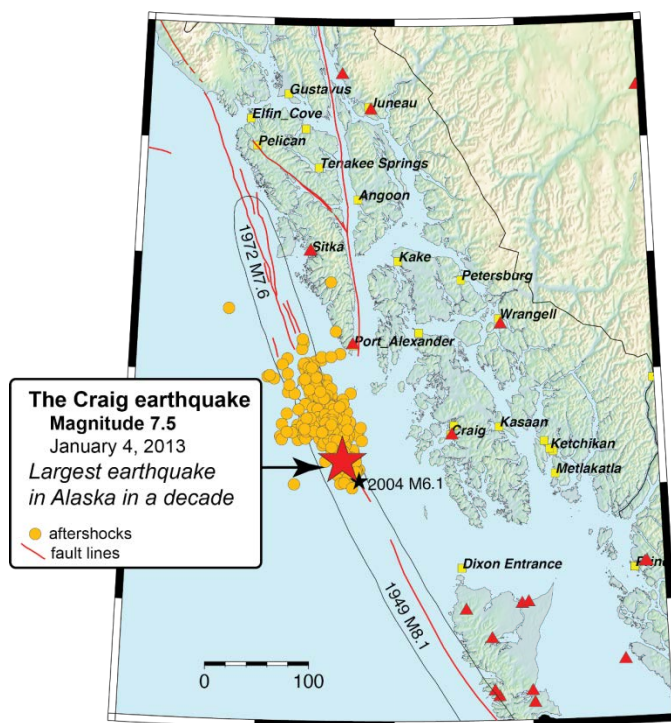


# ALASKA SEISMIC HAZARDS SAFETY COMMISSION

## ANNUAL REPORT TO THE GOVERNOR AND STATE LEGISLATURE FOR 2013



*The largest Alaska earthquake in 2013 (magnitude 7.5) occurred along the Fairweather-Queen Charlotte fault on 5 January 2013, about 71 miles west of Craig. The earthquake was felt strongly throughout southeastern Alaska, to as far away as Seattle. No ground failure or structural damage was reported, but damage to an underwater fiber-optic cable affected GCI service to Wrangell. A tsunami warning was issued for many southeastern communities, but no significant waves or inundation was reported. This was the largest earthquake in Alaska in a decade.*

21 JANUARY 2014

**ASHSC** Alaska Seismic Hazards  
Safety Commission



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## EXECUTIVE SUMMARY

This report summarizes the Alaska Seismic Hazard Safety Commission's (ASHSC) business, activities and accomplishments in 2013 as related to its statutory (AS 44.37.067) powers and duties on behalf of the Governor, Legislature, local governments, as well as public and private sectors.

In December 2013, the Alaska Legislative Budget and Audit Committee (LB&A) approved its audit of the ASHSC (currently scheduled to terminate on June 30, 2014); concluding that the ASHSC is operating in the public's interest and should be extended for another six years. By year-end, the ASHSC had addressed and begun to implement all four of the recommendations in the LB&A's report. In particular, the ASHSC: (i) revised and updated its *Strategic Plan*; refining the scope, priorities and metrics of the specific strategies listed to implement the commission's seven general objectives; (ii) updated its general operating rules (e.g. basic member and officer responsibilities, business and meetings, etc.); and (iii) established standards for preparing and implementing designated policy recommendations.

Over the course of 2013, the ASHSC: (i) maintained a full membership of 11 commissioners; (ii) conducted nine public meetings; (iii) had no written determinations, requests for determinations, or suspected potential violations under the Ethics Act (AS 39.52); and (iv) expended a total \$9,710 in FY13 (within its allotted budget of \$10,000).

Activities initiated directly by the ASHSC included approval of one designated resolution, recommending that Governor Parnell dedicate the year 2014 in commemoration of the 1964 Great Alaska Earthquake; and approval of two designated policy recommendations for mitigating seismic hazards in the State (i.e. *VALUE OF SEISMIC INSTRUMENTATION FOR CRITICAL FACILITIES*; and *SEISMIC PROVISIONS FOR DESIGNING SCHOOLS AND PUBLIC BUILDINGS*). The ASHSC also initiated or continued work associated with its current major long-term projects to:

- Identify and prioritize seismically vulnerable schools in Alaska;
- Complete a scenario earthquake study for the Kodiak Island Borough;
- Advocate for Alaska earthquake research programs; and,
- Amend State regulations to assure seismic knowledge of registered civil and structural engineers.

Finally, the ASHSC: (i) received briefings during its public meetings on seven topics related to mitigating seismic hazards; (ii) responded to specific requests for information or assistance from no less than six entities, including the Federal Emergency Management Agency, Alaska Department of Natural Resources-Division of Geologic and Geophysical Surveys, the University of Alaska, the Matanuska-Susitna Borough, the Western States Seismic Policy Council, and the Government of Yukon in Canada; and, (iii) continued to partner with numerous other organizations and government entities focusing on the mitigation of seismic risks.

