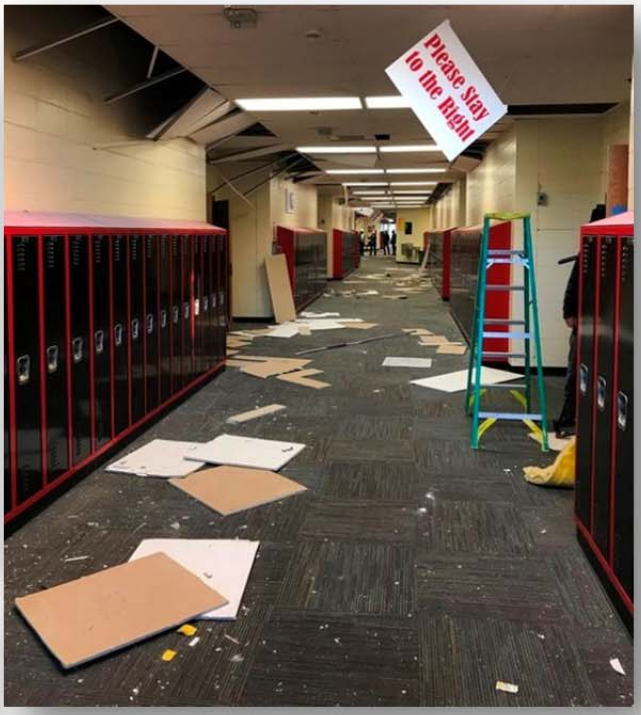
ASHSC Alaska Seismic Hazards Safety Commission



2018 Annual Report

to the Governor and State Legislature

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EXECUTIVE SUMMARY

2018 was a highly active year for earthquakes in Alaska with three significant seismic events shaking our state.

We started out with a bang on January 23rd with a M7.9 earthquake occurring offshore of Kodiak Island. This was the 2nd largest earthquake worldwide in 2018. While tsunami alarms were triggered across the state, we were fortunate in that only a minor wave was generated.

On August 12th, a M6.4 earthquake occurred on the North Slope between the Trans-Alaska Pipeline and the village of Kaktovik. This was an unexpectedly large earthquake for this region and raised seismic safety awareness among oil field producers.

The year ended with a destructive M7.1 earthquake on November 30th, shaking Southcentral Alaska to its core. This was the largest earthquake to impact a US metropolitan area in over 15 years. Incredibly there were no deaths and only minor injuries. This event has demonstrated the value of a community built with seismic safety in mind.

The Alaska Seismic Hazard Safety Commission lost our patriarch this year with the well-earned retirement of John Aho. John has been a pillar in the seismic safety community for years and was the driving force behind the establishment of this Commission. His lifelong efforts were acknowledged as he was nationally recognized as one of Engineering News Record's Top 25 Newsmakers of 2018. This Commission continues to be inspired by John's example and looks forward to continuing his mission of improving seismic safety in Alaska.

In 2018 this Commission pushed forward on a number of fronts:

- Completed a project to assess the vulnerability of older buildings in the Juneau and Sitka School Districts to significant structural damage during a design earthquake using FEMA's Rapid Visual Screening Method.
- Oversaw publication of 'Active Faults and Seismic Hazards in Alaska'
- Conducted incident-response meetings immediately following the January Offshore Kodiak and the November Anchorage earthquakes in line with our earthquake response plan.
- Compiled and distributed summaries of the January Offshore Kodiak M7.9 earthquake and the November Anchorage M7.1 earthquake.
- Sponsored training for post-earthquake damage assessment for local engineers and architects.
- Coordinated initial planning efforts between state disaster-response planners and local engineering professional organizations.

The Commission is available and would welcome the opportunity to discuss any issues within our purview.

Sterling Strait, Chair
Laura W. Kelly, Vice-Chair

Cover Photos provided by AK DHS&EM disaster assessment teams and reflect damage from the November 30 earthquake to Houston High School and homes in Eagle River.

