State Of California

ALFRED E. ALQUIST SEISMIC SAFETY COMMISSION

Governor Edmund G. Brown Jr.

Board of Supervisors Hearing Room
105 East Anapamu Street, 4th Floor
Santa Barbara, California
Minutes of Regular Meeting
April 9, 2015

Members Present	**Members Absent**
Timothy Strack, Chairman	Greg Beroza
Tracy Johnson, Vice Chair	Ken Cooley
Salud Carbajal	Kit Miyamoto
Michael Gardner	David Rabbitt
Mark Ghilarducci	Chet Widom
Randall Goodwin	
Peggy Hellweg	**Staff Present**
Helen Knudson	
Jim McGowan	Richard McCarthy, Executive Director
Ian Parkinson	Fred Turner, Structural Engineer
Fuad Sweiss	Salina Valencia, Legislative Director
Mark Wheetley	

I. CALL TO ORDER AND ROLL CALL

Commission Chairman Timothy Strack called the meeting to order at 10:05 a.m. and welcomed all participants.

II. CHAIRMAN'S REMARKS

Chairman Strack thanked Supervisor Janet Wolf and the Santa Barbara County Board of Supervisors for allowing the Commission to use its meeting space. He said the Commission was pleased and honored to be in Santa Barbara, one of California's most beautiful and diverse areas.

Chairman Strack said that on April 8, the Commission presented the Board of Supervisors with information on the Commission's background and history, and had an opportunity to hear from the Board of Supervisors and discuss ways of working together to improve the seismic safety of Santa Barbara and the state.

Chairman Strack proposed deferring Item III, approval of minutes, until later in the meeting.

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

IV. OPENING COMMENTS

Chairman Strack invited Commissioner Salud Carbajal to introduce the presentations from Santa Barbara County.

Commissioner Carbajal expressed his appreciation to the Commission for visiting Santa Barbara, an area that has experienced many natural disasters. He introduced the chair of the Santa Barbara County Board of Supervisors, Janet Wolf, to give an official welcome.

V. COUNTY BOARD OF SUPERVISORS

Honorable Janet Wolf, Chair, Santa Barbara County Board of Supervisors, said the Board of Supervisors enjoyed meeting the Commission and staff at the April 8 Board of Supervisors meeting. She said the Board of Supervisors has been grappling with budget issues recently, so it was refreshing to focus on earthquake vulnerability. She thanked Chairman Strack and Executive Director Richard McCarthy for meeting in Santa Barbara.

Supervisor Wolf said people in Santa Barbara County feel lucky to live in this beautiful, varied, and diverse community. She observed that Santa Barbara County has also had its share of disasters, including four major fires during her tenure on the Board of Supervisors. She noted that the area has not had a major earthquake recently, but residents are aware of the seismic risk. Supervisor Wolf added that she attended high school with Lucy Jones, a well-known advocate for earthquake preparedness.

Supervisor Wolf said the Commission would be hearing later from Ryan Rockabrand, director of Santa Barbara's emergency operations center. She indicated that Santa Barbara has a new operations center, a project born out of the local fire disasters, but also because people are aware of their vulnerabilities to floods and earthquakes. She stated that the emergency operations center is well staffed and ready to respond to any kind of emergency.

Supervisor Wolf advised that the people in northern Santa Barbara County are concerned about their proximity to the Diablo Canyon nuclear power plant. She pointed out that Highway 101 is the main access route in and out of the county, north or south, with mountains on one side and the ocean on the other, so people are concerned about preparedness.

Supervisor Wolf said the Board of Supervisors, because of the leadership of Supervisor Carbajal, directed the staff to look at the vulnerability of the building stock in Santa Barbara County, and she cited this as a great leap forward. She said the county will continue to work on preparedness and communicating with constituents. She expressed her appreciation to the Commission for the policy initiatives it promotes and disseminates. She added that she hoped Santa Barbara would be considered as a site for a pilot project to test the statewide early warning system.

Supervisor Wolf wished the Commission an enjoyable stay and expressed her appreciation to the Commission for its work and to Supervisor Carbajal for arranging this meeting.

Commissioner Mark Ghilarducci said that before he was appointed as Governor Brown's emergency manager and homeland security chief, he spent considerable time in Santa Barbara working with the Board of Supervisors. He commented that Santa Barbara has improved tremendously from where it was a few years ago, in terms of both its preparedness level and capacity, and he recalled that the emergency operations center was working out of portable trailers then. Commissioner Ghilarducci recalled concerns voiced by members of the public after the fires about disaster preparedness. He commended the Santa Barbara County Board of Supervisors for making Santa Barbara County one of leaders in public safety now. He said Santa Barbara is being used as a model throughout the nation. Commissioner Ghilarducci congratulated Santa Barbara County for its state of preparedness.

Supervisor Wolf said the accomplishments were a team effort, and she expressed her appreciation to the Board of Supervisors, the staff, and the members of the community for their support and help.

Supervisor Carbajal remarked that Supervisor Wolf was the linchpin on the Board of Supervisors and remained steadfast in her leadership on this issue.

VI. CITY OF SANTA BARBARA

Chairman Strack introduced Mayor Helene Schneider and invited her to address the Commission.

Mayor Schneider welcomed the Commission to Santa Barbara and said she hoped commissioners enjoy their stay.

Mayor Schneider observed that disasters follow no jurisdictional lines, so disaster preparedness and response is a joint effort of the Santa Barbara County Board of Supervisors and staff, the City Council and staff, and other community areas who work together to provide emergency aid. She noted that Santa Barbara upgraded its emergency operations center to its main fire station a few years ago, and more recently moved the dispatch center from a seismically vulnerable 1960's building to the Granada garage facility, a safer facility.