Robert L. Scher, Chair  
Richard D. Koehler, Vice-Chair

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### APPENDIX A - Resolutions & Policy Recommendations

#### *Abbreviations used in this report for Federal and Alaska entities:*

AELS	Board of Registration for Architects, Engineers, and Land Surveyors
AEC	Alaska Earthquake Center
ASHSC	Alaska Seismic Hazards Safety Commission
DGGS	Division of Geological & Geophysical Surveys
DNR	Department of Natural Resources
FEMA	Federal Emergency Management Agency
DEED	Department of Education & Early Development
DHS&EM	Division of Homeland Security & Emergency Management
DLA	Division of Legislative Audit
DMVA	Department of Military & Veterans' Affairs
LB&A	Legislative Budget and Audit Committee
USCG	U.S. Coast Guard
USGS	U.S. Geologic Survey

# ALASKA SEISMIC HAZARDS SAFETY COMMISSION ANNUAL REPORT TO THE GOVERNOR & STATE LEGISLATURE FOR 2013

This report summarizes the Alaska Seismic Hazard Safety Commission's (ASHSC) business, activities, and accomplishments in 2013 as related to its statutory powers and duties (AS 44.37.067) on behalf of the Governor, Legislature, local governments, as well as the public and private sectors, including:

- *Recommending goals and priorities for mitigating seismic hazards (e.g. strong ground shaking, landslide, avalanche, liquefaction, tsunami inundation, fault displacement, and subsidence);*
- *Recommending policies including needed research, mapping, and monitoring programs;*
- *Reviewing the practices for recovery and reconstruction after a major earthquake; to recommend improvements to mitigate losses from similar future events; and,*
- *Gathering, analyzing, and disseminating information of general interest on seismic hazard mitigation to reduce the state's vulnerability to earthquakes.*

## INTRODUCTION

Destructive earthquakes over the past decade in Alaska (e.g. 2002 M7.9 Denali fault) and around the world (e.g. 2010 M8.8 Maule Chili, 2011 M9 Tohoku Japan, etc.) serve as reminders of the need to be prepared for future damaging seismic events. Alaska has more earthquakes than any other region of the United States and is, in fact, one of the most seismically active areas of the world. The second largest instrumented earthquake in the world occurred in southcoastal Alaska on March 27, 1964 (magnitude 9.2), and the largest on-land earthquake in North America in almost 150 years occurred in central Alaska on November 3, 2002 (magnitude 7.9). During 2013 the Alaska Earthquake Center<sup>a</sup> (AEC) located roughly 28,000 earthquakes in the state (Figure 1), including about 40 that exceeded magnitude 5<sup>b</sup>. The largest earthquakes in 2013 were the magnitude 7.5 Queen Charlotte Fault earthquake on January 5<sup>th</sup> (see cover) in southeastern Alaska, and a magnitude 7.0 earthquake on August 20<sup>th</sup> near the Andreevof Island group of the Aleutian Islands.

While it is not possible to predict the time and location of the next big earthquake, the active geology of Alaska guarantees that major, potentially damaging earthquakes will continue to occur. Further, despite advancements in seismic hazards analysis and engineering, the age and structural resilience of buildings and infrastructure vary across Alaska, especially in areas of higher seismicity. Therefore, the risks to public safety and infrastructure from these future events can be greatly reduced through proper planning, design, construction, and continuing education and outreach.

Since 2005 when the ASHSC first became active<sup>c</sup>, it has submitted annual reports to the Governor and Legislature - this report summarizes the ASHSC's business and accomplishments for 2013.

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<sup>a</sup> [www.aeic.alaska.edu](http://www.aeic.alaska.edu)

<sup>b</sup> A magnitude greater than about 5 is generally considered sufficient to cause structural damage, subject to the distance and site conditions.

<sup>c</sup> Legislation establishing the ASHSC was passed in 2002, but the first commissioners were not appointed until 2005.

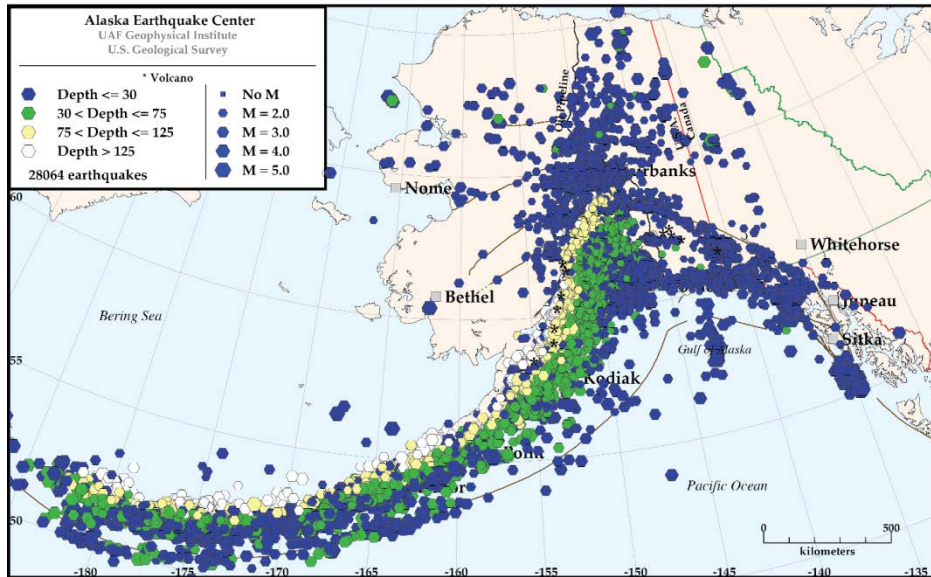


FIGURE 1: Earthquakes Reported by the Alaska Earthquake Center in 2013

## COMMISSION BUSINESS IN 2013

This section summarizes the ASHSC’s business conducted in 2013, including membership, meetings, ethics act, a legislative audit, updates of its strategic plan and operating rules, and finances. These elements were completed with administrative support provided by the Alaska Department of Natural Resources (DNR) Division of Geologic & Geophysical Survey (DGGS) (e.g. meeting logistics, budget, travel, website, etc.). The ASHSC’s documents associated with the following topics (e.g. meeting agenda and minutes, strategic plan, reports, etc.) are posted on its website: [www.seismic.alaska.gov](http://www.seismic.alaska.gov).

