

FEMA ROVER Version 2, a Mobile Earthquake Safety Software

FEMA has released Version 2 of Rapid Observation of Vulnerability and Estimation of Risk (FEMA P-154 ROVER CD Version 2), a free, mobile software for pre-earthquake building screening for potential seismic hazards and post-earthquake rapid building evaluation for safe occupancy. ROVER uses the *de facto* international paper-and-clipboard standards developed by the Applied Technology Council (ATC) for pre- and post-earthquake building safety screening: FEMA 154, Rapid Visual Screening of Buildings for Potential Seismic Hazards, A Handbook, 2nd Edition, and ATC-20-1 Field Manual: Postearthquake Safety Evaluation of Buildings, 2nd Edition.

Unlike a paper-based methodology, ROVER looks up site-specific seismic hazard and soil conditions from its built-in hazard and soil databases, offers a built-in electronic database for storing building-inventory data, captures and stores unlimited digital captioned photos, operates on any mobile device with a browser and active data connection, and exports to FEMA's Hazus-MH software and the USGS's ShakeCast ROVER Edition (see Figure 1). As Hazus-MH and ShakeCast have no native field-data collection tools, ROVER ties these three programs together and serves as a data-collection need for ShakeCast and Hazus-MH users (see www.hazus.org for more information on Hazus-MH). The ROVER Ready Alliance, a community-based user group, has been established to network among users and share ROVER project experience and information about features, functionality, and resources.

New Features of ROVER Version 2

FEMA released ROVER Version 1, FEMA P-154 ROVER CD, in October 2011. Since then, all 1,500 copies of the ROVER Version 1 CDs have been shipped to customers and 900 customers have downloaded the software from www.roverready.org. Version 1 employed Windows Mobile phones that synchronize their data with a server on a Windows PC or other desktop system. The new ROVER Version 2 includes many productivity-enhancing features. The updated software suite now works on any mobile device, such as Android, iPhone, iPad, and Windows Phone, with a web browser and active data connection. Version 2 requires no software on the mobile device other than a web browser, and allows the user to transmit field data immediately to the software, which can reside in the user's office or virtually

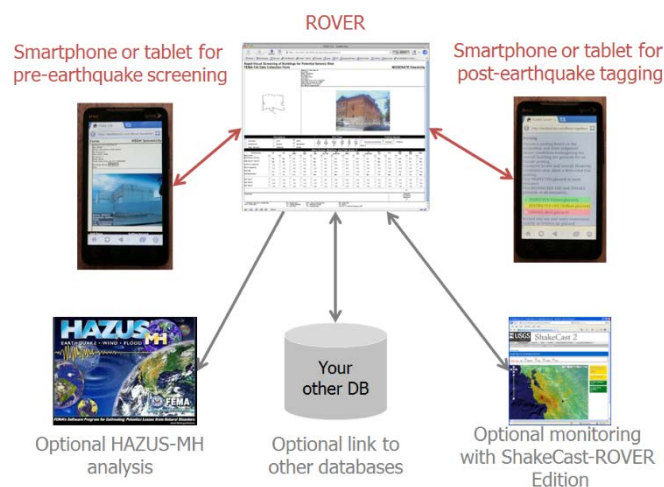


Figure 1. ROVER resides on a Windows or other web-accessible PC. Engineers, architects, and building professionals collect field data about buildings via a smartphone, tablet, or other mobile device with a data connection, via the device's web browser. Field data can be gathered before an earthquake to screen buildings for potential seismic hazards using ROVER's FEMA 154 module. ROVER can be used as part of a post-earthquake safety tagging process using its ATC-20 module. ROVER exports data to Hazus-MH for optional safety assessment, or to USGS's ShakeCast ROVER Edition for earthquake monitoring. Other software can interact with ROVER via an application programming interface built into ROVER.

anywhere in the world. Version 2 also adds unlimited photos to the ATC-20 rapid and detailed post-earthquake forms. When a building that has been screened before an earthquake is evaluated after an earthquake using ATC-20, ROVER puts overlapping data in the ATC-20 form: address, occupancy, number of stories, and pre-earthquake photos.

