WSSPC
WESTERN STATES SEISMIC POLICY COUNCIL

We develop seismic policies and share information to promote programs intended to reduce earthquake related losses.

A non-profit earthquake consortium for the western states

Spring 2018 e-Newsletter

Western States Seismic Policy Council
801 K Street, Suite 1236
Sacramento, CA 95814
Phone: 916-444-6816
Fax: 916- 444-8077

In This Issue

SAVE THE DATE!

WSSPC Annual Meeting and National Earthquake Program Managers Meeting
The WSSPC Annual Meeting and National Earthquake Program Manager's (NEPM) Meeting will be held in Seattle, Washington the week of April 30 – May 4, 2018 at the Downtown Seattle Crowne Plaza Hotel. The first three and a half days will be devoted to the NEPM Meeting and will be followed by the WSSPC Committees, the WSSPC Board, and the Annual Business Meeting May 3 and 4.

April 5 is the Crowne Plaza hotel cut-off date to get the meeting rate of $179. Register here.

April 23 is the last day to register for the NEPM and associated events. There is a registration fee for the NEPM, and the optional Awards Lunch and field trip. Register for the Awards lunch ($30), NEPM ($100) and NEPM field trip ($30) here.

—WSSPC Agenda—

Thursday May 3, 2018
12:30-1:30 P.M. WSSPC Awards in Excellence Lunch
Come support the award winners:

- WSSPC Lifetime Achievement Award – Donald Thomas, Ph.D.
- 2018 Award in Excellence: Use of Technology – U.S. Geological Survey for ShakeMap Scenario Suite
- 2018 Award in Excellence: Non-Profit Agency Efforts – U.S. Resiliency Council for Earthquake Rating System

2-5P.M. NEMA Earthquake Subcommittee Meeting
2-3:30P.M. WSSPC Basin and Range Province Committee
4:30-5:30P.M. WSSPC Engineering, Construction and Building Codes Committee

Friday, May 4, 2018

8-9A.M. WSSPC Board Meeting
8-9:30A.M. WSSPC Tsunami Hazard Mitigation Committee Meeting
9:30-11:30A.M. WSSPC Annual Business Meeting (all WSSPC members invited)

Policy Recommendation Update: The revised policy recommendations are posted on the WSSPC website as Version 3:*http:www.wsspc.org/public-policy/2018-wsspc-draft-policy-recommendations/*. The policies will be approved by the members at the Annual Business meeting on Friday, May 4 in Seattle, Washington (following the NEPM meeting).

A full NEPM agenda is available here.
Information, as it is updated, is found on the *http://www.eqprogram.net* website.

continued on page 2

continued from page 1

—NEPM Agenda—

Monday, April 30, 2018
12-2 P.M. NEPM Field Trip (Bainbridge Island, Seattle Fault)
3-5 P.M. NEPM Registration

Tuesday, May 1, 2018
7:30-8:30A.M. NEPM Registration
8:30 A.M.-5P.M. NEPM

Wednesday, May 2, 2018
8A.M.-5:30P.M. NEPM

Thursday May 3, 2018
8A.M.-12:30P.M. NEPM

NEWS

California Bill Requires Building Departments to Create Inventory of Vulnerable Buildings

Assembly Member Adrin Nazarian of California's 46th District introduced Assembly Bill Number 2681 to the California Legislature in February. AB 2681 would require each building department of a city or county to create an inventory of potentially vulnerable buildings and submit that inventory to the Office of Emergency Services. In addition, AB 2681 requires the Office of Emergency Services to, among other things, "maintain a statewide inventory, create a standard reporting form, prepare a report identifying possible funding mechanisms available to building departments and building owners in complying with these provisions, and report annually to the Legislature on the compliance of building departments with these provisions."

The bill was inspired by the Seismic Resilience Initiative, a working group led by the United States Resiliency Council (USRC) to promote policies and education related to the threats of earthquakes and to protect people and the communities they live in. Evan Reis, Executive Director and co-founder of the USRC explains the four key steps to take in order to create a safer city: education, identification, evaluation, and mitigation. Reis goes on to state that jurisdictions "must know what their risk is in the event of a big earthquake, including how much housing and retail space they will lose."
As of mid-March the bill was referred to the Governmental Organization and Local Government Committees.

References:

http://temblor.net/earthquake-insights/new-california-bill-aims-to-create-a-public-inventory-of-collapse-risk-buildings-6497/

http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB2681

http://usrc.org/files/technicalresource/The%20Case%20for%20Earthquake%20Resilience%20-%20White%20Paper.pdf

RFP For URM Buildings Study in Washington State

The Washington State Department of Commerce is initiating this Request for Proposals (RFP) to solicit proposals from firms interested in participating on a project for a study/inventory regarding suspected unreinforced masonry building in Washington state.
More Information Questions? Contact Noreen Hoban, Management Analyst,
at noreen.hoban@commerce.wa.gov or 360-725.5039.