Mayor Schneider reviewed some of the major earthquakes Santa Barbara experienced in the past. She said the first was in December of 1812, an event ranking 10 on a scale of 1 to 12, with 12 representing total destruction of a community; a 6.3-magnitude earthquake occurred 113 years later, in June of 1925, causing 13 deaths and $6 million in damages. She noted that the reconstruction effort after this event led to the establishment of the City of Santa Barbara's Architectural Board of Review and adoption of the prevalent Spanish Revival style of architecture.

Mayor Schneider stated that Santa Barbara experienced a magnitude 5.9 earthquake in August of 1978, causing $7.3 million in damage, but no deaths, reflecting improvements in seismic safety policies and procedures.

Mayor Schneider observed that 37 years later, in Santa Barbara over 200 unreinforced masonry buildings have been evaluated and seismically retrofitted. She expressed her appreciation to the Seismic Safety Commission for the policy guidance it provides to cities and counties to help them deal with these issues. Mayor Schneider said Santa Barbara is working with other cities to address soft-story buildings to minimize loss of life and injuries in the event of an earthquake.

Mayor Schneider expressed her appreciation for the Commission's work with cities and counties to provide information and sound policy direction focusing on seismic resilience. She welcomed assistance from the state in finding the financial resources needed to move these efforts forward.

Mayor Schneider thanked Commissioner Carbajal for his assistance and leadership.

Chairman Strack noted that at the Board of Supervisors meeting the previous day, he explained that the Commission wants to meet away from Sacramento to hear from local government officials and citizens, and he welcomed this outreach opportunity.

VII. SENATE REPRESENTATIVE

Ms. Fran Farina, District Representative for Senator Hannah-Beth Jackson, joined in welcoming the Commission to Santa Barbara. She encouraged commissioners to take advantage of the area's beauty and attractions during their visit. She advised that because of the drought, local restaurants serve drinking water only upon request.

Ms. Farina explained that Senator Jackson was in a legislative session in Sacramento and regretted that she was unable to attend in person. She noted that Senator Jackson just returned from a trip to Japan, and one of the issues she explored there was local earthquake preparedness, and she had a few remarks to share with the Commission.

Ms. Farina indicated that Senator Jackson reported that when the Japanese government evaluates earthquake preparedness and recovery, the recovery focuses on basic public infrastructure, such as roads; electric, gas, and water utilities; and food. She observed that people tend to focus so much on preparedness that they overlook recovery. Ms. Farina said Senator Jackson plans to encourage Assembly Member Rodriguez, the current chair of the Joint Legislative Management Committee on Emergency Management. to hold a hearing on earthquake preparedness and recovery.

Ms. Farina mentioned that Senator Jackson's district includes all of Santa Barbara County as well as the western portion of Ventura County. She introduced Mr. Kevin McGowan, from the Ventura-based Office of Emergency Services, and asked him to talk in more detail about that agency's earthquake preparedness activities.

Ms. Farina indicated that the Office of Emergency Services had launched a public outreach effort called "Ready Ventura County" to develop a three-day individual preparedness capability. She said they have a redesigned and improved countywide POST incident command assessment and building assessment program, recently revised after the Camarillo Springs disaster, which began with a fire during the summer, followed by mudslides produced by the first rains in October, and

then a heavy storm in December that resulted in severe damage to homes from rock slides. She observed that the region has since improved its damage assessment and building safety program. Ms. Farina reported that the Office of Emergency Services is working in collaboration with the California Integrated Seismic Network and Santa Barbara County on the early earthquake warning system.

Chairman Strack thanked Ms. Farina for her remarks.

VIII. ASSEMBLY REPRESENTATIVE

Chairman Strack welcomed Ms. Hillary Blackerby, Senior Field Representative, Office of Assemblymember Das Williams.

Ms. Blackerby said Assemblymember Williams represents southern Santa Barbara County and western Ventura County, and is a member of the Select Committee for Local Emergency Preparedness. She added that he was unable to attend this meeting because he was attending a hearing on 911 location accuracy.

Ms. Blackerby noted that the Office of Emergency Management has done a great job of upgrading, and people in the community have stepped up their own preparedness efforts. She reported that the area has an award-winning CERT program, with many volunteers ready to act in emergencies. She added that people on the Central Coast are making great progress in preparedness and resiliency. She thanked the Commission for its work and offered Assemblymember Williams' support.

Chairman Strack thanked Ms. Blackerby for her comments.

IX. REPORT ON EARTHQUAKE VULNERABILITY OF BUILDINGS IN SANTA BARBARA COUNTY

Commissioner Carbajal introduced a series of presentations from Santa Barbara County's Planning and Development Department, starting with a report on vulnerabilities the County has analyzed and the direction the Board of Supervisors provided in terms of follow-up actions on these issues.

Dr. Glenn Russell, Director, Planning and Development Department, said Building Official and Deputy Director of Building and Safety, Massoud Abolhoda, formerly worked for the City of Fremont and was responsible for some of the early earthquake-related ordinances addressing issues such as soft stories. He invited Mr. Abolhoda to address the Commission.

Mr. Abolhoda said the report identifies all types of potentially hazardous buildings during an earthquake. He presented an earthquake hazard map of California and noted the areas of peak ground acceleration and shaking. He pointed out that most of southern Santa Barbara County is shown in red, indicating the possibility of a very strong earthquake occurring there. Mr. Abolhoda advised that geologists and seismologists believe an earthquake of a 7.0 moment magnitude can occur in Santa Barbara if several faults rupture simultaneously. He observed that this would cause hundreds of millions of dollars in damages as well as loss of lives.

