Item I

State Of California

ALFRED E. ALQUIST
SEISMIC SAFETY COMMISSION

Governor Edmund G. Brown Jr.

Revised AGENDA
January 14, 2016
State Capitol, Room 437
Sacramento CA 95814

Time	Item	AGENDA	Action
10:00	**I.**	**Call to Order** **Roll Call**	Roll Call
10:05	**II.**	**Chairman's Remarks** *Commissioner Timothy Strack*	Discussion & Possible Action
10:10	**III.**	**Approval of Oct 8 & 9, 2015 Meeting Minutes**	Discussion & Possible Action
10:15	**IV.**	**Draft Report on the Mw6 South Napa Earthquake of August 24, 2014** *Dr. Laurie Johnson, Pacific Earthquake Engineering Research (PEER) Center*	Discussion & Possible Action
10:40	**V.**	**Developing an Interactive Web-Based Earthquake and Tsunami Education Program** *Dr. Lori Dengler, Humboldt State University*	Discussion & Possible Action
11:00	**VI.**	**The HayWired Earthquake Scenario: Planning for Disaster in a Wired (and Wireless) World** *Dr. Dale Cox, Project Manager, Science Application for Risk Reduction, US Geological Survey* *Dr. Anne Wein, Disaster Scientist and HayWired Science Leader, US Geological Survey*	Discussion & Possible Action
11:20	**VII.**	**Strategies for Incapacitating the Effect of Building Seismic Performance and Stakeholder Decision-Making in Post Earthquake Recovery Modeling** *Dr. Ross Stein, Global Earthquake Model* *Dr. Henry Burton, University of California at Los Angeles*	Discussion & Possible Action
11:50	**VIII.**	**JPL Technology for Earthquake Resiliency: Lessons from the Napa and Nepal Earthquakes, and a Proposed Path Forward** *Dr. Susan Owen, Jet Propulsion Laboratory, National Aeronautics and Space Agency*	Discussion & Possible Action
12:15		**LUNCH**	
1:15	**IX.**	**Uninhabited Aerial Vehicle Synthetic Aperture Radar Observations of Recent Earthquakes in California** *Dr. Andrea Donnellan, Jet Propulsion Laboratory, National Aeronautics and Space Agency*	Discussion & Possible Action
1:35	**X.**	**Guide and Appendix to Identify and Manage the Seismic Risks of Buildings for Local Governments** *Commissioner Goodwin* *Mr. Fred Turner, Senior Structural Engineer, Seismic Safety Commission*	Discussion & Possible Action
1:45	**XI.**	**Department of State Hospital's Report on Seismic Safety** *Mr. Fred Turner, Senior Structural Engineer, Seismic Safety Commission*	Discussion & Possible Action

1:55	**XII.**	**Implications of the San Francisco Public Utilities Commission's Water System Improvement Program Delays and Review Letter** *Commission Gardner* *Mr. Fred Turner, Senior Structural Engineer, Seismic Safety Commission*	Discussion & Possible Action
2:05	**XIII.**	**Post-Earthquake Fire Performance of a Light-Gauge Cold-Formed Steel Framed Building** *Dr. Tara Hutchingson, University of California, San Diego*	Discussion & Possible Action
2:25	**XIV.**	**Draft Annual Report for 2015** *Ms. Lena Daniel, Administrative Officer, Seismic Safety Commission*	Discussion & Possible Action
2:35	**XV.**	**Legislation** *Ms. Salina Valencia, Legislation Director & Communications, Seismic Safety Commission*	Discussion & Possible Action
2:45	**XVI.**	**Executive Director's Report** • Alquist-Priolo Act Review Letter • Budget, *Ms. Lena Daniel, Administrative Officer, Seismic Safety Commission* *Mr. Richard McCarthy, Executive Director, Seismic Safety Commission*	Discussion & Possible Action
3:00	**XVII.**	**Public Comment** *(Please complete a "Request to Speak" Form)*	Discussion & Possible Action
3:05	**XVIII.**	**Miscellaneous & Good of the Meeting**	Discussion & Possible Action
3:10	**XIX**	**Adjourn**	Discussion & Possible Action

Next Meeting: March 10, 2016

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MEETING NOTICES

SIGN-UP & TIME LIMITS: If you wish to speak on an item, please fill out a "Request to Speak" form and give it to a staff person before the public hearing. The forms are available near the door to the meeting room. Time limits are indicated on the speaker sign-up forms and in case of questions or disputes the Chairman will determine the time limits for each speaker at the beginning of the public hearing.

SUGGESTIONS FOR SUBMISSION OF WRITTEN MATERIALS. It is requested that written materials be submitted to the Commission staff prior to the meeting. If this is not possible it is requested that at least 30 copies be submitted to the Commission. This material will be distributed to the Commission members. Applicants are responsible for presenting their projects at the public hearing. NO FAXES will be accepted at the meeting site. You may be able to make prior arrangements with staff or a Commissioner to send a fax but you will be responsible for paying the hotel or meeting site for its receipt.

CLOSED SESSION: The Commission may meet to consider possible and pending litigation in a session closed to the public pursuant to attorney-client privilege and statutory exception to the Open Meeting Act (Government Code §11126e).

ACCESS TO HEARING: Meeting facilities are accessible to persons with disabilities. If you require special assistance, please contact any staff member prior to the meeting. An interpreter for the deaf will also be made available upon request to the staff at least five days prior to the meeting.

Item III

State Of California

ALFRED E. ALQUIST SEISMIC SAFETY COMMISSION

Governor Edmund G. Brown Jr.

Minutes of Commission Meeting
D Street Neighborhood Center
1304 D Street, Arcata, California
and
Crescent City Harbor District
101 Citizens Dock Road, Crescent City, California
October 8, 2015

Members Present

Timothy Strack, Chairman
Tracy Johnson, Vice Chair
Greg Beroza
Michael Gardner
Randall Goodwin (arrived late)
Peggy Hellweg
Mark Johnson (for Mark Ghilarducci)
Helen Knudson
Fuad Sweiss
Mark Wheetley

Members Absent

Ken Cooley
Kit Miyamoto
Ian Parkinson
David Rabbitt
Chet Widom

Staff Present

Richard McCarthy, Executive Director
Ellena "Lena" Daniel, Administrative Manager
Robert Anderson, Engineering Geologist
Fred Turner, Structural Engineer
Salina Valencia, Legislative Director

I. CALL TO ORDER AND ROLL CALL

Chairman Strack called the meeting to order at 9:07 a.m. He said the Commission is pleased to have traveled to the North Coast, one of California's most seismically active areas

Legislative Director Salina Valencia called the roll and confirmed the presence of a quorum.

II. CHAIRMAN'S REMARKS

Chairman Strack Chairman thanked Commissioner Mark Wheetley for his help in arranging the workshops and meeting.

Chairman Strack introduced and welcomed Ms. Karen Deamer, City Manager, City of Arcata, and Dr. Lisa Rossbacher, President, Humboldt State University.

III. APPROVAL OF AUGUST 13, 2015 MEETING MINUTES

Commissioner Michael Gardner observed the Commission was provided with a set of draft amendments to SB 494 that were not discussed as part of the presentation of the state's early warning system, and the presentation was dramatically different from the amendments. He clarified that the minutes were correct as written.

ACTION: Commissioner Gardner made a motion, seconded by Commissioner Wheetley, that:

The Commission approve the minutes of the August 13, 2015, meeting as presented.

* Motion carried, 10 – 0 – 1 (Commissioner Hellweg abstaining).

IV. OPENING COMMENTS

Commissioner Wheetley welcomed the Commission to the North Coast. He said the Commission would be hearing from local representatives during the morning, followed by a discussion of tsunami risks in Crescent City that afternoon, and workshop with the Northern California Tribal Chairs Association the following day.

Commissioner Wheetley introduced Karen Deamer, City Manager, City of Arcata, and invited her to address the Commission.

Ms. Deamer welcomed the Commission and staff to Arcata and the North Coast. She noted area residents recognize their isolation and the need to work together collaboratively to share resources and respond to seismic and tsunami activity.

Commissioner Wheetley stated that the City of Arcata and the university have worked hard to erase borders and build a good, collaborative working relationship. He introduced Dr. Lisa Rossbacher, President, Humboldt State University, and also a geologist.

Dr. Rossbacher welcomed the Commission to Arcata and Humboldt County. She noted that although the North Coast is quite isolated, the environment is breathtakingly beautiful, largely because of the geology. She acknowledged that a considerable risk comes with the geology, and said Dr. Lori Dengler would be discussing that topic as part of her presentation.

Dr. Rossbacher stated that one of her responsibilities is making sure the university is as prepared as possible for whatever natural events may occur. She said university leaders welcome the opportunity to learn from the Commission and work together to make sure the campus is as earthquake-ready as possible. Dr. Rossbacher remarked that California has lots of opportunities to learn because of the frequency of seismic activity. She expressed her appreciation for the Commission's assistance in improving seismic safety.

V. THE REDWOOD COAST TSUNAMI WORK GROUP: 20 YEARS OF ADDRESSING THE CASCADIA EARTHQUAKE THREAT

Commissioner Wheetley noted that the North Coast is the most seismically active area in the State of California, and the area also has a great tsunami risk. He said Dr. Lori Dengler, Department of Geology, Humboldt State University, has done more than anyone else in the region to educate the public about these risks. He commented that thanks to her efforts, the majority of households in the area are likely to have a copy of "Living on Shaky Ground."

Dr. Dengler thanked the Commission and staff for visiting the North Coast. She reminded everyone to register to participate in the 2015 ShakeOut the following week.

Dr. Dengler emphasized critical public safety messages: 1) Survive the earthquake; 2) Drop, cover, and hold on during the earthquake; and 3) Count the duration of the earthquake, both to calm down and to calculate tsunami threats. She said the duration, not the strength of an earthquake, determines the tsunami threat, so any earthquake longer than 20 or 30 seconds could trigger a tsunami. She noted that once people are evacuated from a tsunami zone, they also need to be told to stay away.

Dr. Dengler stated that the Redwood Coast Tsunami Work Group was formed about twenty years ago to develop, promote, and disseminate a coordinated outreach program, and those efforts are still underway. She traced the history of the work group, discussed its activities, described some of its projects and measures of success, and talked about challenges moving forward.

Dr. Dengler noted that the Counties of Del Norte, Humboldt, and Mendocino represent approximately 30 percent of the state's coastline, and they are characterized by low populations and high poverty rates. She reported that about 20 percent of all earthquakes in the contiguous 48 states since 1980 of magnitude 5 and larger occurred in this region and its adjacent offshore area, representing about 45.5 percent of the total actual energy released in earthquakes. She said this means the North Coast has bigger earthquakes than other parts of the contiguous 48 states. Dr. Dengler pointed out that the meeting site was only about 8 miles away from the only fault system in California capable of producing a magnitude 9 earthquake. She said there is no population center within the three counties more than 20 miles away from an active fault.

Dr. Dengler stated that the Redwood Coast Tsunami Work Group started in 1992 after the magnitude 7.2 Cape Mendocino earthquake, which occurred on a fault related to the Cascadia Subduction Zone. She said this was the first earthquake on the North Coast to be declared a federal disaster, with about $60 million in damage and about 400 injuries. She noted that the earthquake produced a tsunami that arrived only minutes after the earthquake and surprised many people and caused them to wonder about the potential tsunami risk of a magnitude 9 event on the same system.

Dr. Dengler said there was a 1995 study of the effects of a bigger magnitude 8.4 earthquake on the North Coast of California to the Oregon border, and that study contained a thorough description of the likely impacts of ground-shaking in a larger earthquake. She noted the state had no tsunami program in 1995, and the risk of near-source tsunamis was not addressed at all. She thanked Executive Director Richard McCarthy and the Seismic Safety Commission for their

support in helping her bring this issue to the state's attention. Dr. Dengler remarked that few people at that time were aware of the Cascadia Subduction Zone or knew what they could do to mitigate the seismic risk, and these problems gave rise to the Redwood Coast Tsunami Work Group, an ad hoc organization.

Dr. Dengler stated that the work group's primary tasks were to determine what public messages and materials should be disseminated about the Cascadia earthquake threat; how outreach should be done; help with evacuation planning, including signage and siren placement; conduct exercises and drills; assess progress; and promoting participation in ShakeOut and Tsunami Week.

Dr. Dengler advised that a number of core principles have been identified that have guided the work group's efforts. First, she emphasized the importance of keeping messages positive, not fear-based, to promote preparedness. She thanked the California Earthquake Authority, CalOES, and other partner organizations involved with the value-based messaging that promotes peace of mind, accomplishment, security, happiness, and fun. She discussed the work group's branding program, and showed examples of banners and brochures. Dr. Dengler noted that because public messages may change over time, every publication mentions that scientists are still learning, and that new knowledge may result in the need to adjust the advice.

Dr. Dengler said another key principle is building strong local, state, and federal partnerships to counteract the region's geographical isolation, provide the best available information, and work together as a team. She noted that the work group uses earthquakes and other natural disasters as they occur to raise awareness of preparedness issues and earthquake safety.

Dr. Dengler advised that the work group's message has changed: materials used to instruct people to expect a tsunami after a strong earthquake; the "strong" has now been deleted, because sometimes tsunamis occur after earthquakes that are not strong. She clarified that scientists know now that tsunamis are triggered by earthquakes that last a long time.