### MEMBERSHIP

The ASHSC maintained a full membership of 11 commissioners through 2013, listed below.

NAME/OCCUPATION	REPRESENTATION <sup>a</sup>	CONTACT
John L. Aho, Ph.D., Sc.D. Engineering Consultant; Anchorage	Public/Restricted	eqman39@gmail.com
Gary A. Carver, Ph.D. Geologic Consultant; Kodiak	Public/Restricted	cgeol@acsalaska.net
Bud Cassidy Borough Manager, Kodiak	Local Government	bcassidy@kodiakak.us
Mark J. Delozier Maritime Services, Valdez	Local Government	akmaritime@ak.net
Ann Gravier Hazard Mitigation Officer, Anchorage	Alaska Department of Military & Veteran Affairs	ann.gravier@alaska.gov

Laura W. Kelly, P.E. Civil Engineer, USCG Base Kodiak Juneau	Federal Agency	laura.w.kelly@uscg.mil
Richard D. Koehler, Ph.D. Geologist; Fairbanks	Alaska Department of Natural Resources	rich.koehler@alaska.gov
Robin J. McSharry State Farm Insurance; Anchorage	Insurance Industry	robin.mcsharry.chi7@statefarm.com
David E. Miller Fire Chief, Sitka	Local Government	davem@cityofsitka.com
Robert L. Scher, P.E. Geotechnical Engineer; Anchorage	Public/Restricted	bscher@rmconsult.com
Michael West <sup>b</sup> , Ph.D. Alaska State Seismologist, Fairbanks	University of Alaska	mewest@alaska.edu

a. As defined in AS 44.37.065(b)

b. Replaced former member Roger Hansen who retired in February

## MEETINGS

The ASHSC conducted nine public meetings in 2013, including seven half-day teleconference meetings (January 10, February 11, March 7, May 30, July 11, August 22, and November 14), and two two-day ‘face-to-face’ meetings in Anchorage (April 24-25, and October 7-8). The ASHSC also conducted one additional teleconference meeting in executive session, pertaining to a legislative audit (see below).

## ETHICS ACT

The ASHSC members had no written determinations, requests for determinations, or suspected potential violations under the Ethics Act (AS 39.52) in 2013.

## LEGISLATIVE AUDIT

Per AS 44.66.010(a)(8) the ASHSC is scheduled to terminate on June 30, 2014. From May through October 2013, the ASHSC cooperated with the Alaska Legislative Budget and Audit Committee (LB&A), Division of Legislative Audit (DLA) during its audit of the commission. The ASHSC was pleased to learn that on December 11, 2013 the LB&A approved the DLA’s report<sup>d</sup> which concluded that the ASHSC is operating in the public’s interest and should be extended for another six years. Note also that by year-end, the ASHSC had addressed and begun to implement all four of the recommendations in the DLA’s report (i.e. see *Strategic Plan*, and *Operating Procedures*, below).

## STRATEGIC PLAN

Based on a DLA<sup>d</sup> recommendation, the ASHSC revised its *Strategic Plan*<sup>e</sup>; in particular refining the priorities, completion dates, and metrics for gauging success for the specific strategies listed to implement each general objective. As this is a dynamic plan, the ASHSC also adopted a policy to

<sup>d</sup> DLA. *Audit Report*, Alaska Seismic Hazards Safety Commission. September 19, 2013.

<sup>e</sup> The ASHSC’s original strategic plan was approved in June 2012 and provided to the Office of the Governor, the Legislature, and DNR as part of its annual report for 2012.



review the plan objectives and strategies every two years as experience is gained and additional information becomes available.

### **OPERATING PROCEDURES**

Based on a DLA<sup>d</sup> recommendation, the ASHSC revised and updated its *Rules of Procedure* (e.g. basic member and officer responsibilities, business and meetings, standards for resolutions, policy recommendations, and reports, etc.).

### **FINANCES**

The ASHSC's expenditures (e.g. meeting and travel expenses, etc.) in FY13 totaled \$9,710; within its allotted budget of \$10,000.

## **ACTIVITIES & ACCOMPLISHMENTS IN 2013**

This section summarizes the ASHSC's activities and accomplishments in 2013, including resolutions, policy recommendations, progress on long-term projects, briefings and presentations, responses to requests from others, partnering, etc. While these items generally involved the ASHSC as a whole, most were coordinated or implemented under one or more of the commission's six standing committees, including: Earthquake Scenarios (*chair* Gary Carver), Education-Outreach-Partnering (Robert Scher), Hazards Identification (Rich Koehler), Insurance (Robin McSharry), Response and Recovery (Ann Gravier), and Schools (Laura Kelly).

