



The FEMA Building Science Branch

2014 in Review



FEMA

Cover Photo

*August 29, 2014, Napa, California. Damage to buildings in downtown Napa, California, prompted the city to fence off streets and close down businesses after a 6.0 earthquake rocked the city on August 24, 2014.
Photo by Eilis Maynard/FEMA*

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WHO WE ARE

The Building Science Branch leads FEMA's efforts to provide communities across the United States with technical guidance to reduce loss of life and property damages from earthquakes, floods, hurricanes, tornadoes, and other natural hazards. The Branch resides in the Risk Reduction Division of FEMA's Federal Insurance Mitigation Administration (FIMA) and is staffed by highly skilled national experts on building codes, disaster-resistant construction techniques, and post-disaster rebuilding strategies. The Branch and its partners help to implement and promote the National Earthquake Hazards Reduction Program (NEHRP), the Mitigation Assessment Team (MAT) Program, and the adoption of model building codes. The Branch also provides technical support to the National Flood Insurance Program (NFIP) and develops and delivers resources in support of local multi-hazard risk reduction implementation.

WHAT WE DO

FEMA's Building Science Branch has the lead role in the development, production, and promotion of more than 220 resources that incorporate the most up-to-date building codes, seismic design and retrofitting criteria, and floodproofing and wind design requirements for new construction and the repair of existing buildings. These resources include publications, guidance, technical reports and studies, tools, training courses, outreach materials, technical bulletins, and recovery advisories.



May 7, 2014, Mayflower, Arkansas. Tornado debris and damage on Dam Road in Mayflower following severe storms and a tornado on April 27. FEMA supports State, local, and tribal governments in their recovery efforts following a natural disaster. Photo by Christopher Mardorf/FEMA

In recognition of their work, three Building Science staff received the International Code Council (ICC) Community Service Award, an award for outstanding service in the building safety industry. The products of the Branch also were recognized with four Communicator awards, the leading international awards program recognizing innovative ideas in marketing and communications; a Silver Mercury Excellence Award in the Special Products Category for the FEMA Earthquake School Hazard Hunt Game; and three Ava Digital Awards, which recognize excellence by creative professionals for the concept, design, and production of digital communication.

Branch staff frequently provides technical guidance to disaster-affected areas through workshops, in-person meetings and on-site support, and outreach events. Equally important is the work of the Branch in deploying MATs to conduct post-disaster

engineering investigations and its work with code and standards organizations and State and local building officials to develop and encourage the adoption of disaster-resistant building codes.

Branch Products and Activities in 2014

- New and revised publications, guidance, software, and Recovery Advisories: 12 +
- Publications and other resources distributed to customers via the FEMA Warehouse: 170,000 +
- Technical reports and studies: 10 +
- Flyers and Fact Sheets: 5 +
- Articles: 12 +
- GovDelivery Announcements: 25 +
- Presentations at exhibitions at conferences and meetings: 30 +
- Training courses developed: 5
- Training courses held: 120 +
- People trained: 7,000 +
- Helpline: 470 + responses to inquiries

ACCOMPLISHMENTS

The following projects, resources, and initiatives illustrate how the Branch and its partners made progress toward disaster loss-reduction nationwide in 2014.

Building Codes

Support for the 2015 International Codes Process

The Building Science Branch helps to promote disaster-resilient communities through its support of national building code and standards organizations such as the ICC. This work is an important part of FEMA's overall mission to help the Nation prepare for and protect against all natural and man-made hazards that pose a threat to life and property.

First released in 2000, the International Codes (I-Codes) are a set of construction codes that address building, fire, plumbing, mechanical, fuel gas, property maintenance, zoning, and energy efficiency. The 2015 I-Codes reflect the

most advanced building science construction methods and practices to achieve resiliency, safety, innovation, and affordability in the built environment.