Mr. Abolhoda noted that the report presented to the Board of Supervisors identifies the most vulnerable building types that may exist in the County of Santa Barbara, discusses actions by other jurisdictions, and recommends next steps. He said the report did not address slope stability, liquefaction, and other geohazards related to an earthquake, post-earthquake fire hazards, tsunamis, public buildings, oil and gas utilities, and infrastructure.

Mr. Abolhoda stated that soft-story buildings have received considerable media attention in recent years, and he showed a slide of a soft-story building in San Francisco that was damaged in the 1989 Loma Prieta earthquake. He explained that walls in these buildings are the primary source of resisting earthquake loads, and a major reduction of the walls due to garage entry doors or a storefront results in having substantially less stiffness and strength at the lower level, causing failure at the so-called soft levels. Mr. Abolhoda advised that the County had not observed many of these buildings in the Santa Barbara area.

Mr. Abolhoda noted that retrofit costs can vary from $4 to $10 per square foot, based on a report by the City of San Francisco, which is substantially less than the typical $20 per square foot repair costs, not including loss of income. He pointed out that other benefits of retrofitting would be their life-saving potential and increasing the value and lifespan of the building.

Mr. Abolhoda displayed a schematic diagram of a typical soft-story retrofit, consisting of installing a new steel frame and foundation within one of the garage openings. He said the number and size of the frame depends on the height, weight, and size of the building. He showed a slide of a soft-story building that collapsed during the Northridge earthquake, resulting in loss of life as well as loss of the building.

Mr. Abolhoda showed an example of a tilt-up concrete building that collapsed in the 2010 Chilean earthquake. He said pre-1973 buildings, those designed to earlier versions of the Uniform Building Code, with concrete and masonry walls and wood or metal roof and floor are vulnerable to earthquake damage. He explained that the main weakness of this type of building is in the connection of the walls to the roof and floor, because the connections tend to separate during an earthquake, resulting in partial or complete collapse of the building. Mr. Abolhoda presented slides depicting examples of damaged buildings. He added that this type of construction is typically found in commercial and industrial areas, and there are only a few of them in the County of Santa Barbara.

Mr. Abolhoda advised that seismic retrofit of this type of building is relatively simple, with an average cost of about $5 per square foot. He showed slides of typical retrofits.

Mr. Abolhoda said many pre-1950 single-family homes lack proper bracing walls in the crawl space or have no connection between the sill plate and foundation. He noted that this puts the building at risk of falling off the foundation during a medium to strong earthquake. He showed examples of damage from this kind of failure. Mr. Abolhoda stated a retrofit of these homes entails adding bracing and anchors to the foundation, and the retrofit is relatively simple when there is sufficient headroom in the crawl space. He displayed slides showing crawl spaces with

no bracing, and then a retrofitted crawl space with plywood paneling reinforcement and anchoring sill plates to the foundation.

Mr. Abolhoda observed that chimneys in many houses constructed pre-1950, and even later, were constructed from unreinforced masonry, so they can break and fall in an earthquake, causing damage and injuries to occupants of the house and adjacent properties. He remarked that there are many instances of unreinforced masonry chimneys in the County of Santa Barbara. He showed an example of retrofitting with steel bracing connecting the chimney to the roof, but noted the best solution is to replace the chimney with wood framing and a metal flue. He added that applying plywood paneling above the ceiling around the chimney flue prevents the chimney from falling inside the house, but it does not prevent the chimney from falling outward.

Mr. Abolhoda discussed damage to mobile homes after earthquakes. He showed a picture of a mobile home failure after the recent Napa earthquake. He noted that pre-1994 mobile homes were often supported on metal pedestals that were not designed to resist earthquake forces, so if they fall of their pedestals during an earthquake, they can rupture gas lines, starting fires.

Mr. Abolhoda reported that Santa Barbara County has about 2,729 mobile home spaces. He said mobile home construction is regulated by the State of California Housing and Community Development, and only that agency can require a retrofit.

Mr. Abolhoda showed a picture of the Kaiser Permanente medical building in Granada Hills, an older, nonductile reinforced concrete frame construction, and a wall collapsed and separated from the main unit over the full height of the building. He explained that concrete buildings constructed to 1976 or later versions of the building codes are considered ductile and have reinforcement systems that enable the structure to plastically deform and absorb energy without failure; concrete buildings constructed to older codes are considered nonductile and will have only a limited energy absorption, resulting in sudden loss of strength and the possibility of collapse under high seismic loads. He advised that the County does not expect to find many nonductile concrete buildings within its jurisdiction. Mr. Abolhoda observed that some hospitals, schools, and government buildings in other parts of the state have been retrofitted, and retrofit methods vary drastically and are usually very costly.

Mr. Abolhoda noted that the Northridge earthquake revealed a major problem with modern steel buildings: many welded connections of beams to columns can fracture or fail, resulting in a partial or total collapse of the building during an earthquake with long duration or in a subsequent aftershock. He displayed a picture showing cracks through a moment connection. He said these connections are most hazardous in mid-rise and high-rise buildings, of which there are only a few in Santa Barbara County. He indicated that these types of frames were used occasionally in residential buildings, but they are not considered a significant risk due to the light weight of the wood frame houses. He noted that retrofit methods vary and can be expensive.