The bracketed { } number/letter(s) following the items listed under *Policy Recommendations*, *Long-Term Projects*, and *Briefings and Presentations* refer to the corresponding 'objective' and 'implementation strategy' described in the ASHSC's updated Strategic Plan (Appendix A).

Final documents the ASHSC prepared under the following headings are posted on its website: [www.seismic.alaska.gov](http://www.seismic.alaska.gov).

### **RESOLUTIONS**

The ASHSC approved one designated *resolution* in 2013 (R 2013-1), recommending that Governor Parnell dedicate the year 2014 in commemoration of the 1964 Great Alaska Earthquake; the largest earthquake ever recorded in North America (second largest worldwide), which devastated many Alaska communities and was a major historic hallmark in its statehood. The full resolution is provided in Appendix C.

### **POLICY RECOMMENDATIONS**

The Commission approved two designated *policy recommendations* in 2013 for mitigating seismic hazards in the State<sup>f</sup>:

- **PR 2013-1: VALUE OF SEISMIC INSTRUMENTATION FOR CRITICAL FACILITIES.** Government, public and private owners of important facilities should incorporate and maintain seismic

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<sup>f</sup> A summary of the ASHSC's 10 designated policy recommendations approved to-date, including current status, is provided at the end of Appendix C.

instrumentation as part of its routine operating systems, especially in the moderate to high seismic and more densely populated areas of Alaska. {1. c, e; 2. b}

- **PR 2013-2: SEISMIC PROVISIONS FOR DESIGNING SCHOOLS AND PUBLIC BUILDINGS.** The Alaska Department of Education and Early Development, Department of Public Safety (Division of Fire Safety), and Department of Transportation and Public Facilities should temporarily adopt the seismic provisions in the 2012 International Building Code (IBC) for designing new schools and public buildings, or structural retrofits thereof, versus using the seismic provisions in the 2009 IBC currently in effect. {1. b, c, e}

Full versions of both these new policy recommendations, including discussions of need, basis, and implementation strategy are provided in Appendix C.

## LONG-TERM PROJECTS

- Identification and Mitigation Prioritization of Seismically Vulnerable Schools: {1. b, c}
  - Completed FEMA's *Hazard Mitigation Grant Program (HMGP) Intent to Apply Form* for funding a Rapid Visual Screen of Alaska Schools Pilot Program. *[no HMGP funds were available for Alaska in 2013, intend to submit application for funding in 2014]*
  - Updated the ASHSC's Alaska map of schools and seismic hazard. *[produced by DNR/DGGS for the DLA audit report – see footnote 'd' on page 3 of this report]*
  - Sent letters (November and December) to eight Alaska school districts soliciting information on any studies or projects they administered pertaining to the seismic vulnerability or retrofit of its facilities (i.e. the Aleutians East Borough, Anchorage, Fairbanks-North Star Borough, Juneau, Kenai Peninsula Borough, Lake and Peninsula Borough, Matanuska-Susitna Borough, and Southeast Island school districts).
  - Sent a letter (December) to the Alaska Department of Education and Early Development (DEED) requesting a list of school projects funded through its *Capital Improvements Projects* program since 2010 that involved seismic improvements or mitigation.
- Kodiak Scenario Earthquake Study: {5.a}
  - Continued work on a scenario earthquake study for the built environment along the Kodiak Island road system (which has experienced several damaging earthquakes and tsunamis over the past few hundred years). *[final report expected in 2014]*
  - Participated in a teleconference with FEMA Region 10 to discuss the preliminary results of its risk assessment (*estimation of infrastructure damage value and casualties using the computer program HAZUS*) for the Kodiak Island Borough (*based on scenario earthquakes previously provided by the ASHSC*).
  - Worked with the AEC to develop a ShakeMap for a Narrow Cape fault earthquake scenario, which was then provided to FEMA for use in its Kodiak risk assessment.
  - On behalf of the Kodiak Island Borough, reviewed and provided comments on FEMA's draft report of its Kodiak risk assessment project.
- Advocate for Alaska Earthquake Research: {2.a, d; 4.c}
  - Continued work on an abbreviated summary of the known earthquake sources and seismicity across the state. *[final report expected in 2014]*
  - Continued work for development of an Alaska earthquake clearing house website. *[based on templates developed by the Utah Geologic Survey]*
- Regulations of Civil and Structural Engineers: {1.e}
  - Met with the Alaska State Board of Registration for Architects, Engineers, and Land Surveyors (AELS) to discuss the Commission's 2012 specific recommendations for



amendments to state licensing regulations intended to ensure civil and structural engineers possess a basic knowledge of seismic hazards and seismic engineering.

- Sent a letter to the AELS (October) requesting a response to ASHSC's 2012 recommendations.

