

# Resilient Washington Subcabinet Report

Findings and Recommendations

*August 2017*



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# Acknowledgments

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This report was developed as a collaborative effort by the Resilient Washington Subcabinet Project Team from the Washington Military Department's Emergency Management Division on behalf of Governor Jay Inslee and the Resilient Washington Subcabinet. The conclusions reached reflect the result of a collaborative effort to consider all points of view by many contributors, and we appreciate the participation and support of the following contributors in producing this report:

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# Executive Summary

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Washington State has the second-highest earthquake risk in the United States. The 700-mile Cascadia Subduction Zone (CSZ) represents an extreme threat to the Pacific Northwest, capable of generating a magnitude 9.0 or higher earthquake and a tsunami. The most recent studies estimate 10,000 fatalities and direct economic losses of more than \$80 billion combined for Washington and Oregon. In addition to the CSZ offshore, Washington's mainland is littered with active crustal faults which pose seismic hazards; the histories and hazards of many of these faults are still being uncovered. Developing a state that is prepared for these impending natural disasters will significantly mitigate the damage they can cause to its people, property, economy, and long-term survival.

On November 4<sup>th</sup>, 2016, Gov. Jay Inslee issued Directive 16-19, establishing a Resilient Washington Subcabinet. Through this subcabinet, the Washington Military Department's Emergency Management Division was directed to assess our strategy in creating a resilient Washington State with regard to the hazards posed by earthquakes and tsunamis. In addition, a general goal of the Directive was to increase individual, family and business preparedness.

Workgroups consisting of key stakeholders and subject matter experts were formed to identify gaps; develop and prioritize actions; estimate implementation costs; and draft a report with initial findings and recommendations. The report that follows is a summary of the findings by the workgroups, and the implementation plans they developed. These initial action plans provide a foundation for more thorough and detailed scoping, both in terms of activities and costs, and are meant to help guide the best path forward for initial actions.

Significant work has already occurred to increase Washington's resilience to withstand earthquakes and tsunamis, yet much work remains to further this effort. As you will see throughout this report, there are many high priority actions that can be accomplished within existing resources or an additional incremental investment, such as integrating the WAsafe Program within the ESF-3 structure to rapidly conduct building assessments post-earthquake; establishing a stakeholder business continuity workgroup; and completing the master bulk fuel contract to improve fuel distribution post-earthquake. Despite being comparatively low cost, these action items will still require labor, agency leadership direction to reprioritize staff time from existing efforts, and substantial coordination across many entities.

Many of the actions identified by the workgroups are very similar and fall under four categories – Assessment, Inventorying, Data Collection and Storage; Building Code Revision; Outreach and Training; and Multi-Agency collaboration. Due to their similarities (i.e., schools, cities, and historic buildings, for example, will all benefit from a combined effort to inventory and create a database of vulnerabilities), there is significant potential for leveraging resources and effort across organizations to lower costs for these actions.

Several key actions will also require legislation and/or significant funding to accomplish, such as developing a state-level disaster recovery program; creating an earthquake insurance authority program; conducting seismic safety assessments on our school buildings; inventorying our earthquake-vulnerable

buildings; and supporting the building of tsunami vertical evacuation structures along the coast. While they do require capital investments, these actions are critical for making Washington resilient and offer some of the greatest opportunities to save lives and mitigate property damage – the highest priorities in any emergency.

Earthquake and tsunami resilience in Washington is a long-term goal. This document is meant to guide some of the first steps on that path, and outline future actions that need to be taken. To be successful in this long-term effort, Washington needs to establish a body, with corresponding authority and funding, to further the state’s resilience goals by facilitating efforts across state agencies. This effort will require the continued support of the Governor, Resilient Washington Subcabinet, Legislature, and all entities involved in creating this report.

# Introduction

Washington State has the second highest earthquake risk in the United States. The 700-mile Cascadia Subduction Zone (CSZ) represents an extreme threat to the Pacific Northwest, capable of generating a magnitude 9.0 or higher earthquake and tsunami. The most recent studies estimate 10,000 fatalities and direct economic losses of more than \$80 billion combined for Washington and Oregon. In addition to the CSZ offshore, Washington's mainland is littered with active crustal faults which pose seismic hazards; the histories and risk from many of these faults are still being uncovered. Developing a state that is prepared for these impending natural disasters will significantly mitigate the damage they can cause to its people, property, economy and long-term survival.



In 2012, Washington State Emergency Management Council's Seismic Safety Committee – a subgroup composed of subject matter experts and policy makers in relevant fields to seismic hazard mitigation – published the Resilient Washington State Report, detailing 10 key recommendations for Washington State to mitigate, respond to, and recover from the effects of a devastating earthquake and tsunami. For the sake of the report, the Seismic Safety Committee adapted the following definition for resilience:

*A resilient state is one that maintains services and livelihoods after an earthquake. In the event that services and livelihoods are disrupted, recovery occurs rapidly, with minimal social disruption, and results in a new and better condition.*

In June 2016, the *Cascadia Rising* exercise tested the state's capabilities of responding to a full rupture of the CSZ and resulting tsunami – the worst-case scenario geologic hazard event for Washington. Using the most up-to-date data on potential earthquake impacts and combining the efforts of local, state,

interstate, federal and international partners, the four days of exercise highlighted the significance of the degree of damage, challenges to response and life-safety issues. One direct result of the exercise was the realization that families in Washington should prepare themselves with two weeks of supplies, given it will take a long time for responders to reach isolated communities due to damaged infrastructure. The Cascadia Rising Exercise After-Action Report (AAR) highlighted the ability of many partners from a wide variety of backgrounds to work together in a situation with many unknowns; it also identified some critical weaknesses in the state's response and recovery capabilities.

On Nov. 4<sup>th</sup>, 2016, Gov. Jay Inslee issued Directive 16-19, establishing a Resilient Washington Subcabinet. Through this subcabinet, the Washington Military Department's Emergency Management Division was directed to assess Washington's strategy in creating a resilient state with regard to earthquakes and tsunamis. This was in consultation with the Washington Departments of Transportation, Commerce, Health, Enterprise Services, Social and Health Services, the Utilities and Transportation Commission, and other agencies, boards, commissions and councils as appropriate. This includes coordinating across multiple entities to identify gaps, developing and prioritizing actions, estimating implementation costs, and drafting this report, detailing initial findings and recommendations.

The Directive originally focused on recommendations 2, 3, 5, 6 and 7 in the Resilient Washington State Report, and 2 items (mass care and bulk fuels) that arose as lessons learned from the Cascadia Rising exercise. Recommendations 1 and 9 were added at the request of the governor, along with a third item from the Cascadia Rising after-action report (communications). Recommendation 8 was also added at the request of the Department of Natural Resources. Communications is intended to be a cross-cutting effort for state-wide resilience, however for this report it is included as its own section. For each of the 11 focus areas, a workgroup was formed and facilitated by project team members from the Washington Military Department's Emergency Management Division. The workgroups consisted of subject matter experts from state agencies, local jurisdictions, professional associations and other key stakeholders.

In addition, a general goal of the directive was to increase individual, family and business preparedness for an earthquake and/or tsunami in Washington. Washington's efforts to improve earthquake and tsunami resilience have been ongoing for years. The report that follows is a summary of the findings by the subcabinet and the implementation plans developed by the workgroups.

# Methodology

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For each focus area, a workgroup was formed and facilitated by project team members from the Washington Military Department's Emergency Management Division. The workgroups consisted of subject matter experts from state agencies, local jurisdictions, professional associations and other key stakeholders, and together they identified:

- Actions necessary for accomplishing the recommendations;
- Current actions being taken toward accomplishing the recommendations;
- Gaps and barriers hindering the accomplishment of identified actions;
- Anticipated costs and effort for completing necessary actions;
- Areas where additional collaboration is necessary and/or could help facilitate efforts;
- Which actions are highest priority (and categorized by short-term, medium-term and long-term); and
- Implementation plans for completing the prioritized actions.

Each workgroup met regularly between January and June of 2017. Their findings were reported out to the governor and subcabinet on January 17<sup>th</sup> and May 3<sup>rd</sup> of 2017. A third subcabinet meeting is scheduled for the end of September, 2017, to brief the governor and subcabinet on this report.

The workgroups were asked to rank each action in the following categories:

**Priority:** Prioritize the actions as high, medium or low, with regards to the goal of a resilient state.

**Estimate Effort:** This is the amount of effort/time/coordination/complexity/difficulty/FTE etc. that this action will take.

**Estimate Cost:** This is the cost to complete this action: low = \$0 to \$50,000, medium = \$50,001 to \$1,000,000, and high = greater than \$1,000,000.