Download the full RFP.

Alaska Earthquake Increases Spawning Behavior of Pupfish

A 7.9 magnitude earthquake occurred on January 23 in the Gulf of Alaska. The quake shook the state; waves washed along shorelines of British Columbia and California; and a foot tall seiche occurred in an aquifer-fed pool east of Death Valley in Ash Meadows National Wildlife Refuge in Nevada—Devils Hole. Devils Hole is a limestone cavern that is over 500 feet deep and home to the endangered Devils Hole pupfish (a species of the desert pupfish).

The seiche didn't cause any damage; however, some of the Devils Hole pupfish increased their spawning. Spawning in pupfish is easily noticeable because the male pupfish turn a shade of brilliant blue. "The misconception is that the earthquake 'started' the spawning," says ecologist Kevin Wilson. "This is incorrect. Disturbance events like earthquakes and floods increase the spawning behavior of the Devils Hole pupfish." The Devils Hole pupfish had a population of about 550 in 1972 and has decreased to between 110 and 130 today. Due to such a small population even a very slight environmental change can have a great impact.

An effect like this has occurred in Devils Hole in the past. In 2010 and 2012 similar seiches were seen which resulted in comparable pupfish spawning results. To take a closer look at the 2012 seiche watch: *https://www.youtube.com/watch?time_continue=2&v=a6h82PIi_-0*

This video gives more information on the pupfish: *https://www.youtube.com/watch?v=c4lp-QdDuIw*

Images: (top) Devils Hole Pupfish; (bottom) Map of pupfish site in Devils Hole
Source: (top) www.earthtouchnews.com; (bottom) www.earthtouchnews.com

References:

https://www.smithsonianmag.com/smart-news/endangered-desert-pupfish-spawn-wake-alaskan-earthquake-180967961/

https://www.earthtouchnews.com/conservation/endangered/earthquake-in-alaska-shakes-up-endangered-pupfish-in-death-valley/

Record High California Earthquake Retrofit Grant Applications

Registration for the Earthquake Brace + Bolt (EBB) program was closed in late February with over 7,500 California homeowners' applications having been submitted. The EBB program is available to homeowners with qualifying older houses. The program targets homes built prior to 1979 with raised concrete foundations and those with wood-framed (cripple) walls under the first floor. "A brace-and-bolt seismic retrofit braces the cripple walls and bolts the house to its foundation, to help keep the house from collapsing or from toppling off the foundation."

The seismic retrofit grants award up to $3,000. Recipients are randomly chosen to either participate or be placed on a waiting list to be accepted throughout the year. Only 2,000 retrofit grants are available for 2018.

"A record number of Californians signed up for EBB this year, and that is another indication of the growing awareness in our state of the need to become better prepared for the next damaging earthquake," said CEA CEO Glenn Pomeroy.

Reference:

https://earthquakeauthority.com/Press-Room/Press-Releases/2018/Record-number-of-Californians-apply-for-earthquake

https://www.insurancejournal.com/news/west/2018/02/26/481634.htm

https://www.earthquakebracebolt.com/homeownerregistration

BESR/COSG Webinar—Cascadia Megaquake

The National Academies Board on Earth Sciences and Resources' (BESR) Committee on Seismology and Geodynamics (COSG) developed a three part webinar series on the Cascadia Megaquake. The third part of the webinar was held on Friday, March 23. Richard Allen from U.C. Berkeley Seismology Lab, Department of Earth & Planetary Sciences, and Diego Melgar from the University of Oregon, Department of Earth Sciences, presented on emerging opportunities to reduce uncertainty and provide early warning; specifically focusing on ShakeAlert and the challenges ahead for tsunami warnings as a result of a Cascadia event.

Part One took place on Thursday, May 18, 2017; it covered current science on earthquake sources and related hazards. The presenters were Dr. Kelin Wang from the Pacific Geoscience Center, Geological Survey of Canada, and Dr. Joan Gomberg from the University of Washington/U.S. Geological Survey. Part Two covered current strategies to mitigate loss of life; it took place on Wednesday, August 16, 2017. The presenters were Yumei Wang, Geotechnical Engineer with the Oregon Department of Geology and Mineral Industries and Timothy Walsh, Assistant State Geologist, Washington Geological Survey.

Parts 1 and 2 recordings are available on the website. Check back for the Part 3 recording at: *http://dels.nas.edu/global/besr/BESR-Webinar*

PREPAREDNESS

Pacific Northwest Released EEW Outreach Strategy

In March, the *Pacific Northwest Strategy for Earthquake Early Warning (EEW) Outreach, Education, and Training* was released. The 45-page strategy discusses how to effectively implement EEW systems when ShakeAlert eventually goes public in the Pacific Northwest. Earthquake program managers from Washington and Oregon, in coordination with the Cascadia Region Earthquake Workgroup, incorporated input from 100 state, tribal and local stakeholders as well as 300 community members into the strategy to create the goals, objectives and activities.