Mr. Abolhoda showed examples of damage to unreinforced masonry (URM) buildings. He said the State of California mandated that all jurisdictions compile an inventory of their URM's, and Santa Barbara identified its building and passed a mandatory retrofit ordinance for privately-

owned buildings in 1994. He stated that according to the Seismic Safety Commission's report, all URM buildings in the County have been retrofitted or demolished.

Mr. Abolhoda talked about what some neighboring cities are doing. He said the County of Ventura, County of San Luis Obispo, Cities of Santa Barbara, Ventura, and Solvang have mandatory retrofit programs, and the staff has not been able to verify whether the City of Goleta also has one. He reported that the City of Lompoc only requires URM's to be posted with placards identifying the building as an earthquake hazard; the Cities of Fremont, Berkeley, and San Francisco have adopted mandatory retrofit ordinances for soft-story buildings; and the Cities of Los Angeles and Fremont have mandatory retrofit ordinances for tilt-up buildings. Mr. Abolhoda said he was unable to verify if any other city has a mandated program for tilt-ups.

Mr. Abolhoda noted that the County's next steps are to develop a voluntary retrofit and educational program for single-family homes, develop options for future consideration of a mandatory retrofit when substantial modifications or additions are proposed, and prepare a code amendment to address construction on a steep hillside, similar to the City of Los Angeles. He said for nonresidential and multi-family residential buildings, the County will conduct a survey to identify at-risk buildings, provide owner outreach and education on the earthquake vulnerability of their buildings, and develop options for future consideration of retrofit.

Commissioner Carbajal said that when he and other County officials became aware of some of the vulnerabilities, they directed the staff to conduct a more detailed analysis and follow-up action plan. He emphasized the need to encourage local governments to give seismic safety a higher priority, and he commended the his fellow supervisors and the County staff for their efforts.

Mr. Abolhoda responded that a countywide survey has not yet been conducted, but that task is on the action plan. He said the County did survey Isla Vista, the most populated part the County in terms of apartment buildings, but no soft-story buildings were found, although there may be some within the City of Santa Barbara. He remarked that Santa Barbara County does not have as many areas with apartment complexes as more metropolitan areas.

Mr. Abolhoda stated that a survey of Westmont College is also part of the action plan, and there may be a few buildings of concern there.

Commissioner Carbajal noted that the County survey only covers unincorporated County areas, not the City of Santa Barbara and other cities. He expressed his hope that the County's efforts will be a catalyst for cities to undertake similar efforts.

Chairman Strack thanked the Santa Barbara County representatives for their presentations, and he commended Commissioner Carbajal and the staff from Santa Barbara County for their great work.

X. EARTHQUAKE EARLY WARNING AND SANTA BARBARA COUNTY

Commissioner Carbajal introduced Mr. Ryan Rockabrand, Director, Santa Barbara County Office of Emergency Management, and asked him to describe Santa Barbara County's involvement in the earthquake early warning system.

Mr. Rockabrand thanked the Commission for the opportunity to discuss this important project. He said Santa Barbara County was fortunate to be able to leverage some existing funding to implement the earthquake early warning system. He noted that earthquakes are third on the list of Santa Barbara County's natural hazards, after floods and fires. He acknowledged there was a very significant risk and a high probability, so they are still a major concern locally.

Mr. Rockabrand noted that Mayor Schneider talked about some of the major earthquakes in Santa Barbara's history, and he said both the 1857 San Andreas-Fort Tejon earthquake and the 1925 earthquake had major effects on the area. He showed pictures of damage in 1925, in 1927 after an earthquake in Lompoc and a local tsunami, and a Goleta earthquake in 1978 which caused considerable damage to buildings at the university and the airport, as well as a train derailment. He expressed concern about the risk posed by trains carrying cargos of hazardous materials.

Mr. Rockabrand said Santa Barbara hopes to create an earthquake early warning system that will become a template that other areas can leverage in the future. He noted that Santa Barbara took a whole community approach, developed partnerships with local organizations, and implemented automation. Because of the importance of the governance structure, he observed, having the right team to provide leadership was a key priority, so a task force was assembled to tackle each of the necessary tasks. Mr. Rockabrand acknowledged the support of the Board of Supervisors, Doug Given and Dr. Jones at USGS, former Fire Chief Dyer, and Dr. Glenn Russell and his team.

Mr. Rockabrand stated that the process began with finding a funding mechanism, obtaining authorization to move forward, and then bringing in people with varied expertise, along with their own staff resources, to implement the plan. He indicated that the timeline was extremely aggressive because of funding performance requirements, so the County took a four-phased approach to developing concept and design, implementation, which entails permitting and completion, beta-testing of the system and integrating it with existing networks, and working with partners to leverage use of the system.

Mr. Rockabrand displayed a slide showing the strategic location of vaults along fault lines and photos of vaults. He said units are solar powered, and the sensor unit extends 10 or 15 feet down, with the seismic technology at the base. He noted the GPS is fed by cellular phone, and also to landline facilities, so there is real-time integration. He explained that the vaults feed data to centers at Cal Tech and USGS to calibrate the readings.

Mr. Rockabrand said one of the key milestones was completing site surveys and picking the right spot for quick installations. He thanked the Board of Supervisors and the City Council for allowing the permits and approvals to move forward. He said other milestones were completion

of the licensing agreements, permits, hiring contractors for the digging and installs, all on a very aggressive timeline, and then moving into beta and test launch. Mr. Rockabrand reported that the County held a ribbon-cutting ceremony and a press conference to announce the completion. He added that public outreach and information was a vital component leading to the success of the project.