This report includes a summary of the findings from each workgroup, with a focus on the highest priority actions that can be achieved with the least amount of funding and effort. These include actions that scored an 8 or 9 (see below for more details on scoring), were legislative requests, were common among multiple workgroups and/or that specifically require large multi-agency efforts. Each workgroup summary section includes at least two implementation actions, even if they did not qualify as high prioritization (i.e., school seismic assessments and building tsunami vertical evacuation structures). For a full list of all actions identified by the workgroups, please see the appendices.

Prioritization for each action was based on the combined score of the following categories: priority, effort and cost. Example: for high prioritization, the action needs to be ranked in the highest scoring category in at least 2 of the categories for a score of 8 or 9, for medium prioritization the action needs to be ranked in medium in at least 2 categories for a score of 5, 6 or 7, etc.

	High	Medium	Low
Priority	3	2	1
Effort	1	2	3
Cost	1	2	3

Prioritization	
Highest	8-9 Points
Medium	5-7 Points
Lowest	3-4 Points

### Assumptions

- Current and anticipated resources (appropriations and allotments) will be available.
- Resources will be able to be reassigned/reallocated from current projects in a way that will keep these projects within their time frames of short-, medium- and long-term.
- Expertise needed to carry out many actions described does not currently reside in position descriptions. Most of those individuals are tasked with other agency projects and other areas of focus.
- All costs provided are best estimates, some of which are indeterminate at this time. Calculating the actual costs (public and private) will require further analysis.
  - o For instances where cost estimates were not provided, a range was estimated using the scales provided for the templates (i.e., an item with a “high” will cost “at least \$1 million.”)
- Estimated costs are considered total project costs (inclusive, one-time expenditures).
- Some of the short-term actions that scored higher in the report are setting the foundation for medium- and long-term actions.

# Workgroup Sections

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Each workgroup provides a summary containing the highest priority action items (see the appendices for a list of all identified actions). These include actions that scored an 8 or 9 (see the Methodology section for more details on scoring), were legislative requests, were common among multiple workgroups and/or that specifically require large multi-agency efforts. Each workgroup summary section includes at least two implementation actions, even if they did not qualify as high prioritization (i.e., school seismic assessments and building tsunami vertical evacuation structures). Some of these action items are steps toward longer-term items. In addition, many of the action items identified were the direct result of the interdisciplinary workgroup efforts to craft an implementation strategy in accordance with the governor’s directive as opposed to a specific activity, action or current priority proposed by one or more state agencies.

## RECOMMENDATION 1

*Make schools resilient: structurally, socially, and educationally.*

With the multitude of potential seismic sources around the state, a key element of resilience is making sure the buildings in which residents spend the most of their time are also resilient. For children, this location for most of the year is their schools. Many Washington school buildings are older and have not undergone a retrofit to ensure their structural integrity during and following an earthquake. Some Washington school buildings are even part of the National Register of Historic Places due to their age and cultural significance, and many more would make it onto this register if evaluated. These buildings have a cultural significance within our communities that must be considered in addition to the hazard they represent.

Understanding the scale of the seismic risk to school buildings is a critical first step, but the desired end-goal is to ensure that all schools in Washington are seismically safe. The educational function of schools also provides an ideal opportunity to provide the foundation for a culture of resilience; students can learn about Washington’s seismic hazards and how to protect themselves from, and be prepared for disasters. They can then bring those lessons home to share with their families. This process helps initiate a cultural value shift toward preparedness, leading to a more resilient state.

Steps toward the goal of resilient schools require efforts by both hazard assessment professionals, engineers and policy makers. First, to understand the full magnitude of seismic risk, consistent building assessments need to be conducted for all schools in Washington. Once the scale of the risk is known, legislative efforts are critical to push funding of school building retrofits and replacements, and the development of a culture of resilience in Washington’s schools. Recent legislation has declared that four

mandatory types of safety drills must be performed in Washington schools per year, with earthquake “Drop, Cover, and Hold On” life safety drills as one optional choice. With the high seismic risk in places where students and their families live, work, and vacation, amending the legislation to mandate this option would be ideal for life safety. Additional legislation must be enacted requiring schools to create and/or participate in the development of hazard mitigation plans (HMPs), and to develop continuity of operations plans (COOPs). Schools are an integral, historical, and cultural part of many communities, and functioning schools are critical to recovery following an earthquake.

### **Lead Entities**

#### **Washington State Department of Natural Resources (DNR)**

Office of the Superintendent of Public Instruction (OSPI)

Military Department, Emergency Management Division (WA EMD)

### **Current Actions**

- Washington DNR, structural engineers, WA EMD, and FEMA have performed school seismic safety assessment pilot studies at several school districts throughout the state.
- A Pre-disaster Mitigation (PDM) program has been developed within OSPI Information and Condition of Schools (ICOS) inventory system. The system uses statewide GIS hazard data (not site specific) to identify the overarching hazards for each school facility, with additional building information, and uses tables to display the levels of hazard and risk for each campus or building. The system includes not only information regarding earthquakes, but also the following natural hazards: volcano, landslide, flood, tsunami, and wildland urban interface fires.
  - Twenty-five school district Hazard Mitigation Plans (HMPs) have been completed or nearly completed, drawing on the campus-level and building-level building data collected in OSPI’s ICOS database.
- Development of an Earthquake Performance Assessment Tool (EPAT) that can provide quantitative estimates of the level of damage expected for any public K-12 school building in Washington for a range of earthquake ground motions. This tool is simpler to use than HAZUS and includes consideration of the time-history of building codes in our state and refined fragility estimates for schools built at different times. To be fully functional, further study of site specific hazards needs to be done.
- Substitute House Bill 1279 – signed May 4th, 2017, which requires schools to conduct four types of drills per year, with earthquake “drop, cover and hold on” as an option.
  - The legislation requires monthly drills (nine or 10 per year), which includes summer months if summer sessions are offered at the school. Schools decide which ones they need to do more of.

- Schools must include three basic functional exercise drills annually, including lockdown, shelter-in-place and evacuation. Pedestrian evacuation is required for districts/schools in tsunami inundation zones and mapping must be included in at least one drill.
- House Bill 1003 (2016) calls for a model policy for natural disaster school infrastructure recovery. Although that model policy includes/refers to adoption of a required COOP, there is no requirement for districts to adopt the policy and develop the COOP.

**Gaps and Barriers**

- Support for the following necessary elements:
  - OSPI staff
  - Technical consultants for HMPs
  - Geologists/engineers/architects to enter the hazard and risk data into ICOS
  - Initial site-specific hazard investigations by geologists and engineers
  - Staffing for follow-up once initial investigations have been conducted
  - Staffing to assist schools with developing HMPs
- Current school assessment efforts do not include work with Washington’s Department Archaeology and Historic Preservation (DAHP), and these must be considered.
- Training and implementation of databases, HMPs, COOPs

**Implementation Plan**

**Short-Term (1-5 years)**

**Action Description:** Complete consistent, cost-effective, comprehensive inventories and assessments of Washington school buildings to prioritize seismic risk reduction efforts. DNR estimates that this effort will cost at least \$15 million. Additional time and effort will be needed to compile the data into the ICOS system as part of the district HMPs, which will cost at least \$10,000 for each of the 270 school districts in Washington – at least another \$2.7 million.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

**Action Description:** Update language in RCW 28A.320.125 (6)(d) that requires school safety drills from “may” to “must” incorporate an earthquake drill annually, using the state-approved earthquake safety technique “drop, cover, and hold on.” Previous legislation in 2016 allows a school district to voluntarily include this type of drill but falls short of requiring earthquake safety drills. This drill requirement may be satisfied by participating in the annual Great Washington ShakeOut Drill.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Enact legislation that requires all school districts to develop HMPs either on their own, or by participating in a city or county mitigation planning process. Drafting this legislation initially and completing the 25 Pilot school HMPs will be low-cost, as a funding source is currently identified for that project. However, the cost for implementing HMPs for all schools would be significantly higher.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Enact legislation that requires all school districts to develop and maintain comprehensive COOPs, including provisions for mutual aid (e.g., facility-sharing) between districts.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Med**

## RECOMMENDATION 2

*Require that utility providers (domestic water supply, wastewater, electricity, natural gas, petroleum, and information and communication technology) identify the vulnerabilities in their systems and mitigate the deficiencies.*

Recognizing that energy, water, communication, and transportation make up the “lifeline sectors” upon which all other critical infrastructure sectors rely, the survivability of publicly and privately-operated utilities is a crucial component of Washington’s resilience. Utility restoration provides essential support to response operations and is a precondition for community recovery. A significant takeaway from the 2016 Cascadia Rising exercise was the extent to which utility infrastructure would be impacted by a catastrophic earthquake. Damage to these components would not only significantly hinder response efforts, but also put individuals, families, and businesses at risk following a disaster, due to a variety of hazardous conditions. The interdependence of critical pieces of infrastructure and facilities means that damage to any portion of the systems directly effects the whole.