The Building Science Branch monitors the Nation's model building codes by reviewing proposed changes for the International Codes (International Building Code (IBC), International Residential Code (IRC), International Existing Building Code (IEBC), and others) to identify those which have a positive or negative impact on disaster resistance building performance. In 2014, Branch staff testified at code hearings to obtain favorable outcomes for those changes resulting in no loss of overall flood, wind, or earthquake-related disaster resistance of the provisions of relevant I-Codes, including their equivalence with the minimum *NEHRP*

Recommended Seismic Provisions for New Buildings and Other Structures and requirements of the NFIP. For the 2015 I-Codes, FEMA flood and wind-related proposals demonstrated a 75 percent rate of approval and seismic-related testimonies had a success rate of more than 90 percent.

In September 2014, the Branch released the fourth edition of *Reducing Flood Losses through the International Codes: Coordinating Building Codes and Floodplain Management Regulations*. This guide is intended to help State and local officials integrate the I-Codes into their current floodplain regulatory processes related to structures, buildings, and other development to meet requirements for participation in the NFIP. This update includes three model ordinances prepared by FEMA which are coordinated with the flood provisions of the I-Codes.



October 27, 2014. Image created to provide a visual representation to commemorate the second anniversary of Hurricane Sandy. Photo by Delia Husband/FEMA

As a result of the findings in the *Mitigation Assessment Team (MAT) Report – Spring 2011 Tornadoes*, FEMA P-908, May 2012, and FEMA's participation in the code development process, the 2015 IBC requires ICC 500 storm shelters in high-wind regions (250 mph tornado wind speed zones) for new schools and other critical facilities, such as police stations and fire stations. The ICC 500 Standard for the Design

and Construction of Storm Shelters is based on early editions of *Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business*, FEMA P-320, and *Design and Construction Guidance for Residential and Community Safe Rooms*, FEMA P-361. The new fourth editions of FEMA P-320 and P-320 CD were published in December 2014. The third editions of FEMA P-361 and P-361 CD will be published in 2015.

The *MAT Report – Hurricane Sandy in New Jersey and New York*, FEMA P-942, November 2013, also helped FEMA's efforts to successfully strengthen flood provisions in the 2015 IRC. The new requirements include:

- Buildings and structures in all flood hazard areas shall have the lowest floors elevated to or above the base flood elevation plus 1 foot, or the design flood elevation, whichever is higher.
- Buildings and structures constructed in whole or in part in coastal A Zones, where designated, shall be designed and constructed in accordance with the V zone requirements of the code.

Updates in the 2015 NEHRP Recommended Seismic Provisions

The NEHRP Recommended Seismic Provisions for New Buildings and Other Structures is a widely recognized seismic code resource document of FEMA. Since 1985, the NEHRP Provisions has played an important supporting role to national building codes and standards. The NEHRP Provisions serves as a research-to-practice platform for NEHRP, both in the implementation of research results and as support for our most important and effective earthquake protection tool – earthquake resistant building codes. When States and communities adopt and enforce current national building codes, the built-in protection against loss of life and property damage from earthquakes helps to achieve NEHRP goals. This

is the foundation for FEMA's 30-year commitment to the NEHRP Provisions.

This role continues with the 2015 edition of the NEHRP Provisions as a seismic code resource focused on translating new research results for improving the ASEC/SEI 7 Minimum Design Loads for Buildings and Other Structures, now the national design standard that is directly referenced by the IBC – the model code adopted by all 50 States and most local communities. The new Provisions will provide more than 40 recommended technical changes developed and consensually approved by the Provisions Update Committee, Issue Teams, and member organizations of the Building Seismic Safety Council. The major changes



August 26, 2014, Napa, California. At least 103 structures were tagged "RED" by inspectors as unsafe to enter after the earthquake. Photo by Christopher Mardorf/FEMA

include a complete rewrite of seismic-response-history procedures, revised soil structure interaction for seismic design, a new alternative diaphragm design procedure, revised design requirements for seismically isolated structures and structures with damping systems, updated site coefficients and new requirements for foundations on liquefiable sites, adoption of new U.S. Geological Survey (USGS) seismic hazard maps for seismic design, strength design of foundations, update of modal analysis procedure, adoption of methodologies as alternatives for seismic qualification of new

systems and components, and a revision of the intent of the Provisions. All of these changes also will be brought to the ASCE 7 Seismic Subcommittee to be considered for adoption into ASCE 7-16. The tentative FEMA publication date for the 2015 NEHRP Provisions is mid-2015.