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Abbreviations used in this report for Federal, Alaska and Other entities:

AEC	Alaska Earthquake Center
AELS	Architects, Engineers, and Land Surveyors [*Alaska State Board of*]
ASHSC	Alaska Seismic Hazards Safety Commission
DEED	Department of Education & Early Development
DFLS	Division of Fire and Life Safety
DGGS	Division of Geological & Geophysical Surveys
DHS&EM	Division of Homeland Security & Emergency Management
DNR	Department of Natural Resources
FEMA	Federal Emergency Management Agency
FNSB	Fairbanks North Star Borough
NEHRP	National Earthquake Hazard Reduction Program
UAF	University of Alaska Fairbanks
USCG	U.S. Coast Guard
USGS	U.S. Geological Survey
WSSPC[1]	Western States Seismic Policy Council

[1] *The Alaska DHS&EM, DGGS, and ASHSC are the three Alaska members to WSSPC*

ALASKA SEISMIC HAZARDS SAFETY COMMISSION
ANNUAL REPORT TO THE GOVERNOR & STATE LEGISLATURE FOR 2017

INTRODUCTION

This report[2] summarizes the Alaska Seismic Hazard Safety Commission's (ASHSC) business, activities, and accomplishments in 2018 as related to its statutory powers and duties (AS 44.37.067) on behalf of the Governor, Legislature, local governments, and the public and private sectors, which include:

- *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 and 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.*

Alaska has more earthquakes than any other region of the United States and is one of the most seismically active areas of the world. During 2018 the Alaska Earthquake Center recorded over 55,000 earthquakes throughout all regions of the state. Overall it was a very seismically active year with three significant seismic events impacting the state[3]:

Jan 23, M7.9 Offshore Kodiak Earthquake: The year's largest earthquake in Alaska struck at 12:31am on Jan. 23, 180 miles southeast of Kodiak Island in the Gulf of Alaska. The National Tsunami Warning Center immediately issued tsunami warnings, leading to evacuations in communities across southern Alaska. The earthquake was felt from Unalaska to Fairbanks and even caused endangered pupfish to spawn out of season by sloshing the waters of Devil's Hole in Death Valley. The earthquake did generate a tsunami, but its highest waves were measured in inches rather than feet.

August 12, M6.4 Kaktovik Earthquake: The year's most unexpected earthquake, from a seismological perspective, was the Aug. 12 M6.4 quake in the Sadlerochit Mountains, 52 miles southwest of Kaktovik and 25 miles south of the Beaufort Sea coast. This was by far the largest earthquake ever recorded north of the Brooks Range in Alaska. The M6.4 mainshock and M6.0 aftershock were both felt widely, with reports coming in from Kaktovik west to Nuiqsut and as far south as Fairbanks. There were no reports of damage or injuries, and there was no impact on pipeline operations.

November 30, M7.1 Anchorage Earthquake: At 8:29am, a fault inside the subducting Pacific plate ruptured at a depth of about 20 miles under Point Mackenzie. The rupture

[2] *The Commission's documents (e.g. annual reports, meeting agenda and minutes, strategic and operating plans, policy recommendations and white papers, etc.) are available on our website www.seismic.alaska.gov.*

[3] *2018 Earthquake Summary Source: Alaska Earthquake Center http://earthquake.alaska.edu/2018-year-review*

itself lasted for about 11 seconds, which translated to twenty seconds or more of violent shaking in Anchorage and Mat-Su. Miraculously, there were no deaths, but early estimates put the damage to homes, businesses, and public facilities at $76 million, making this the most damaging earthquake in Alaska since 1964. Southcentral Alaska weathered the magnitude 7.1 earthquake in remarkably good shape, but the impacts were serious. Many residents are dealing with expensive damage to their homes, and some homes are not yet safe to live in. Two Eagle River schools will not be able to open for the 2019-2020 school year. Many Alaskans have also experienced anxiety and other mental health impacts from the quake and its aftershocks.

These events demonstrate the value of a community built with seismic safety in mind. For us to have weathered the November earthquake without a single death is a testament to the skill and dedication of our engineers, building officials, seismologists, and countless others.

Unfortunately we cannot afford to sit back and rest on our laurels. The next big earthquake and potential tsunami could be right around the corner and we must continue to improve our seismic safety. The risks to public safety and infrastructure from future events can be greatly reduced through proper planning, design, construction, and continuing education and outreach.