Mr. Rockabrand said the project's short-term goals were to complete construction and launch the system, and the long-term goal is sustainability. He stressed the importance of having performance measurements, good implementation plans, and working with partners through the whole community approach. He reported that all short-term outcomes were achieved, and a public awareness campaign increased registrations, but the Napa earthquake provided a real-world measurement of the system's performance. Mr. Rockabrand advised that the system provided a 112-second warning to the Santa Barbara area, and although no shaking was felt, there was a notification.

Mr. Rockabrand indicated that the early earthquake warning system is in Phase Four, which involves working with oil and gas industry partners to educate them about how early warnings would benefit them, automating the doors on fire stations so they open before the S-wave hits them, and working with the Office of Emergency Management to send alerts and messages through mobile phones.

Mr. Rockabrand said Santa Barbara has a population of roughly 435,000, but the area gets more than six million visitors a year and more than thirty cruise ships, so informing guests about earthquake preparedness and response is another top priority.

Mr. Rockabrand talked about private-sector partnerships and support for the system. He said the County wants to implement the backbone and support the overall network so it is reliable and robust, but the success of the system depends on its adoption by the private sector. He noted warnings would be useful to factories and construction sites so they can receive notifications and stop certain manufacturing procedures and heavy equipment; as well as to trains and port facilities, operators of oil and gas pipelines, data centers, hospitals, and airports. Mr. Rockabrand emphasized the importance of preventing panic by providing people with information about impending events and what to do. He observed that early warnings would help students in schools, people at large sports facilities, and post-disaster rescue workers so they can brace for the impacts and strong aftershocks. He added that because of the local tsunami risk, Santa Barbara County also needs to warn people to seek high ground and move away from the coastline.

Mr. Rockabrand played a brief video about earthquake and tsunami hazards. He said emergency managers know there are two issues that tend to attract public attention: a real-world disaster, or cinema. He remarked that a crisis sometimes provides an opportunity for people to focus on preparedness. He advised that messaging will be developed within six weeks, and the messages will air throughout the summer. He noted that the goal of the messages will be to encourage people to think about maintaining adequate emergency supplies so they can sustain themselves after disasters.

Mr. Rockabrand stated that the early earthquake warning system is a key element in improving a local jurisdiction's resilience to natural disasters. He said the system will save lives, lessen property damage, and facilitate economic recovery. He observed that the area is still in recovery mode from the 1994 Northridge earthquake, and a joint field office is still staffed and open in Pasadena, and that was not even a significant earthquake. Mr. Rockabrand stressed that the panic and chaos after an earthquake can be reduced by giving people a warning so they can take security measures. He pointed out that the economic impact of a large earthquake can be devastating to local and national economies, and he cited the earthquake in Christchurch, New Zealand, which caused a 6 to 7 percent drop in gross domestic product overnight.

Mr. Rockabrand commented that the message video released this summer will encourage people to focus on their own preparedness, response, and recovery.

Commissioner Ghilarducci asked what kind of permitting and regulatory challenges the County encountered after past disasters. Mr. Rockabrand responded that Santa Barbara was able to leverage many County-owned facilities through local fire stations by bolting on additions to existing stations, and this work was exempted from the California Environmental Quality Act process. He mentioned that the County wanted to install a station in the Santa Inez Valley on a facility with a solar array that was regulated by the Federal Aviation Administration, and that permitting process was too cumbersome and lengthy, so the County found a different source of power.

Commissioner Mark Wheetley asked about public outreach to students at the University of California (UC) at Santa Barbara in terms of tsunami preparedness for that campus location. Mr. Rockabrand said the County works closely with officials at UC and Goleta to be "tsunami-ready" and "storm-ready" certified through the National Oceanic and Atmospheric Agency (NOAA). Commissioner Wheetley said Humboldt State University just completed a tsunami drill with NOAA, and the area has an early warning system and active preparedness efforts on that campus. He thanked the presenters from Santa Barbara County.

Chairman Strack thanked all the speakers and expressed his appreciation to Commissioner Carbajal for his assistance.

Chairman Strack proposed taking the update on the state earthquake early warning system next.

XII. UPDATE ON STATE EARTHQUAKE EARLY WARNING SYSTEM (Out of Order)

Commissioner Ghilarducci congratulated Mr. Rockabrand and Santa Barbara County for their success, and he said Santa Barbara serves as a model for all 58 counties with respect to earthquake early warning.

Commissioner Ghilarducci noted that developing an earthquake early warning system is challenging from a reliability standpoint and a public policy standpoint. He said the statewide effort began with Senate Bill 135 (Padilla) 2013, which called for implementation of a statewide

earthquake early warning program. Prior to SB 135, he observed, the earthquake early warning systems were generally developed separately.

Commissioner Ghilarducci described the California Integrated Seismic Network (CISN), developed over twenty years by a loosely aligned group of people from universities, USGS, the Office of Emergency Services (OES), and California Geologic Survey, that applied technology to monitor and record strong motions to identify earthquakes and determine their strength, depth, and complexity. He commented that although this data was very helpful to emergency managers and responders, it was still provided after the fact. He said the challenge will be to turn that capability through new technology into sensing before an earthquake happens, or when the "P" wave arrives.

Commissioner Ghilarducci advised that early warning alerts are highly dependent upon the number of sensor arrays and the user's location relative to the fault and epicenter of the earthquake. He explained that people close to the epicenter get less warning time, while those who are farther away get more time. He added that the timing also depends on the types of sensors in the ground and the networks over which the signals travel.

Commissioner Ghilarducci reported that since SB 135, OES has engaged with the scientific community, including USGS, Caltech, UC Berkeley, and many others from the state and local government and the private sector, to develop a strategy for identifying the gaps in existing technology and then plan a way to get there.