Estimating Damages to Structures

Communities participating in the NFIP are required to determine if damage to structures within a Special Flood Hazard Area meets the criteria for Substantial Damage. These communities, however, often have difficulty determining whether residential structures (single-family homes, town or row houses, and manufactured homes) and non-residential structures (office buildings, strip malls, and restaurants, among others) have been damaged. This difficulty can be magnified after a major flood or other disaster where a large number of structures have been damaged and there is the need to provide timely Substantial Damage determinations so that reconstruction can begin.

The Substantial Damage Estimator (SDE) tool was developed by FEMA to assist State and community officials with this responsibility and to formalize a FEMA-accepted approach for obtaining Substantial Damage determinations for structures. The SDE Version 2.1.0 allows community officials with limited appraisal or construction backgrounds to develop reasonable estimates of structure values and damage in accordance with NFIP requirements. The SDE tool provides users with a single location for the storage of data collected as part of the Substantial Damage determinations, and allows for the import of multiple records from an outside database at one time. The target users of the SDE tool are local and State officials responsible for meeting NFIP requirements. The tool also may be used by contractors, lending agencies, and potential

purchasers of structures to assess the overall percent of structure damage and to determine a general estimate of repair costs.

Losses Avoided Study

Communities are known to benefit from adopting and enforcing disaster-resistant building codes. However, until now, there has been no practical methodology for quantifying the broad range of losses avoided realized from adhering to disaster-resistant codes.

In June 2014, Branch staff completed the Phase 2 Regional Study: Losses Avoided as a Result of Adopting and Enforcing Hazard-Resistant Building Codes. The Phase 3 Losses Avoided National Methodology was completed in September 2014. This project work presents the culmination of three years of research to create a methodology to model the losses avoided, on a local to national scale, resulting from the adoption of the I-Codes.

Promoting and Monitoring the Adoption of Building Codes

The Branch promotes building code adoption in partnership with the ICC, standards groups, the design industry, and research institutes and through cooperative agreements with the Federal Alliance for Safe Homes (FLASH), the four Regional earthquake consortia, and the Earthquake Engineering Research Institute (EERI). Branch staff also works with other FEMA programs to integrate building codes and standards in the NFIP and into Grants policies and requirements.

The Branch uses the Building Code Effectiveness Grading Schedule, a tool owned by the Insurance Services Organization, to evaluate and score local building code departments for code adoption and enforcement for insurance credit every five years. FEMA has purchased the use of the data to track the rate of code adoption and report performance to FEMA, the Department of

Homeland Security, and the Office of Management and Budget. A performance goal for the Branch is to increase the percent of communities in hazard-prone areas (earthquake, flood, and wind) that have adopted disaster-resistant building codes. In 2013, 57 percent of the communities in high-earthquake-, flood-, and wind-prone areas had adopted disaster-resistant building codes equivalent to the I-Codes. By 2014, this percentage had increased to more than 60 percent.



March 20, 2014, Sea Bright, New Jersey. New Jersey Institute of Technology student volunteers pick up trash off Sea Bright streets to aid Jersey Shore's recovery from Hurricane Sandy. Photo by Rosanna Arias/FEMA

Training

The Building Science Branch is continually developing and updating training courses for its many audiences, conducting training in venues across the United States and via webinars, and sponsoring and hosting training through programs such as the National Earthquake Technical Assistance Program (NETAP). All told, training conducted, hosted, or sponsored by the Building Science Branch reached more than 7,000 constituents in 2014. More constituents were trained independently through educational training tools developed by the Branch, such as *Multi-hazard Mitigation and Design Concepts: Wind, Flood, and Earthquake*

Training Videos, FEMA P-940 CD, March 2014, and *Home and Business Earthquake Safety and Mitigation*, FEMA P-909 CD, June 2014.