The community of public and private entities that make up the energy, water, and telecommunications sectors is working to address vulnerability and mitigate deficiencies. In some cases, this is done by investor-owned utilities (IOUs) who have an interest in continuity of operations and are subject to regulatory requirements to provide safe and reliable service. In other cases, this infrastructure is operated by publicly-owned utilities (POUs) that place a high value on reliability and recovery, and provide these services to their own communities. Addressing the threat posed by catastrophic earthquakes remains challenging, and continued coordination spanning public and private sector owner/operators and all levels of government is needed to ensure a comprehensive and integrated approach.

### **Lead Entities**

#### **Washington Utilities and Transportation Commission (UTC)**

Washington Department of Commerce, State Energy Office (COM)

Northwest Power and Conservation Council (NWPCC)

Washington Department of Health (DOH), Office of Drinking Water

### **Current Actions**

- COM is engaged in funding and leveraging outside investment to modernize the electrical grid with resilience in the forefront of project development through Clean Energy Funds (CEF) 1 and 2. Projects have included development of integrated control systems that maximize the efficiency and situational awareness within the grid; energy storage; micro and campus grids; and islands of refuge.

- The Infrastructure Resilience Sub-Committee (IRSC) of the state’s Emergency Management Council (EMC) is an active community that facilitates improved coordination, planning, and response among public and private sector lifeline operators.
- DOH’s Office of Drinking Water (ODW) has substantial regulatory oversight of reliability and emergency operations. DOH is planning to update its 2010 Water Sector Specific Plan which provides a foundation for response to catastrophic events.
- The Water Supply Forum ([www.watersupplyforum.org](http://www.watersupplyforum.org)) is currently undertaking a regional project envisioned to help the water utilities of King, Pierce, and Snohomish counties take proactive steps to evaluate and enhance water supply system resilience. This group published a document titled Earthquake Vulnerability Assessment Technical Memorandum in April of 2016 that directly addresses earthquake resilience issues for the three-county workgroup.
- The State Building Codes Council (SBCC) examined requiring earthquake-activated shutoff valves on the customer side of natural gas meters approximately 10 years ago. The SBCC did not adopt the requirement. Since 2009, the US Pipeline and Hazardous Material Safety Administration has required excess-flow valves for new or replaced service lines. The latest rules also require curb valves for the same construction.
- The Washington Emergency Communication Coordination Work Group (WECCWG), a group focused on emergency communication planning and telecommunication infrastructure resilience, has met four times in 2017. In July 2017, the group laid the groundwork for comprehensive emergency communications response planning that will directly address the threats posed by a catastrophic earthquake. WECCWG URL: <https://mil.wa.gov/emergency-management-division/washington-emergency-communications-coordination-working-group>.
- Leveraging the expertise of the IRSC, the WA EMD’s Infrastructure Program is working with the Washington State Fusion Center to establish a survey-to-database tool. This tool will allow emergency planners to prioritize utility restoration based on identified dependencies and interdependencies of critical infrastructure facilities. This tool would leverage federal infrastructure data present in the Infrastructure Protection (IP) Gateway to identify infrastructure locations to be analyzed with the tool.
- The Bonneville Power Administration (BPA) engaged the Electric Power Research Institute in 2014 to develop a spare transformer strategy. This project explored the development of substation spare equipment to expedite the restoration of the power grid following a major disruption. BPA has made strides in addressing the resilience of their transmission and substation infrastructure as documented in the BPA Transmission Management Strategy and the BPA AC Substation Asset Management Strategy.

### **Gaps and Barriers**

- There are significant regulatory differences for utilities based on multiple factors:

- The UTC has authority over the three IOUs that provide electricity in the state. These IOUs provide service to approximately half the state. No state agency is charged with regulating the rates and services of Public Utility Districts (PUDs), municipal utilities and cooperatives.
  - DOH has significant authority over the operations of all public water systems, while the UTC has rate setting authority of the private, investor-owned public water systems.
  - The Department of Ecology (ECY) has regulatory authority over the environmental aspects of most publicly owned wastewater infrastructure.
  - The Federal government has preemptive authority over interstate natural gas and petroleum lines. The state has no authority over interstate pipelines, i.e. cannot regulate pipelines to make mitigation investments.
  - ECY and UTC have regulatory authority over intrastate hazardous liquid pipelines.
  - The UTC regulates wireline telephone service; the Federal Communications Commission (FCC) regulates cellular and Voice Over Internet Protocol (VOIP).
- Data necessary to make informed planning and investment decisions toward resilience is incomplete at the state level. For instance, the UTC’s pipeline GIS data contains only lines operating above 250 PSIG. This excludes nearly all distribution facilities.
  - Restoration prioritization must be based upon the actual damages that occur, infrastructure and system interdependencies, and operational requirements. For example, in order to restore electricity to a specific location, repairs to the supporting grid must occur in a specific, sequential order.
  - Tools to determine economic losses due to an earthquake exist, but are limited in scope. Results of these tools are also highly sensitive to their starting assumptions and user inputs.
  - Challenges to public-private coordination:
    - The private sector may not wish to jeopardize confidential network information by sharing locations of infrastructure or other operational information with public agencies.
    - There are legal and statutory barriers to distributing state and federal funding and resources to the Investor Owned Utilities (IOUs) to facilitate restoration.

### **Implementation Plan**

Estimated cost of the following action items is at least \$2 million.

#### **Short Term (1-5 years)**

**Action Description:** Prepopulate a public information campaign (i.e., flyers showing options for making water safe to drink and how to dispose of human waste appropriately). Some of this information is already in existence but will need to be tailored for a catastrophic event and the technical and

organizational environments of utility providers. It will need to go beyond current personal preparedness public information campaigns. It must also be consistent and replicable by infrastructure owner/operators across the state.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Multi-agency legal mapping of “lifeline sector” agencies (energy, transportation, communication, and water/wastewater) emergency powers vs. governor’s emergency proclamation. Analysis of statutory authority would need to occur in consultation with the Attorney General’s office. Once a full understanding is established of legal authorities as related to state agencies who play a role in the lifeline sectors during emergencies, policy recommendations may be made to clarify any gaps in legal authorities that need to be instituted in a governor’s proclamation.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>			3

**SCORE: 7 – Medium**

**Action Description:** Jurisdictional/regulatory gap assessment, requiring multi-agency assessment. Specifically, there are multiple entities that require emergency backup generators dependent upon the facility in question (i.e., backup generation for hospitals is required by the Department of Health, backup generation for other critical facilities may be required for other critical facilities based upon county, state or federal requirements). This action will require the multi-agency coordination of one FTE, one executive from each state agency listed (Governor’s Office, UTC, Commerce, DOH, WMD, OCIO, DES, SDOT) and an AAG; Federal assessment by DHS, BPA, WECC/NERC, FEMA, FHMSA, and FRA must also be completed.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>		2	

**SCORE: 6 – Medium**

**Action Description:** Detailed attention needs to be given to the Infrastructure Systems Target Capability Assessment in the State Preparedness Report (SPR). The current SPR lists response as a target capability, but this section is in need of an update based on new knowledge of the effects of a 9.0 CSZ event. Additionally, a new Target Capability Assessment is needed for recovery. This should include development of a strategy for coordinating “lifeline sector” (energy, transportation, communication, water/wastewater) recovery planning to maximize effectiveness.

Multi-agency coordination is necessary by one FTE, one executive from each state agency listed (Governor’s Office, UTC, COM, DOH, WMD, OCIO, DES for fuel contracting, WSDOT) and an AAG; Coordination with federal agencies (DHS, BPA, WECC/NERC, FEMA, FHMSA, FRA) is also required.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>		2	

**SCORE: 6 - Medium**

## RECOMMENDATION 3

*Improve the resilience of buildings in areas of high seismic hazard to improve life safety and increase the number of people who will be able to shelter in place.*

The 2001 Nisqually Earthquake provided a reminder that many buildings in Washington were constructed before the state's seismic hazards were well known or even discovered. Facades and parapets on many old buildings crumbled and fell into the streets. While fortunately, no one was killed, the earthquake caused injuries and significant property damage. Many of these structures are in need of seismic retrofitting to prevent injury or loss of life, in addition to remaining intact following an earthquake. Improving the seismic safety of buildings is critical to community, regional, and statewide resilience by saving lives and preventing injury, during both the main earthquake and aftershocks. Additionally, businesses located within seismically-safe structures will be able to resume operations much faster following a disaster, which is essential to rapid community and economic recovery.