Dr. Dengler said the work group is developing a Spanish version of "Living on Shaky Ground," and she welcomed the Commission's assistance in finding ways to pay for printing costs.

Dr. Dengler reviewed fairs and workshops at which the work group exhibits and participates. She commented that being among people is an important way to gather feedback that can improve public messaging.

Dr. Dengler said the work group also works closely with state agency partners to disseminate up-to-date hazard planning maps. She noted that the North Coast is often used as a pilot project for the rest of the state. She reviewed other earthquake and tsunami preparedness activities.

Dr. Dengler remarked that North Coast residents will probably receive a short advance warning, so people near the coast need to be particularly vigilant. She said the North Coast currently has seven Tsunami-Ready communities, and Manila, Fort Bragg, and all of Del Norte County are expected to join that group next year.

Dr. Dengler showed samples marking the boundaries of tsunami zones, evacuation routes, interpretive signs in national and state parks, and multi-hazard signs for beaches. She said at least five people in the area die each year as a result of unusual wave activity and abalone diving. She stressed the need for regular drills and preparedness exercises to reinforce community earthquake readiness. Dr. Dengler noted that the North Coast has been conducting annual tsunami code drills since 2008 to test all the systems that will be disseminating warning messages.

Dr. Dengler reported that the work group has conducted about nine surveys since 1993 to determine current levels of preparedness and awareness of earthquakes and tsunamis. She remarked that there has been a dramatic increase in the number of people who are now aware of the Cascadia Subduction Zone and local tsunami sources, and relatively few people live in tsunami hazard zones.

Dr. Dengler said the Redwood Coast Tsunami Work Group has no formal structure, no written constitution, and is not part of any state, federal, or local agency, and these factors provide a great level of flexibility. She noted that the work group has always been very inclusive, and all participants have an equal voice at the table. Dr. Dengler advised that the work group has made important contributions to the region and the state as a whole, especially with regard to tsunamis, but also with respect to the special needs and challenges of rural areas.

Dr. Dengler described some of the challenges facing the work group in the future: the need for perpetual and continuing messages reinforcing preparedness; providing accurate and objective information about risks and vulnerabilities; helping individuals understand what to do and carry out those plans; and providing for a smooth succession to the next generation of leaders. She said there will be an ongoing need for financial support, and she expressed her appreciation to Humboldt State University, CalOES, the California Geological Survey, and the Earthquake Country Alliance for their help.

Dr. Dengler proposed a partial solution to the problems facing the North Coast. She recommended starting young by involving schools and youth groups in a preparedness culture, and she observed that California is a bit behind in this respect. She said California has great participation in ShakeOut drills, but there is no statewide curriculum effort to make sure students learn about preparedness.

Dr. Dengler provided a copy of her new book for lower elementary students, "The Extraordinary Voyage of Kamome," to be published on November 5, which describes the boat that beached in Crescent City in 2013. She expressed her appreciation to the Del Norte high school students and others for their help in sending the boat back to its port of origin. She said the students started an exchange, and the interaction was positive for everyone. Dr. Dengler welcomed the Commission's support in developing a Website to go along with the book next year that will provide additional information for parents, teachers, and kids.

Commissioner Wheetley welcomed suggestions from Dr. Dengler as to specific ways the Commission can help. Dr. Dengler said she has a long history and relationship with the Commission and looks forward to continuing that work to address the issues faced by the North

Coast. She noted that the North Coast receives scant attention from the state because of its small population, but that small size can actually work to its advantage by serving as a pilot educational project for the rest of the state. She expressed interest in developing pilot education projects for the earthquake early warning process. Dr. Dengler added that the counties in the region have been phenomenally supportive of preparedness efforts.

Mr. McCarthy noted the Commission might be able to help fund research projects. Dr. Dengler said most of the funding for the work group so far has come from Humboldt State University's nonprofit foundation that administers grants and contracts. Mr. McCarthy suggested continuing to work within the university to develop a proposal for creating and maintaining the new website for a three-year period. He added that it is easier for the Commission to work with state agencies like the university system than to contract with outside groups.

Dr. Dengler thanked the Commission and said she would pursue that route. She commented that the work group's public messaging incorporates the research done by former Commissioner Dennis Mileti regarding the most effective ways to engage people and spur them to action.

Commissioner Fuad Sweiss commented that although San Francisco's population density is much higher than that of the North Coast, the threat level and risk are similar. He invited Dr. Dengler and members of the work group to come to San Francisco to see some of its preparedness programs. Dr. Dengler thanked Commissioner Sweiss for the invitation.

Dr. Dengler showed a bi-lingual Japanese-English booklet the work group hopes to translate to Japanese-Spanish, -Russian, -Chinese, and -Korean.

Commissioner Sweiss asked if tsunami insurance was available. Dr. Dengler responded that property owners can purchase flood insurance that covers tsunami damage, but there have been political discussions lately about changing some of the parameters of that national program. She added that almost all land in California within a tsunami zone is also within a 100-year flood zone and eligible for flood insurance.

Ms. Kate Long, California CalOES, thanked the Redwood Coast Tsunami Work Group for its participation and contributions to the Earthquake Country Alliance, an organization with considerable influence on grassroots organizing across the state.

Chairman Strack and commissioners applauded and thanked Dr. Dengler for her presentation.

VI. SEISMIC RISK AND RECOVERY: CRITICAL TOWN/GOWN PARTNERSHIPS

Commissioner Wheetley noted that town-gown partnerships can be productive in many communities throughout the state where there are campuses with large populations of students from elsewhere, who might not be familiar with local hazards and ill-prepared to deal with emergency situations.

Commissioner Wheetley introduced Mr. Michael Fisher, Associate Director, Planning and Design, Humboldt State University, and Mr. Mark Andre, Director of Environmental Services, City of Arcata, and invited them to discuss their partnership in more detail.

Mr. Fisher expressed the support of Humboldt State University's foundation for Dr. Dengler's efforts, and he encouraged her to submit a proposal.

Mr. Fisher presented an overview of the seismic risk to Humboldt State University and the City of Arcata. He began by reviewing California State University's (CSU's) governing seismic policy guidelines, which form the basis for CSU's seismic action plan since 1993. He said the policy establishes protocols with respect to seismic risk assessment, peer review, and building standards. He added that each CSU campus is located in a unique seismic area, and the policy and its attachments were created to augment the California Building Code by providing specific design criteria and seismic coefficients for those areas.

Mr. Fisher said CSU's seismic policy also establishes the role of the CSU seismic review board, a group that was founded in 1972 to implement the independent peer review requirements of the CSU seismic policy. He described the board's membership, and he stated that all CSU projects, except for maintenance projects, are subject to the board's review. He noted that CSU maintains an annual master enabling agreement with the board that allows campuses to contract services at a standard rate based on the project budget. He said the agreement also allows preliminary consultation regarding any seismic safety-related issue at no cost to the university.

Mr. Fisher reported that Humboldt State University and the CSU system have evaluated all of the buildings on the campus with a comprehensive analysis of the building's existing structure as it relates to current code and seismic area coefficients. He said this analysis allows the university to assign life safety and seismic risk values that can be used to prioritize seismic retrofit projects and allocate capital funds to those buildings found to be most at risk. Mr. Fisher advised that Humboldt State University has two buildings at high risk: the library seismic retrofit, and the John Van Duzer Theater retrofit.

Mr. Fisher commented that in the event of a significant seismic event, each CSU facilities management team will be able to quickly identify priority areas for investigation and recovery efforts. Also, he noted, CSU will have significant documentation of any damage in place to pursue emergency funding from state and federal sources.

Mr. Fisher stated that preparedness is practiced in a number of different ways on campus, including staff and faculty drills, numerous campus publications regarding preparedness, materials about the great ShakeOut, and course offerings. He noted that it is through these efforts that the region's residents have a consciousness that Humboldt is a unique area, not only for its natural resources and beauty, but also because of its proximity to the Mendocino triple junction and its activity.

Mr. Andre welcomed the Commission to Arcata. He said he works for the city's Environmental Services Department, which includes a number of functions, but code enforcement and new development are the purview of the city's Community Development Department.

Mr. Andre remarked that the area has had plenty of practice in many earthquakes and plenty of opportunities to implement its emergency operations centers and coordinate with other local organizations, and each event has taught important lessons that improve performance. He said the city works in tandem with Humboldt State University, attending regular meetings with staff, participating in tabletop exercises and drills, and the Arcata Police Department tends to be the focal point of these activities.

Mr. Andre reviewed the seismic risks faced by the City of Arcata. He cited threats from hillsides, liquefaction zones, critical facilities located on the bay margin lowlands, including an old wastewater treatment plan right on the bay. He said the city uses chlorine as its primary wastewater disinfection and stores bulk chlorine at that facility, which poses a seismic safety risk. He added that some of the large equipment has been rolled out in response to past tsunami warnings. Mr. Andre reported that the city is addressing this problem by changing its disinfection method to an ultraviolet system, and that will eliminate the stockpiling of chlorine.

Mr. Andre advised that all city EOC facilities meet current standards and function well in emergencies. He said the city is looking for a more suitable location to relocate or build a new facility on city-owned land closer to Humboldt State University. He stated that the city installed a new tsunami siren on its corporation yard and has invested heavily in portable generators to keep water and wastewater systems running as well as possible after a disaster.

Mr. Andre noted that the city has numerous policies in the public safety element of its general plan addressing education, displaying risk zone maps on the city's website, coordinating with Humboldt State University on ShakeOut events and messaging, and posting evacuation maps and making it clear where people should go.

Mr. Andre said the city follows the universal building code, and there are specially designated liquefaction zones and Alquist-Priolo fault zones. He indicated that all new development must comply with modern codes and standards. He acknowledged that there were many existing older structures throughout the region that were likely to fail in a large event, but the city hoped many would get retrofitted over the coming years.

Mr. Fisher noted that the City of Arcata has a great GIS system and maps that university officials consult frequently to identify liquefaction zones and high-risk zones. He said there has been a considerable amount of geotechnical work done throughout the city for various projects, and that collection of data can be used to spot trends and control costs.

Mr. Andre reported that Arcata has a number of low-lying areas, so the city is quite concerned about the potential impacts of sea level rise. He said the city is working to fortify its critical assets, such as its treatment plants and corporation yard, using techniques to create salt marsh buffers to protect the shoreline and levees. He added that the city also avoids siting critical facilities in zones subject to sea level rise.

Mr. Andre stated that within the last fifteen years, the city has been able to purchase land for conservation easements, open space, wildlife habitat, and buffer zones between the coast and the

built environment. He noted that the land also has a network of coastal access trails and fish habitat projects that benefit people and wildlife.

Mr. Fisher said Humboldt State and the City of Arcata work together on their unified action recovery program. He noted that Arcata has a population of only 17,000, and the university has about 9,000 with staff and faculty, a substantial portion, so the recovery action plan needs to be unified and cohesive. He indicated that in the event of a major event, Humboldt State will activate its emergency operations center, which has three main priorities: 1) to ensure life safety of all persons on campus; 2) protect property; and 3) re-establish ongoing delivery of services to students and the region.

Mr. Fisher noted that Humboldt State's EOC is housed in the Student Business Services Building, located in the heart of the campus, and is staffed by trained members of the campus community. He indicated that the EOC will have liaisons with other lead agencies, including the City of Arcata, Humboldt County, perhaps CalOES, local fire departments, and other agencies.

Mr. Fisher said the majority of people on campus during instruction hours are students, and HSU operates almost year-round. He stated that the campus has a total enrollment of 8,000 students, many of whom live on campus, plus hundreds more staff and faculty, so ensuring life safety is a critical component of the HSU response. He stressed the importance of the partnership with local agencies in ensuring the support and resources needed to conduct search and rescue activities, fire suppression, and coordinating state and federal support.

Mr. Fisher said HSU relies on the Arcata Fire Department and the State Fire Marshal as first responders, and those agencies work together frequently and seamlessly. In addition, he noted, a CSU seismic review board member would be dispatched to the campus to assume the role of the campus deputy building official and help the city rapidly assess its buildings.

Mr. Fisher noted that a significant seismic event could result in a large displacement of people if homes and dormitories are destroyed or damaged. In that case, he said, the larger buildings on campus would be used to house people and stage emergency operations. He added that HSU will work with community partners to re-establish services and rebuild damaged utility facilities. He pledged CSU's support and partnership on projects to achieve economies of scale and expedite delivery.

Mr. Andre stated that even though the City of Arcata has its own EOC, it works to complement the university. He said the city has plans to open emergency shelter centers, evacuate people in danger, and protect property. He emphasized that agency coordination and ongoing communication is critical in ensuring an effective and cohesive emergency response.

Mr. Andre commented that as a result of large fires in nearby areas, Arcata has concerns about maintaining adequate water storage and ensuring that water tanks are robust, so the city has been investing in increased emergency water storage capacity for fire suppression and public consumption. He said the city built a new groundwater well that can be used to supply drinking water if all other storage tanks and reservoirs are lost. Mr. Andre stated that after a seismic event, the city's water crews immediately inspect all tanks, pipes, and couplings.

Mr. Andre underscored the need to practice and drill regularly in coordination with Humboldt State to deal with conditions such as bad weather, darkness, and maximum student population.

Commissioner Gardner commented that the City of Riverside has a population of a little over 300,000, with three universities and a large community college that adds about 60,000 students, but students make up a much greater percentage of Arcata's population.