Through NETAP, the Branch supports training in earthquake mitigation topics at the State and local level. The courses are conducted by the Applied Technology Council (ATC), under contract to FEMA, and are designed for State and local building personnel, facilities managers, and other groups. Training topics are related to the mitigation of earthquake risk and include ATC-20, FEMA 154, FEMA E-74, FEMA P-646, FEMA P-807, and FEMA P-154 ROVER, Rapid Observation of Vulnerability and Estimation of Risk. NETAP-supported training is provided on site, with courses typically one day or less in duration, and via webinars.

In 2014, in-person training was provided through NETAP via 80 courses to participants in 14 States and U.S. Territories. FEMA also supported earthquake training through its cooperative agreements with the four earthquake consortia. For example, the Central United States Earthquake Consortium (CUSEC)

worked with FEMA and other partners, including the Insurance Institute for Business & Home Safety (IBHS), FLASH, and local emergency management, to develop and host a Building Code Public Forum for about 80 local officials and public and building design professionals. Speakers included representatives from FLASH, IBHS, New Zealand, local government, the private sector, and CUSEC. Under contract with EERI, the Branch also sponsored four technical education seminars on Next Generation Attenuation (NGA) for Seismic Mapping in the West. The seminars were done in conjunction with the Pacific Earthquake Engineering Research Center, and were held in Salt Lake City, Long Beach, Seattle, and San Francisco.

The Branch offered an extensive portfolio of training courses, workshops, and webinars for communities and homeowners on how to build stronger and minimize damage from wind, flood, coastal environment hazards, and wildfires. Some of the courses and workshops, which are typically offered in the field or at conferences by Branch staff, are listed below.

Selected Branch Training in 2014

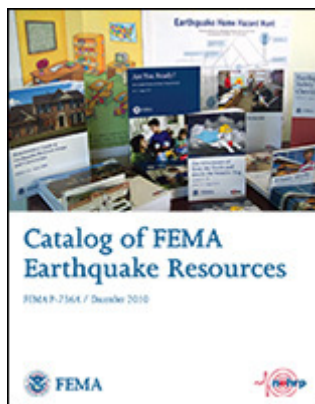
- FEMA Refuge Evaluation and Safe Room Design 101, training for professional engineers and architects on how to assess the best locations in buildings to serve as areas of refuge during a tornado or other extreme weather event. Eight courses held in January – March 2014.
- Coastal Construction Workshops, seven workshops held for about 250 construction professionals in FEMA Region I in July – September 2014.
- Introduction to Residential Coastal Construction, IS-00386, an independent study course for design professionals and community officials on *Coastal Construction Manual*, 4th Edition, FEMA P-55. The course was completed by 327 participants.
- 2015 Flood Codes, Standards, and Building Science Tools, a workshop on the flood provisions of the updated 2015 IRC and upcoming ASCE 24-14, Flood Resistant Design and Construction. Presented for the first time on September 30, 2014 at the ICC Annual Conference in Florida.

- Applying ASCE 24 Engineering Standards to HMA Projects, a webinar offered in August 2014 on FEMA’s implementation guidebook completed in November 2013.
- Flood Resistant Design CodeMaster, an eight-page laminated quick guide for building officials. An online webinar was held May 14, 2014.

Guidance and Tools

The Building Science Branch owns the majority of the agency’s publication portfolio, managing more than 220 multi-hazard publications for a variety of stakeholders, including homeowners, businesses, schools, non-profit organizations, government agencies, engineering and design professionals, and building code officials. See these links to view Branch publications:

<http://www.fema.gov/building-science-publications> and <http://www.fema.gov/earthquake-publications>.



In addition to the FEMA-numbered publications listed on the next page, Building Science published technical papers and reports; developed flyers, web pages, guides, and fact sheets to assist State and local

officials, homeowners, and design and construction professionals with mitigation and recovery; and authored articles in technical and industry journals. Branch publications are made available through the FEMA Publications Warehouse and online. In 2014, more than 170,000 Branch publications were distributed to FEMA customers.