Improving the resilience of buildings requires a multi-faceted approach. One of the fundamental challenges associated with improving the resilience of buildings is knowing where to prioritize current scarce resources and any potential future investments without a full understanding of the scope of the issue. Presently, existing building stocks that contain vulnerable or potentially-vulnerable structures located within local jurisdictions have not been assessed for seismic performance to know where retrofitting may be most beneficial, and to what degree. To accomplish this major task, there must be collaboration between research organizations, local businesses, legislators, historic preservation specialists, and building owners, as well as resources allocated to support such an endeavor.

In addition to looking at current building stock, this approach also examines opportunities to support development and implementation of updated building codes which improve seismic safety. During an earthquake response, buildings need to be assessed as quickly as possible so they can either be reoccupied or deemed unsafe, and repairs can begin where needed. Finally, homeowners, renters, and small-to-medium sized businesses must know and understand what their options are when it comes to earthquake insurance before and after an earthquake. This will assist them as they seek to recover both physically and financially in the earthquake and/or tsunami aftermath.

### **Lead Entities**

**Washington State Department of Commerce (COM)**

Military Department, Emergency Management Division (WA EMD)

Office of the Superintendent of Public Instruction (OSPI)

Department of Archaeology and Historic Preservation (DAHP)

Office of the Insurance Commissioner (OIC)

Department of Natural Resources (DNR)

Federal Emergency Management Agency (FEMA)  
American Society of Civil Engineers (ASCE)  
Washington Association of Building Officials (WABO)  
Structural Engineering Association of Washington (SEAW)  
American Institute of Architects (AIA)  
Washington State Building Code Council (WSBCC)  
City of Seattle, Office of Emergency Management (OEM)

### **Current Actions**

- WA EMD and the WABO addressed liability concerns regarding organizations that train volunteers for post-disaster damage assessments. SSB 5185 was signed by Gov. Inslee on April 17, 2017, which extended immunity from liability over damages by covered volunteer emergency workers to professional and trade organizations.
- OIC has identified that consumers may be unaware that their homeowner's or renter's insurance policy does not include coverage for earthquake losses. OIC is pursuing consumer education to increase the take-up rate for earthquake insurance. To help accomplish this, OIC has created a webpage which lists the top 40 companies authorized to sell earthquake insurance in Washington.
- COM has begun reviewing various databases for inventories of vulnerable structures, such as unreinforced masonry (URM) buildings.
- COM, WA EMD, and DSHS have collaborated with a wide variety of external stakeholders on the development of a draft housing Recovery Support Function (RSF) as part of the state's long-term recovery strategy. The housing RSF is the first to be developed and will serve as a template for future recovery planning efforts.
- The WAsafe Program, which is designed to support post-earthquake building assessments, was formalized. WAsafe is composed of members from WABO, AIA, SEAW and ASCE. WAsafe is currently enrolling and training qualified volunteers that can be rapidly dispatched to support local jurisdictions in performing post-disaster building safety assessments. The organizations that make up WAsafe are being integrated within Emergency Support Function (ESF) 3 – Public Works and Engineering.

### **Gaps and Barriers**

- There is currently a lack of a Washington State-specific local planning framework/template for communities that describes how to incorporate resilience concepts, including tools demonstrating how a community can protect its cultural and historic resources in disaster preparedness, response and recovery.

- There is not an existing inventory of earthquake-vulnerable structures, such as unreinforced masonry (URM), soft story, concrete tilt-up buildings, etc. that local jurisdictions can use to prioritize limited resources toward retrofitting, replacing, etc. Similarly, there is a lack of incentives and financing options available for public and private sector entities to retrofit buildings that are identified to be vulnerable.
- There are no models of local legislation within Washington that require mandatory or voluntary building retrofits, such as URM retrofitting ordinances common in many California cities. Additionally, a capital program that provides financial and technical assistance or incentives for seismic retrofitting of vulnerable buildings and structures, especially URMs, does not exist.
- Local government comprehensive plans are existing tools for incorporating community resilience concepts and/or locally identified mitigation strategies. Such plans and updates require resources and many smaller jurisdictions with a single planner or a contractual arrangement for planning services may have difficulties implementing such strategies without additional resources.
- Currently, when building permits are issued for repairs due to earthquake damage or geologic hazards, there are no requirements for attaching such records to a property deed. This makes it difficult for home/building owners to determine potential risks when purchasing property.
- There is a deficit of resources and/or coordinated effort within the public and private sectors to support workshops for building owners and real estate agents in order to explain the performance criteria in the building code (i.e., life safety vs immediate occupancy), as well as opportunities and options for retrofitting existing structures.

The lack of a state-level disaster recovery fund and programs like those available in a federally declared disaster, which are designed to rapidly support a local jurisdiction's rehousing and recovery needs, remains an impediment to long-term recovery efforts. Especially in small-to-moderate disasters in which federal individual assistance programs are not available.

### **Implementation Plan**

Estimated cost of the following action items is at least \$2.7 million.

#### **Short Term: (1-5 years)**

**Action Description:** Define how resiliency relates to the Growth Management Act (GMA) and add a Community Resiliency Guidebook into the Growth Management Services Unit's annual work program. Additionally, identify new resources for a DAHP toolkit on cultural and historic resources that will be included as a component of the new guidebook. COM is currently in the process of aligning the agency's programs around new strategic priorities, including seeking ways to improve community resilience. As a component of this work, COM and DAHP will work with stakeholders to produce a guide that could best be implemented through local comprehensive plans, development regulations, and emergency plans.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** A volunteer training curriculum needs to be developed for the WAsafe program. A proposed training curriculum will be based on the California Office of Emergency Services Safety Assessment Program, but customized for use in Washington State by WAsafe volunteers. In addition, this training program will need to be verified and recognized by WA EMD and FEMA.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Develop and formalize a vetting process for volunteer enrollment through the WAsafe program.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Formally integrate the WAsafe program within the ESF-3 structure, which will allow program members to be part of operational response to a disaster. The effort necessary to achieve this action will require modification of internal WA EMD processes and practices as they relate to ESFs, the development of MOUs and moderate FTE resources, which will require some reprioritization within WA EMD and DES. Development of deployment procedures as well as an ongoing state/local training and outreach effort will also be required to fully implement and maintain this capability.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** As COM implements the Evergreen Sustainable Development Standard (ESDS) v3.0, additional training is necessary for COM staff involved in emergency plan review to ensure emergency plans that are submitted as part of the standard are realistic and functional. This will ensure that low-income housing projects subject to ESDS v3.0 have emergency plans relevant to their seismic hazards. This will require the development and delivery of a training curriculum to COM staff that review and approve emergency plans.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Improve earthquake (EQ) insurance take-up rates by increasing the number of affordable options and through regular, on-going public education efforts targeted to raise consumer awareness of gaps in coverage between standard homeowner’s insurance policies and additional EQ insurance policies. Increase public-private sector collaboration on EQ insurance outreach efforts through education campaigns, seminars and workshops, and drills like the “Great Washington ShakeOut.” Such efforts and their potential costs could be leveraged/shared with other organizations working as members of the same campaigns, such as the state of California.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Develop technical standards for the retrofit of URM buildings, including a basic retrofitting technique known as “bolts-plus,” which is designed to attach the buildings’ walls to its floors, and an “aspirational” (above code minimum) standard. The City of Seattle has been actively pursuing the development of a “bolts-plus” program, which may be used as a guideline and adapted for

other local jurisdictions. Developing an aspirational standard that requires additional work and expense may be considerably more challenging. These standards will have additional considerations based on the Secretary of the Interior’s Standards of Rehabilitation when applied to historical buildings. Coordination of these efforts will require a partial FTE, but some technical expertise is anticipated to be provided by volunteer civil and structural engineers, architects, historic preservation specialists, and other design professionals as part of the standards development process.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Establish a working group of key stakeholders to examine the development of voluntary or mandatory seismic evaluations or reporting completed as part of real estate transactions. This would help ensure disclosure of a property’s seismic condition between buyers and sellers. Suggested workgroup members would consist of representatives from the real estate, insurance, finance, historic preservation specialists, engineering and building management industries and other relevant parties that need to be engaged. Reprioritization of staff time or recruitment of additional staff may be required to support the workgroup.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Engage and conduct training for stakeholders that have been identified as part of the housing Recovery Support Function (RSF) plan and other key participants that support disaster housing. Depending upon the authorizing direction, development of training and operational procedures will have moderate FTE impacts, as this would require broad multi-agency coordination and potentially extensive stakeholder engagement. Reprioritization of staff time from COM as well as staff from collaborating agencies (WA EMD, DSHS) would be required.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Medium Term (5-10 years)**

**Action Description:** Develop mandatory requirements for mitigation of geologic hazards in Washington through the use of land use and zoning. California’s Alquist-Priolo Act may be used as an example of such legislation that has been used in the past. This would include recognition of a property’s seismic vulnerability (including to liquefaction, ground failure, or shaking amplification), or its location within a potential tsunami inundation zone during real estate transactions. In Washington, this could extend to other potential hazards such as landslides and wildfires. The California legislation also includes minimum engineering standards and education requirements about a building’s performance-based standards. Such recommendations could include options that could be adopted at the state level through modification of the RCW, or model code language that could be adopted by local jurisdictions via ordinance.