The *Pacific Northwest Strategy* describes Washington and Oregon's shared vision and goals for EEW. The five keys goals of the strategy are:

1. "Facilitate Oregon's and Washington's involvement in ShakeAlert and EEW
2. Engage and inform federal, state, local, tribal, and private sector decision makers, policy influencers, media, and emergency management/public safety partners on EEW and ShakeAlert
3. Promote opportunities for end users to integrate EEW into their systems and operations
4. Support the education and training of end users on EEW protective actions
5. Assess EEW's ability to reduce injury and loss to life and property."

"Oregon and Washington state, tribal, local and business partners have spent months collaborating on this strategy," said Maximilian Dixon, earthquake program manager for the Washington's Emergency Management Division. "It is our roadmap to reach stakeholders and to educate the public on actions to take when they get a ShakeAlert."

References:

https://mil.wa.gov/blog/news/post/outreach-strategy-on-earthquake-early-warning-system-in-pnw-released-today

https://www.mil.wa.gov/uploads/pdf/emergency-management/wa_or_crew_eewstrategy_final.pdf

There are so many ways to stay connected!

Online- www.wsspc.org
Twitter- @WSSPC
Facebook- www.facebook.com/WSSPC

continued

2018 Plans for West Coast ShakeAlert

Doug Given, U.S. Geological Survey (USGS) National Earthquake Early Warning Coordinator, spoke about the ShakeAlert program at the USGS Public Talk in Menlo Park, California on January 25, 2018.

The ShakeAlert program keys in on two of the important aspects of USGS's Earthquake Hazards Program: providing earthquake notifications and building public awareness. In 2018 USGS plans to install additional stations, continue to improve software of the system to make it more reliable, build public-facing secure servers, continue doing research and development, and develop a plan for communication, education, and outreach. There will also be a limited rollout of ShakeAlert in which several pilot delivery and use applications will begin operations including automated actions and limited public alerting.

Reference:
https://www.youtube.com/watch?time_continue=9&v=C6uPiZuJiCU

How would you like your warning?

One of the communication issues scientists are grappling with is what threshold to use for warning. Public expectations about what the system can or cannot do must be clearly communicated and understood. To receive adequate warning time to take protective actions, the threshold must be set very low.

As earthquakes shaking starts, the signals received are very similar for large and small magnitude earthquakes, as illustrated in the diagram. Waiting for the full development of a large magnitude earthquake reduces the potential warning time. Longer warning times are possible with lower magnitude earthquakes, but the shaking may not be as severe or even felt. While the 'false-alarms' (alerts without shaking due to small magnitude earthquakes) may seem like an inconvenience they could help the public build the muscle-memory needed in order to react at a second's notice.

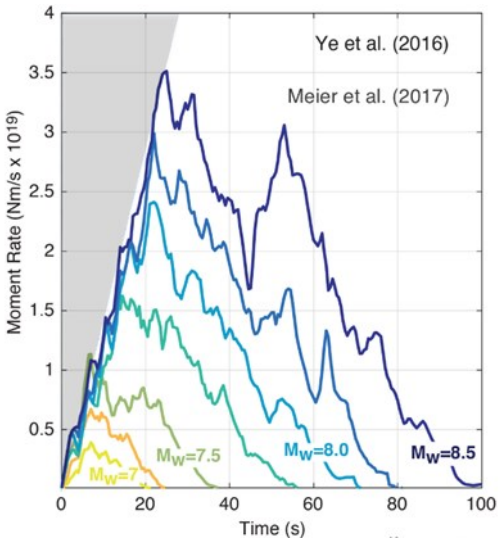


Image: Illustration that the signals from earthquakes with large magnitudes initially appear almost identical to lower magnitude earthquakes. Sources: Meier et al. (2017); Modified by temblor.net

References:

http://temblor.net/earthquake-insights/earthquake-early-warning-early-and-often-or-possibly-late-6638/

Meier, M.-A, et al., 2017, The Hidden Simplicity of Subduction Megathrust Earthquakes: Science 357, 1277-1281, 22 September 2017.

Minson, Sarah E., et al., 2018, http://advances.sciencemag.org/content/4/3/eaaq0504

Parents4Preparedness: Portland Parents want Emergency Stockpiles at Schools

Parents for Preparedness (P4P) is a network of Portland area parents whose priority is to make schools seismically safer and encourage a culture of preparedness within schools. They recently testified before the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) on a number of school seismic safety issues including asking local schools to stockpile emergency supplies. The assumption is that parents may not be able to immediately reunite with their children at school after a large earthquake, so stockpiles should be a part of the consideration of a mass care and shelter plan. "If schools were required or incentivized to keep emergency supplies on school grounds, student and staff basic human needs could be met in the days that it takes for all children to be reunited with their families," Laura Hall (P4P co-chair) testified. "We recommend that schools have basic supplies for at least one-third of their students for 72 hours."