Commissioner Gardner asked if Arcata had considered pumping water from the bay for firefighting purposes. Mr. Andre said he did not know, but he noted that the fire department might have considered that possibility. Commissioner Gardner suggesting looking at San Francisco's saltwater-based pumping system for firefighting.

Mr. Andre noted there was a brushfire on the marsh earlier that year, and firefighters scooped and dropped water from the bay to suppress that fire. He acknowledged that the area faces a number of risk factors, including antiquated infrastructure, tsunamis, and liquefaction in low-lying areas, and the effects of climate change and sea level rise are additional concerns. He said Arcata welcomes opportunities to do things smarter, better, and more collaboratively.

Chairman Strack thanked Mr. Fisher and Mr. Andre for their presentations.

VII. LAST CHANCE GRADE, HIGHWAY 101: HISTORY, GEOLOGY, CHALLENGES, ALTERNATIVES & EDUCATION

Commissioner Wheetley introduced and welcomed Ms. Talitha Hodgson, Project Manager, Caltrans.

Ms. Hodgson said the Last Chance Grade project is quite complex and she provided a general overview and description of the work which is being done. She stated that Last Chance Grade is in a very geologically unstable area about 10 miles from the Del Norte County border, and this three-mile stretch of highway has been an issue since the 1930's. Ms. Hodgson noted that a decision was made in the 1970's not to relocate the roadway because of severe geological impacts. She advised that this area experiences one to three large landslides per decade, and state spending on this section has increased as a result.

Ms. Hodgson reported that Caltrans initiated studies in the 1980's to identify potential alternatives, but then funding for that effort disappeared, and Caltrans has made a number of "band-aid" fixes ever since. She said the road moved so much in 2009 that it was completely out of alignment and dangerous for drivers, so Caltrans added safety walls and releveled the roadway, but the threat of a major landslide remains.

Ms. Hodgson noted that there were large storms in 2011 and 2012 that did significant damage at Last Chance Grade and a couple other places. She indicated there were three slip-outs on the grade in 2011, and a wall began to fail in 2012, necessitating emergency repairs. She estimated that Caltrans has spent $36 million since 1981 to maintain the grade.

Ms. Hodgson displayed a slide showing the movement of the roadway. She reported that since July 2012, there has been a vertical drop of 2.6 feet and a horizontal spread of 3.3 feet toward the ocean. She said the grade is composed of two different materials, softly rolling hills and gentle slopes in the lower portion, and broken rocky formations in the upper portion, which is where falling blocks and landslides tend to occur.

Ms. Hodgson presented a map of landslides along the coast of California, and she pointed out that the North Coast area has one of the highest concentrations of active landslides in the country. She showed other views of the large broken formation and deep slides. She also displayed pictures of landslides and roadway repairs. Ms. Hodgson remarked that as the roadway gradually moves west toward the ocean, there is less space to move the road. She added that the roadway is now at the edge of the cliff at this spot, and wave action at the toe of the slope is causing noticeable deformation of the roadway.

Ms. Hodgson displayed a map showing landslide movement at Last Chance Grade. She noted there was as much movement between January and April 2015 as there had been for the last few years, so the rate of movement has accelerated, even in this current drought. She pointed out numerous landslide areas along Last Chance Grade.

Commissioner Sweiss commented that conditions at Last Chance Grade appear similar to those in the Devil's Slide area along the coast south of San Francisco. Ms. Hodgson agreed, and said Caltrans engineers consulted with the geologist from that project to learn from his experience. She noted the Devil's Slide project is a great example of the community and local governments working together for a solution.

Ms. Hodgson advised that Last Chance Grade is near the Redwood state and national parks in an area of significant cultural importance to Native American tribes. She said Caltrans conducted an economic impact study to determine what would happen during a prolonged closure of Last Chance Grade, and result would be a detour of up to 320 miles for the average traveler, meaning substantial travel delays and increased operating costs. Just for Del Norte County, she noted, the study projects $340 million in reduced annual output, and a loss of 3,000 to 4,000 jobs, representing $130 million per year in lost wages. Ms. Hodgson emphasized that these impacts are very significant, especially for an area with a low population and a high poverty rate.

Ms. Hodgson said that after reviewing the impact study, Caltrans concluded that relocating the roadway would be a sound investment for the State of California. She advised that Caltrans gathered an enormous amount of input from local governments, state agencies, and the public.

Ms. Hodgson stated that Caltrans has formed a partnership with local tribes and the state and national park systems to develop a solution, and a work group has been meeting monthly to coordinate that effort. She said multiple public meetings have been held, and Caltrans updates its local resources of regulatory agencies regularly. Ms. Hodgson noted that the partnership authorized a feasibility study that identified 14 possible alternatives to relocating the roadway, and that list has since been narrowed to 7, ranging in cost from $250 million up to $1 billion, a substantial investment for the state.

Ms. Hodgson reviewed some of the maintenance and repair projects undertaken by Caltrans to keep the roadway open. She said there has been monthly paving and crack-sealing, and Caltrans installed a real-time monitoring system that provides text alerts when movement occurs.

Commissioner Gardner asked if Caltrans had analyzed the feasibility of just stabilizing the toe of the slide to reduce the turbidity of the water and minimize future damage. Mr. Sebastian Cohen, Project Manager for Caltrans, said that the size of abutment would have to be massive and at least 200 feet deep to resist the force of the water. Ms. Hodgson added that the detailed analysis done in 1995 addressed that alternative.

Chairman thanked Ms. Hodgson and Mr.Cohen for their presentation.

VIII. GUIDE TO IDENTIFY AND MANAGE SEISMIC RISKS OF BUILDINGS FOR LOCAL GOVERNMENTS

Chairman Strack noted that the Commission has been working on an updated version of the guidebook for the past year. He said the purpose of the guidebook is to provide local governments with best practices and recommendations so they can implement effective programs and policies without state mandates. He invited Staff Structural Engineer Fred Turner to provide an update.

Mr. Turner referred to the latest draft version of the guidebook under Tab 8 of the meeting packet, and he welcomed comments and suggestions from commissioners. He said the Commission's ad hoc review committee, chaired by Commissioner Randall Goodwin, with Commissioners Sweiss and Kit Miyamoto as members, has been working with editor Andrew Alden to produce a polished draft for the Commission's review.

Commissioner Sweiss stated that the Commission published the first version of the guidebook for local governments in 1981, and there have been numerous engineering and regulatory developments since then. He recalled that a previous version was presented to the Commission in June, and comments made at that meeting have been incorporated in the latest draft.

Commissioner Sweiss noted that the guidebook consists of two parts, an executive summary and appendices. He said more work needs to be done to finalize the appendices, and the committee plans to have a final version of the guidebook ready for the Commission's review before publication. He asked commissioners to submit comments and proposed revisions to the staff by Thursday, October 15.

Chairman Strack commented that he reviewed the latest draft and that it was excellent. He suggested sending an email to Commissioners soliciting final suggestions, and Mr. Turner said he would do that. He stated that Commissioners will have an opportunity in December to review and comment on the draft appendices. Commissioner Sweiss added that the document should be ready for publication in January or February.

Chairman Strack thanked the staff and committee members for their hard work.

Commissioner Hellweg noted the last section of the draft mentions a checklist, and she asked about the status of that document. Mr. Turner stated that the appendix will include some checklists that are still being developed by the committee. He said the Commission has provided a number of checklists to local governments in the past, so it would probably be worthwhile to include them as optional forms. Commissioner Hellweg suggested referencing on the checklist the location of background information within the executive summary and appendices. Mr. Turner confirmed that the committee was trying to link and cross-reference the information in the executive summary and the appendices.

Chairman Strack thanked Mr. Turner for the update.

IX. CALIFORNIA SMALL BUSINESS CONTINUITY TRAINING

Mr. McCarthy noted that the Small Business Development Centers (SBDC) made presentation at the last meeting about their plans to develop business continuity training. Since that time, he said, SBDC representatives met with GoBIZ and obtained their support, and SBDC developed a proposal for a second phase of outreach in partnership with the Governor's Office. He noted the Commission previously helped fund SBDC's guidelines for assisting small businesses after a disaster.

Mr. McCarthy introduced Ms. Kristi Johnson, Chair, Small Business Development Centers' Leadership Council, and invited her to present the Phase 2 proposal.

Ms. Johnson welcomed the Commission to Humboldt County. She said the Small Business Development Centers (SBDC) has an active program in Humboldt County, and she drew attention to a brochure with a map showing the locations of centers and outreach sites. She indicated that SBDC assists local businesses in over 100 locations throughout the state, and SBDC serves as a primary conduit to convey messages, information, training, and assistance to California's small businesses.

Ms. Johnson introduced Mr. Joel Ayala, SBDC State Representative in Sacramento, to discuss the proposal in more detail. Mr. Ayala thanked the Commission for meeting in Humboldt County and giving many commissioners, staff, and guests an opportunity to visit this part of the state.

Mr. Ayala summarized SBDC's organization, mission, and service locations throughout California. He explained that the SBDC provides small businesses and entrepreneurs with confidential, no-cost advising and expert training on a wide range of topics. He said SBDC provides an infrastructure of technical assistance for thousands of businesses each month, total about 65,000 small businesses each year. Mr. Ayala noted that SBDC can help small business owners access capital, develop business and financial models, create and implement marketing strategies, connect to global markets, and to grow their businesses online. He said SBDC also delivers important information from state agencies to business owners.

Mr. Ayala said SBDC is excited to have an initiative focusing directly on emergency preparedness and business continuation. He noted through its programs, the SBDC has assisted

entrepreneurs in creating new businesses each year, which generate 5,000 new jobs and increase taxable revenue by over $300 million; in addition, SBDC helped to raise nearly $500 million in new capital for small businesses in the state. Mr. Ayala advocated developing strong partnerships with local businesses to build interest and participation in the programs SBDC can provide.

Mr. Ayala reported that the results of SBDC's Phase 1 project reveal that small business are more focused on thriving, and disaster preparation is not an active priority, and about 72 percent had no disaster recovery plan in place, and 42 percent had thought about a plan. He said 34 percent of respondents perceived the greatest threat to their businesses as manmade, including cybercrime, security breaches, or a disgruntled worker; only 32 percent mentioned fires, and only 19 percent mentioned earthquakes. Mr. Ayala stated that over 98 percent of the respondents said restoring electricity, phone, and Internet service were the most important priorities, with transportation and water close behind. Finally, he noted, business owners recommended that the state have an active disaster plan in place, restore communication and transportation systems, make disaster funding available immediately, suspend barriers to post-disaster operations, and make available community generators and mobile charging stations.

Mr. Ayala said that for Phase 2, SBDC proposes to incorporate disaster preparation and business continuity modules into its statewide small business workshops for businesses and entrepreneurs. He noted that the purpose of these educational modules will be to provide owners of new and existing businesses the information they need to be prepared for the disruption caused by any major disaster or business interruption.

Mr. Ayala stated that Mr. John Pryor, a noted author of articles in business journals and publications on this subject, recommends the following steps for businesses: 1) Anticipate potential situations to determine the degree of preparation necessary; 2) Develop or update and test a response plan that identifies who, what, where, when, and how to respond, with guidelines for completing those responsibilities; 3) Implementing the response, while remaining flexible, and conveying accurate and updated information to the public; 4) Evaluate outcomes after the crisis to identify what went well and how future responses can be improved.

Mr. Ayala acknowledged that one plan does not fit all, and a good continuation plan is customized for the business, taking into account its goals, management style, location, and resources. He reviewed and discussed ten important steps a business can take to ensure a successful continuation plan.

Mr. Ayala said SBDC is grateful for the commitment and support of GoBIZ, and looks forward to continuing its work with the Office of the Small Business Advocate, Department of General Services, the Speaker's Office, Board of Equalization, PUC, high-speed rail authority, Caltrans, and other agencies that have small business elements and outreach missions.

Mr. Ayala reviewed some of the topics that would be covered in the proposed educational module for small businesses, and he identified the steps necessary to develop and disseminate the training materials.

Chairman Strack thanked Ms. Johnson and Mr. Ayala for their remarks.

Mr. McCarthy recommended that the Commission approve of the SBDC proposal for $220,000.00 and authorize the staff to develop a more detailed contract, and submit the contract for DGS legal review.

Vice Chair Johnson thanked the SBDC representatives for their presentation, and she said she liked the grassroots outreach to small businesses. She asked if the training sessions would be part of a larger meeting to encourage more people to attend. Ms. Johnson responded that SBDC offers "Business Basics" workshops and financial management workshops, and the new modules will be incorporated in both of those. She estimated it will take SBDC about three months to develop the materials and training program before full delivery, and the proposal calls for a twelve-month schedule.

Commissioner Helen Knudson expressed her support for this project. She encouraged SBDC to incorporate an evaluation component so participants can provide feedback and suggestions. Ms. Johnson noted that SBDC already has a robust reporting network with evaluations for all of its training programs; she said additional questions can be added to an existing evaluation, and then SBDC can provide that input to the Commission. She also offered to provide demographic information on the people who attend the trainings.

Commissioner Hellweg recalled that a questionnaire was circulated after the 20th anniversary of the Northridge earthquake, and she suggested asking small business owners in the Napa area if they had changed their priorities and operations since that earthquake. Ms. Johnson thanked Commissioner Hellweg for that suggestion, and she said SBDC is an active responder after earthquakes, and it would be helpful to talk to business owners about their experiences.