Commissioner Ghilarducci indicated that this effort produced a number of important results, including an understanding that many of the sensors in the ground today tend to be located around population centers and university; many are older technology that are not sufficiently accurate and reliable, giving some false positive readings; and there are still gaps throughout the state where sensors need to be placed. He advised that there are certain "blind zones" where the system cannot provide accurate announcements of earthquakes, either due to lack of sensors or particular environmental or regulatory obstacles.

Commissioner Ghilarducci commended Santa Barbara County for building an earthquake early warning capability in place. He advised that Long Beach has a similar pilot project, and scientists from Berkeley are working with BART to slow or stop trains during earthquakes. He noted the state has identified 18 critical infrastructure sectors in California, ranging from manufacturing to public health to water systems and dams. He observed that all sectors can benefit from and have a direct interest in the outcome of an effective, reliable earthquake early warning system.

Commissioner Ghilarducci noted that in order to obtain buy-in from local governments and the private sector, they need to know that they can program critical equipment to shut down automatically when certain notifications are received. He emphasized that the goal of the technology is to provide reliable alerts that will save money, mitigate their risk, and save employees' lives. He said the industry agrees that the system needs to be reliable, so false positives must be eliminated.

Commissioner Ghilarducci commented that the last phase of the project is getting public buy-in and support, and getting the private-sector business community to embrace and incorporate the system within their own operations. He said the goal of scientists at USGS and other organizations is to develop the scientific capability and install the equipment. He added that his responsibility is to bring the two sectors together.

Commissioner Ghilarducci noted that in a state of 38 million people, the earthquake early warning system needs to be reliable and supported by the public. He estimated that the state is currently about 1200 to 1400 sensors short of having a reliable system in California. He acknowledged that having pockets of capability was a great start, but it was not a complete statewide system. He confirmed that there is already technology that works, but the project needs to be rolled out carefully to ensure optimal reliability and complete coverage.

Commissioner Ghilarducci said the earthquake early warning program will need to find a permanent governance system. He noted that California has a number of decentralized organizations throughout the state working to improve seismic safety in certain areas, but they often had to compete for funds and public attention in order to carry out their programs. He reported that in discussing SB 135 with Governor Brown and Senator Padilla, they recognized the need for a more centralized strategic and collective effort to create an integrated network.

Commissioner Ghilarducci said that after SB 135 was signed, a working group was created to develop a charter, define the kind of system and its parameters, and identify the steps needed to implement the system. He indicated that the working group's recommendations were still being reviewed, but a key recommendation pertained to governance, and proposed establishing a central, statewide point of coordination for earthquake and tsunami programs in California, with earthquake early warning being an important component of that effort. He said necessary aspects of the earthquake early warning system are research and development and science; funding and administrative operations; and the actual operational roll-out of programs, which would include a wide range of activities from public education, the annual ShakeOut, messaging, tsunami response and preparedness, earthquake early warning, and the strong ground motion sensing programs. Commissioner Ghilarducci said the California Geologic Survey has an array of about 1400 sensors in the ground throughout California, of which about 800 are purposed for other things, including about 150 sensors that can be repurposed to detect initial "P" waves immediately, thereby making the network more efficient and accelerating the pace of closing the gaps.

Commissioner Ghilarducci noted that with respect to the private sector, Governor Brown has been very clear that certain activities, including roll-out and support, can be carried out more efficiently and effectively by the private sector than by government, and that the private sector can be an important funding source.

Commissioner Ghilarducci remarked that due to the rapid pace of technological development, there will be many improvements within the next decade that will benefit members of the public. He said he oversees all of the 911 centers as part of the public safety communications network for California, and all centers are acquiring broadband and transitioned to next-generation

equipment, including video capabilities. He emphasized the need to engage the private sector in supporting the advancement of earthquake early warning systems.

Commissioner Ghilarducci advised that he was contacted by representatives of the telecommunications industry who are very excited about this opportunity and wanted to know more about how the signals are being transmitted. He said signals are typically moved via fiber, with wireless capability in a few places. He observed that fiber networks can sometimes be damaged in large earthquakes, so the earthquake early warning system should leverage all of the networks to assure a speedy, immediate, and reliable signal.

Commissioner Ghilarducci said he told the telecommunications representatives that California was looking for private-sector funding, either hard cash or in-kind contributions. For example, he noted, working out an arrangement with the wireless industry for use of towers and installation of sensors would be most helpful. He recommended pursuing similar partnerships with rail transportation and utility systems, industries that would have a strong interest in ensuring the success of the earthquake early warning system. He noted that PG&E can put units on its lines to block power to transformers during an earthquake, and then restore power to an affected community 75 percent faster after an earthquake. Commissioner Ghilarducci pointed out that water and sewer utilities would also benefit from early warnings.

Commissioner Ghilarducci informed the Commission that Senate Bill 494 (Hill) incorporates recommendations from the subcommittee working group and provides for outreach to various stakeholder groups, including the rail industry, telecommunications, education, and health and medical organizations, pulling them all together to establish a governance system, and encouraging them to share resources to move forward with a set of common initiatives. He said SB 494 gives OES authority to develop a fund in the Treasurer's Office for public and private contributions to support the network over the long term. Commissioner Ghilarducci observed that governance is the first step in turning a project into a sustainable program. Commissioner Ghilarducci said the state is also working with USGS to consider repurposing some of its sensors.