In 2012 and 2013, two customer surveys were performed jointly by CFI Group and Federal

Consulting Group of the Department of the Interior to assess overall customer experience and satisfaction (value, use, and other related activities) with the Branch’s publications. The strong overall customer satisfaction scores of 82 and 84 found in the surveys are significantly higher than the average score of 67 for the services and products of other Federal agencies. In 2014, year 3 of the survey, the study focused on 18 non-technical publications. These survey results include the following:

- For the third year in a row, overall satisfaction among Branch customers was rated exceptional. In 2014, those who ordered at least 1 of the 18 publications posted a Customer Satisfaction Index (CSI) score of 83, a full 16 points above the overall government CSI score.
- CSI driver scores continue to perform at exceptional levels, with customers registering very favorable perceptions of Printing and Technical Quality, Ordering Process, Technical Content, and Value.
- Satisfaction with Branch publications is high across customers of all educational levels, as well as across different types of actions taken.

The survey project also provides data on where (by State and U.S. Territory) Building Science Branch resources are ordered by declared disasters.

New and Revised Branch Publications and Guidance

- *MAT and BPAT Reports Compilations*, FEMA P-905 DVD, January 2014
- *Floodproofing Non-Residential Buildings*, FEMA P-936, July 2013, printed March 2014
- *Multi-hazard Mitigation and Design Concepts: Wind, Flood, and Earthquake Training Videos*, FEMA P-940 CD, March 2014
- *Homebuilders Guide to Earthquake Resistant Design and Construction*, FEMA P-232 CD, June 2006, printed May 2014
- *Evaluation of Earthquake Damaged Concrete and Masonry Walls*, FEMA 306/307/308 CD, May 1999, printed May 2014
- *Home and Business Earthquake Safety and Mitigation: A Train-the-Trainer Course*, FEMA P-909 CD, June 2014
- *Homeowners Guide to Retrofitting*, Third Edition, FEMA P-312 and P-312 CD, June 2014
- *Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide*, Fourth Edition, FEMA E-74 CD, December 2012, printed August 2014
- *Formal Observation Report – Tornado: Moore, Oklahoma, May 20, 2013 – Safe Room Performance, Observations, and Conclusions*, FEMA P-1020, August 2014
- *ROVER Version 2*, FEMA P-154 ROVER CD, September 2014
- *Earthquake Home Hazard Hunt Poster*, FEMA V-528, September 2014
- *Drop, Cover and Hold On Poster* (English and Spanish Editions), FEMA V-529, September 2014
- *NEHRP Recommended Seismic Provisions for New and Existing Buildings: A Compendium*, FEMA P-753 DVD, September 2014
- *Substantial Damage Estimator Version 2.1 Tool and User Manual*, FEMA P-784, September 2014
- *Emergency Power Systems for Critical Facilities*, FEMA P-1019, September 2014
- *Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business*, FEMA P-320 and P-320 CD, December 2014
- *Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business*, FEMA L-233, December 2014

Outreach and Awareness

Awareness and education campaigns, public messaging, and other outreach activities are essential tools in the FEMA mission to help the public prepare for and protect against natural disasters. The Building Science Branch conducts and supports a broad range of outreach activities for many audiences, from awareness day events and exhibits and workshops at home building supply stores to non-structural animation videos and interactive games for kids. Each year, the Branch also exhibits and presents at numerous hazard-related conferences and expositions across the United States.

Some of the Branch work in outreach is described below. Information on many other Branch programs and events can be found on the FEMA website at www.fema.gov/blog-newsroom-videos-photosch.

National Building Safety Month

National Building Safety Month is a public awareness campaign held each May for the last 34 years. Founded by the ICC, the Building Safety Month campaign focuses on public outreach and education to increase the overall safety and sustainability of buildings through the adoption of modern building codes and the promotion of code enforcement. For the 2014 Building Safety Month, FEMA hosted

community events and conducted an array of outreach activities in support of the 2014 theme, “Building Safety: Maximizing Resilience, Minimizing Risks.”