Commissioner Hellweg expressed interest in hearing more about SBDC's partnership with GoBIZ. Ms. Johnson stated that SBDC has a close relationship with GoBIZ and the Small Business Advocate, and both will be helping to promote the classes at their events and in their publications. Mr. Ayala noted that GoBIZ sees the benefit of using SBDC as a small business infrastructure to convey messages and information to small businesses; and, on the other hand, GoBIZ can help SBDC connect with other agencies. As an example, he said, GoBIZ introduced SBDC to an interagency working group for small businesses.

Commissioner Wheetley suggested working with the League of California Cities as another potential outreach partner. He noted that like other cities in California, Arcata has a number of small businesses that would benefit from these resources.

Commissioner Mark Johnson mentioned two existing resources that might be of interest to SBDC, the QuakeSmart program and the Disaster Resilience Business Toolkit. Ms. Johnson thanked Commissioner Johnson for his suggestion.

ACTION: Commissioner Wheetley made a motion, seconded by Vice Chair Johnson, that:

The Commission support the Phase 2 contract with SBDC and direct the staff to proceed as recommended.

* Motion carried, 11 – 0.

X. PUBLIC COMMENT

There were no members of the public who wished to address the Commission.

XI. MISCELLANEOUS & GOOD OF THE MEETING

Chairman Strack informed the Commission that Commissioner Jim McGowan, who represented the Building Standards Commission, had retired. He expressed his appreciation for Commissioner McGowan's service and wished him well in his retirement.

There were no other matters brought to the Commission's attention.

XII. RECESS TO CRESCENT CITY

Chairman Strack noted that the Commission would be traveling to Crescent City after a lunch break.

At 11:18 a.m., the meeting was recessed for lunch, to be reconvened at 3:00 p.m. in Crescent City, California.

CRESCENT CITY HARBOR:
TSUNAMI RISKS & LESSONS LEARNED WORKSHOP
Crescent City Harbor District
101 Citizens Dock Road
Crescent City, California

I. WORKSHOP DISCUSSION

Chairman Strack called the workshop to order at 3:00 p.m.

Honorable Ron Gastineau, Mayor, Crescent City,

Mr. Lane Tavasci, Deputy Harbor Master, Crescent City Harbor District,

Mr. Eugene Palazzo, City Manager, Crescent City

II. Agenda

2011 Tsunami Videos
Discussion Leader Cindy Henderson, Emergency Services Manager, Del North County
Tour: Harbor Inner Boat Basin (I.B.B.); Work Dock & "A" Dock.

III. ADJOURN

Chairman Strack noted that the Commission would be attending an invitational workshop for the Northern California Tribal Chairman's Association the following day in Klamath, California.

There being no further business, the workshop was adjourned at 5:00 p.m.

Invitational Workshop for the Northern California Tribal Chairman's Association
Yurok Tribe Headquarters
190 Klamath Blvd., Klamath, California
October 9, 2015

Commissioners and Staff Present	**Others Present**
Timothy Strack, Chairman	Sue Masten, Yurok Tribal leader
Tracy Johnson, Vice Chair	Thomas O'Rourke, Chairman, Yurok Tribal Council
Greg Beroza	Dean Baker, Yurok Public Works Director
Michael Gardner	Peggy O'Dillon, Planning Director Yurok County
Peggy Hellweg	Kevin Milieu, Elk Valley Rancheria
Helen Knudson	Dimish Shamiski, CalOES Tribal Liaison
Fuad Sweiss	Jan Burnell, Cal OES Coastal Region
Mark Wheetley	Mandy Maker, Yurok County
Richard McCarthy, Executive Director	Nicole Wright, Planner IV Yurok County
Ellen "Lena" Daniel, Administrative Officer	
Robert Anderson, Engineering Geologist	
Fred Turner, Structural Engineer	
Salina Valencia, Legislative and Communications Director	

I. WELCOME/OPENING REMARKS

Mr. Thomas O'Rourke, Chairman, Yurok Tribal Council, called the workshop to order at 9:00 a.m.

Commissioner Mark Wheetley noted that the Yurok tribe is the first tsunami-ready tribe in California. He introduced Ms. Sue Masten, prominent Yurok leader and former President, National Congress of American Indians, and invited her to address the Commission.

Ms. Masten welcomed the Commission to the Yurok tribe's homelands. She said the Yurok tribe is the largest populated tribe in the State of California, with over 6,000 members and the second-largest land base in the state. She stated that the tribe began to organize in 1988 and has grown immensely since then. She noted the tribe takes pride on its positive impact on the local community.

Ms. Masten encouraged commissioners and staff to visit the beautiful visitor center at the end of the block, which has a small amphitheater seating 128 people. She said the Cultural Knowledge Park across the street features a model of a traditional home and sweat house.

Ms. Masten talked about a flood in 1964 that devastated the community and destroyed the thriving town, which at that time included drugstores, mechanics, a bowling alley, theaters, several bars, restaurants, markets, and other services. She said the site of the reconstructed town of Klamath was moved farther uphill. She noted that the tribal center, hotel, restaurant, casino, visitor center, Cultural Village Park, and Tribal Wellness Court were all constructed after that,

and there are plans for a future tribal administration office, sidewalks, streetlights, and other improvements.

Ms. Masten advised that the Yurok tribe has a much smaller amount of money than other tribes in California, but it has a great staff and planning department that actively pursues grant opportunities, and tribal leaders have a vision for the future direction of the community.

Ms. Masten expressed her appreciation to the Seismic Safety Commission for its work. She noted that Humboldt and Del Norte Counties are among the poorest in the state, so there are fewer people and resources to respond to a crisis. She observed that the isolated location imposes additional challenges, and tribes in California tend to be even more rural and isolated than most other communities. She said community members realize they will have to be the first responders in any disaster, so being prepared is a key priority.

Chairman Strack thanked the Yurok Tribe for hosting the Commission meeting. He explained that the Commission focuses on resiliency and safety after earthquakes, and it provides funding for research projects in a wide range of areas. He said one of the Commission's projects deals with tribal outreach for earthquake preparedness and resilience. He clarified that the Commission's interest is in disseminating information, sharing resources, and providing assistance and support. Chairman Strack stated that the Commission looks forward to finding ways to work with the Yurok Tribe on planning and resilience issues.

Executive Director Richard McCarthy gave a brief overview of the Commission's history, composition, mission, and accomplishments. He discussed some of the Commission's recent activities and research projects.

Mr. Michael Kleeman, consultant and researcher, expressed interest in hearing from tribal leaders about their needs and ideas. He said that in working with tribes in southern California, it became obvious that an all-hazards approach is necessary because earthquakes can trigger fires, floods, and other kinds of problems.

Ms. Jan Burnell, CalOES, noted that there is no single entity that represents all the tribes in the state, or even within a particular region. She encouraged tribes in Humboldt and Del Norte Counties to come together to share concerns and identify common issues.

Mr. Kleeman commented that the goal of the outreach project(s) is to provide resources and information by explicitly working with tribally-based organizations to function as the delivery mechanism and coordinate all communications.

Mr. Kleeman asked tribal leaders to consider the hazards in their communities and identify resources that would be helpful in improving preparedness, response, and recovery.

Ms. Peggy O'Dillon said the tribal recovery staff is small, and the tribal jurisdiction extends into two counties. She noted that after past disasters, the staff had a difficult time identifying what resources were available and coordinating recovery efforts. She expressed her opinion that after future disasters, it would be most helpful to have assistance in determining next steps and

accessing resources. Ms. O'Dillon advised that this area had major floods in 1955 and 1964, and then a tsunami totally devastated the community. She said there is a risk of tsunamis after every earthquake.

Ms. O'Dillon expressed interest in learning more about the impacts of tsunamis in rural communities along rivers to help her community better prepare, and she suggested conducting a study to identify key issues. She noted that most of the housing on the reservation is not built to code and was constructed quickly after the 1964 flood, and most of it is not insured against earthquake damage. She welcomed assistance in preparing a study to identify the costs of retrofitting or replacing homes that were not built to code. Ms. O'Dillon said logging practices changed the geography and environment of the area, so there are some overgrown brushy areas that are vulnerable to fires.

Ms. O'Dillon advised that the Yurok reservation is also challenged in terms of communications, and tribal leaders are working hard to bring Internet service to remote locations. She said some of the communities upriver lack plumbing and electricity, so this kind of modernization effort is a major challenge.

Ms. O'Donnell stated that the tribal government can issue its own disaster declarations without having to go through the county. She added that the Tribe maintains good relationships with its neighboring counties.

Ms.Wright reported that the Yurok tribe has encountered difficulties in accessing federal and state funds for drought relief.

Ms. O'Dillon stated that applying for grants and disaster assistance requires a great deal of time and effort by the staff, which is an additional burden on small jurisdictions after disasters occur. She said the Yurok Tribe typically receives funding under an annual federal funding agreement, and that system works better than working through individual counties and state agencies. She recommended working on an administrative level in advance to prearrange a more efficient funding mechanism for processing grants after disasters. Ms. O'Dillon added that the land within the Yurok reservation was left out of Alquist-Priolo Act map zones, but that omission has since been corrected.

Mr. Kleeman summarized the requests for assistance: assistance in producing studies to provide data to substantiate the risks and identify the needs for improving the housing stock, preparedness, and evacuation planning; help in identifying and coordinating available resources; regulations and policies that are sensitive to the realities and needs of tribal communities.

Mr. O'Rourke welcomed the Commission's assistance in making policy recommendations to the Legislature and Governor's Office that are responsive to all tribes' needs and that will help tribes across the state access resources.

Ms. Wright addressed the difficulty of working through neighboring counties to access state proposition funding. She said many state and local government officials do not understand that state requirements do not apply on tribal land, and they lack flexibility to recognize alternative tribal standards. She cited surface water reporting requirements as an example. Ms. O'Dillon added that it sometimes takes months to resolve contract interpretation issues.

Ms. Burnell noted that CalOES's Recovery Division developed a funding matrix to try to identify all programs available to areas affected by the drought. She said Commissioner Mark Ghilarducci is the Chair of the task force that coordinates drought-related efforts. Ms. Burnell confirmed that funding typically flows through the state and then through the county, and tribal access to funding remains a challenge. Ms. Burnell noted that many state agencies tend to treat tribes as subdivisions of a county, but they need to be recognized as sovereign nations, and she observed that changes of that type may require legislation. She asked if Tribal Leaders had brought their concerns to their governing councils so they can convey the message to Cynthia Gomez, the governor's tribal advisor.

Ms. O'Dillon stated that legislation has been passed over the last 35 years, but the problems remain. She expressed her hope that having Tribal Leaders express their needs may help improve the situation.

Mr. Kleeman welcomed suggestions for future education and outreach materials that would be helpful within the tribal community. He said the Commission is working on a guide for local governments to help them identify and manage seismic risks of buildings, and also a Small Business Development Centers project to provide business continuity and preparedness training for businesses.

Ms. O'Dillon expressed interest in assistance with dealing with elderly and disabled populations in emergencies. She emphasized the importance of conducting a study of retrofitting homes in the community to identify the risks and the financial impacts for the tribe. She said tribal employees are trained in performing disaster response duties.

Ms. Burnell mentioned a few helpful resources and tools. She said the Red Guide, the red recovery book for businesses, has one publication specifically for tribal governments that was funded by the Intertribal Long-Term Recovery Foundation. She offered to provide a copy for the Yurok tribe. Ms. Burnell noted that if a tribe does not have a dedicated emergency manager, the regional office of the Bureau of Indian Affairs (BIA) in Sacramento can provide that help. She said tribes need to make the request directly to BIA.

Commissioner Gardner remarked that some of the needs identified at this meeting appear to be much more basic than needs in other parts of the state. He noted that much of the housing stock probably cannot be retrofitted, so the issue is how to create reasonably safe housing stock. He said there are some federal programs that might be able to help with housing, and he offered to follow up with further information.

Commissioner Gardner stated that it was most disturbing to hear about state and county agencies are still not able to work smoothly with tribal governments, despite legislative changes. He

asked if county supervisors were helpful. Ms. O'Dillon said the Yurok tribe has established good relationships with the Humboldt and Del Norte County boards of supervisors and county staff. Commissioner Gardner suggested holding a joint meeting with county supervisors and state representatives to identify specific issues and find ways to resolve them. He added that this direct approach might be more effective than trying to work through the staff of each entity.

The workshop was recessed at 10:30 a.m.

II. GENERAL DISCUSSION

Chairman Strack reconvened the meeting. He thanked all participants for sharing their ideas and feedback.

Commissioner Wheetley thanked the Commission for meeting in the North Coast. He expressed his appreciation to the tribal staff for their hospitality and graciousness.

Ms. Masten said the tribal groups enjoyed the opportunity to discuss their challenges and obstacles with the Commission, and she thanked the Commission for visiting. She invited commissioners and staff to return to the area with their friends and families to enjoy its beauty.

III. ADJOURN

There being no further business, the workshop was adjourned at 11:00 a.m.

Item IV

State of California
Seismic Safety Commission

Memo

To: Seismic Safety Commissioners

From: **Richard McCarthy**
Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506 x 225

Date: January 7, 2016

Subject: Update on the Napa Earthquake Research Project

Background

The project was approved by the Commission at the meeting of October 9, 2014 in San Francisco. Dr. Laurie Johnson, PEER, was assigned as the principal assistant researcher for the project and contracting was finally completed and work began in mid-July 2015.