## BRIEFINGS & PRESENTATIONS

- The ASHSC received the following briefings during its public meetings through the year: {4.}
  - Local emergency and public response during the tsunami warning and evacuation at Sitka after the magnitude 7.5 Queen Charlotte Earthquake on January 5, 2013 (see cover) – David Miller (Sitka Fire Chief/ASHSC)
  - ATC 71-4, update of Rapid Visual Screening guidelines (FEMA 154) – Laura Kelly, P.E. (ATC Project Review Panel/ASHSC)
  - Web-based Alaska Earthquake Alliance – Dr. Peter Haeussler (USGS) [*ASHSC is a member*]
  - Earthquake early warning systems – Ann Gravier (DHS&EM/ASHSC)
  - EarthScope Transportable Array (Alaska deployment plan) – Dr. Mike West (AEC/ASHSC)
  - Developing a tsunami-resilient building design code – Gary Chock (ASCE 7 Tsunami Loads & Effects Subcommittee)
  - Alaska Legislative process, and tracking resources (bills, hearing & meeting schedules, etc.) – Esther Tempel (DNR Legislative Liaison)
- Commissioners Aho and Scher presented two single-day (April), ASHSC sponsored training courses to the Municipality of Anchorage regarding rapid assessment of building safety following an earthquake. {3.b}

## RESPONSES TO REQUESTS BY OTHERS

- Commissioners Carver and Koehler provided (January) input to FEMA regarding viable catastrophic scenario earthquake for its March 2014 Alaska Shield exercise. Commissioners Aho and Scher provided comments regarding the built environment and ground failure potential in Anchorage to FEMA's *Critical Infrastructure Workgroup* also for the Alaska Shield exercise.
- The ASHSC sent a letter (February) to the National Science Foundation supporting a proposed University of Alaska research project to utilize existing information and modeling tools to enhance an overall understanding of the possible physical, economic, and social impacts within the more populated regions of Alaska from design-level scenario earthquakes.
- The ASHSC provided (March) the Matanuska-Susitna Borough Planning Department a summary of the strategies and available resources for developing seismic hazard zonation maps.
- Commissioner West represented the ASHSC at a meeting of the New Madrid Coordination Committee (during the April 2013 Seismological Society of America Annual meeting in Salt Lake City, Utah) to explore interest within the state seismic hazard commissions and others for inter-regional coordination of earthquake education and outreach activities and programs.
- The ASHSC reviewed and provided comments to DGGS for updating the 2010 version of the *State of Alaska All Hazard Mitigation Plan*.
- The ASHSC provided (October) the Government of Yukon Department of Highways and Public Works a summary of the government entities and its programs associated with seismic safety and hazard mitigation in Alaska (i.e. DEED, Department of Military & Veteran Affairs Division of Homeland Security & Emergency Response, DNR-DGGS, Department of Public

Safety's Division of Fire and Life Safety, and the Department of Transportation & Public Facilities; as well as the AEC and ASHSC).

- The ASHSC provided written comments (October) to the Western States Seismic Policy Council (WSSPC) on its draft new policy recommendations pertaining to (i) improving tsunami public education, mitigation and warning procedures; (ii) earthquake monitoring systems/networks; (iii) tsunami monitoring systems/networks; and (iv) earthquake emergency handbooks for first responders.

## PARTNERING

- Commissioners Aho, Carver, Gravier, Kelly, Koehler, and Scher continued to participate in the local organizing committee for the 10<sup>th</sup> National Conference on Earthquake Engineering; to be held in Anchorage in 2014. The ASHSC is a non-financial sponsor of the conference.
- Commissioners Gravier and Scher participated in the Anchorage Museum's organizing committee for its 2014 exhibit to commemorate the 1964 Great Alaska Earthquake.
- Commissioner Aho continued to represent the ASHSC on the DMVA's *Alaska Partnership for Infrastructure Protection* organization.
- Commissioners West and Aho facilitated a meeting in June between the USGS, the Alaska Earthquake Center, and the University of Alaska Anchorage to improve maintenance, operation and data distribution for the Alaska Strong Motion Network.
- Commissioner Koehler represented the ASHSC during the 2013 annual meeting (May) of the Western States Seismic Policy Council (WSSPC) in Seattle – [*the ASHSC, DNR-DGGS, and DMVA-DHS&EM are members of WSSPC*]. Commissioners Gravier and Koehler continued to participate on the WSSPC Tsunami Hazards Mitigation Committee, and Commissioner Scher joined the WSSPC Engineering, Construction and Building Codes Committee.
- Commissioner West participated (in December) on a panel in Washington D.C. to discuss FEMA's Alaska Shield response exercise planned for March 2014.
- Commissioner Kelly continued to participate on the Applied Technology Council's *Project Review Panel* for updating FEMA 154 (*Rapid Visual Screening*). Commissioners Kelly and Aho participated in an exercise at San Francisco to test the new guidelines.
- Commissioner McSharry continued to update the Alaska Department of Commerce, Community and Economic Development Division of Insurance, and Commissioner Kelly continued to update the Alaska Department of Education and Early Development of the ASHSC's activities.

## MISCELLANEOUS

- Sent letters (March) to the Alaska legislative House and Senate Transportation Committees regarding the Knik Arm Bridge Toll Authority (KABATA) project; and volunteered its consultation should the committees have any questions regarding seismic hazards (e.g. earthquake-induced strong ground shaking, ground failure, tsunamis, etc.) pertaining to the KABATA or any other State project before them.
- Sent letters (October) to the Alaska congressional delegation recommending its support for reauthorization of the federal *Tsunami Warning and Education Act*, which expired in 2012.
- Initiated work on general guidelines for communities and entities to follow for planning scenario earthquake studies to improve assessment of their local risks.