May 2014, Washington, D.C. The safe room exhibit at the National Building Museum’s “Designing for Disaster” exhibit. Photo courtesy of the Washington Post

Beginning in May 2014, FEMA supported the “Designing for Disaster” exhibition at the National Building Museum in Washington, D.C. The exhibition, which runs through August 2015, investigates how and where to build communities that are safer and more disaster-resilient. Activities at the National Building Museum sponsored by FEMA included the distribution during a workshop this August of teaching kits to educators from the District of Columbia, Maryland, and Virginia. The kit teaches students in grades 7-9 about the tools used by design professionals to lessen the effects of natural disasters on structures, communities, and people.

A Presidential Proclamation for Building Safety Month was issued for the fourth time in 2014. The Building Science Branch championed the original effort for a Proclamation, which emphasized that building safety is a critical component of personal and public safety and the collective responsibility of the Nation to implement effective codes and standards to sustain safe and resilient structures.

20th Anniversary of the Northridge Earthquake

In January 2014, FEMA participated in the Northridge 20 Symposium commemorating the 20th anniversary of the Northridge earthquake. Branch staff served on the Symposium Organizing Committee and co-organized and co-moderated the Wood Frame and Soft Story Buildings Session. The Symposium featured eight presentations on FEMA products and related work. Staff exhibited at the Symposium and distributed several hundred FEMA publications.



January 2014, Los Angeles, California. Banner for the Northridge 20 Symposium.

FEMA Headquarters and Regional staff also participated in many other conferences and workshops, including the July 2014 10th National Conference on Earthquake Engineering, held in conjunction with the EERI Annual Meeting and commemorating the 50-year anniversary of the 1964 Alaska earthquake and tsunami. Staff served on the Conference Organizing Committee and moderated a Plenary Session on Mega-Disasters: Planning and Design for An Unsettled Planet, and a concurrent session on Tsunami Risk Assessment, which featured four talks on the new FEMA Tsunami HAZUS module. The Symposium featured 12 presentations on FEMA products and related work. FEMA also shared a display booth with ATC and distributed its new popular Earthquake Program flash drives and hundreds of FEMA publications.

Cooperative Agreements

FEMA works in close partnership with the States and organizations such as EERI, FLASH, the Southern California Earthquake Center (SCEC), and the four Regional earthquake consortia: the Northeast States Emergency Consortium (NESEC), CUSEC, the Western States Seismic Policy Council (WSSPC), and the Cascadia Regional Earthquake Workgroup (CREW). The earthquake consortia are long-time partners of FEMA and play an invaluable role in coordinating multi-State response and recovery planning and in public awareness, education, and outreach. The consortia are also very active partners in the ShakeOut earthquake drills that take place across the United States.

An important focus of these cooperative agreements in 2014 was support to the States. FEMA coordinates with these grantees to help carry out local and Regional earthquake risk reduction, including mitigation planning, property inventory and inspection of critical facilities, updating building codes and zoning ordinances, outreach and education, and the development of multi-State groups in support of local earthquake and other multi-hazard initiatives.

ShakeOut

On October 16, 2014, at 10:16 a.m. local time, millions of people around the world participated in the Great ShakeOut earthquake drill, an annual event held since 2008 to promote earthquake readiness by practicing “Drop, Cover and Hold On” and other aspects of emergency plans. This year, more than 26 million people participated in ShakeOut activities, including participants from 47 States and U.S. Territories and 27 Regions worldwide. For the first time, New Mexico participated in ShakeOut, along with Quebec and the Yukon Territory, and Colorado, Montana, and Wyoming had separate sites (all had previously participated as part of the Rocky Mountain

ShakeOut). In addition, Kansas was added to the Central US ShakeOut and Florida joined the Southeast ShakeOut.



October 16, 2014, Falmouth, Kentucky. At the Preschool Center in Falmouth, Head Start children “hold on” during the October 16, 2014 ShakeOut. Photo by Mary Perry/FEMA

The success of ShakeOut is due in part to direct financial support from FEMA NEHRP and the very active involvement and support from FEMA Preparedness, Regional staff, the Earthquake Country Alliance, SCEC, the USGS, the four Regional earthquake consortia, State Earthquake Program Managers, the private sector, and many others. All FEMA Regional offices and FEMA Headquarters participated in ShakeOut this year, and FEMA staff spoke at ShakeOut events held at the National Building Museum and the Washington National Cathedral in Washington, D.C., which sustained more than \$20 million in damages from the August 2011 earthquake.