OSSPAC was tasked by the Oregon Legislature to recommend how to care for large numbers of injured and displaced people in an earthquake, and how to increase earthquake insurance coverage. Their report is due in the fall of 2018.

The group (P4P) was formed in 2015 and has grown into 121 members who represent more than 50 schools in the Portland, Oregon area and beyond. P4P members include 21 trained Portland Neighborhood Emergency Team volunteers and 13 school staff or district employees with the remaining members being connected in some capacity to mostly Portland-area schools. They have documented their preparedness work in a "Lessons Learned" compilation that may be helpful for others.

References:

https://www.nwpb.org/2018/03/13/cascadia-earthquake-prep-parents-want-stockpiles-at-schools-to-prepare-for-the-big-one/

https://drive.google.com/file/d/1cIifHUu1_IbH6BIdEn_Jtz5Qx3u7Crnh/view

https://docs.google.com/document/d/1bisSaSfAWqsxr1ge-HU_NGlYSEtviPPE5b0iQkhc6zc/edit

National Earthquake Resiliency Coalition

The National Earthquake Resiliency Coalition is a group formed after the last National Earthquake Conference in 2016 to keep the visibility on earthquakes alive. The group meets every 2 months on a conference call, with the next call occurring on May 17, 2018. The Coalition is led by FLASH who has set up a You Tube channel where videos from the 2016 National Earthquake Conference are available to view.

You can subscribe here:

https://www.youtube.com/channel/UCc_3X9-gk1BwGij8WDM90RA

MITIGATION

Draft National Mitigation Investment Strategy

FEMA released the *Draft National Mitigation Investment Strategy* in January 2018 for public comment. The Mitigation Framework Leadership Group (MitFLG), with membership from federal, state, local, tribal and territorial bodies took on the task of developing the investment strategy. The investment strategy is grounded in three fundamental principles:

- "First, it is important to empower and facilitate individual, community organizations and private sector engagement in promoting the importance of mitigation, to spur innovation in mitigation investments.
- Second, improved collaboration between the public, non-profit sector, government at all levels and the private sector must take place in order to drive decisions towards common goals.
- Third, investment decisions must be backed by trusted, sound data and analysis as to the causes of risk and loss, have buy-in from the public, be cost beneficial, and result in effective risk-reduction."

MitFLG makes a series of recommendations, leading to six desired outcomes:

1. Improved Coordination
2. Increased Investments
3. Shared Fiscal Responsibility
4. Greater Access to Data
5. Risk-Informed Communications
6. Resilient Built Environment.

If each of the desired outcomes are met the nation could be better equipped and less vulnerable to natural hazards.

Reference:

https://www.fema.gov/national-mitigation-framework

https://www.fema.gov/news-release/2018/01/11/fema-releases-draft-national-mitigation-investment-strategy-public-comment

https://www.fema.gov/media-library-data/1515688801146-ef9a42945d292dc6848dc4390dc0b032/Draft-National-Investment-Strategy-for-Public-Comment_Jan2018.pdf

Natural Hazard Mitigation Saves: 2017 Interim Report

The National Institute of Building Sciences recently issued the *Natural Hazard Mitigation Saves: 2017 Interim Report. T*his Interim Report updates and expands its original report Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities which was released in 2005. Two high-level BCRs (benefit-cost ratios) are featured representing the benefits of mitigation achievable through federal grant programs and by exceeding code previsions. The 2017 Interim Report points out that, "In lieu of providing a result based on a limited set of mitigation measures, with the result likely to change as new mitigation strategies are studied and added to the aggregate number, the project team elected to provide BCRs for each strategy individually."

In the first strategy, the Institute's project team reviewed 23 years of federally funded mitigation grants and found that mitigation funding "can save the nation $6 in future disaster costs, for every $1 spent on hazard mitigation."

The second strategy includes results from the examination of a new set of mitigation measures which exceed 2015 International Building Codes (IBC) and International Residential Codes (IRC) and implements the 2015 International Wildland-Urban Interface Code (IWUIC). This new set of mitigation measures "can save the nation $4 for every $1 spent."

By implementing these two mitigation strategies, the project team estimates that 600 deaths, 1 million nonfatal injuries and 4,000 cases of post-traumatic stress disorder could be prevented. Read the full report here.