This legislation will also require a detailed, consistent geologic hazard assessment across the state, as is suggested in Recommendation 8.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Develop a proposal for establishing a long-term disaster recovery fund, which can be used to support transitional housing and infrastructure for disaster survivors that have been displaced and lack rehousing options when a federal Individual Assistance declaration has not been provided. The level of effort and the cost for developing a decision package to establish a disaster recovery fund, which can support housing and infrastructure recovery, is estimated to be low.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Develop an outreach program for local jurisdictions, property owners, private engineers and architects to inform them of the availability of the Building Occupancy Resumption Program (BORP) and Advisory Placard programs, which allow building owners to rapidly reopen following an earthquake. Such an effort will focus on establishing agreements with building officials,

qualified private building assessors and private property owners. This project is anticipated to be led by volunteers from WABO and WAsafe.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Arrange for WAsafe credentialing and badging of California Office of Emergency Services Safety Assessment Program-trained volunteers to ensure their integration into response actions.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Introduce financial incentives for earthquake insurance to mitigate against property losses and develop options for improved affordability, such as insurer’s premium/mitigation discounts and disaster savings accounts. To improve affordability, insurance products with broader deductible options, such as 5-10-15-20-25% of insured home value, may be examined. Additionally, the establishment of an earthquake insurance authority in Washington, which could provide more options for affordable products, could be examined. Support state and federal legislation that promotes insurance product innovation (balanced with consumer protection), resiliency, preparedness and mitigation.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Pass legislation to authorize the Washington State Building Code Council to develop a mandatory building retrofit code, which includes funding for code development, enforcement and financing options for building retrofits. This action will require time and funding to develop the

code in collaboration with a coalition of stakeholders, legislators, agencies and the Governor’s Office to develop and introduce legislation. This group will then work with key sponsors and legislative leadership to schedule hearings and workshops to present findings, including need, assessment of risk and examples of successful programs. An estimated four FTE would be required to complete this task, provide technical support, legal analysis, construction cost studies, and testimony at public hearings.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

**Long-Term (10+ years)**

**Action Description:** Undertake a comprehensive assessment and inventory of earthquake-vulnerable buildings, including historic buildings across Washington and make the data publicly available. This will provide critical data on areas with high seismic risk and buildings in need of retrofit for planning purposes. While the inventory/database will only need to be completed once (then maintained as new information arises), this project will require a high level of effort over a long term to complete, with at least four FTEs already known: one full-time project/program manager, one data steward/database administrator, and two project support staff. Additionally, a revolving loan fund to support retrofitting of priority public, private, and non-profit structures could be established.

In addition, a significant contract and associated budget to retain qualified professionals (engineers, architects, plan reviewers, historic preservation specialists, etc.) for completion of building assessments will be required. Given the potential legal considerations, legal assistance services would be required by the Attorney General’s Office and/or outside legal counsel.

<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

## RECOMMENDATION 5

*Strengthen business continuity planning efforts by providing education, tools, and training.*

In the aftermath of an emergency or disaster, reviving the local and/or regional economy is essential for the recovery of impacted communities and improving community resilience. Without gainful employment, residents leave, and often never return. Further, a healthy, vibrant community cannot exist when unemployment, as well as homelessness, housing shortages, and poor water quality persist and are exacerbated by a disaster. Business continuity planning helps companies reduce their vulnerabilities prior to an emergency or disaster; aiming for a quicker recovery following the emergency or disaster.

Although not as high-profile or high-earning as big business, small businesses propel economic growth in the United States and across Washington. The Council of Economic Advisors found that small businesses were responsible for creating more than 60% of new jobs in the United States over the past 15 years. However, while owners of small businesses invest a tremendous amount of their time, money, and resources into making their ventures successful, many owners fail to properly plan and prepare for disasters. A study by the Institute for Business and Home Safety estimated 25% of businesses do not reopen following a major disaster. Conversely, most large companies have the resources to conduct detailed business continuity planning, and some have even incorporated such measures into their routine business practices.

### **Lead Entities**

#### **Department of Commerce (COM), Community Outreach Program**

Washington Military Department, Emergency Management Division, Private Sector Program (WA EMD)

Department Archeology Historic Preservations (DAHP)

WA Main Street Program

Cascadia Region Earthquake Workgroup (CREW)

### **Current Actions**

- COM started an agency-wide strategic planning effort that includes a focus on community resilience. Recognizing that economic and business resilience is a crucial part of community resilience, the agency is leveraging its community relationships to coordinate workshops across the state, which includes participation from technical experts:

- The Community Outreach Program is collaborating with WA EMD and other partners to pilot a Business Resiliency Workshop, bringing together members of local Chambers of Commerce, insurance industry representatives, local business owners, Washington Fire Action Council (WAFAC), and elected officials from around Eastern Washington.
- COM has met with rural communities (Okanagan, South Bend, Raymond, Long Beach, Sunnyside, Grandview, and the Shoalwater Bay Tribe) to discuss business and critical infrastructure resiliency efforts.
- COM conducted Home Improvement Zone (HIZ) training with seven counties. Training covered land management strategies for defensible space in wildfire affected communities.
- CREW worked with WA EMD to build a Disaster-Resistant Business Toolkit ([www.DRBTToolkit.org](http://www.DRBTToolkit.org)) in 2010. This toolkit is free to download for any Washington-based business. The Disaster Resistant Business Toolkit Workgroup (DRBTW) is currently supporting conversion of the DRBT from a desktop application to a web-based application. This provides for easier access to the tool on a variety of platforms, thereby promoting more widespread usage.
- WA EMD's Private Sector Program provides continuity planning resources and education for small to medium-sized businesses and performs outreach, coordination, and information sharing with large businesses.
  - The Private Sector Program's website provides the foundation for all outreach, education, and training related to business preparedness and response. The site includes links to online resources, steps to address business preparedness and recovery planning, links to partners, online training, news, and opportunities.
  - The Private Sector Program works with the Small Business Administration (SBA), Association of Washington Businesses (AWB), Washington Chamber of Commerce Executives (WCCE), CREW, and local Economic Development Councils (EDCs) to gain access to business audiences.
  - A Business Re-Entry (BRE) registration system is currently under development. The BRE system and pass supports accelerated re-entry for businesses to reach their customers and/or access their critical infrastructure immediately following a disaster.

### **Gaps and Barriers**

- Many businesses remain unaware of both the hazards (or the full extent of said hazard) in their communities, as well as the variety of free continuity planning tools available to them.
- Even if aware of the available free tools, small-to-medium-sized businesses have limited capacity and resources to undertake business continuity planning efforts without significant technical assistance.

- There is no single regulator for large businesses that operate infrastructure critical to Washington’s communities and economy; nor is there a clear standard for verifying or regulating the continuity plans of these businesses.
- A more extensive Limited English Proficiency (LEP) program is needed to connect with the diverse body of Washington businesses and the communities they serve.
  - COM and WA EMD continue to partner on this issue. However, the scale of the outreach and the scope of the material covered is limited by resource allocation and staffing.

**Implementation Plan**

Estimated cost of the following action items is around \$100,000.

**Short-Term (1-5 years)**

**Action Description:** Establish a stakeholder business continuity workgroup of relevant entities, to include Washington emergency management agencies, Economic Development Councils, Washington Association of Business, Chambers of Commerce, and Councils of Governments.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

**Action Description:** Upon establishment of a business continuity workgroup, complete an assessment of programs to determine how to best leverage existing training and outreach opportunities that may be available for small-to-medium sized businesses within Washington.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		2	
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 7 – Medium**

## RECOMMENDATION 6

### *Strengthen regional transportation networks.*

For nearly 30 years, incremental steps have been taken to increase overall resilience and prevent structure collapse along Washington’s most densely populated transportation corridor. This “Seismic Lifeline Route” includes the Interstate 5 (I-5) corridor from Paine Field (Everett) in the North, to Joint Base Lewis–McChord (Lakewood) in the South. This Central Puget Sound section of the Seismic Lifeline Route is planned to be completed within the next 10 years, but there is much more to be done. Statewide, an additional 592 bridges are identified as requiring seismic retrofitting. Furthermore, there are three potential Cascadia Subduction Zone (CSZ) hazard areas that are currently not addressed in transportation projects and require further research: liquefaction, slides/unstable slopes and tsunamis.