The new ROVER Version 2 also improves photo handling, which is useful for high-resolution images, limited data rates, and when large numbers of people are inserting data at the same time. In addition, the training material and user manual have both been updated and now include instructions on batch-loading a pre-existing database and instructions on the use of the RedROVER software, which exports ROVER data to Hazus-MH's Advanced Engineering Building Module. Additional guidance has been developed on how to get "ROVER Ready," *i.e.*, how to be prepared to use ROVER either before or after an earthquake. The ROVER Ready

Alliance has also established a ROVER Users Group on LinkedIn, <http://linkd.in/1coCSBM>.

The new FEMA P-154 ROVER CD, Version 2 (see Figure 2), is available from the FEMA Publications Warehouse by calling 1-800-480-2520. The software is also available from the website of the ROVER Ready Alliance, www.roverready.org, which offers documentation and guidance on how to implement ROVER in a broader seismic risk-management program and serves as a point of reference for users to try ROVER. Readers should note that the USGS plans to replace ShakeCast Version 2 by the end of 2014 with a new version that incorporates ROVER-related capabilities.



Rapid Observation of Vulnerability and Estimation of Risk

FEMA P-154 ROVER CD, Version 2, September 2014



Figure 2. FEMA P-154 ROVER CD, Version 2

Communities Using ROVER

To date, ROVER has been successfully tested and used in a number of communities across the United States. In Utah, ROVER has been used to refine an inventory of 2,500 possibly unreinforced masonry bearing-wall buildings to help update the state's catastrophic earthquake support plan. Utah had previously performed a pilot inventory of 128 school buildings, which led to a report that supported ongoing legislative efforts to inventory all public schools. Those efforts eventually resulted in two significant pieces of legislation in 2013 to advance the seismic safety of Utah's school buildings. The Public Schools Seismic Safety law requires that school districts requesting bond funds perform FEMA 154 rapid visual screening of all their buildings constructed before 1975 and provide the data to

the Utah Seismic Safety Commission. The second legislation passed in 2013 was a one-time line item for a FEMA 154 rapid visual screening of all K-12 Utah schools. Both programs are using ROVER for data collection and evaluation.

ROVER also has been used by the Wyoming Office of Homeland Security to inventory critical buildings and was recently adopted by officials in South Carolina for pre-earthquake rapid visual screening of buildings. The Northern California chapter of the Earthquake Engineering Research Institute (EERI) exercised the new ROVER form for a few hundred buildings in Albany, California, and the California Office of Emergency Services is training its Safety Assessment Program Evaluators in the use of ROVER.

Training Programs and Opportunities

ROVER is now an important and in demand component of FEMA's National Earthquake Technical Assistance Program (NETAP), which is designed to help state, local, and tribal governments obtain the knowledge, tools, and support they need to plan and implement earthquake mitigation strategies. In July 2014, FEMA, South Carolina, and local engineers received FEMA training on FEMA 154, ATC-20, and ROVER under NETAP. Over the course of three days after the training, the team used ROVER to compile a pre-earthquake inventory of all Charleston's public school buildings (other than trailers).

In Shelby County, Tennessee, a project is planned that will be the first time ROVER is used in the central United States. The FEMA 154/ROVER training at the Shelby County Emergency Operations Center is in support of a local community's interest for a potential seismic inventory project of school buildings. The Central United States Earthquake Consortium (CUSEC), FEMA Region IV, the ROVER project team, and FEMA NETAP coordinated and helped to support the training. Other communities interested in learning how to use ROVER, or that plan to conduct seismic risk assessment for their building stocks, should contact FEMA NEHRP for possible training support (see www.fema.gov/earthquake-training/national-earthquake-technical-assistance-program).

For more information, visit www.nehrp.gov or send an email to info@nehrp.gov.



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