Mitigation Category	Cost	Benefit	BCR
Riverine Flood	$11.51	$82.00	7:1
Wind	$13.60	$70.00	5:1
Earthquake	$2.20	$5.70	3:1
Wildland-Urban Interface Fire	$0.06	$0.17	3:1
Total for federal grants	**$27.40**	**$157.90**	6:1

Image: Costs and benefits associated with 23 years of federal grants (in $ billions). Source: FEMA

Reference:

https://www.nibs.org/page/mitigationsaves

https://www.fema.gov/media-library-data/1516812817859-9f866330bd6a1a93f54cdc61088f310a/MS2_2017InterimReport.pdf

Hawaii and Oregon Case Studies in Swiss Re Report on Electric Grid

A Johns Hopkins University report, funded by Swiss Re, examined the effects of disruptions to the electric grid using 3 case studies: Hurricane Iniki, Kauai; Cascadia Subduction Zone earthquake and tsunami in Oregon; and a comparable study of the interconnected grid in Canada. The report, titled *Lights Out: The Risks of Climate and Natural Disaster Related Disruption to the Electric Grid,* points out the projected impacts of climate change and natural disasters, and provides ideas to manage the large risks.

Among the infrastructure systems used today, the electric grid is one of the most critical, but it is also the most vulnerable. "According to the North American Electric Reliability Corporation (NERC), of 2,428 total unplanned electric grid outages in the western states in 2015, nearly a quarter were caused by extreme weather events and variability in environment." Financial losses from power outages caused by flooding, hurricanes, and extreme weather in the U.S. have been recorded as $20-55 billion annually (U.S. insurance industry).

Like most states, the electric grid in Oregon is highly vulnerable to natural disasters. Oregon's Public Utility Commission states that in the event of a magnitude 9.0 earthquake, "more than 50 percent of substations would be damaged beyond repair." After a disaster of that magnitude the electric grid would need an estimated two years to restore only 10–20 percent of the electrical grid. Restoration for the whole system could take several years.

In Kauai, the 1992 Hurricane Iniki destroyed "26.5% of transmission poles, 37% of distribution poles, and 35% of the island's 800 mile long distribution wire system." Power was restored to 20% of the island within 4 weeks, but total restoration of services took almost 3 months.

As the effects of climate change become more prevalent the structural integrity of America's electric infrastructure system is being placed under more strain. More destructive storms, increased wildfires, and higher average temperatures will ultimately increase the risk for utilities. In addition, several critical infrastructure systems are highly interdependent. The report states that, "In the event of a major earthquake, damage to road networks can make it impossible to repair transmission and distribution lines, thereby preventing the restoration of all other electricity-dependent lifeline services (water, sewage, and telecommunications)."

Read the full report here.

Reference:

http://www.swissre.com/library/archive/lights_out_the_risks_of_climate_and_natural_disaster_related_disruption_to_the_electric_grid.html

https://www.insurancejournal.com/magazines/mag-features/2017/09/04/462876.htm

Are Portable Classrooms in Utah Putting Kids at Risk?

Utah is no different than the majority of school districts across the county when it comes to overcrowding. School buildings are not big enough to hold the student population, so portables are built as extra classrooms. Portables are low-cost alternatives to constructing newer and bigger schools. Salt Lake County's five school districts operate a combined 604 portable classrooms.

Natalie Grange, an assistant superintendent for the Utah Board of Education explained that the portables are not required to be on a permanent foundation. Grange describes that the portables are placed on rails and tied to bars that extend two-three feet into the soil beneath, in a way that "satisfies safety and seismic requirements."

Leaders of Utah professional engineering groups issued a statement urging more stringent standards be applied to these modular buildings. Anthony Schmid, president of the American Society of Civil Engineers Utah Section; Conrad Guymon, chairman of the Utah Section's Structural Engineering Institute; and Troy Dye, president of the Structural Engineers Association of Utah write, "Unanchored and/or unbraced structures intended for occupancy [permanent use] do not meet the provisions of the building code and present a risk to the health and safety of the occupants."

They point out that ground stakes don't meet the current building codes for permanent foundations; because the portables are used more than 180 days out of the year they should be considered permanent structures.

Matt Roblez, past president of the American Society of Civil Engineers Utah Section, who has inspected modular units intended for school use, believes that they should be secured with a permanent footing and a foundational system.

Image: Steve Hogan, Granite School District's director of planning and boundaries viewing a portable classroom at Stansbury Elementary School in West Valley City, Utah.
Source: Trent Nelson, The Salt Lake Tribune

References:

https://www.sltrib.com/news/education/2018/01/24/thousands-of-utah-students-learn-in-portable-classrooms-which-could-put-them-in-danger-during-an-earthquake-experts-say/

http://kutv.com/news/local/utah-engineers-say-portable-classrooms-should-sit-foundations-to-survive-big-quake