#### **Lead Entities**

**Washington State Department of Transportation (WSDOT)**

#### **Current Actions**

- WSDOT's Continuity of Operations Plan and Emergency Operations Plan both address seismic response and recovery. WSDOT has regional support to devolve during a seismic incident, with 10 available Emergency Operations Centers (EOCs) located statewide.
- Seismic Lifeline Route/Seismic Retrofit Program: Current lifeline corridor primarily uses I-5, I-405 and State Route (SR) 520. The priority travel for this route is from JBLM to Everett, with the focus being ground transportation routes between the following air fields: McChord Field, Paine Field, SeaTac and Grant County International Airport (Moses Lake).
- WSDOT has coordinated efforts with the following programs, agencies and jurisdictions:
  - Emergency Management Division – planning efforts:
    - Development of a Catastrophic Incident Plan
    - Statewide Catastrophic Incident Planning Team
    - Infrastructure Resilience Sub-Committee
  - Seismic Safety Committee – WSDOT is a participant of the multi-jurisdictional committee under the guidance of the Emergency Management Council.
  - The Region Resilience Assessment Program (RRAP) which includes Dept. of Homeland Security Region X Infrastructure Protection, WA EMD, FEMA Region X, US Coast

Guard District 13 and USDOT Region X, is assessing transportation infrastructure/route impacts from a CSZ.

- Local emergency planners – coordinating with King County, City of Seattle, Snohomish County, and Pierce County on seismic retrofit and identification of local lifeline corridors.

### **Gaps and Barriers**

- Research for specific impacts from a CSZ event is limited and not incorporated into the seismic retrofit plan (1,000-year event – current standard) for bridges; to initiate this research, the first steps would be to develop a research plan and commit resources.
- WSDOT established the basic Puget Sound corridor lifeline while acknowledging that additional work to establish branch lifeline corridors off the main corridor is necessary. Statewide, an additional 592 bridges needing some seismic retrofitting have been identified. These bridges are outside of the current Seismic Lifeline Route.
- Planning and coordination is necessary to expand lifeline routes to additional corridors to address the massive impact of a CSZ event; additional coordination needed with local jurisdictions to gain understanding and agreement on how local roads could be impacted by an event and/or utilized for a comprehensive lifeline route.
- Recognize other jurisdictions' roadways will likely be utilized for response in a seismic event. Identification of specific roadways is difficult given the unknown nature (location, magnitude, duration) of an earthquake.
- Current construction and retrofitting is designed to prevent structure collapse; despite not collapsing, bridges may be too damaged for traffic for several weeks to months depending on the level of damage. When a significant seismic event occurs, assume that these structures will require emergency repairs to be used.
- Retrofit work and estimates do not include subsurface work to mitigate liquefaction, this work is accomplished on new construction. Liquefaction will affect roadway and bridge stability in identified zones.
- Research has not been completed to anticipate and identify the seismic vulnerability of unstable slopes. Although WSDOT does respond to and mitigate landslides that impact transportation routes on a routine basis as part of general operations, it is anticipated that the current amount of resources available to respond to slide hazards would be overwhelmed from a CSZ incident.
- Need to expand on identification of tsunami impacts to transportation facilities.

## **Implementation Plan**

Estimated cost of the following action items is approximately \$2 million.

### **Short-Term (1-5 years)**

**Action Description:** Conduct research to thoroughly analyze the effects of a CSZ event on WSDOT structures (bridges, tunnels, etc.). A future challenge to seismic resilience is identifying the consequences of a CSZ earthquake. American Association of State Highway and Transportation Officials (AASHTO) standards currently address 1,000-year and 2,500-year seismic events, and it is still unknown if retrofitting to these standards would be enough to withstand the impacts of a full rupture of the CSZ. Research on the consequences of a CSZ event is required before the design and construction of structures. This can occur simultaneously, or after, the completion of the current Seismic Lifeline retrofit.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

### **Long-Term (10+ years)**

**Action Description:** Expansion of the Seismic Lifeline into a comprehensive North-to-South route from the Oregon State line to the Canadian border, and East to West from the coast to beyond the Cascades. Costs of this item are not currently able to be calculated, but are assumed to be extremely high, over a period of many years.

<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

## RECOMMENDATION 7

*Make hospitals resilient – structurally and functionally.*

Hospitals are critical facilities for saving and sustaining lives. Due to high demand, and in keeping with good business practice, hospitals are typically at full capacity with patients at any given time of any given day. Making hospitals more resilient helps save patient lives by maintaining continuity of care in their hospital, instead of “decompressing” the degraded hospital wherein patients are moved (a highly stressful activity for both patients and personnel) to another, non-degraded healthcare facility (NOTE: patient movement is heavily dependent upon available vehicles and usable routes). Important planning factors to consider for hospital resilience are the ability to quickly assess the structure following a catastrophic earthquake and maintain critical supply chains required to keep a hospital in operation as a healthcare facility. Finally, making hospital facilities resilient means that they could potentially remain functional following a catastrophic earthquake thereby assisting in the response by being able to admit new patients and saving more lives.

### **Lead Entities**

**Department of Health (DOH)**

### **Current Actions**

- Washington adopts the latest version of the International Building Code (currently updated every three years) in Title 51 WAC. The DOH Construction Review Program in conjunction with local building departments enforces Title 51 WAC during the review of new construction healthcare facilities. Additionally, these standards are occasionally incorporated into existing hospital facilities when they receive significant renovation, thereby bringing portions of older buildings up to compliance with current standards; however, the owners of such buildings are not technically required to retrofit older healthcare facilities.
- Within the Office of the Assistant Secretary for Preparedness and Response (ASPR) funding opportunity announcement for budget year 2017–2022, there is a requirement to assess supply chain inventory. This mandate is in-depth, and requires Hospital Preparedness Program awardees to conduct a supply chain integrity assessment to evaluate equipment and supply needs for resources that will be in-demand during emergencies and develop strategies to address potential shortfalls.

- DOH is participating in efforts to complete the Washington State Restoration Framework with the U.S. Department of Health and Human Services (HHS) Recovery Support Function (RSF) as an RSF lead. This helps us align with the HHS recovery approach.

### **Gaps and Barriers**

- Retroactive application of Seismic Building Codes:
  - Hospital facility construction standards are approved when built. Existing facilities are not required to implement seismic retrofits.
  - Many critical access hospitals cannot absorb the expense of seismic retrofits.
  - Private hospitals require incentives to retroactively apply seismic standards.
  - Local jurisdictions maintain all the authority for seismic building code enforcement.
- Supply Chains:
  - The just-in-time business model supply distribution companies use for operations means that in a disaster, most healthcare facilities would run short of medical materials almost immediately.
  - Although most hospitals have an emergency requisition capability, it would be depleted quickly. Washington is therefore reliant on the capabilities of the Strategic National Stockpile.
- Volunteers to support medical needs:
  - There is a critical gap in available medical volunteers across the state due to the geographic location of Medical Reserve Corps (MRCs).
  - The current Emergency Worker program (RCW 38.52.310) is designed to be used by state and local emergency managers and not by other state agencies in accordance with WAC 118.04. It does not fit the needs of health care response.
  - Independent of RCW 38.52.310, DOH needs separate specific authority, and within health statutes, to develop an Emergency Health Worker program to recruit, register, train and deploy MRCs after coordination with local jurisdictions as needed across the state. The geographic disparity among MRCs and the ability of MRC volunteers to decline to serve creates a critical gap in health care delivery and response during a catastrophic event, as identified during the 2016 Cascadia Rising Exercise.

### **Implementation Plan**

Estimated cost of the following action items is around \$100,000.

**Short-Term (1-5 years)**

**Action Description:** Collect, compile and assess data for existing hospitals related to long-term functionality after an event and supply chains. Includes internal data and cross-agency data sources in multiple content forms (plans, maps, files, etc.).

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Medium-Term (5-10 years)**

**Action Description:** Enact changes to the state building codes for addressing performance gaps. New construction standards are sufficient and regularly updated with current technical data. Existing structures will have a greater challenge in meeting the new building codes. A technical advisory team would review requirements to correct gaps, draft code change proposals and attend hearings at the national level, while relying on private input for code changes.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		2	
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 7 – Medium**

## RECOMMENDATION 8

*Identify and map in greater detail sources of seismicity and geologically hazardous areas and develop plans for mitigation of identified hazards.*

Understanding and cataloging the geology of the state helps to show where hazard potential exists and communicate the information to policy makers, emergency planners and the public. Understanding the subsurface geology improves knowledge of the overall impacts of these hazards, such as degree of earthquake-induced shaking amplification from local soils or basin configurations. The synthesis of this information helps inform the collaboration among scientists, engineers, planners and policy-makers as they work together to mitigate hazards. For example, this information may be used toward creating stricter local building codes. The M9 Project, which is an investigation of the potential effects of a Magnitude 9 earthquake on the CSZ, is an example of one of these collaborations, bringing these stakeholders from various fields together to understand not only what the latest research is, but what it means.