## **APPENDIX A**

# **RESOLUTIONS & POLICY RECOMMENDATIONS**

RESOLUTION R 2013-1

POLICY RECOMMENDATION PR 2013-1

POLICY RECOMMENDATION PR 2013-2

STATUS OF ACTIVE POLICY RECOMMENDATIONS



THE STATE  
of **ALASKA**  
GOVERNOR SEAN PARNELL

## SEISMIC HAZARDS SAFETY COMMISSION

Department of Natural Resources  
3354 College Road  
Fairbanks, Alaska 99709-3707  
Main: 907.451.5010  
Fax: 907.451.5050

### RESOLUTION NO. 2013-01

#### DEDICATION OF 2014 IN COMMEMORATION OF THE 1964 GREAT ALASKA EARTHQUAKE

**WHEREAS**, the March 27, 1964 Great Alaska magnitude 9.2 Earthquake was the largest earthquake ever recorded in North America, second largest worldwide, and constitutes one of the major hallmarks in the history of Alaska statehood; and

**WHEREAS**, the earthquake and associated tsunami caused devastating damage to many coastal communities as well as economic effects extending across much of the State; and

**WHEREAS**, the year 2014 will be the 50<sup>th</sup> anniversary of the earthquake and tsunami; and

**WHEREAS**, numerous events including exhibits, national conferences, emergency response exercises, etc., are planned in many Alaska communities during 2014 to commemorate the earthquake (e.g. Anchorage, Fairbanks, Kodiak, Valdez, etc.); and

**WHEREAS**, Alaska is located in one of the most seismically active regions of North America and the State will continue to experience earthquakes resulting in damage and injury to the populace; and

**WHEREAS**, public awareness is critical to being prepared for the next earthquake,

**NOW, THEREFORE, BE IT RESOLVED** that the Alaska Seismic Hazards Safety Commission recommends and requests Governor Parnell dedicate the year 2014 in commemoration of the 1964 Great Alaska Earthquake.

**PASSED AND APPROVED** by the Alaska Seismic Hazards Safety Commission on this 14<sup>th</sup> day of November 2013.

A blue ink signature of Robert L. Scher, P.E.

Robert L. Scher, P.E.  
Chair



## **POLICY RECOMMENDATION 2013-1**

### **VALUE OF SEISMIC INSTRUMENTATION FOR CRITICAL FACILITIES**

**(ADOPTED 7 OCTOBER 2013: UNANIMOUS)**

Government, public and private owners of important facilities should incorporate and maintain seismic instrumentation as part of their routine operating systems, especially in the moderate to high seismic and more densely populated areas of Alaska. The Commission believes there is near-term economic value and life-safety benefit to state and local governments, facility owners, and the public from maintaining on-site or in-structure seismic instrumentation.

#### **BACKGROUND**

Based on a recent study by the Federal Emergency Management Agency<sup>1</sup> (FEMA) Alaska was ranked second only to California in terms of the estimated annualized earthquake loss (AEL), or damage, versus the replacement value of the total infrastructure. Additionally, the risk along the rail belt, from Anchorage to Fairbanks, compares with the greater Los Angeles and San Francisco metropolitan areas in terms of AEL per capita.

Seismic instruments are sensitive devices that detect and record vibrations caused by passing energy waves traveling through the earth, in particular those generated by an earthquake. Of particular interest to engineers, building officials and the public are ground motions strong enough to potentially cause ground failure or structural damage. The Alaska Earthquake Information Center (AEIC)<sup>2</sup> collects and analyzes strong motions measured at over 80 instrumented sites spread across the state; including denser instrument networks in the Anchorage and Fairbanks areas. While most of these instruments are situated on the ground away from the influence of a building (aka free-field), a number are also located within structures (from the basement to rooftop), and buried in 'down-hole' arrays.

Earthquake scientists and civil engineers have long recognized the importance of ground motion data for monitoring seismic activity, evaluating seismic hazards, damage estimate studies (e.g. FEMA *HAZUS*) and certainly structural design. However, less well known are studies over the past few decades which have demonstrated that strong motion records measured using on-site or in-structure instrumentation can be a simple and cost effective means to:

- Improve the validity, quality, and detail of information available to emergency responders and the public pertaining to the possible extent, types, and severity of damage within the subject area immediately following a damaging earthquake;
- Enhance the means available for engineers involved with assessing the potential damage to a building or facility immediately after an earthquake, thereby possibly optimizing the need, scope, and cost for more intrusive structural inspections, and/or possibly limiting the time before which the facility can be put back into operation; and,

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<sup>1</sup> FEMA. 2008. HAZUS MH Estimated Annualized Earthquake Losses for the United States. FEMA 366.

<sup>2</sup> <http://www.aeic.alaska.edu/>

- Improve the cost and efficiency of structures to resist earthquake forces, new as well as upgrades to existing, and thereby reducing risk to the public through continued improvements to the building codes, and design and construction standards, on both a national and local level.

In conclusion, the Commission believes these applications demonstrate there is economic value and life-safety benefit to state and local governments, facility owners, and the public from maintaining on-site or in-structure seismic instrumentation.