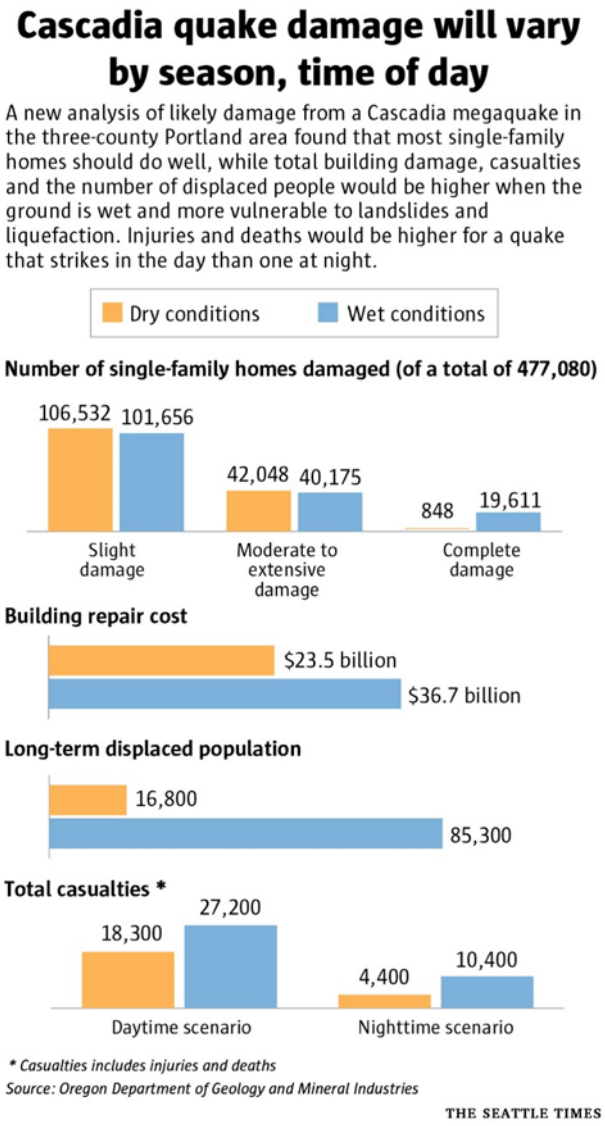
RESEARCH

Earthquake Regional Impact Analysis for Portland, Oregon Counties

In early March, the Oregon Department of Geology and Mineral Industries released a report, *Earthquake Regional Impact Analysis for Clackamas, Multnomah, and Washington Counties, Oregon.* Ian Madin, the agency's deputy director, stated that the study "is the most detailed damage estimate for a magnitude 9 Cascadia Subduction Zone earthquake in a major urban area."

The analysis of the Portland area is one of the first to include comprehensive information on buildings including location, construction date and construction type. Madin explains how this information will allow researchers to examine damage on a "building-by-building basis." Differences between an earthquake occurring during a dry versus during a wet season (when the potential for landslides and liquefaction is much greater) were also examined. "In the "dry" scenario, the costs to repair damaged buildings in the three counties could total about $24 billion. In the "wet" scenario, the figure soars to about $37 billion."

While the study's focus is on three Portland counties the next phase of the study will evaluate Columbia County, Oregon and Clark County, Washington.



References:

https://www.seattletimes.com/seattle-news/science/new-cascadia-quake-analysis-shows-building-retrofits-would-save-thousands-of-lives/

http://www.oregongeology.org/pubs/ofr/O-18-02/O-18-02_report.pdf

RESILIENCE

Seattle Buildings Not Ready for Earthquakes

Five years ago an advisory committee recommended mandatory retrofits for unreinforced masonry (URM) buildings in Seattle. Legislation to require retrofits was expected in 2013 but the requirement has been postponed several times. There are over 1,100 URM buildings in Seattle and even more across the state. According to city officials, draft legislation on mandatory retrofits will not be presented to the council until a package of financial incentives is created and no earlier than 2019. Seattle Emergency Management Director Barb Graff told the City Council, "The biggest step is to identify some combination of financing mechanisms so that this time we succeed."

Lianne Dalziel, mayor of Christchurch, New Zealand, while visiting Seattle, warned that they "might be on borrowed time." In 1931 an earthquake killed 256 people in New Zealand, mostly from collapsing brick walls and parapets. Similar to Washington, New Zealand had failed to act on past warnings about the dangers of URMs, and in 2011 a M6.3 quake destroyed 97% of the URM buildings in Christchurch and killed 185 people.

WAITING FOR DISASTER

Most of Washington state's seismic-safety priorities from 30 years ago remain unaddressed or incomplete. A few examples:

Schools: No mandatory seismic evaluation for schools. About 386,000 public-school students — one of every three enrolled — live in earthquake-prone areas and attend schools that were built before seismic standards were adopted statewide, according to a Seattle Times analysis.

Buildings: No state requirements or grants to retrofit buildings. At any given moment in Seattle, about 33,000 people may be inside an old, brick building — the most vulnerable to earthquakes — that hasn't been retrofitted, according to city data.

Bridges: As of early 2017, the state Department of Transportation had spent almost $200 million retrofitting bridges since 1991, and estimated it will cost well over $1 billion to finish the work.

Source: Box quoted from Seattle Times, February 18, 2018.