Learning more about the full impacts of Washington's seismic hazards is a continuous process which will require understanding the current unknowns. Further paleoseismic studies are critical to understanding the recurrence intervals of earthquakes along surface faults, such as the Seattle and Southern Whidbey Island faults. Computer simulations of shaking from a variety of sources help to constrain details about how Washington's building stock will be affected by different subsurface effects, and different durations of shaking. Continuing to improve seismic and geodetic monitoring will increase not only the understanding of Washington's geologic hazards, but improve the capabilities for Earthquake Early Warning system, providing additional automatic mitigation actions by technical users.

### **Lead Entities**

#### **Washington State Department of Natural Resources (DNR)**

Department of Commerce (COM)

University of Washington (UW)

Pacific Northwest Seismic Network (PNSN)

U.S. Geological Survey (USGS)

### **Current Actions**

- Collecting seismic shear wave data at schools and coordinating with structural engineering data.
- USGS creates national seismic hazard maps that characterize hazard for rock sites.

- M9 Project using computer simulations to refine details of expected ground shaking for magnitude 9.0 Cascadia earthquakes.
- Mapping and fault investigation is ongoing.
- Seismometers are recording earthquakes and collecting important fault data.
- Lidar is being collected to help understand active faulting.
- Statewide liquefaction maps have been made.

### **Gaps and Barriers**

- Need more comprehensive paleoseismic studies to identify and characterize active crustal faults and to better determine the recurrence times of Cascadia Subduction Zone (CSZ) Magnitude 8+ earthquakes.
- Need to conduct more studies on active faulting.
- Need improved knowledge of the shallow (< 2 km deep) structure of the crust, especially in sedimentary basins (i.e., Seattle, Tacoma, Everett, Bellingham) to improve computer simulations of shaking for future large earthquakes.
- Need more computer simulations of ground shaking to better predict effects and impacts of strong ground motion.
- Urban seismic hazard maps should be produced for other higher-risk areas of Washington using computer simulations and detailed mapping of soils and sub-surface structure.
- Need to monitor slip and seismicity in the offshore portion of the CSZ, using seafloor GPS and seismometers, to better understand strain accumulation and more quickly determine magnitude of earthquake.
- DNR has limited staff for any of the action items listed in needs and expectations.
- Support is necessary for seafloor seismic and geodetic monitoring to better understand the CSZ.
- Need an update of the Seattle seismic hazard maps for a wide range of shaking frequencies based on 3D simulations using improved crustal model and source specification.
- More staff needed to collect data and enter subsurface information into databases.
- Need better models of the shallow crust, including depth to bedrock in the Seattle basin and other basins, and the shear-wave velocity to a depth of about 2 km.
- Most DNR work has been done under small competitive grants from FEMA and USGS the last few years. Grants are not always available and DNR is not always successful in attaining the grant.

## **Implementation Plan**

Estimated cost of the following action items is at least \$2 million.

### **Medium Term: (5-10 years)**

**Action Description:** Prioritize areas for detailed liquefaction and other seismic hazard mapping and accelerate these efforts. Reference the updated liquefaction hazard maps in building codes and establish a consistent means of communicating maps and related information to local jurisdictions for use as best-available-science under the Growth Management Act (DNR and COM). This will require two FTEs at DNR and/or COM to work on this full-time, ongoing.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

**Action Description:** Develop and maintain an online subsurface database for the state combining data from geotechnical work, geophysical surveys, and deep-well studies to provide easily-accessible resource assessments, hazard maps, and raw data. This data will be available when necessary for research in modeling of site-response and economic/building stock impacts (i.e., HAZUS runs). This will require several FTEs at PNSN to help populate these databases as information arrives from the various studies.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

## RECOMMENDATION 9

*Improve life safety in communities at risk of local tsunamis.*

Communities along Washington's coast, the Strait of Juan De Fuca, Puget Sound and Hood Canal are all at risk from locally-sourced tsunamis, which will provide little warning before the first wave arrives. In some of these areas, it will not be possible to evacuate to high ground in time due to earthquake damage to evacuation routes and bridges, or due to lack of accessible high ground. Reducing loss of life depends on improving the ability of residents, workers, and visitors to reach sufficiently-high ground. In some areas, this means creating new high ground where it was previously unavailable. Improved modeling of tsunami inundation zones and pedestrian evacuation continues to show how critical alternative tsunami evacuation methods are to life-safety.

The Ocosta School tsunami vertical evacuation structure is the first of its kind in North America. The 2011 Project Safe Haven Study established that for life safety along the coast in the event of a tsunami, at least 50 more of the structures are needed, with locations varying by population density. Since the Ocosta school was built, many coastal areas are working on modifying planned or routine construction into vertical evacuation structures. Each project is a multi-year effort involving the collaboration of multiple agencies in a process that includes feasibility, design, site-selection, geotechnical analysis, community involvement, acquisition of funding, and site-specific aspects. Additional life safety improvements will be obtained through educating community members on the use of these structures and on identifying appropriate evacuation routes to safety in each community.

### **Lead Entities**

#### **Military Department, Emergency Management Division (WA EMD)**

Washington State Department of Natural Resources (WA DNR)

University of Washington (UW)

National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory (NOAA PMEL)

### **Current Actions**

- Project Safe Haven Round 3, workshops to identify potential sites for Tsunami Vertical Evacuation Structures will occur in 2018.
- One structure completed at Ocosta Elementary School.
- One structure in design phase at Long Beach.

- Other vertical evacuation structures currently in planning/development stage:
  - Quinault Casino
  - Port of Grays Harbor: replacing the port EOC
  - Fire station at Ocean Park
- Plans in place to relocate Taholah and Makah Reservation infrastructure out of tsunami hazard zone.
- Pedestrian evacuation modeling being conducted to show where improvements are necessary.
- Tsunami inundation mapping being conducted to understand where there are tsunami hazard areas.

### **Gaps and Barriers**

- Additional staff needed to conduct modeling, mapping and planning.
- New design guidelines are forthcoming that change building codes, specifically for structures in tsunami zones that require additional modeling (ASCE 7-16 chapter 6).
- Site-specific hazard assessments of all remaining candidate sites must be conducted, including detailed modeling of potential forces on proposed structures.
- Modeling, mapping, and planning efforts are currently dependent on grant funding.

### **Implementation Plan**

Estimated cost of the following action items, excluding construction, are at least \$2 million.

#### **Short-Term: (1-5 years)**

**Action Description:** Support existing efforts to build and/or adapt local structures into tsunami vertical evacuation structures with a focus on schools. This will require two FTEs for tsunami inundation modeling at selected locations for the project provided by DNR, UW, and PMEL. These initial projects will demonstrate the most cost-effective approaches and identify funding options that may be instituted on a regional or local basis. Based on the Long Beach berm vertical evacuation and Ocosta School pilot projects we estimate around \$3-5 million for each project, depending on leverage.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

**Long-Term: (10+ years)**

**Action Description:** Continue to support planning, development, and construction of tsunami vertical evacuation structures by local and tribal jurisdictions. Adequate funding must be secured to construct 50 vertical evacuation structures on the outer coast for the safety of the Washington populace. This would require new detailed modeling at each site at an effort level of three FTEs for two biennia (per site), plus engineering teams for each of the 50 structures. This long-term project will also involve:

- Advocating for and prioritizing integrating Safe Haven structures into school funding;
- Altering local zoning to encourage structures in tsunami hazard zones to be designed as safe havens;
- Mandating new hotel construction to incorporate safe havens;
- Supporting development of improved methods for detailed, site-specific modeling assessments of the tsunami hazard; and
- Determining funding sources for supporting local development of Safe Havens.

<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>	1		

**SCORE: 5 – Medium**

## DIRECTIVE 1

*Plan for the distribution of bulk fuel through the use of master contracts in order to support relief efforts, restore essential services and re-establish commerce.*

Given the prevalence of the internal combustion engine in everyday life, fuel distribution was chosen to be the first of the additional directives to supplement the initial 2012 Resilient Washington Report. Without fuel to power the vehicles and equipment required for a 21<sup>st</sup> century emergency response, alternatives become walking, bicycling, or using work animals where available. These alternatives significantly increase response times which is deleterious to life-saving efforts. Further, many communications facilities used by first responders and emergency managers rely on fuel-consuming backup generators and, even where generators are on-site, the average fuel storage covers only the first 72-hours of continuous use. Additionally, certain fuels provide for the rapid preparation of large quantities of food, disinfecting water, and sterilizing equipment. Without planning and coordination, the exhaustion of remaining fuel supplies could temporarily set society back to the 18<sup>th</sup> century following a catastrophic earthquake and tsunami.