COMMISSION BUSINESS IN 2018

The following summarizes the ASHSC's business conducted in 2018, including membership, meetings, ethics act, and finances; with administrative support provided by the Alaska Department of Natural Resources (DNR), Division of Geological & Geophysical Survey (DGGS) (e.g. meeting logistics, budget, travel, website, etc.).

MEMBERSHIP

The ASHSC experienced a lot of turnover is 2018. And yet by year end only one seat remained vacant: that of the Insurance Rep (*editor note: this seat was filled in January 2019*).

TABLE 1: COMMISSION MEMBERSHIP IN 2018

COMMISSIONER / OCCUPATION / RESIDENCE	REPRESENTATION
John L. Aho, Ph.D., Sc.D. † Engineering Consultant; Anchorage	Public/Restricted
Garret Gladsjo § Engineering Consultant, Juneau	Public/Restricted
Edward Athey Fire Chief, City of Seward	Local Government
Jennifer Shockley § Deputy Chief, Unalaska Public Safety	Local Government
David Gibbs Director Emergency Services, FNSB; Fairbanks	Local Government
Laura W. Kelly, P.E. Civil Engineer, USCG; Juneau	Federal Agency
Robert L. Scher, P.E. Geotechnical Engineer, Consultant; Anchorage	Public/Restricted
De Anne Stevens Geologist, DGGS; Fairbanks	Alaska Department of Natural Resources
Sterling Strait Structural Engineer, Alyeska Pipeline; Anchorage	Public/Restricted
Kimberly Stuart † DMVA, DHS&EM; Anchorage	Alaska Department of Military & Veterans Affairs
Dan Belanger § DMVA, DHS&EM; Anchorage	Alaska Department of Military & Veterans Affairs
Michael West, Ph.D. † Alaska State Seismologist, UAF; Fairbanks	University of Alaska
Natalia Ruppert, Ph.D. § Seismologist, UAF; Fairbanks	University of Alaska
Vacant	Insurance Industry

† Resigned during 2018 § Appointed in 2018

MEETINGS

The ASHSC conducted four public meetings in 2018, including three by teleconference (April 11, July 12 and September 6) and one 'in-person' meetings at Anchorage (November 8-9). In addition, three emergency meetings were held: One following the January M7.9 Kodiak Offshore earthquake and two following the November M7.1 Anchorage earthquake.

ETHICS ACT (AS 39.52)

The ASHSC submitted quarterly ethics reports to the Department of Law in 2018, with no written determinations, requests for determinations, or suspected potential violations.

FINANCES

The ASHSC's expenditures (e.g. meeting and travel expenses, etc.) in FY18 totaled $3,516.52.

ACTIVITIES & ACCOMPLISHMENTS IN 2018

This section summarizes the ASHSC's activities and accomplishments in 2018. While these items generally involved the ASHSC as a whole, most were coordinated or implemented by informal working groups tapping the Commissioners with the most relevant expertise.

- The Commission completed a project to assess the vulnerability of older buildings in the Juneau and Sitka School Districts to significant structural damage during design earthquakes, using FEMA's Rapid Visual Screening (RVS) method. The Anchorage-based company BBFM Engineers Inc. was contracted to conduct the necessary surveys and concluded that 9 structures had risk levels sufficiently high to warrant follow-on evaluation. The culmination of this project was two reports titled *Vulnerability of Some Juneau School District Schools to Earthquake Damage Based on Rapid Visual Screening* and *Vulnerability of Some Sitka School District Schools to Earthquake Damage Based on Rapid Visual Screening*. Both final reports can be found on the Commission's website and were also delivered to the school districts.
- As a follow-up to the RVS screening effort, the Commission provided information to the Alaska Professional Design Council (APDC) to assist them in their effort of lobbying for the seismic retrofit of school structures.
- In May the Commission saw the final publication of a landmark study on seismic hazards in Alaska. *Active Faults and Seismic Hazards in Alaska*[4] is the first document of its kind to present a complete picture of the seismic risks in our state. This report was initiated at the request of this Commission in 2013 and was guided by the review efforts of several Commissioners.
- The Commission represented the state as a member of the Western States Seismic Policy Council (WSSPC). The Commission supported WSSPC by reviewing policy recommendations that are used across the western U.S. and at the federal level. The Commissions' involvement helps ensure that Alaska's needs are accurately represented at the federal level.
- Following the M7.9 Offshore Kodiak earthquakes in January, the Commission held an emergency meeting per our earthquake response plan. At this meeting we were briefed on the event by Alaska Earthquake Center and heard reports of the community response to the tsunami alerts. The commission compiled and distributed a summary of the earthquake for public information. This information can be found on the Commission's website under "Significant Alaska Earthquakes."[5]