Commissioner Michael Gardner thanked Commissioner Ghilarducci for his comments, and he noted that earthquake early warning is a much more complex issue than many people realize, and he cited the example of shutting off power distribution at substations. He pointed out that this would also entail shutting off power generation to avoid overloads, and generation can take time to restart and restore. He said users need to define who gets warnings and then develop guidelines for mandatory and voluntary responses. Commissioner Gardner remarked that building the system is comparatively simple, involving just time and money, but making the system work is a far more difficult challenge.

Commissioner Sweiss thanked Commissioner Ghilarducci for his work on the earthquake early warning system and its various components. He said that over the past few years, he has been working with experts in the Middle East to implement an earthquake early warning system there. He noted that the countries in the region tend to be small, so an effective network requires having sensors spread over a wide enough area to benefit all the countries there. Commissioner Sweiss stated that the Middle Eastern experts focused more on the social aspects of the early warning

system, and how it can be an opportunity to bring communities together and promote peace in that area.

Commissioner Sweiss observed that implementation of California's earthquake early warning system is imminent, and the network will be reliable and robust, but how the signals are used after that is a public policy matter in terms of training people how to respond. He recommended taking an opportunity on the social level by starting training now for communities, long before the system is launched.

Commissioner Sweiss said San Francisco has a Neighborhood Emergency Networks program in which the City provides training and advice to neighborhoods about establishing points of contact and responding to disasters. He noted that California should be investing in these kinds of programs to help prepare people so they are ready when the system is ready. He pointed out that the early warning system can provide jobs and conserve on government resources.

Commissioner Peggy Hellweg thanked Commissioner Ghilarducci for his update and summary of the issues. She strongly advocated calling the network an "earthquake information system" rather than an "early warning system." She noted that earthquake information historically came two or three weeks after an earthquake when records were mailed and analyzed by scientists. As data pipelines improved over recent decades, she said, information came within a few minutes, and now it comes after a few seconds.

Commissioner Hellweg explained that scientists are only a small part of earthquake early warning because their role is limited to preparing the information, and running the networks, but they are not telling people how to use the information. She pointed out that early warning is not the answer to earthquake preparedness and recovery, because just taking immediate securing measures will not facilitate rapid recovery unless other preparedness actions are taken before an event. Commissioner Hellweg recognized the importance of early warning information as an improvement in the short term, but said California also needs to focus on its broader earthquake problem, both before and after an event.

Commissioner Tracy Johnson noted that Commissioner Sweiss talked about how San Francisco recognizes the potential impact of the public taking an interest in the system and causing others to make it a higher priority, and she expressed support for the idea of building grassroots support to encourage industry to devote more money to research and development.

Commissioner Hellweg requested that Mr. Rockabrand provide the Commission with a pre-screening copy of the trailer for the movie "San Andreas".

XI. TRIBAL COMMUNITY OUTREACH INITIATIVE PILOT PROJECT

Chairman Strack introduced and welcomed Mr. Michael Kleeman, Senior Fellow, University of California, San Diego.

Executive Director Richard McCarthy noted that the Commission and CalOES are embarking on Phase Three of the "Totally Unprepared" campaign, which entails the marketing and promotion

of Commission and CalOES products. He said the Commission entered into a $200,000 contract with UC San Diego to complete the work, and a tribal community outreach will be incorporated into the new contract.

Mr. Kleeman stated that the Commission recognized the importance of addressing the needs of California's Native American population, a group with special jurisdictional and legal status, and also a group that tends to be under-served and that may view government officials with suspicion. He explained that the purpose of the pilot effort was the make sure messages of earthquake safety and preparedness reach particular tribal areas that have high risks, heavier burdens of poverty, are largely uninsured, and in which state building codes do not apply, which often puts them and their facilities at risk. Mr. Kleeman noted that California's tribal groups vary greatly in their wealth, from rich groups like the Agua Caliente to small tribes without gambling or gaming and the groups are self-governing.

Mr. Kleeman indicated that the pilot project focused on the tribal communities adjacent to the university, and it featured some very aggressive outreach. He said researchers began by having discussions with five different tribal councils, none of which agreed to participate. He noted that UC San Diego then coordinated its efforts with the American Red Cross, but that organization is viewed with suspicion in some communities. Mr. Kleeman said the Red Cross helped network with a group called the Tribal Emergency Preparedness Group and its Inter-Tribal Long-Term Recovery Foundation, and they introduced the researchers to a tribal communications organization. He emphasized that coming into these communities from outside does not work as well as finding ways within the communities to provide them with ideas and resources.

Mr. Kleeman discussed the project's multi-pronged outreach program to schools, tribal councils and affiliated groups, directly to the public through media and community events, presentations at fire preparedness fairs, and working with partners such as the Tribal Emergency Preparedness Group and the Red Cross on an all hazards-basis. He showed examples of outreach to schools with shake-table tests of gingerbread houses built by students. He said other contacts included fire chiefs in all tribal communities, articles in local media, and visits to homes to install smoke detectors.

Mr. Kleeman expressed his appreciation to the Inter-Tribal Long-Term Recovery Foundation and Americorps teams for their help in with outreach, recruitment at schools, and post-event impact surveys. He said the American Red Cross provided materials for a pillowcase project in elementary schools, fire-safe materials, smoke detectors, and training for Americorps volunteers and tribal personnel doing the installations.

Mr. Kleeman reviewed a list of tribal councils that were contacted and showed samples of the materials and displays for their communities. He said the media was blanketed through print, direct communications, posters in tribal community centers, tribal TV channels and radio stations, print and online publications, and digital media. He showed a sample of the banner ad focusing on tribal youth and tribal elders. Mr. Kleeman added that the youth in these communities typically have a very strong sense of responsibility for the elders in their communities.