Disaster Support

Deployment of Mitigation Assessment Teams

FEMA’s MATs conduct engineering analyses after major natural disasters to assess damage to government facilities, homes, businesses, and other structures, and to determine the causes of structural failures and successes. Based on a comprehensive analysis of data, the teams prepare recommendations related to construction codes and standards, building design issues, and best practices that

communities and the construction industry can use to reduce damages in future disasters.

Although there were no MAT deployments in 2014, Branch staff conducted five Hurricane Sandy MAT briefings in late 2013 and completed work on the *MAT Report - Hurricane Sandy in New Jersey and New York*, FEMA P-942 and FEMA P-942 CD. This report documents observations made during field visits conducted by the MAT to evaluate building damages and presents recommendations for disaster-resistant practices in hurricane-prone regions related to building codes and standards; flood protective measures; residential construction; critical facilities and key assets; and mechanical, electrical, and plumbing systems. The recommendations in FEMA P-942 are applicable to planners, designers, building officials, government officials, building owners and operators, emergency managers, and homeowners.

As property owners rebuild, it is important for them to not only consider mitigation measures that can reduce their risk for flood damage from a future flood event, but also to understand how these mitigation measures affect their flood insurance premiums. Hurricane Sandy Recovery Advisory 7, *Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A*, provides information to residential property owners interested in reducing their flood risk and NFIP flood insurance premium for residential buildings located in Zone A. In addition to describing mitigation measures such as elevation and filling in a basement, the Advisory includes guidance on modifying or strengthening existing ground floor walls of a single-family home or row house/townhouse.

South Napa Earthquake

At 3:20 a.m. on August 24, 2014, a magnitude 6.0 earthquake struck Napa Valley in California. Within hours, teams of researchers had

gathered in donated rooms at a CalTrans field office to begin capturing data on the earthquake before it could be lost. An analysis of the data and subsequent findings will be further studied to help understand the failures in structures and infrastructure caused by the earthquake. FEMA supported the earthquake clearinghouse through its cooperative agreement with EERI. The clearinghouse was led by the California Geological Survey and included the USGS, the California Seismic Safety Commission, and the California Office of Emergency Services.



August 2014. At work supporting the Napa Valley Clearinghouse. Photo by FEMA staff

Since the MAT program is not currently set up to handle earthquakes, FEMA's investigation of the South Napa earthquake is being done under a special project using ATC and funded under FEMA's NETAP. ATC is using data from a USGS strong-motion recording instrument located in downtown Napa to investigate every building within a 1,000 foot radius, along with several other buildings of interest, using the ATC-38 methodology to compare their performance to the known ground motion and to document mitigation performance. This data will be used to evaluate the performance of seismic retrofitting techniques used on several unreinforced masonry structures as well as non-structural components, which were

responsible for the vast majority of the damage and injuries. The data also will be used to help validate the new FEMA P-58, *Seismic Performance Assessment of Buildings*, and FEMA P-154, *Rapid Visual Screening of Buildings for Potential Seismic Hazards*.

Regional Activities

The FEMA HQ Building Science Branch staff works closely with their counterparts at the Regional level to support partnerships with the States and local communities in implementing and executing NEHRP and multi-hazard risk reduction activities. On a day-to-day basis, FEMA Regional staff support local outreach, training delivery, oversight and execution of cooperative agreements, disaster operations, and technical assistance on local projects. Their active involvement and support ensures that the NEHRP mission, building codes, standards, and other building science principles are

integrated in local mitigation planning, grant decisions, and local activities.

Building Science Helpline

The FEMA Building Science Branch maintains building science and safe room helplines. In 2014, the helplines responded to more than 470 inquiries.

For More Information

For more information on FEMA's Building Science Branch and its publications and resources, and to subscribe to Building Science email updates, see

<http://www.fema.gov/building-science/>

For additional information on FEMA's NEHRP activities and its publications and resources, and to subscribe to FEMA NEHRP email updates, see

<http://www.fema.gov/earthquake/>