[4] http://dggs.alaska.gov/pubs/id/29705
[5] http://seismic.alaska.gov/significant_earthquakes.php

- Following the M7.1 Anchorage earthquakes in November, the Commission held a series of emergency meeting per our earthquake response plan. At this meeting we were briefed on the event by Alaska Earthquake Center and heard reports on the community damage and recovery. The commission compiled and distributed a summary of the earthquake for public information. This information can be found on the Commission's website under "Significant Alaska Earthquakes."[6]

- The Commission sponsored post-earthquake damage assessment training for the professional engineering and architecture community. This training was certified by the California Office of Emergency Services Safety Assessment Program[7] and all the attendees were added to California's roster of trained professionals.

- Initiated planning and coordination efforts between the professional engineering and architectural community and the Alaska Department of Homeland Security and Emergency Management. This effort laid the groundwork for volunteer professionals to assist with post-earthquake damage assessments.

- Following the M7.1 Anchorage Earthquake, multiple Commissioners coordinated to provide the roster of trained individuals to the State Emergency Operations Center. This effort resulted in a group of engineers and architects volunteering to complete facility damage assessments on state-operated facilities throughout Southcentral Alaska.

POLICY RECOMMENDATIONS

No policy recommendations were issued in 2018.

LONG-TERM PROJECTS

- Identification and Mitigation Prioritization of Seismically Vulnerable Schools:

  Completed a project[8] using FEMA's state-of-practice *Rapid Visual Screening* method to assess the vulnerability of a select number of buildings located on Juneau and Sitka School Districts to significant structural damage during a design earthquake. The results of this project will provide the district with an effective framework for prioritizing future construction projects.

- Advocate for continued earthquake research in Alaska:

  Continued work on an informational report summarizing the known earthquake sources and seismicity across the state. In 2018 this effort was focused on supporting the Alaska Earthquake Center in their goal of adopting seismic stations of the USArray into their monitoring network.

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[6] http://seismic.alaska.gov/significant_earthquakes.php

[7] https://www.caloes.ca.gov/cal-oes-divisions/recovery/disaster-mitigation-technical-support/technical-assistance/safety-assessment-program

[8] *To be completed under a grant from the Federal Emergency Management Agency (FEMA) National Earthquake Hazard Reduction Program (NEHRP), routed through the Earthquake Engineering Research Institute (EERI). This project is similar to the previous RVS projects the Commission completed in 2015 - 2017.*

- Leadership in Preparing Engineers and Architects for Post-Earthquake Inspections:

  The commission laid the groundwork for the Alaskan engineering and architecture community to step in after a significant earthquake and assist the State in completing damage assessment inspections. This effort bore fruit after the Anchorage Earthquake when the volunteers trained at an ASHSC sponsored event were deployed to inspect state-operated facilities.

PARTNERING & OUTREACH

- Commission worked with AK DHS&EM along with FEMA to offer training on ATC-20 *Postearthquake Safety Evaluation of Buildings* in Anchorage and Fairbanks.
- Commissioners Belanger and Strait met with representatives of the local engineering community to coordinate on how to utilize volunteers to conduct post-earthquake damage assessment inspections.
- Commissioners Belanger, Stevens, and Strait coordinated in the hours following the Anchorage Earthquake to connect volunteer damage inspectors with the state officials that needed their assistance.
- Commissioner Sher worked with the Municipality of Anchorage following the November earthquake to assist them in determining their needs for damage inspections.
- Commissioner Kelly worked with the Alaska Professional Design Council to share the Commission's findings from the RVS studies and to raise awareness of the need for seismic retrofits in Alaska's schools.