.....	1-5
1.2.4 RedROVER (Importing to the HAZUS-MH Advanced Engineering Building Module (AEBM)).....	1-11
1.2.5 ShakeCast ROVER Edition.....	1-12
1.3 Getting Started: The ROVER-Ready Process	1-13
1.3.1 Do You Need ROVER 2?	1-13
1.3.2 Being ROVER-Ready	1-13
1.3.3 Optional Ways to Go Further	1-15
1.4 Your Plan: The Big Picture	1-15
1.4.1 Identify the Team	1-16
1.4.2 Get Trained.....	1-17
1.4.3 Compile the Project Plan.....	1-17
1.4.4 Planning for Hardware and Software Needs	1-18
1.4.5 Deploy and Validate ROVER 2	1-19
1.4.6 Rollout ROVER 2	1-20
1.5 FEMA 154 Second Edition URM Scoring Issues for Moderate- and Low-Seismicity Regions	1-20
2. Deploying and Validating the ROVER 2 Application Suite.....	2-1
2.1 Preparing for a ROVER 2 Application Suite Installation.....	2-1
2.1.1 Platform Architecture	2-1
2.1.2 Understanding Installation and Options	2-3
2.1.3 Determining Which Installation Type to Use.....	2-4
2.2 Installing in a Windows Environment	2-4
2.2.1 ROVER 2 Server Installation	2-5
2.2.2 RedROVER Installation	2-10
2.2.3 ROVERLoad Installation	2-11
2.2.4 ShakeCast ROVER Edition Installation.....	2-11
2.3 Confirm Installation	2-11

3.	ROVER 2 Management Activities	3-1
3.1	How to Start and Login to the ROVER 2 Server.....	3-1
3.1.1	Locate the ROVER 2 Start Server Program	3-1
3.1.2	Start the ROVER 2 Server.....	3-1
3.1.3	Login to the ROVER 2 Server.....	3-2
3.1.4	Stop the ROVER 2 Server	3-3
3.2	Creating and Managing Accounts.....	3-4
3.2.1	Two Systems with Similar Account Management	3-4
3.2.2	Add New Screener (or Inspector).....	3-5
3.2.3	User Account Role Assignment.....	3-7
3.2.4	View List of Currently Active Screeners or Inspectors.....	3-8
3.2.5	Edit Any Active Screener or Inspector	3-8
3.3	Site Maintenance: FEMA 154 (Pre-Earthquake).....	3-9
3.3.1	Add a New Site: FEMA 154 (Pre-Earthquake)	3-10
3.3.2	View List of Active Sites: FEMA 154 (Pre-Earthquake).....	3-10
3.3.3	Assigning a Site to a User: FEMA 154 (Pre-Earthquake).....	3-11
3.3.4	Deleting a Site: FEMA 154 (Pre-Earthquake).....	3-12
3.3.5	Worksheet Activities: FEMA 154 (Pre-Earthquake).....	3-13
3.4	Site Maintenance: ATC-20 (Post-Earthquake).....	3-13
3.4.1	Add a New Site: ATC-20 (Post-Earthquake)	3-13
3.4.2	View List of Active Sites: ATC-20 (Post-Earthquake)	3-14
3.4.3	Assigning a Site to a User: ATC-20 (Post-Earthquake)	3-15
3.4.4	Deleting a Site: ATC-20 (Post-Earthquake)	3-16
3.4.5	Evaluation Activities: ATC-20 (Post-Earthquake)...	3-16
3.5	RedROVER Module.....	3-16
3.5.1	Checking the Correctness of Building Data	3-18
3.5.2	Configuring Building Data for Export to HAZUS-MH	3-18
3.5.3	Preparing the HAZUS-MH AEBM Database.....	3-21
3.5.4	Importing Data into HAZUS-MH AEBM.....	3-23
3.6	ShakeCast ROVER Edition Module.....	3-24
4.	FEMA 154 (Pre-Earthquake) Screener Activities.....	4-1
4.1	The FEMA 154 (Pre-Earthquake) Module	4-1
4.1.1	Logging In	4-1
4.1.2	System Selection.....	4-2
4.1.3	Main Menu	4-2
4.1.4	View List of Active Sites: FEMA 154 (Pre-Earthquake).....	4-2
4.1.5	Modify Site Data	4-3
4.1.6	Add, Edit and View Worksheet.....	4-4
4.1.7	Special Worksheet Features.....	4-5
4.2	Best Practices for Screeners.....	4-7
5.	ATC-20 (Post-Earthquake) Inspector Activities.....	5-1
5.1	The ATC-20 (Post-Earthquake) Module	5-1
5.1.1	Logging In	5-1

5.1.2	System Selection	5-2
5.1.3	Main Menu	5-2
5.1.4	View List of Active Sites: ATC-20 (Post-Earthquake).....	5-2
5.1.5	Modify Site Data.....	5-3
5.1.6	View an Existing FEMA 154 Worksheet.....	5-4
5.1.7	Add, Edit Rapid Evaluation.....	5-4
5.1.8	Add, Edit Detailed Evaluation.....	5-6
5.1.9	Special Evaluation Form Features.....	5-9
5.2	Best Practices for Inspectors	5-9
Appendix A: Differences between FEMA 154 and ROVER		A-1
A.1	Site hazard	A-1
A.2	Site Soil	A-1
A.3	Negative Scores.....	A-2
Appendix B: FEMA 154 URM Scoring Issues		B-1
Appendix C: ROVERLoad (Importing Building Data into ROVER 2).....		C-1
C.1	Introduction	C-1
C.2	Installing Python Software	C-1
C.3	Creating the Data File.....	C-2
C.4	Saving the Data File and the Python Import Script.....	C-4
C.5	Obtaining the URL and Credentials for the ROVER 2 Server	C-5
C.6	Importing your Data, Case 1: Using ROVER 2 Server on a Personal Computer	C-5
C.7	Importing your Data, Case 2: Using ROVER 2 Server on a Windows Server or Hosted by a Service Provider	C-11
References.....		D-1
Project Participants		E-1