Project Brief and Status Update: The Pacific Earthquake Engineering Research Center (PEER) has worked cooperatively with a wide variety of organizations, companies and governmental entities over the past six months to synthesize and analyze observations and studies resulting from the South Napa earthquake. The intent of this work is not to develop a compendium of all information known about the South Napa earthquake but to convey specific findings and identify recommended actions to be considered by the California Seismic Safety Commission, as well as other governmental and private sector entities, to better prepare for and mitigate earthquake hazards and risks in California. Particular attention has been given to identifying:

- Success stories where current policies worked well and as intended;
- Best practices implemented before and following the South Napa earthquake that might be considered for adoption by other jurisdictions and organizations;
- Issues related to existing policies and mitigation practices that were not as successful as desired and where further refinement may be needed;
- Issues that were previously unanticipated and where new policies might be developed; and
- Research and other studies that might be needed to develop, assess, and validate new policies and practices.

PEER was also asked to review relevant and transferable lessons from other recent earthquakes that have occurred in California, Japan, New Zealand and elsewhere in recent years and to also consider how scientific, engineering and technological advances of the last few decades affected emergency response and recovery following the 2014 South Napa earthquake, including (but not limited to) earthquake detection and notification, disaster

damage assessment, seismic performance standards for structures and infrastructure, and recovery coordination and management.

While waiting for contract approval, preliminary work was undertaken in early 2015 to gather documents and develop a working list of relevant policy topics. In late July, PEER met with a small group from the CSSC and reviewed a working list of potential policy topics, documents and other informational resources, contacts, and report format. PEER then conducted a series of interviews with federal and state agencies involved in response and recovery following the 2014 South Napa earthquake to gather additional insights and refine the policy topics. PEER also analyzed an array of documents collected including: post-earthquake reconnaissance reports; more in-depth post-earthquake investigations of geotechnical issues, as well as infrastructure, structural and non-structural performance; after-action reports prepared by federal, state and local agencies and lifeline operators; local government meeting minutes and program documentation; and newspaper accounts.

A working draft report has been prepared and submitted to CSSC staff for feedback. A Working Draft-Findings Only version has been provided to Commissioners. It is organized into a series of findings and recommendations in the areas of: Geosciences, Infrastructure, Structures, People and Businesses, and Government and Institutions. PEER is currently meeting with representatives of impacted county and city governments and other key stakeholders, and also eliciting input on draft findings and recommendations from state agencies and other key stakeholders.

Recommendation

A copy of the Working Draft (Findings Only) is provided for the Commission's review. Dr. Johnson will present the draft findings at the January 14th meeting. Staff recommends that the Commissioners review and provide comments on the draft findings. Staff further recommends that the Commissioners form a sub-committee to work with Dr. Johnson to review and prioritize draft recommendations that have been developed to accompany the findings. Once the draft recommendations are reviewed and prioritized a final draft of the full report will be sent to the Commissioner for review and comment.

Item V

State of California
Seismic Safety Commission

Memo

To: Commissioners

From: Richard McCarthy
Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506

Date: 1/4/16

Subject: Development of a Web-Based Interactive Earthquake and Tsunami Education Program, Humbolt State University

Background

On April 7, 2013, a little over two years after the magnitude 9 Japan earthquake triggered a massive tsunami off the coast of northeastern Japan, a lone boat washed up on the shores of Crescent City, California. The confirmation of the boat as belonging to Takata High School in the city of Rikuzentakata was first step in an amazing story that has connected two tsunami-vulnerable cities and initiated an exchange between high schools in Japan and California. This story was published as a children's book in November 2015 by Humboldt State University Press.

The book, aimed for lower elementary grades, provides a window for discussing earthquakes, tsunamis, marine debris, preparedness and cultural awareness in the classroom and within families. Over the next two years, the existing web sites: humboldt.edu/kamome, humboldt.edu/rctwg, and humboldt.edu/shakyground will be upgraded and include curriculum and preparedness information aimed towards elementary classrooms and families. This project will make use of connections with teachers in Humboldt and Del Norte Counties through the Cascadia Earthscope Earthquake Tsunami Education Project and the Earthquake Country Alliance. The project's goal will be to provide accessible materials that will fit into the current state teaching framework and address priority needs in the State for earthquake and tsunami outreach.

Recommendation

Dr. Dengler’s presentation will outline the structure and goals of the project and the work plan for the next two years. Commission’s should listen to her presentation, ask questions, and modify the scope of the project as needed. Staff recommends that the Commission approve funding for this project.

Development of a web-based interactive earthquake and tsunami education program

On April 7, 2013, a little over two years after the magnitude 9 Japan earthquake triggered a massive tsunami off the coast of northeastern Japan, a lone boat washed up on the shores of Crescent City, California. The confirmation of the boat as belonging to Takata High School in the city of Rikuzentakata was first step in an amazing story that has connected two tsunami-vulnerable cities and initiated an exchange between high schools in Japan and California. This story was published as a children's book, *The Extraordinary Voyage of Kamome. A Tsunami Boat Comes Home*, in November 2015 by Humboldt State University Press.

The book, aimed for lower elementary grades, provides a window for discussing earthquakes, tsunamis, marine debris, preparedness and cultural awareness in the classroom and within families in a positive way. Over the next two years, we plan to develop our existing web sites: humboldt.edu/kamome, humboldt.edu/rctwg, and humboldt.edu/shakyground to include curriculum and preparedness information aimed towards elementary classrooms and families. This project will make use of connections that we have made with teachers in Humboldt And Del Norte Counties through the Cascadia Earthscope Earthquake Tsunami Education Project and the Earthquake Country Alliance to provide accessible materials that will fit into the current state teaching framework and address priority needs in the State for earthquake and tsunami outreach.

Activity Timeline

Year 1

- Selection of an advisory committee with representatives from CGS, USGS, Cal OES, NWS, Seismic Safety Commission and other organizations involved with earthquake and tsunami science and outreach
- Review of existing curricular materials including the Cascadia EarthScope Earthquake Tsunami Education Project (CEETEP), the California Earthquake Education Project (CalEEP), Washington State Tsunami Curriculum, FEMA Tremor Troups and Seismic Sleuths, HSU Tsunami Curriculum to identify activities with the best potential to be adapted to an interactive web format and fit the California curriculum standards for elementary schools.
- Adaptation of three activities identified above for an on-line launch during Tsunami Week (March 27 – April 2, 2016); an additional three activities for an on-line launch during ShakeOut (October 20, 2016).
- Survey of elementary school teachers in Humboldt and Del Norte Counties to assess what types of earthquake and tsunami activities they currently use and what types of materials they would like to see developed.
- On-line versions of the Kamome book with print and audio in Japanese, English and Spanish.
- Developing web-based metrics to assess use of the web sites.

Deliverables: Report including teacher surveys and priorities, California State Curriculum Standards and how Kamome-related activities would fit into the current framework, updated web sites to include new activities and audio versions.

Year 2

- Prioritizing new curriculum projects resulting from year 1 survey results.
- Working with a curriculum development specialist to develop new activities

• Launch of additional activities – at least two per K – 6 grade level, one focused on earthquakes and one focused on tsunami. Each activity including teacher materials on how it relates to California framework standards.
• Publicity campaign to encourage use of the activities
• Assessment of activities

Deliverables: Report including summary of activities and how each meets state framework, assessment

Project Management

Principal Investigator: Lori Dengler, Director Humboldt Earthquake Education Center and Professor Emeritus, Geology. (707) 826-311, lori.dengler@humboldt.edu

Budget detail

Project Management and Coordination: $5,468
Staff: $14,000
Curriculum Development Specialist: $4,500
Student Assistants: $1,300
Travel: $600
Supplies: $400
Website development: $10,000
Indirect (@ 25%): $10,016
Total Request: $48,779

Matching

Book Development (donation from Desert Community Center to HSU): $12,000
Printing 3,000 copies of book (donation from Desert Community Center to HSU): $13,000
Copies distributed to every school library 2nd & 3rd grade classroom in Humboldt and Del Norte Counties (donation from the Humboldt Area Foundation): $1,000
In kind contribution of time Lori Dengler - book writing, book events, web content, curriculum review (275 hours at $68.35/hour): $18,796
Illustration and book design Amy Uyeki: $10,000
Total Match: $59,975

Item VI

State of California
Seismic Safety Commission

Memo

To: Commissioners

From: Richard McCarthy
Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506

Date: 1/5/16

Subject: The HayWired Earthquake Scenario: Planning for Disaster in a Wired (and Wireless) World

Background

The USGS is leading the development and dissemination of an earthquake scenario on the Hayward fault. The scenario's name, HayWired, is a reference to the rupture of the Hayward fault and speaks to the potential chaos caused by impacts to our wired and wireless world. California has not experienced a large earthquake in an urban environment since our society; culture and economy have become entwined with the Internet. More generally, "wired" represents interconnectedness at many levels: the interconnectedness of seismicity evidenced by afterslip and aftershocks, interdependencies of lifelines, social connectivity through technology (including earthquake early warning), and ripple effects of damages and disruption throughout the economy encompassing the digital economy.

The HayWired theme is particularly apropos for the Bay Area, which is home to Silicon Valley and to world leaders in high technology and digital communications. With the HayWired scenario, we aim to improve the communication of scientific information, to expand the application of science to earthquake risk reduction, to advance the discussion of key earthquake issues in the Bay Area, to stage new conversations that update resilience strategies, and to boost on-going decision-making and policy making. The organizers seek to reach audiences beyond emergency response (who traditionally use scenarios) to further engage communities and businesses in response and recovery planning.

In this presentation to the Safety Seismic Commission, we will

- summarize the new and recent hazard information that is the foundation of the scenario
- summarize the damage and consequence analyses conducted or in progress
- align analyses with various themes that will be used to explore ways to increase resilience to the impacts of earthquakes with our audiences
- present plans to collaborate with partners in reaching audiences
- request assistance from CSSA finding new uses and audiences for the scenario

Recommendation

Staff recommends that the Commission listen to Dr Cox’s presentation and provide guidance on how the Commission can assist in making the HayWired Scenario a success.

Item VII

State of California
Seismic Safety Commission

Memo

To: Commissioners

From: Richard McCarthy
Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506

Date: 1/5/16

Subject: **Strategies for Incorporating the Effect of Building Seismic Performance and Stakeholder Decision Making in Post-Earthquake Recovery Modeling (Global Earthquake Model)**

Background

Dr Henry Burton's (Global Earthquake Model) presentation will highlight two key aspects of the simulation-based tools and methods that are being developed to understand and enhance the process of post-earthquake recovery. First is the formulation of probabilistic methods for assessing building performance limit states that influence post-earthquake functionality and recovery. An overview of the methodology used to map the fragility function parameters for the building performance limit states used in traditional loss estimation tools such as HAZUS to those of the recovery-based limit states will be presented. An update will also be provided on a major building inventory capture that is currently underway to characterize the spatial distribution of seismic vulnerabilities in single and multifamily wood frame residential buildings in the City of Los Angeles, which will be used as the test bed location for the case study. Soft-story buildings are of particular interest because they are known to be especially vulnerable to uninhabitable and/or irreparable earthquake damage. A high occurrence of this type of damage state in a community can have an adverse effect on the recovery process.

The second key component of the recovery model that will presented relates to modeling the dynamic interactions and

decisions of key stakeholders conditioned on the state of their building and their surrounding environs, as well as other endogenous variables. Some examples of post-earthquake decision outcomes following a major earthquake include: occupants remain in their home and repair (if safe to occupy), occupants vacate while home is being repaired and return once repairs are complete, occupants demolish and rebuild (if home is damaged beyond repair or demolishing and rebuilding is more economical) or occupants sell or abandon home and permanently relocate to a different neighborhood or community. The presentation will highlight alternative approaches to incorporating stakeholder decision-making as well as the efforts to acquire the data needed to calibrate and validate the models.

Recommendation

Staff recommends that the Commission listen to Dr. Burton's presentation and provide guidance on the direction of the project and suggest any modifications, if needed.

Item VIII

State of California
Seismic Safety Commission

Memo

To: Commissioners

From: Robert Anderson, P.G., C.E.G.

Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506

Date: December 31, 2015

Subject: JPL Technology for Earthquake Resiliency: Lessons from the Napa and Nepal Earthquakes, and a Proposed Path Forward

Project Description: Remote sensing technologies enhancing the detection of damage in earthquake related debris has been used after both the Napa and Nepal earthquakes. The work products developed have been used in assessment of damage caused by the earthquakes and shared with local governments. One of the remote sensing tools was deployed by a private company and successfully found several victims in a collapsed building in Nepal.

The purpose of this project with the Jet Propulsion Laboratory and NASA is to identify how such technologies have helped enhance community resilience after two very different earthquakes in two very different communities.

Dr. Susan Owen from JPL will discuss JPL/NASA's progress on the project and present some initial ideas on a path forward to further develop remote sensing use to further enhance post disaster resilience for communities.

Recommendation:

This is an informational item. Commissioners are encouraged to ask questions.

Item IX

State of California
Seismic Safety Commission

Memo

To: Commissioners

From: Robert Anderson, P.G., C.E.G.

Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506

Date: January 4, 2016

Subject: Uninhabited Aerial Vehicle Synthetic Aperture Radar Observation of Recent Earthquakes in California

Project Description: The use of synthetic aperture radar has been becoming more and more used in observing damage to structures and infrastructure for a number of years after several earthquakes in California. The kinds of damage range from minor structural damage to buildings, streets, and gas and water lines in the La Habra earthquake, to detection and location of heavily damaged houses and buildings in the Napa earthquake as well as damaged roads and tilled farm lands during the El Mayor Cucapah earthquake in 2010.

Dr. Andrea Donnellan, from JPL, will discuss JPL/NASA's efforts in applying UAVSAR to understanding crustal deformation associated with recent earthquakes in California and the detection and location of damage. The presentation will focus on the 2010 M7.2 El Mayor – Cucapah, 2014 M5.1 La Habra, and 2014 M6.0 South Napa earthquake. For each earthquake, geodetic imaging detected considerable slip on structures beyond the main shock rupture zone. UAVSAR was used to detect the pattern of postseismic motions following the El Mayor – Cucapah and South Napa earthquakes. Dr. Donnellan will discuss the implications of the results for seismic hazard assessment.

Recommendation:

This is an informational item. Commissioners are encouraged to ask questions of Dr. Donnellan after her presentation.

Item X

State of California
Seismic Safety Commission

Memo

To: Seismic Safety Commission

From: Fred Turner, Staff Structural Engineer
California Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
Phone: (916) 263-0582 Fax: (916)263-0594 Email: Turner@StateSeismic.com

Date: January 5, 2016

Subject: Update on Guide and Appendix to Identify and Manage Seismic Risks of Buildings for Local Governments

Background

At the October hearing, the Commission's Committee on Collapse Prone Buildings presented a final draft of a 14-page executive summary. The committee is chaired by Commissioner Randy Goodwin and includes Commissioners Kit Miyamoto and Fuad Sweiss. Since October, the Committee has focused on developing a draft of a companion appendix. A draft of the appendix will be handed out at the Commission hearing in January 2016. It includes an introduction, a summary of the common types of buildings that are prone to collapse, the most effective methods of managing this risk, a section on who is responsible for managing the risks, checklists of typical tasks for inventorying and evaluating buildings, sample form letters, and reference materials.

Staff Recommendation

This is an informational update and requires no action by the Commission.

Item XI

State of California
Seismic Safety Commission

Memo

To: Seismic Safety Commission

From: Fred Turner, Staff Structural Engineer
California Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
Phone: (916) 263-0582 Fax: (916)263-0594 Email: Turner@StateSeismic.com

Date: January 5, 2016

Subject: Seismic Safety of the Department of State Hospitals' (DSH) Facilities

Background

This year's budget required the Department of State Hospitals to consult with the Seismic Safety Commission while DSH summarized known information about the level of seismic safety of its state-owned hospital buildings by January 10, 2016 (Supplemental Reporting Language in Item 4440-301-0001 of the FY 2015-16 Budget Law). A rough draft "Report on the Seismic Safety of the State Hospitals" was issued by DSH on October 9, 2015. The Seismic Safety Commission staff provided the attached letter to DSH that offered 27 recommendations for changes to the draft. Second and third drafts were released in late December. Some, but not all of the SSC staff recommendations were addressed by DSH. The final report, though not yet available, is intended to support a more comprehensive priority-setting process for the Department's future capital outlays.

DSH manages the nation's largest in-patient forensic mental hospital system in the U.S. serving 13,000 patients that include 6,700 patients in continuous care in five hospitals and three psychiatric programs located in state prisons. DSH employs over 12,300 staffmembers at these facilities.

The report focuses only on the five state-owned hospitals that are called Atascadero, Coalinga, Metropolitan Los Angeles, Napa and Patton. They have 474 buildings with over 6.5 million square feet of floor space. These state hospitals were exempted from the state's 1973 Hospital Seismic Safety Act as well as retroactive replacement and retrofit requirements enacted in 1995 for other hospitals. Decades of funding shortfalls have also contributed to the vulnerability and inadequacy of these facilities.

DSH was unable to prepare draft reports in a timely manner to enable the full Commission to be consulted at a public hearing as required by the Supplemental Reporting Language in the state's budget.

Major Conclusions from the Draft DSH Report

About two-thirds of the state-owned hospitals (measured by floor area) are in Seismic Performance Category 1 that can pose significant risks of collapse and danger to the public. Only one hospital campus at Coalinga was built to modern standards in 2005.

Using a somewhat less stringent rating criteria that the State Architect had applied to public school buildings, one-fourth of the hospitals are in AB 300 Category 2 that have construction types that have performed poorly in past earthquakes. They warrant further detailed seismic evaluations to determine if they can achieve life-safety performance in earthquakes with design-level ground motions.

Age of DSH construction ranges from 1875 to 2005 with the majority of the buildings constructed before 1960 and predominantly mid-20th-century.

In addition several hospital campuses are located such that more than one campus can be impacted by a single earthquake. DSH currently lacks surge space to be capable of relocating patients out of damaged and inoperable facilities on one or more campuses. Nonstructural vulnerabilities including security risks to staff and patients have not been addressed in this initial report, but will likely be included in future evaluations.

DSH is recommending that it develop a comprehensive building categorization and ranking system for each building, prioritize buildings for addition seismic evaluations, seek funding, and incorporate seismic safety needs into DSH's long-term capital outlay master plan and budgets.

Staff Recommendation

By the time of the Commission hearing on the 14th, we expect to receive a copy of DSH's final report which will be handed out at the hearing. This is an informational item only and no action by the Commission is anticipated to be needed. Staff will apprise the Commission of major changes, if any, to the overall prognosis and recommendations in the final report.

Item XII

State of California
Seismic Safety Commission

Memo

To: Seismic Safety Commission

From: Fred Turner, Staff Structural Engineer
California Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
Phone: (916) 263-0582 Fax: (916)263-0594 Email: Turner@StateSeismic.com

Date: January 5, 2016

Subject: Review of Delays to the San Francisco Public Utilities Commission's (SFPUC's) Water System Improvement Program

Background

The State's Water Code Section 73502 requires the Seismic Safety Commission (SSC) to relay comments to the Joint Legislative Audit Committee on the public safety implications of delays and deletions to the SFPUC's Water System's Improvement Program. At its December 8th hearing, the SFPUC adopted a resolution to notify the SSC of additional program delays. We expect to receive formal notice shortly. Upon receipt of the formal notice, the SSC will have 90 days to comment.

This will be our ninth review of delays since 2006 and, in only prior reviews and not this particular case, some project deletions.

Summary of Latest Changes to the Program

The latest delays to five seismic safety-related projects do not appear to adversely impact the seismic safety of the Hetch Hetchy regional water system nor will the delays extend the program's overall completion date. That date in 2019 depends on the completion of the new Calaveras Dam which, while being years behind schedule, has not experienced additional delays. Key seismic project delays range from 4 months to over a year, so some delays are more significant than others. All of the delayed projects will have substantially completed their construction and will be operable prior to March 2016 when the SSC will be required to submit its review. The delays have reportedly been caused by minor punch list items during the final phases of the projects, including late change order requests and litigation claims from contractors that the SFPUC staff is negotiating and processing.

While the SFPUC is required by the Water Code to report delays, the requirement is triggered only when the SFPUC formally adopts delays. While the SFPUC staff has known about some delays for upwards of more than 8 months, the SFPUC staff elected

not to ask its Commissioners to formally adopt the delays and notify the SSC until December 8th. The SFPUC's decision to not promptly report delays does not alter their significance nor the SSC's responsibility to comment on their impacts cumulative from the program's inception in 2002.

Staff Recommendation

The staff recommends that the SSC hear from staffmember Fred Turner and appoint Commissioner Michael Gardner to review drafts and advise staff as it develops a letter to the Joint Legislative Audit Committee that will be brought back to the full Commission for its consideration at one of the Commission meetings this spring.

Item XIII

State of California
Seismic Safety Commission

Memo

To: **Seismic Safety Commissioners**

From: Richard McCarthy
Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506 x 230

Date: January 12, 2016

Subject: **Post Earthquake Fire Performance of a Light-Gauge Cold-Formed Steel Framed Building (CFS)**

Background

Support has been secured by UC San Diego Shake Table to design, construct and test, under a range of earthquake motions, a full-scale, 5 story, completely CFS-framed and sheathed structure. This experimental program, with complete funding for seismic testing provided elsewhere, provides an opportunity to nominally extend the program and evaluate the post-earthquake fire performance of an earthquake damaged CFS-building.

Proposal

It is proposed, following the earthquake testing, to conduct room-scale fire tests in the specimen in order to assess the fire performance of structural and non-structural systems, including exit system components (corridors, stairs, doors)d, fire- and smoke-rated compartments (walls and ceilings), exterior system performance (walls and windows) and possibility active fire protection systems.

The total estimated cost for the fire test program is $100,000. The proposal is for the California Seismic Safety Commission's support for approximately half of these costs ($49,350), which would be used to support specimen time and activities while on the shake table to instrument and conduct the live fire tests. The remaining direct costs support will be sought from industry sponsors.

Recommendation

Staff recommends that the Commissioners listen to the presentation by Dr. Tara Hutchinson, Professor, Structural Engineering Department, UC San Diego, and be prepared to ask questions. Staff recommends that the Commission approve Dr. Hutchinson's funding request.

Exhibit A

Post-Earthquake Fire Performance of a Light-Gauge Cold-Formed Steel Framed Building

Tara Hutchinson, Professor, Structural Engineering Department, UC San Diego, tara@ucsd.edu; Brian J. Meacham, Associate Professor, Department of Fire Protection Engineering, Worcester Polytechnic Institute (WPI), bmeacham@wpi.edu;

Motivation: The need for low cost, multi- hazard resilient buildings constructed of sustainable low-carbon footprint materials is urgent. Light-gauge cold-formed steel (CFS) framed multi-story buildings for such occupancies as hospitals, medical buildings and schools have the potential to support this urgent need. There are numerous benefits of CFS-framed structures. For example, they have lower installation and maintenance costs as compared with other systems, are durable, ductile, lightweight, and manufactured from recycled materials. In addition, consistency in material behavior and low material costs are added benefits compared with their wood-framing counterparts. The components of CFS-framed assemblies (studs, track, joists) can be assembled quickly and with relative ease into prefabricated panels. Notably, the ductile nature of a CFS-framed structure aligns with the performance needs in moderate to high seismic zones. Taken in totality, these many beneficial attributes lead to a highly sustainable construction type for housing communities. However, the lack of full-scale, system-level test data documenting the seismic response at key performance levels, particularly for CFS-buildings above 3-4 stories, is needed to substantiate its benefits to the community. Presently, design engineers and contractors are precluded from constructing mid-rise CFS-framed buildings due to limited understanding of their performance even under low-level earthquake motions. In addition, post-earthquake fire performance of CFS-framed buildings above 3-4 stories is completely unknown, and is therefore needed to support future acceptance of such buildings in earthquake-prone areas.

Synopsis of Request to the California Seismic Safety Commission: Support has been secured to design, construct and test, under a range of earthquake motions, a full-scale, 5-story, completely CFS-framed and sheathed structure (test specimen). This experimental program, with complete funding for the seismic testing provided elsewhere, provides a unique opportunity to nominally extend the program and evaluate the post-earthquake fire performance of an earthquake damaged CFS-building. The test specimen is currently under design, with constructed slated for the March 2016 timeframe, and immediate earthquake motion testing in April-May 2016. It is proposed, following the earthquake testing, to conduct room-scale fire tests in the specimen in order to assess the fire performance of structural and non-structural systems, including exit system components (corridors, stairs, doors), fire- and smoke-rated compartmentation (walls and ceilings), exterior system performance (walls, windows), and if time and resources permit, active fire protection systems. If funding can be secured, post-earthquake fire testing can be conducted in the May-June 2016 timeframe. The total estimated cost for the fire test program is $100,000 (direct costs – see budget). Herein, we are seeking the California Seismic Safety Commission's (CSSCs) support for approximately half of these costs **($42,000 direct + 7,350 indirect (17.5%) = $49,350 total request),** which would be used to support specimen time and activities while on the shake table to instrument and conduct the live fire tests. Presently, we are seeking the remaining direct cost support from industry sponsors.

Project Team and Experience: The fire test program will be led by Brian Meacham of the Worcester Polytechnic Institute (WPI) Department of Fire Protection Engineering; with close collaboration of Professor Tara Hutchinson of the University of California, San Diego (UCSD). Professor Hutchinson is leading the earthquake test program with Professor Gil Hegemeir. WPI and UCSD were partners on the highly successful Building Nonstructural Components and Systems (BNCS) project which involved construction, earthquake testing, and post-earthquake fire testing of a 5-story reinforced concrete specimen fit out as office, laboratory and medical space (see http://bncs.ucsd.edu/). This landmark $5

Exhibit A

Million effort resulted in numerous reports, journal publications, and conference publications. It supported numerous MS, PhD and post-doctoral researchers. With respect to benefits to the fire protection engineering community, it supported former WPI FPE MS student Jin-Kyung Kim, who completed his MS thesis in the topic area and is now a fire engineer with Arup in Hong Kong, and former WPI FPE PhD student Dr. Haejun Park, now a fire researcher at BRANZ in New Zealand. It also resulted in numerous technical papers (see reference list). The CSSC supported a portion of this effort at a comparable level of $50,000. These resources were utilized to purchase sensors, instrumentation, and related materials for on-site fire testing of the specimen at the shake table facility: a critical component of the fire test program. For the upcoming tests, Dr. Praveen Kamath of WPI is available as a Post-Doctoral Fellow to support the team. Dr. Kamath has conducted post-earthquake fire performance research for his PhD at the Indian Institute of Technology, Roorkee, India, and at the University of Edinburg in Scotland. In addition to his PhD research, his projects include "A Collaborative Research Framework for Structures Subjected to Extreme Loads" and "Fire Resistance and Repair of Earthquake Damaged Structures." (see reference list).