#### **IMPLEMENTATION & ASSESSMENT**

The Commission will prepare a report providing more complete background and discussion to support the policy recommendation. This report will be completed within three months of the policy's approval date. The report will then be forward to the Alaska departments responsible for major structures (e.g. DEED and DOT&PF), and city building departments and major facility operators (e.g. power and communication utilities, pipelines, petroleum and chemical manufacturing, etc.) located in moderate to high seismic areas of the state (e.g. Anchorage, Fairbanks, Juneau, Kodiak, Wasilla, etc.).

Measure of the acceptance of this policy recommendation will be tracked by the number of entities that respond to and act upon the report.

The Commission's Education, Outreach and Partnering committee will be responsible for the implementation and assessment of this policy recommendation.



## **POLICY RECOMMENDATION 2013-2**

### **SEISMIC PROVISIONS FOR DESIGNING SCHOOLS AND PUBLIC BUILDINGS (ADOPTED 14 NOVEMBER 2013; UNANIMOUS)<sup>1</sup>**

The Alaska Department of Education and Early Development, Department of Public Safety (Division of Fire Safety), and Department of Transportation and Public Facilities should temporarily adopt the seismic provisions in the 2012 International Building Code (IBC) for designing future new schools and public buildings, or structural retrofits thereof, versus using the seismic provisions in the 2009 IBC currently in effect. The seismic provisions in the 2012 IBC reflect a number of significant technical changes from the 2009 IBC, all very relevant for Alaska, which would improve the resiliency and safety of future schools and public buildings until such time as the full 2012 IBC is adopted by the State.

#### **BACKGROUND**

Alaska statute requires that building structures be designed following the triennial International Building Code (IBC). The State adopted the 2009 IBC effective November 2012. The 2012 IBC was published in February 2012, but will likely not be adopted by Alaska until possibly 2015.

The seismic provisions in the 2012 IBC reflect a number of significant technical changes from the 2009 IBC, all specifically intended to improve the structural resiliency of buildings to resist earthquake loads. The technical changes in the 2012 IBC seismic provisions most relevant to building designs in Alaska include:

- Design ground motions in the 2012 IBC are based on the most recent USGS probabilistic seismic hazards maps for Alaska, published in 2007, which reflect much improved characterizations of the principal known earthquake sources across the state. The 2009 IBC uses the USGS maps for Alaska published in 1998.
- The 2012 IBC design ground motions provide a uniform one-percent in 50-years risk target of building collapse. The design ground motions in the 2009 IBC, and preceding editions, are derived from a uniform hazard maximum considered earthquake with a probabilistic return period of 2,500 years. This represents a significant change in basis of determining seismic ground motions and loads, and is intended to improve the consistency of structural designs across the United States to prevent building collapse; which is the over-riding principal safety objective of the code.
- Design ground motions in the 2012 IBC reflect the maximum directional component of the ground motion, which is approximately 10 to 30 percent greater (depending on the period of the motion) than the geometric mean of the two principal horizontal motion directions used in the 2009 IBC. However, the 2012 IBC also set a ‘deterministic’ upper

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<sup>1</sup> This conforms to the Western States Seismic Policy Council (WSSPC) Policy Recommendation 13-4, *Seismic Provisions in the 2012 International Building Codes*, which was adopted in November 2012.

limit for the design ground motions at sites near large, active sources; which control the design ground motions over much of southcoastal Alaska.

- To evaluate the potential for earthquake-induced ground failure (e.g. liquefaction, settlement, lateral spreading, slope instability, etc.), the 2012 IBC uses an index peak ground acceleration (PGA) with a slightly lower probability of occurring versus the building design ground motions. The 2009 IBC uses an index PGA that has the same probability of occurring as the building design ground motions. This change reflects the current reasoning of code officials and seismic engineers that more conservancy is warranted in the geotechnical evaluations to improve confidence that the ground does not fail before the structure; a fundamental condition of all model building codes.
- Details are improved for seismic design of critical nonstructural components such as stairways, doors, suspended ceilings, etc.

The consequence of these changes in Alaska will be most dramatic to the structural design of taller or more flexible buildings, and the geotechnical investigations for all buildings. For example, the 2012 IBC design ground motions in regions of Alaska characterized with moderate to high seismic activity will generally be within plus or minus five to 15 percent of the 2009 IBC values for short period (e.g. short and stiff) structures, but over 15 to plus-30 percent greater than the 2009 IBC values for longer period (e.g. tall and flexible) structures. Further, the index PGAs used in Alaska to evaluate the potential for earthquake-induced ground failure are roughly 25 to plus-50 percent greater than the values used in the 2009 IBC.

In conclusion, the Commission believes that the seismic provisions in the 2012 IBC are more up-to-date and appropriate for use in Alaska versus the seismic provisions in the 2009 IBC, the building code presently enforced by Alaska. Therefore, the Commission believes that applying the seismic provisions of the 2012 IBC would improve the resiliency and safety of future schools and public buildings until such time as the full body of the 2012 IBC is adopted by the State.

### **Implementation & Assessment**

The Commission will prepare a position paper providing more complete background and discussion to support the policy recommendation. The position paper will then be submitted directly to the Commissioners of the Alaska Department of Education and Early Development, Department of Public Safety, and Department of Transportation and Public Facilities.

Measure of this policy recommendation will be gauged by its acceptance and adoption by the targeted departments.

The Commission's Schools, and Education, Outreach and Partnering Committees will be responsible for the implementation and assessment of this policy recommendation.

