

## **POLICY RECOMMENDATION 2021-1 RESILIENT CRITICAL INFRASTRUCTURE**

The health and safety of Alaskans during and after an earthquake is dependent on the seismic performance of critical infrastructure. Critical infrastructure "includes systems, facilities, and assets so vital that their destruction or incapacitation would have a debilitating impact on national security, the economy or public health, safety, and welfare. Critical infrastructure may cross political boundaries and may be built (such as structural, energy, water, transportation, and communication systems), natural (such as surface or ground water resources), or virtual (such as cyber, electronic data, and information systems)<sup>1</sup>."

Critical infrastructure in Alaska include ports, schools, hospitals, firehouses, airports, road and rail corridors (example in *Figure 1*), communications systems, police stations/holding facilities, and facilities for supplying and transmitting electricity, fuel, and water (see also *Table 1*).

An earthquake may cause failure of critical infrastructure, and facilities that were built prior to current building codes are especially vulnerable. The State of Alaska has no plan or requirement for mitigating existing at-risk critical infrastructure. Increasing the resilience of Alaska's critical infrastructure is an investment in the safety and well-being of Alaskans now and into the future. Resilience "refers to the capability to mitigate against significant ... risks and incidents and to expeditiously recover and reconstitute critical services with minimum damage to public safety and health, the economy, and national security<sup>1</sup>."

As initial steps toward resilient critical infrastructure in Alaska, the Alaska Seismic Hazards Safety Commission (ASHSC) recommends the following:

1. Establish an Alaska Seismic Site Response Clearinghouse to inform risk reduction measures such as rapid visual screening, prioritization of seismic retrofits, site investigations for seismic design, and site response research
2. Increase awareness of resources to achieve resilient critical infrastructure through a white paper and an award for earthquake resilient infrastructure
3. Establish a Critical Facility Seismic Rehabilitation Grant Program to provide funding for the seismic rehabilitation of critical public buildings



*Figure 1. Failure of Glenn Highway embankment induced by the 2018 Anchorage Earthquake<sup>2</sup>.*

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<sup>1</sup> American Society of Civil Engineers Policy Statement 518 – Unified Definitions for Critical Infrastructure Resilience

<sup>2</sup> Marc Lester/Anchorage Daily News via AP

### **1. Compile an Alaska Seismic Site Response Clearinghouse**

Site response, e.g., amplification or deamplification of earthquake ground motions, liquefaction, surface rupture, and/or slope deformation, plays an important role in the performance of critical infrastructure during and after an earthquake. Establishing an Alaska Seismic Site Response Clearinghouse would be beneficial for reducing seismic risk, including the following:

- Identify areas that will likely have poor site response, allowing for prioritization of critical infrastructure retrofits;
- Inform rapid visual screenings as site response can significantly affect results of the screening;
- Reduce site investigation costs and increase accuracy of seismic evaluations by sharing information among federal, state, municipal, and private entities;
- The U.S. Geological Survey (USGS) and other public research institutions are making significant advances in characterizing site response in Alaska; the Clearinghouse would provide a central location for interested parties to access these evaluations, as well as provide additional sources of information to the researchers.

The Clearinghouse would be publicly available on the internet, and may include the following:

- Borehole, cone penetration testing (CPT), and water/oil well logs;
- Geophysical surveys;
- Bedrock geologic, surficial geologic, and landslide maps;
- Liquefaction and ground failure occurrence locations;
- Seismic monitoring locations, e.g., seismometers;
- Alaska site response evaluations, e.g., USGS.

Information would be provided to the Clearinghouse on a voluntary basis.

### **2. Increase Awareness of Resources to Achieve Critical Infrastructure Resilience**

ASHSC would increase awareness of resources to achieve resilient critical infrastructure as follows:

1. Develop and publish a white paper on guidelines, references, and funding for improving critical infrastructure resilience with recommendations for implementation in Alaska.
2. Establish an annual award highlighting a project that has improved resilience of infrastructure to earthquakes in Alaska.

### **3. Establish a Critical Facility Seismic Rehabilitation Grant Program**

Establish a competitive grant program providing funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency service facilities. Owners of such facilities could use these grants to perform engineering analyses of their facilities to identify and address seismic deficiencies.

Oregon currently uses such a program to incentivize seismic improvements:  
<https://www.orinfrastructure.org/Infrastructure-Programs/Seismic-Rehab/>

Table 1. Examples of Critical Infrastructure<sup>3</sup>

| <b>Table 8-1</b>   |  | <b>Alaska's Critical Infrastructure</b>   |   |   |
|--|--|---|---|---|
| <ul style="list-style-type: none"> <li>• Hospitals, Clinics, &amp; Assisted Living Facilities</li> <li>• Fire Stations</li> <li>• Police Stations</li> <li>• Emergency Operations Centers</li> <li>• Any Designated Emergency Shelter</li> <li>• Telecommunications Structures &amp; Facilities</li> </ul> | <ul style="list-style-type: none"> <li>• Satellite Facilities</li> <li>• Radio Transmission Facilities</li> <li>• Highways and Roads</li> <li>• Critical Bridges</li> <li>• Airports</li> <li>• Harbors / Docks / Ports</li> </ul> | <ul style="list-style-type: none"> <li>• Power Generation Facilities</li> <li>• Potable Water Treatment Facilities</li> <li>• Reservoirs &amp; Water Supply Lines</li> <li>• Waste Water Treatment Facilities</li> <li>• Fuel Storage Facilities</li> </ul> | <ul style="list-style-type: none"> <li>• Oil &amp; Gas Pipeline Structures &amp; Facilities</li> <li>• Service Maintenance Facilities</li> <li>• Community Halls &amp; Civic Centers</li> <li>• Community Stores</li> <li>• Community Freezer Facilities</li> </ul> | <ul style="list-style-type: none"> <li>• Schools</li> <li>• Community Washeterias</li> <li>• National Guard Facilities</li> <li>• Landfills &amp; Incinerators</li> <li>• Community Cemeteries</li> </ul> |

<sup>3</sup> <https://ready.alaska.gov/Plans/Mitigation/Documents/Alaska%20State%20Mitigation%20Plan/Ch08-RiskAnalysis.pdf>