Earthquake Test Program: To obtain data on the earthquake performance of CFS-framed buildings, a team led by Professor Hutchinson has been assembled to construct and test a full-scale, 5-story, completely CFS-framed and sheathed residential housing structure on the UCSD Large High-Performance Outdoor Shake Table (LHPOST). This effort is jointly funded by the U.S. Department of Housing and Urban Development (HUD), UCSD, and a consortium of industry sponsors. Support for the earthquake test program is estimated at about $750,000, including cash and in-kind donations (e.g., materials, equipment, design and installation services, etc.). Benefiting from collaboration with the cold-formed steel framing industry, this lightweight framed and structural integrated panel (SIP) building will be constructed and instrumented directly on the UCSD shake table. Subsequently, it will be subjected to a suite of earthquake motions of increasing severity to assess its damage progression. Approximately 100 sensors will be distributed throughout the test building to measure accelerations and displacements. An array of video cameras both within the interior and exterior of the test building will also be placed and synchronized with the analog sensor data to identify instances of damage as plausible.

Specimen Design: The test specimen is being designed for a high seismic region in Southern California, and assuming typical residential occupancy (assisted living) at each level, is tentatively planned with 9-foot floor heights uniformly adopted at each floor level. Within the interior of the building, long shearwall corridors will be implemented, while shorter squat shearwalls (as is common in practice) will laterally brace the exterior/end walls. The design will be in accordance with current ASCE 7-10 (2010) prescriptions with a structural reinforced concrete foundation cast and anchored directly to the NHERI@UCSD[1] shake table. Nearly the full footprint of the NHERI@UCSD shake table will be utilized (40 ft. x 25 ft.). Lateral seismic resistance will be provided by the SIP subsystems, as they are commonly used in seismic regions of the U.S. and particularly common in residential construction. Layouts on the five floors may be relatively uniform, however will feature corridors, compartment walls, doors and windows (see Fig. 1). Window openings will be featured in exterior walls and as possible, fire rated sheathing shall be used within fire rated corridors. Detailed structural design aimed at achieving target drift and acceleration in the specimen to the selected ground motions is being undertaken in consultation with a design firm selected by our CFS-industry partner. UCSD is working closely with the design consultant in the preparation of the design and construction documents.

[1] Formerly supported through the NEES program, the large outdoor shake table has become part of the Natural Hazards Engineering Research Infrastructure (NHERI) Equipment Facilities as of January 1, 2016

Exhibit A

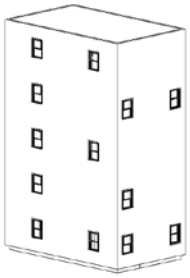

Fig. 1(a) - Exterior Sketch

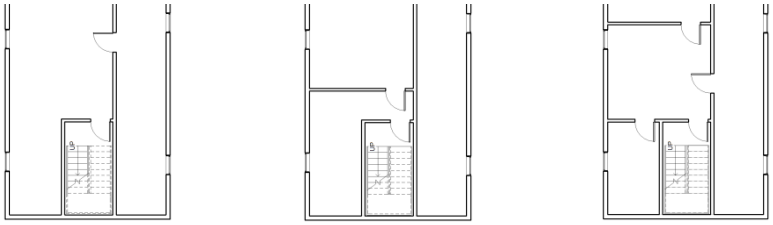

Fig. 1(b) Potential Interior Configurations

Post-Earthquake Fire Performance Issues: Under normal circumstances, fire protection of light-gauge cold-formed steel (CFS) framed structures is straightforward, and is typically achieved through proper installation of fire-rated gypsum wallboard on interior walls, and where required, appropriately fire-rated exterior wall systems. However, as demonstrated in the recent BNCS project, passive fire protection systems can be significantly damaged by differential seismic-induced movement of the structure. With respect to interior wall systems, a key concern is at wall-wall joints and wall-ceiling joints, where gaps can be created due to the movement of the building. If large enough, these gaps can allow for the dramatic spread of smoke and flame (see e.g. Fig. 2).

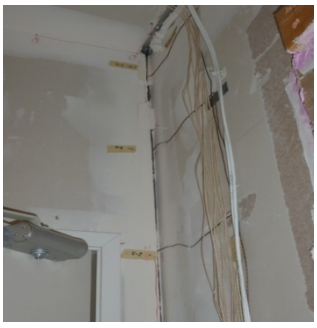

Fig. 2(a) 2.5 cm gap in wall-wall joint due to movement of building during seismic test

Fig. 2(b) Flame extension from room with test fire to adjacent room via gap at wall-wall joint

Fig. 2(c) Gap between exterior CFS framed wall system created due to ground motion and soot from smoke

In this same test series, significant damage was observed to the exterior balloon frame wall system, which was framed using CFS. In this situation, the exterior wall system separated from the floor system by as much as 5 cm along extended lengths. This loss of compartmentation resulted in vertical smoke and flame spread. The evidence of this can be seen in Fig 2(c), where the gap can be seen, along with soot residue from smoke which vented through the gap during the fire test phase. In addition to the passive fire protection systems, damage to active fire protection systems, such as sprinkler systems, can also occur during earthquakes, impacting the availability of automatic fire suppression within buildings. Furthermore, damage can occur to fuel gas piping, which could lead to additional fire hazards. Understanding the totality of potential sources of fire, and the performance of fire protection systems following earthquakes, is therefore extremely important.

Proposed Fire Test Program: To assess the post-earthquake performance of CFS framed multi-story construction, we propose to conduct 8 live fire tests in the specimen following the earthquake tests. Since the specimen is being designed with various fire-rated construction features, we will be able to assess earthquake performance of these systems to determine if gaps or other failures result, which would impact fire and life safety, and then use the live fire tests to assess the potential impact on fire spread. The test

Exhibit A

specimen will allow us to assess various fire mitigation measures, including various firestop materials and systems, and fire rated construction (walls, doors, ceilings). Active systems and water supply systems (sprinklers and standpipes) may be included, pending cost and time constraints. The specimen will be instrumented with thermocouples, smoke sensors, and cameras, with a focus on compartment temperatures, transmission of smoke and hot gasses through compartment barriers, and performance of egress systems. The fires will range from 0.5 MW to 5.0 MW, pending necessary approvals. The fires will be sized in each test to assess the potential for smoke spread, fire spread and local collapse.

Estimated Fire Test Budget and Timeline: The building components and systems will be provided and installed by UCSD's CFS-industry partner, as part of the earthquake test program, so there are no additional costs associated with preparing the base test specimen. The working budget for the fire test program is approximately $100,000 (direct costs), which includes 10 days of UCSD LHPOST facility time to support sensor installation and testing on the shake table ($21,000[2]), materials for fire testing (fuel, instrumentation, etc.) based on 8 fire tests ($38,000), one month of salary and indirect cost for Professor Meacham and 2 student (or post-doc) researchers ($36,000) and travel expenses ($8000). **Of the CSSC, we are requesting support for the additional two weeks of shake table time support to facilitate these tests, i.e. ($21,000 x 2 weeks + 17.5% assumed overhead = $49,350)**. We note that some in-kind support for experimental set-up and post-test analysis by Professor Meacham and students is anticipated from WPI. Time permitting, we will also solicit donation of water supply and sprinkler equipment in the form of in-kind donations from fire protection partners. Time on site will be limited to 10 days for fire testing: 4 days of sensor installation and calibration, 4 days of testing, and 2 days of sensor removal.

Key Activities	**Dec 15**	**Jan 16**	**Feb 16**	**Mar 16**	**Apr 16**	**May 16**	**Jun 16**
Fire funding requests							
Fire systems design							
Specimen Design & Construction							
Earthquake Testing							
Fire Testing							

[2] A nominal reduction in recharge rates is assumed, as the shake table will not be operated during the live fire tests.

Item XIV

State of California
Seismic Safety Commission

Memo

To: California Seismic Safety Commissioners

From: Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
(916) 263-5506

Date: January 7, 2015

Subject: 2015 Annual Report

The attached 2015 Annual Report is in DRAFT format. This is the first DRAFT version. The final report will be presented at the *March 2016* Commission meeting for approval.

2015 Annual Report
California Seismic Safety Commission

Executive Summary

The Alfred E. Alquist Seismic Safety Commission (SSC) is the primary seismic resource for the State of California dedicated to reducing earthquake risk for the people of California since 1975. The Commission investigates earthquakes, reports on earthquake-related issues, and evaluates and recommends to the Governor and Legislature policies needed to reduce earthquake risk. Although the SSC does not have any governing authority on earthquake policy, the SSC strives to ensure a coordinated framework for establishing earthquake safety policies and programs in California.

Mission Statement

To provide decision makers and the general public
with cost-effective recommendations to reduce earthquake losses
and expedite recovery from damaging earthquakes.

Vision Statement

To provide leadership in implementing and achieving the goals and objectives in the *California Earthquake Loss Reduction Plan,* including to advance learning about earthquakes and risk reduction in both the short and long term, advance the earthquake-resistant designs of buildings and other important structures, and advance the preparedness and emergency response systems for earthquakes.

2015 Commission Membership

Timothy Strack, Chair	Fire Protection
Tracy Johnson, Vice Chair	Public Utilities
Senator Anthony Cannella	State Senate
Assembly Member Ken Cooley	State Assembly
Dr. Kit Miyamoto	Structural Engineering
Ian Parkinson	Emergency Services
Vacant	Vacant
Dr. Margaret Hellweg	Seismology
Helen Knudson	Social Services
Fuad Swiss	Mechanical Engineering
Dr. Gregory Beroza	Geology
Honorable Michael Gardner, Councilman Riverside	Local Government
David Rabbitt, Sonoma County Supervisor	Local Government
Mark Wheetley, Councilman, Arcata	Local Government
Vacant	Vacant
Randy Goodwin	Architectural and Building Official
Vacant, State Representative	Building Standards Commission
Mark Ghilarducci, State Representative	California Office of Emergency Services
Chester Widom, State Representative	State Architect
Vacant	Insurance

Commission Staff

Richard J. McCarthy, Executive Director
Robert Anderson, Senior Engineering Geologist
Sue Celli, Executive Secretary and Office Manager
Lena Daniel, Administrative Manager
Henry Reyes, Structural Engineer (Special Projects)
Fred Turner, Senior Structural Engineer
Salina Valencia, Legislative/ Communications Director

The SSC was established in 1975 to advise the Governor, Legislature, state and local agencies, and the public about strategies to reduce earthquake risk (Government Code §8870, et seq.). The SSC is under the State Business, Consumer Services and Housing Agency and consists of 20 commissioners. The Governor appoints 15 commissioners, chosen for their technical expertise and experience; the Senate and the Assembly each choose a representative from their respective memberships; and three state organizations are represented. The state representatives are the *California Office of Emergency Services, California Building Standards Commission, and the Division of the State Architect*. The SSC is supported by 6.5 staff members.

Commission Funding

The SSC is supported by the Insurance Fund managed by the California Department of Insurance. The SSC's operational budget for fiscal year (FY) 2015/2016 is ######. Occasionally, the Commission will receive reimbursement funds for special projects. For projects supported by the *California Earthquake Research Fund*, the Commission is entitled to charge a 10% overhead.

Commission 2015 Projects

Special Hearing on South Napa California (Post August 24, 2013 - 6.0 Earthquake) Emergency Response Recovery and Lessons Learned

The 2014 South Napa earthquake occurred in and around the city of Napa, California, on August 24 at 3:20 a.m. local time, measuring at 6.0 on the moment magnitude scale. The tremor's epicenter was located south of Napa, approximately 3.7 miles (6.0 km) northwest of American Canyon near the West Napa Fault, beneath the Napa Valley Marina on Milton Road, just west of the Napa County Airport.

This earthquake was the largest in the San Francisco Bay Area since the 1989 Loma Prieta earthquake. Significant damage and several fires were reported in the southern Napa Valley area, and there was also damage in the nearby city of Vallejo, in Solano County. The quake killed one person, injured about 200, and interrupted power to more than 69,000 Pacific Gas and Electric Company customers. An experimental earthquake warning system provided several seconds of warning to select Bay Area locations before the strong shaking arrived. A Presidential Disaster Declaration was announced on September 11, 2014. Early estimates by California officials indicated that the earthquake caused over $400 million in damage, of which $87 million may be eligible for federal reimbursement. Several dozen previously-retrofitted unreinforced masonry buildings experienced mixed performance, with a few suffering life-threatening damage.

In 2014 the Commission contracted with the Pacific Earthquake Engineering Research (PEER) Center to identify lessons learned from the August 2014 South Napa earthquake. PEER has completed a draft of the report and it is to be released to the Commission in January 2016.