Reference:

https://www.seattletimes.com/seattle-news/times-watchdog/seattle-makes-little-progress-on-buildings-that-can-kill-in-earthquakes/

http://www.king5.com/article/news/local/washington-not-ready-for-earthquakes-and-tsunamis-inslee-is-told/281-479188865

"Back to Normal": Earthquake Recovery Modelling Report

The State of California Seismic Safety Commission released a report written by GEM (The Global Earthquake Model Foundation) discussing a new methodology and open-source software tool to estimate recovery states and recovery times following an earthquake. The report also investigated the effect of external socio-economic factors on these recovery times. The report was developed using the city of Napa and the 2014 M6 South Napa Earthquake as a real-world case study.

The project has met several goals including the development of the Integrated Risk Modeling Toolkit (IRMT) software, the development of a methodology referred to as the Reconstruction Recovery Model, and conducting a case study for the Southern California ShakeOut scenario using the new model and software. "The results of this project will be useful to various stakeholders, including government, industry and academics that are concerned with enhancing post-disaster recovery of California communities." (p. 6)

Four recommendations emerged from the study:

"Recommendation 1: More long-term recovery studies from other earthquakes are required to refine both the Reconstruction Recovery Model and the Socio-Economic Recovery Model.

Recommendation 2: Extend the methodologies beyond residential buildings to model recovery of critical facilities, such as hospitals, fire and police stations, power plants, water treatment plants and telecommunication networks.

Recommendation 3: Based on the identified significant variables from the Socio-Economic Recovery Model that positively contribute to the recovery process, it is recommended to:

1. Facilitate access to assistance for vulnerable groups of the population, such as residents that do not speak English.
2. Conduct further investigations into the relationships between the variables that correlate most positively with recovery (e.g., homeownership and health insurance) to determine the underlying causes.
3. Conduct more extensive research on cost-benefit analysis of retrofitting buildings because the buildings not seismically designed in the city of Napa sustained significantly more damage compared to stronger structures.
4. Improve access to financial mechanisms, such as earthquake insurance, to residents exposed to high earthquake risk, as well as investigate and promote alternative post-earthquake resources, such as grants, which will support residents in the rebuilding process.

Recommendation 4: Facilitate the involvement of insurance industry partners in future projects as advisors to improve the model and to gain access to more detailed earthquake insurance data."

To read the full report here.

Resilient Los Angeles

Los Angeles Mayor Garcetti recently released *Resilient Los Angeles*, a comprehensive plan with strategies to build urban resilience. The plan was developed in partnership with 100 Resilient Cities, a Rockefeller Foundation Initiative, public and private sector experts, and community input. It built upon the 2014 *Resilience By Design* report, which focused on the most vulnerable buildings, water system, and telecommunications.

The report offers 96 actions under 15 goals that address the shocks and stresses the city faces with tools and plans to prepare for them. Shocks and stresses considered range from earthquakes and fires to crimes and homelessness. Mayor Garcetti's intent is to "fortify our infrastructure, protect our economy, and make our city safer."

Of particular note to the earthquake hazard mitigation community is Strategy 61: *Advance Seismic Safety, Prioritizing the Most Vulnerable Buildings, Infrastructure, and Systems*. Included in this strategy are ideas to:

- Re-establish the Mayor's Seismic Safety Task Force
- Evaluate the seismic risk of city assets and incorporate it into planning and management
- Explore financing strategies and incentives for seismic retrofits of privately owned buildings
- Develop recommendations for mandatory retrofits such as steel buildings built before 1994 (the Northridge earthquake).
- Develop a mandatory private school seismic evaluation program for K-12 schools and daycares.
- Develop and adopt a "public safety" standard for new buildings and advance building codes that allow for immediate occupancy after an earthquake.

To accomplish these goals, the city plans to expand the Mayor's Office of Resilience and have each city department select their own resilience officer.

<u>*References:*</u>

To read the *Resilient Los Angeles* plan: *https://www.lamayor.org/sites/g/files/wph446/f/page/file/Resilient%20Los%20Angeles.pdf*

https://www.lamayor.org/mayor-eric-garcetti-announces-plan-resilient-los-angeles

http://www.latimes.com/local/lanow/la-me-ln-earthquake-garcetti-20180302-htmlstory.html

https://www.constructiondive.com/news/los-angeles-mayor-promotes-mandatory-earthquake-safeguards-for-buildings/518466/

New Construction Techniques Offer Savings

Seattle's new Rainier Square Tower now under construction has employed an earthquake-resistant design that has also saved costs. The savings come from needing less equipment, less construction time, and faster occupancy. The 58 story high rise is scheduled to be completed and occupied by April 2020. "The modular system of cross-tied, steel-plate walls, which will be filled with concrete in the field, will offer an earthquake-resistant core and a building capable of resisting lateral wind and seismic loads, according to designers", as reported in *ConstructionDive.com*.

In another development, a new type of concrete is showing promise for use in earthquake regions. University of British Columbia researchers are developing Eco-friendly Ductile Cementitious Composite (EDCC). EDCC is a concrete that uses 70% fly ash in the cement as well as polymer-based fibers, which have similar molecular qualities to steel. The mixture is applied to walls and then subjected to a M9.1 earthquake.