Mr. Kleeman noted the goal of the pilot project was to spread the message through the youth at schools, get people prepared and provide kits, get people informed and working with local community organizations. He explained that earthquakes are not as much a concern in these communities as fire, so an all-hazards approach went over very well. He recommended that the Commission develop a similar program for Native American tribal groups throughout the state.

Mr. Kleeman said key lessons learned from the pilot project include

- Participation of local partners is essential, and tribal communities need to feel the program is theirs, with local voices, local images, local partners; recruiting the right local partners, developing materials, and working with local schools and community organizations may take a year or longer;
- Outcomes should be tracked and then tied to funding;
- Multi-dimensional approaches work: parents learn from what their children bring home from school; and
- An all-hazards approach allows access to difficult-to serve communities where earthquakes are not seen as a clear and present danger; for example, installing smoke detectors provides an opportunity to increase awareness of other hazards;

Commissioner Ghilarducci thanked Mr. Kleeman for this interesting work. He asked if the researchers worked through the Tribal Coordination Office at OES. Mr. Kleeman confirmed that OES' Tribal Coordination Office helped make introductions to contacts in the community. He said the researchers also worked with FEMA Title IX and their tribal contacts. He welcomed an opportunity for additional partnerships. Commissioner Ghilarducci invited Mr. Kleeman to meet with OES and the Governor's Office tribal liaison to discuss further outreach.

Mr. McCarthy reminded the Commission that outreach to tribal communities is very important to Governor Brown, and all state departments and agencies are required to develop outreach plans and information for tribal communities.

III. APPROVAL OF FEBRUARY 12, 2015 MEETING MINUTES (Out of Order)

Chairman Strack drew attention to the minutes of the February 12 meeting and welcomed comments.

ACTION: Commissioner Hellweg made a motion, seconded by Commissioner Carbajal, that:

The Commission approve the minutes of the February 12, 2015, meeting as presented.

* Motion carried, 12 – 0 (Commissioners absent during voting).

XIII. LEGISLATIVE UPDATE

Legislative Director Salina Valencia reported that members of the Legislature just returned from spring recess. She said she and Mr. McCarthy met with the outgoing and incoming Japanese General Consul, and California sent a legislative delegation to Japan and observed its earthquake early warning program.

Ms. Valencia advised that the Commission is not sponsoring any legislation this year, but a number of bills relating to seismic safety are being tracked at the request of the Business, Consumer Services, and Housing Agency, and the Governor's office. She drew attention to AB 81 (Wood), which would extend the seismic safety deadline for a particular hospital in Willits, California, to September 1, 2015, a facility in the process of being retrofitted and currently about 90 percent complete.

Ms. Valencia noted that another bill that appears to be moving is SB 602 (Monning), which would allow the California Earthquake Authority (CEA) to create a new voluntary financing tool for homeowners to mitigate and retrofit their homes. She explained that the CEA could finance up to 100 percent of the retrofit costs with loans secured by the real property, and homeowners could pay off the loans as part of their existing property tax bills.

Chairman Strack thanked Ms. Valencia for her report.

XIV. EXECUTIVE DIRECTOR'S REPORT

2015-16 Budget

Mr. McCarthy said commissioners can expect to receive the staff's 2015-16 budget projections within a few days. He noted that since the last meeting, he learned that the cash-out amount for Ms. Cogan's retirement had been over-estimated, and the Commission will receive $42,000 reimbursement from two projects that it is required to review. He pointed out that the Commission still has $50,000 in research overhead that has not yet been billed. Mr. McCarthy advised that the Commission has incurred about $12,000 in costs to cover the Napa earthquake and produce its report. Those costs will be invoiced to the Commission's Earthquake Emergency Investigations Account.

Mr. McCarthy asked the Commission to authorize the staff to bill costs related to the Napa Earthquake to the Earthquake Emergency Investigations Account *

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

The Commission authorize the staff to balance the budget as proposed.

***** Motion carried, 12 – 0.

Expiration of Commissioner Terms

Mr. McCarthy said some commissioners' terms will expire on May 15, but they may continue to serve until July 15 unless they resign or are reappointed. He noted the Governor's Office has contacted some commissioners about their intent to reapply.

Mr. McCarthy indicated that he would email a list to commissioners showing each commissioner's term.

Upcoming Meeting Schedule

Mr. McCarthy noted that the Commission might be holding its June meeting by conference call, and the staff will contact commissioners in advance to let them know. He advised that Commissioner Wheetley will be hosting the Commission in October in Arcata, so commissioners should plan ahead for this visit to the North Coast. He commented that the area is challenged by its seismic and tsunami risks, as well as its potential isolation after a large earthquake.

McCarthy proposed setting the Arcata meeting for the second Thursday, October 8.

Commissioner Knudson asked if an August meeting would be held. Mr. McCarthy said he would have more budget information available before the June meeting, and the Commission can decide in June whether to hold an August meeting.

XV. PUBLIC COMMENT

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

XVI. MISCELLANEOUS AND GOOD OF THE MEETING

Commissioner Ian Parkinson said his area just held its annual disaster preparedness event, and participation continues to grow each year. He reported that he arranged for a shake table, and people seemed interested and engaged. He advised that he obtained a copy of a 1982 earthquake planning scenario book, and he provided copies to the Commission staff for anyone interested in reviewing the publication.

XVII. ADJOURN

Chairman Strack thanked the County of Santa Barbara and Commissioner Carbajal for hosting the meeting. There being no further business, the meeting was adjourned at 12:15 p.m.

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Sue Celli
Office Manager

Approved by:

_____
Richard McCarthy
Executive Director