**STATUS OF ACTIVE POLICY RECOMMENDATIONS (Note a) – December 2013**

	POLICY RECOMMENDATION (Note b)	ADOPTED	IMPLEMENTATION
2010-1	Identification and Mitigation Prioritization of Seismically Vulnerable School Buildings	<i>(Notes c, d)</i>	<ul style="list-style-type: none"> <li>-Originally submitted to Alaska DEED in 2009; resulting in changes to the DEED's CIP application in 2010.</li> <li>-Submitted to the Governor and Legislature in the Commission's 2010 Annual Report.</li> <li>-Submitted a <i>White Paper</i> to the Governor and Legislature in the Commission's 2012 Annual Report.</li> <li>-Initiated planning in 2013 for a Rapid Visual Screening Pilot Program of select schools. Also initiated compilation in 2013 of database of recent Alaska school projects pertaining to study of seismic vulnerability or structural retrofits.</li> </ul>
2010-2	Seismic Risk Mitigation of Future Design, Construction, and Major Renovation of Schools	<i>(Notes c, d)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2010 Annual Report</li> <li>-Submitted a <i>White Paper</i> to the Governor and Legislature in the Commission's 2012 Annual Report</li> </ul>
2011-1	Position Statement in Support of Development of an Earthquake Research Program	<i>(Note c)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2011 Annual Report</li> <li>-Submitted a <i>White Paper</i> to the Governor and Legislature in the Commission's 2012 Annual Report</li> </ul>
2011-2	<p>Earthquake Engineering - Basic Knowledge Requirements for Professional Engineering Licensure</p> <p><i>Directed to the Alaska Board of Architects, Engineers, and Land Surveyors (AELS)</i></p>	<i>(Note c)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2011 Annual Report</li> <li>-Presented the PR to the AELS in August 2012; and then submitted a <i>Position Paper</i> with specific recommendations to amend the licensing regulations to the AELS in Dec 2012 (included in the Commission's 2012 annual report to the Governor and Legislature).</li> <li>-Met with AELS in May 2013. Sent letter to AELS in Oct 2013 requesting their response to the Commission's 2012 recommendations.</li> </ul>

**STATUS OF ACTIVE POLICY RECOMMENDATIONS, CONTINUED (Note a) – December 2013**

	POLICY RECOMMENDATION (Note b)	ADOPTED	IMPLEMENTATION
2011-3	Identification and Mitigation Prioritization of Seismically Vulnerable Buildings	<i>(Note c)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2011 Annual Report</li> <li>-Submitted a <i>White Paper</i> to the Governor and Legislature in the Commission's 2012 Annual Report</li> </ul>
2011-4	Relief from Liability for Qualified and Trained Volunteers who are Assigned to Damage Assessments Tasks	<i>Introduced Nov 29-30, 2011 (Note c)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2011 Annual Report.</li> <li>-Sent a letter to the Alaska Office of the Attorney General in Oct 2012 requesting an opinion on AS 09.65.091 (<i>Civil Liability for Responding to Disaster</i>). Submitted a <i>White Paper</i> to the Governor and Legislature in the Commission's 2012 Annual Report.</li> <li>-Received in Mar 2013 a reply from the Alaska Attorney General's office to our 2012 letter (<i>AG believes AS 09.65.091 addresses the focus of PR 2011-4, but also stated that a new, more specific statute could be of value</i>).</li> </ul>
2011-5	Investigate Potential Impacts and Develop Contingency Plans to Prepare for and Mitigate the Possible Detrimental Effects of a Great Pacific Northwest Earthquake on Alaska	<i>Introduced Jun 20-21, 2011 (Note c)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2011 Annual Report.</li> <li>-Completed report in May 2012, which was then published by DGGGS in Aug 2012, <i>Misc. Publication 148</i>.</li> </ul>
2012-1	Development of a Post-Earthquake Clearinghouse for Alaska	<i>Introduced May 5-6, 2011 (Note c)</i>	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2011 Annual Report.</li> <li>-Submitted a <i>White Paper</i> to the Governor and Legislature in the Commission's 2012 Annual Report.</li> </ul>
2013-1	Value of Seismic Instrumentation for Critical Facilities	Oct 7, 2013	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2013 Annual Report. Also initiated work on a position paper to be sent to specific Alaska state and local government entities and private and public facilities.</li> </ul>
2013-2	Seismic Provisions for Designing Schools and Public Buildings	Nov 14, 2013	<ul style="list-style-type: none"> <li>-Submitted to the Governor and Legislature in the Commission's 2013 Annual Report. Also initiated work on a position paper to be sent to the Alaska DEED, DPS-DFS, and DOT&amp;PF.</li> </ul>

*Notes:*

- a. In 2010 the Commission adopted its current practice to formally number and document policy recommendations. Prior to 2010, the Commission had made numerous recommendations which are discussed in the Commission's annual reports to the Governor and Legislature, and are not included in Table A1.
- b. The policy recommendations are directed to the Governor and Alaska Legislature unless noted otherwise.
- c. Prior to 2013 the policy recommendations were effectively adopted as part of Commission's annual reports to the Governor and Legislature.
- d. In 2013, the Commission adopted its current practice to review and terminate or re-approve policy recommendations within three years of its adoption. Accordingly, the Commission will review PRs 2010-1 and 2010-2 in 2014.