Reference:

https://www.constructiondive.com/news/570m-seattle-high-rise-game-changer-in-seismic-and-wind-resistance/513696/

National Tsunami Hazard Mitigation Program Strategic Plan Released

In February, the 2018-2023 National Tsunami Hazard Mitigation Program (NTHMP) Strategic Plan was accepted and released. The plan draws upon a federal-state partnership to support tsunami resilience of U.S. coastal communities. NTHMP developed four overarching themes in the Strategic Plan: Hazard and Risk Assessment, Education and Preparedness, Mitigation and Recovery, and Alert, Warning, and Response. Each of the themes are supported by specific goals and strategies.

The plan was developed by a working group consisting of federal and state NTHMP partners. It drew upon the 2017 NTHMP external review that evaluated progress towards achievement of stated outcomes, as well as the activities in the Tsunami Warning, Education, and Research Act of 2017.

Read the full plan here.

SAVE THE DATE!

Week of April 30, 2018

NEPM and WSSPC
Annual Business Meeting
Seattle, Washington
www.wsspc.org

PUBLICATIONS

California Geological Survey Special Publication 42 (SP 42)
Special Publication 42 (SP 42)—Earthquake Fault Zones: A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California has been completely revised to provide more detailed guidance to government agencies, report reviewers, and practicing geoscientists representing property owners and developers who are affected by the Alquist-Priolo (AP) Earthquake Fault Zoning Act. The purpose of the AP Act is to regulate development near active faults so as to mitigate the hazard of surface rupture. SP42 was first issued in December 1973; in February, California Geological Survey (CGS) released the 12th edition.

The objectives of these Guidelines are two-fold:

1. To promote uniform and effective statewide implementation of the evaluation and mitigation elements of the Alquist-Priolo Earthquake Fault Zoning Act.
2. To assist affected parties in the evaluation and mitigation of surface fault rupture hazard for projects within designated Earthquake Fault Zones.

The 2018 edition of SP 42 is available on the CGS website as a pdf download: *http://www.conservation.ca.gov/cgs/Documents/CGS_SP42_2018.pdf*

California Geological Survey unveils web application to help public locate Earthquake Hazard Zones

The California Earthquake Hazards Zone Application is an online map that allows anyone with a computer, tablet or smartphone to conveniently check whether a property is in an earthquake hazard zone. With this tool, you can type in an address or use the location capability of your computer or mobile device to determine whether a property lies within any of CGS's mapped earthquake hazard zones. It will also tell you if CGS has not yet evaluated the hazards in that area. Mapped hazards include fault rupture, landslides, and liquefaction zones.

Reference:

https://maps.conservation.ca.gov/cgs/EQZApp/app/

PEOPLE

WSSPC Welcomes New Members

- Michael J. Willis, Director, Colorado Office of Emergency Management
- Adrian Hickin, Acting Chief Geologist and Executive Director, British Columbia Geological Survey
- Thomas L. Travis, Administrator, Hawaii Emergency Management Agency (HI-EMA)

CONFERENCES, WORKSHOPS & EVENTS

Great Utah Shakeout
April 19, 2018

FEMA P-807 Webinar on Seismic Evaluation and Retrofit of Multi-Unit Wood-Frame Buildings with Weak First Stories
April 25, 2018 (12:00PM PST)
Register here: *https://register.gotowebinar.com/register/4397952342322136835*

San Juan County Earthquake Training
April 25-26, 2018
Friday Harbor, Washington (San Juan Island)
http://www.sanjuandem.net/ATC20

NEPM and WSSPC Annual Meeting
April 30 – May 4, 2018
Seattle, Washington
http://eqprogram.net/

2018 Bay Area regional Community Resilience Summit
May 16, 2018
San Francisco, California
http://www.empowersf.org/summit/

SSA 2018 Annual Meeting
May 14-17, 2018 (New Dates)
Miami, Florida (New Location)
https://www.seismosoc.org/meetings/

Emergency Management Leaders Conference (EMLC)
June 12-13, 2018
Tampa, Florida
http://emlc.us/conference-home/

11th United States National Conference on Earthquake Engineering
June 25-29, 2018
Los Angeles, California
https://www.11ncee.org/
[WSSPC is a Cooperating Organization.]

AEG 61st Annual Meeting/13th IAEG Congress
September 17-21, 2018
San Francisco, California
http://www.aegweb.org/mpage/iaeg18m

NEMA Annual Forum
October 1-4, 2018
Savannah, Georgia
https://www.nemaweb.org/index.php/forums-meetings/save-the-date

Publication of this e-Newsletter was funded through FEMA Cooperative Agreement EMW-2017-CA-00096.

If you have a newsworthy item for our e-Newsletter, please forward it to Erin Mommsen Program Manager at: *emommsen@wsspc.org*