Local Government Guidebook for Managing Risk of Collapse-Prone Buildings in California

California's 14 million buildings include some of the most modern and earthquake-resistant in the world. However, most older buildings could be damaged and a few – perhaps less than 5% - could collapse in severe shaking. This amount may seem small, but collapse can cause significant life loss, injuries and substantial social and economic disruption mounting to hundreds of billions of dollars.

The "Guide to Identify & Manage Seismic Risks of Collapse-Prone Buildings" summarizes California's laws and regulations to assist local governments to identify and reduce collapse risks, as well as best practices that building owners can take to further manage the risks.

At the October 2015 hearing, the SSC's ad hoc Committee on Collapse Prone Buildings presented a final draft of a 14-page executive summary. The ad hoc committee is chaired by Commissioner Randy Goodwin and includes Commissioners Kit Miyamoto and Fuad Sweiss. The Committee is currently focused on developing a draft companion appendix to the "Guide to Identify & Manage Seismic Risks of Collapse-Prone Buildings". A draft of the appendix will be handed out at the Commission hearing in January 2016. The draft appendix includes an introduction, a summary of the common types of buildings that are prone to collapse, the most effective methods of managing this risk, a section on who is responsible for managing the risks, checklists of typical tasks for inventorying and evaluating buildings, sample form letters, and reference materials.

California Earthquake Early Warning Benefit Analysis Report

The California Office of Emergency Services (CalOES) was tasked with leading a comprehensive effort to bring together experts, scientific members of government and private industry, to secure an effective and reliable Earthquake Early Warning System (EEWS) in California.

In September 2013, Governor Jerry Brown signed Senate Bill 135 into law. This was a critical step forward in the overall effort to provide Californians with enough warning that an earthquake capable of producing intense ground shaking has occurred.

SB 135 requires that the CalOES will, in collaboration with the California Institute of Technology (Caltech), the California Geological Survey (CGS), the University of California (UC Berkeley), the United States Geological Survey (USGS), the SSC and other stakeholders, develop a comprehensive statewide EEWS through a public/private partnership.

The SSC is part of the "California Office of Emergency Services Earthquake Early Warning Working Group." This partnership is dedicated to develop a needs-driven, user-driven California Early Earthquake Warning System (CEEWS). The working group completed a charter in 2014 to serve as a road map to developing a working system.

CalOES has agreed to pursue a phased approach to a Benefit Analysis of CEEWS. The SSC will fund phase-one of the Benefit Analysis. Per the request of CalOES in partnership with the SSC the Pacific Earthquake Engineering Research (PEER) Center will be conducting research and study to prepare a business case for EEWS. PEER is a multi-institutional research & education center. The PEER study will provide and objective analysis to assess and validate the potential benefits of an EEWS. The objective is to establish the system's value to the business community and key sectors in order to promote public and employee safety, enhance business resiliency, and protect infrastructure critical to local communities and the economy. This project is an initial step toward what will be a more comprehensive analysis over time and as the system is developed.

Senate Bill 1345: Seven Year Extension of Seismic Safety Commission Review of San Francisco Public Utilities Water Delivery System Retrofit Project

SB 1345 extends the Commission's oversight of the public safety implications of delays and project deletions during the San Francisco Public Utilities' Commission's (SFPUC) efforts to retrofit and replace major portions of the Hetch Hetchy Regional Water Transmission System to the Bay Area.

The Wholesale Regional Water System Security and Reliability Act required the City and County of San Francisco to adopt a specified program of capital improvement projects designed to restore and improve the Bay Area regional water system. Within 90 days of receiving changes to the program or postponements of the scheduled completion dates, the Seismic Safety Commission and the State Department of Public Health are to submit to the SFPUC and the Joint Legislative Audit Committee written comments with regard to the significance of the change with respect to public health and safety. Existing law makes the act inoperative and repeals these provisions on January 1, 2015.

SB 1345 extends the time the Seismic Safety Commission and the State Department of Public Health have to submit the written comments to 120 days and would extend the repeal date of the act to January 1, 2022. By extending the period of time during which certain requirements would apply to regional wholesale water suppliers and the City and County of San Francisco, the bill will impose a state-mandated local program.

The latest delays to five seismic safety-related projects do not appear to adversely impact the program's overall completion date. All of the delayed projects will have substantially completed their construction and will be operable prior to March 2016 when the SSC is required to submit a review. The delays have reportedly been caused by minor items during the final phases of the projects, including late change order requests and litigation claims from contractors that the SFPUC staff is processing.

Hospital Safety Board Annual Report To Commission

Government Code Section 8870.95 requires the Hospital Building Safety Board to report annually to the Alfred E. Alquist Seismic Safety Commission.

This year's budget required the Department of State Hospitals to consult with the SSC while Department State Hospitals (DSH) summarized known information about the level of seismic safety of its state-owned hospital buildings by January 10, 2016. A rough draft "Report on the Seismic Safety of the State Hospitals" was issued by DSH on October 9, 2015. The SSC staff offered recommendations for changes to the draft. Second and third drafts were released in late

December. Some, but not all of the SSC staff recommendations were addressed by DSH. The final report, though not yet available, is intended to support a more comprehensive priority-setting process for the Department's future capital outlays.

Global Earthquake Model Foundation – Back to Normal
&
Beyond Button Pushing

The SSC has identified a serious lack of seismic research in the area of post-disaster economic recovery. This is especially true for the speedy recovery of the state's building stock. Current computer earthquake programs (models) perform simulations that estimate consequences. Unfortunately, current loss models used around the world are "closed models," that is, the mathematics used to run the model is proprietary.

The Global Earthquake Model Foundation (GEM) is an organization focused on developing damage models and sharing information on earthquake hazards to vulnerable communities worldwide. GEM's own computer earthquake model (OpenQuake) is NOT proprietary and users can review the mathematics and assumptions that drive the model. Currently, models can account for social consequences and resilience, but only approximately – like applying a "fudge factor" to an otherwise complicated calculation. In particular, models can not yet reliably estimate the amount of recovery time for a community or region to "get back to normal."

The Commission partnered with GEM in 2013 to produce an earthquake model that will benefit California. This is a unique opportunity for the Commission. It will bring products and services to California that otherwise would not be available. GEM will quantify the effectiveness of specific actions, now or in the future, to speed recovery. Additionally, this project will produce the technical basis for models to estimate recovery times. Currently, models are used only to estimate earthquake damage.

GEM publicly released OpenQuake on schedule on December 31, 2014, followed by a release event January 21st in Pavia, Italy. This milestone represents the culmination of five years of development and an investment of more than $25 million. The OpenQuake platform for earthquake risk assessment includes original datasets, software, graphical interfaces, and tools for modeling and visualization, all open and free for public use.

The precedent that GEM has set for open data and modeling, and for public-private partnerships, is now being actively followed by the climate change community.

University of California, Los Angeles, (UCLA) has been actively conducting analyses to produce recovery curves, specific relationships between damage states and time to regain function for a given building. The GEM staff in Pavia is establishing macro-level relationships between damage and recovery time, by analyzing historical data from the Northridge and Loma Prieta earthquakes.

The OpenQuake release includes risk and hazard toolkits for investigating the influence of modeling parameters on results. With these, GEM has begun to produce results for California and identify the most influential parameters, making use of historical data from Northridge and Loma Prieta, to make comparisons and validate its findings.

Both GEM projects include training workshops and publications that will provide specific guidance on how to build California's resilience to earthquakes.

Note: The Commission became a nonvoting government member on GEM's Board of Directors in 2012, along with the World Bank and many other prominent organizations. GEM benefits from California's knowledge and resources while providing good exposure and educational materials for California by disseminating information on California's earthquake hazards and structural vulnerabilities.

Community & Media Outreach

One of the SSC's primary objectives is to assist the residents in the State of California to become aware of the risks and preparation associated with earthquakes and other natural disasters. In order to enhance the impact of the SSC's continued work towards assisting the residents of California, the SSC has contracted with the University of California San Diego (UCSD) and Professor Michael Kleeman to create effective public awareness, engagement with and community practice for earthquake preparedness and disaster response in California.

The purpose of the community and outreach project is to create and leverage a network of services and media partners who will highlight efforts supported and enabled by the SSC. The community and media outreach project will significantly expand the number, quality of channels and media types used to communicate information and build ongoing public awareness of the importance of preparedness for earthquakes and other natural disasters.

Earthquake & Tsunami Classroom Curriculum

Humboldt State University has partnered with the SSC for a project designed to deliver preparedness information to elementary aged students and their families in the North Coast network of schools. The framework of the project includes the development of a web-based interactive earthquake and tsunami education program that extends to include curriculum and preparedness information. This project provides accessible materials that will fit into the current state teaching framework and address the priority needs in the State for earthquake and tsunami outreach.

Independent Peer Review Panel for Diablo Canyon Nuclear Power Plant

The SSC with a number of other state organizations, assisted the California Energy Commission in the development of a report based upon AB 1632 (Blakeslee) in 2008. The legislation directed PG&E to use advanced 3-D seismic surveying and other methods to try to reduce the uncertainty in information regarding the seismic hazard. In 2011 The California Public Utilities Commission secured funding and created an Independent Peer Review Panel (IPRP) consisting of the California Public Utilities Commission (CPUC), the SSC, the California Geological Survey, the California Energy Commission, The California Coastal Commission and a representative from the County of San Louis Obispo. The IPRP has been reviewing and meeting as warranted with personnel from the Pacific Gas and Electric Company and various interveners since 2011.

HayWired: How Earthquakes Damage Communication and Information Technology in the Bay Area

The United States Geological Service (USGS) and Joint Venture Silicon Valley have partnered with the SSC to research and strategize to enhance the resilience of Bay Area communities to Climate Change and Natural Hazards. The USGS in collaboration with its partners and stakeholders transform hazard information into risk products that are useful for decision and policy makers across scales of government and the private sectors.

Currently, the USGS is leading a scenario, called HayWired, in the San Francisco Bay Area of California. The HayWired scenario is a hypothetical, but realistic earthquake sequence initiating with a rupture of the Hayward Fault. The main shock earthquake is a magnitude 7.05 earthquake with the hypocenter in Oakland, California. The scenario's name HayWired, is a reference to the Hayward Fault and speaks to the potential chaos caused by impacts to the wired and wireless world. California has not experienced a large earthquake since our society, culture, and economy have become entwined with the Internet. More generally "wired" represents interconnectedness at many levels: interdependencies of lifeline, social connectivity through technology, and the ripple effects of damages and disruption throughout the economy encompassing the digital economy. The HayWired theme is particularly apropos for the Bay Area, a leader in digital communications and technology.

The Haywired scenario address risks of climate change and natural hazards, benefiting communities, businesses, governmental agencies and the general public in the Bay Area, California. The HayWired project is slated to end on April 30, 2017.

California Small Businesses Earthquake Education & Outreach

California's Small Business Development Centers (CASBDC) network is one of the State's primary resource partners for small business development. The CASBDC consortium of over 42 service centers and administrative lead centers play a leading role in driving the states economy by providing small businesses and entrepreneurs with confidential, no-cost advising and expert training. The CASBDC network works closely with 65,000 businesses and entrepreneurs across California annually.

In an effort to bring forth an awareness of disaster preparedness amongst the State's small businesses, the Commission contracted with the CASBDC in 2013 and 2014 to assess the preparedness amongst California small businesses in the event of a natural disaster. This contract was two-fold: One was to conduct a survey of California small businesses and secondly, the creation of the California Small Business Disaster Resource Guide. As a result of the project it was found that the State's small business owners are focused on keeping their businesses growing and thriving. Preparing for a disaster is not always an active priority for the small business owner.

This year, the SSC has contracted with the CASBDC who will be hosting a series of educational workshops targeting potential entrepreneurs as well as the over 3.4 million business owners in California. The purpose of the educational sessions will be to provide new and existing businesses with information they need to be prepared for disruption caused by major earthquakes or other natural disasters. These workshops assist the small business owner in planning for business continuity during and after an earthquake.

Earthquake Resiliency in California – Report and Assessment
Jet Propulsion Laboratory/
National Aeronautics and Space Administration

Situational awareness following an earthquake or other natural disaster is critical for state, county and local officials for proficient emergency response. Understanding the scope of the damage, identifying where critical infrastructure is compromised and where it is still working is necessary for getting needed supplies to locations where people are at risk in the most efficient way possible.

The SSC has partnered with the Jet Propulsion Laboratory (JPL)/ National Aeronautics and Space Authority (NASA) in the sponsorship of a report that will investigate and assess the potential for

JPL-developed technology and capabilities that may assist in reducing earthquake hazard and improving earthquake resiliency and other natural disaster within California.

Guide to Identify & Manage Seismic Risks of Buildings for Local Governments

At the October hearing, the Commission's Committee on Collapse Prone Buildings presented a final draft of a 14-page executive summary. The committee is chaired by Commissioner Randy Goodwin and includes Commissioners Kit Miyamoto and Fuad Sweiss. Since October, the Committee has focused on developing a draft of a companion appendix. A draft of the appendix will be handed out at the Commission hearing in January 2016. It includes an introduction, a summary of the common types of buildings that are prone to collapse, the most effective methods of managing this risk, a section on who is responsible for managing the risks, checklists of typical tasks for inventorying and evaluating buildings, sample form letters, and reference materials.

Commission Budget Summary

Budget Year 2015/2016

Staff	California Insurance Fund
6.5	