Having a bulk fuel master contract allows the use of substitute commercial fuel distribution sources following a catastrophic incident. Such advance planning adjusts for the anticipated loss of routine sources from the state of Texas, which are received at a terminal in Tacoma. The current efforts and authorities within the scope of this area is for the public (i.e., government and non-profits performing essential government services) sector only. Bulk fuels distributed through master contracts reach the end-user after a local government Emergency Operations Center formally requests (to include pre-scripted/before incident requests) those resources from the State Emergency Operations Center.

### **Lead Entities**

**Department of Enterprise Services, Contracting & Purchasing Office (DES)**

Department of Commerce, State Energy Office (COM)

Military Department, Emergency Management Division, State Logistics Program (WA EMD)

### **Current Actions**

- Currently, COM has an established plan for the distribution and prioritization of energy products (the Washington State Energy Assurance and Emergency Preparedness Plan). This plan defines energy shortages, service interruptions, and an energy emergency in detail. The legislation that grants authority to the governor to establish controls, standards, and priorities for the production, allocation, and consumption of energy (to include fuel) is found in Chapter RCW 43.21G RCW.

- The governor declares an energy emergency through executive order. This makes available extraordinary powers that can be used to respond to an emergency and convenes the Joint Committee on Energy Supply and Energy Conservation to review and comment on the governor’s proposed response plans.
- Measures available to the state under an energy supply alert are also substantial, as are options available to energy companies. It is generally expected that even severe supply shortages can be successfully addressed without resorting to the extraordinary powers available under a declared energy emergency.
- Mandatory directives that are authorized under a declared energy emergency are controversial measures that have their own costs while restricting citizens’ choices. In addition, emergency response policies in the past at both the federal and state level explicitly embraced more severe regulatory actions. Reliance on markets is the preferred policy, and regulatory actions like state-wide fuel allocation programs are discouraged and contemplated only as extraordinary measures for extraordinary conditions.
- Upon the declaration of a condition of energy supply alert or energy emergency, the governor shall present to the committee her or his proposed plan(s) for programs, controls, standards, and priorities for the production, allocation, and consumption of energy during any current or anticipated condition of energy emergency, and any proposed plans for the suspension or modification of existing rules pertaining to energy. The governor shall review any recommendations of the committee concerning such plans and matters.

### **Gaps and Barriers**

- Washington State maintains master contracts to distribute fuel at the *distributor level*. This means that if a disruption in service occurs, or the transportation network is compromised, fuel delivery does not have to be made by any of the five contracted distributors. Essentially, with the current contracts, a post-CSZ environment will have no fuel distribution and contracts cannot be utilized to leverage distribution.
- Lack of response authority for the state to provide direct assistance to the private sector refineries in Washington responsible for providing fuel to the public sector under emergency contract.
- Lack of response authority for the state to provide fuel to the general public.

### **Implementation Plan**

Estimated cost of the following action item is less than \$50,000.

## Short-Term (1-5 years)

**Action Description:** Complete the master bulk fuel contract. DES is developing a master contract with Washington State refineries to provide fuel to the entire state of Washington. The new contract will enable the distribution of fuel post CSZ, and will have emergency response language within the contract. A refinery can choose from multiple modes (air, rail, road, water, etc.) to transport fuel. There will remain a substantial reliance on ESF #1 (Transportation) to clear routes for the distribution of fuels, however the refinery will be contractually obligated to move fuels into the state or along the coast. The anticipated timeframe for the completion of the new bulk fuel contract is September 2017.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

## DIRECTIVE 2

*Develop a Mass Care Operational Coordination Plan Annex to address collaboration among response agencies and organizations, to be housed under Emergency Support Function 6.*

The second additional directive supplementing the initial 2012 Resilient Washington Report focuses on mass care. Mass care is providing congregate shelter, sustenance (i.e., food and water), emergency supplies and family reunification to displaced persons. Without a coordinated and managed mass care response, an emergency or disaster becomes a humanitarian crisis. Mass care is distinctly separate from health care for acute injury or illness. During a “typical” emergency or disaster, staff from non-profit nongovernmental organizations (NGOs) provide mass care services directly to individuals on behalf of local governments, whereas state government has a coordinating role only. However, the large-scale and widespread nature of a catastrophic earthquake and tsunami requires greater state involvement to provide mass care to a significantly higher volume of individuals (projected to be more than one million persons).

A challenge with mass care planning for a catastrophic earthquake and tsunami is that the majority of pre-identified emergency shelters are schools, community centers, and places of worship, many of which are unreinforced masonry structures. Therefore, assuming that most pre-identified emergency shelters are rendered inoperable from the incident, 'non-traditional' sheltering facilities (such as field-expedient shelters in suitable open spaces) become immediately necessary. Further, if not thoroughly coordinated and planned-for in advance, using non-traditional facilities will involve emergency contracting with their owners (the preferred method over exercising eminent domain) as well as emergency contracting with companies that operate and/or deliver field-expedient emergency sheltering services. Providing security and law enforcement capabilities for large emergency shelters is another important planning factor.

### **Lead Entities**

#### **Department of Social and Health Services (DSHS)**

American Red Cross (ARC)

The Salvation Army

### **Current Actions**

- Initiated formal quarterly meetings of key ESF-6 partners.

- Improved geospatial capabilities to enable rapid identification of the residential location of clients and mapping in relationship to specific threats and hazards.
- Identified potential for using Contract #00707 (Emergency Standby Services/ESS) for establishing field-expedient shelters. Need to clarify capability/expectation of vendors (i.e., base camp for responders vs. emergency shelter for the general public).
- Pursuing opportunities for using The Salvation Army reservists for disaster case management expertise.

### **Gaps and Barriers**

- No single or combined state agencies have been mission-assigned or allocated resources to provide the full array of mass care services and capabilities. State government has never adequately resourced this function.
- The current ESF-6 state capability is insufficient to address a catastrophic incident.
- State level ESF-6 relies almost entirely on non-governmental organizations (American Red Cross, The Salvation Army, Northwest Harvest, etc.) to self-organize, deploy, and address the response needs.
- The state lacks experienced catastrophic incident planning expertise. Mercy Corps, the International Red Cross, or other international humanitarian aid organizations with experience in providing both mass care support in significantly-degraded environments, and Civil/Military coordination may provide a source of catastrophic planning expertise the state could engage to assist with current planning efforts.
- Following a CSZ event, a humanitarian crisis may manifest within days. However, sufficient levels of resources may not reach survivors in coastal areas for weeks. Any delay of support increases the risk of mortality.
- State employees and NGOs are not trained and equipped to support catastrophic mass care response in forward and unsecured areas. Planning efforts must be coordinated with security from the military or law enforcement so mass care actions will not be impeded.
- Limited training and exercise opportunities exist that focus on mass care, especially with the detail necessary to resolve complex policy issues and provide specific (vs. general) knowledge to staff.

### **Implementation Plan**

Estimated cost of the following action items is around \$1 million.

**Short-Term (1-5 years)**

**Action Description:** Develop comprehensive agreements (Memoranda of Understanding) with each non-governmental organization that would be involved in a catastrophic response.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		2	
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Develop a comprehensive training and exercise plan to prepare state agency employees to staff ESF-6 in the SEOC following a catastrophic incident.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

## DIRECTIVE 3

*Build resilient communication systems and develop the relevant procedures to ensure reliable communications with clear protocol following a catastrophic seismic event.*

Society is becoming increasingly reliant on real-time communication in our day-to-day lives. This reliance intensifies in times of crisis. Communication infrastructure provides vital capabilities for response and recovery activities. This infrastructure is important at all levels of society from connecting emergency operations centers and government officials, to personal correspondence between members of the community. It is imperative that Washington invests in the necessary technology to reduce or eliminate the disruption to communications that is expected following a catastrophic earthquake. It is equally important that common understandings and procedures are in place to ensure government and private sector organizations effectively utilize emergency communications to enhance and expedite their response.

Within the State Emergency Operations Center (EOC), Emergency Support Function 2 (ESF-2) responsibilities include extensive collaboration and outreach with public sector, private industry and tribal nation partners to ensure protection, restoration and sustainment of cyber systems and information technology resources for statewide emergency communications. The Washington State Military Department's Information Technology (IT) Division oversees the staffing and administrative management of ESF-2 within the incident management and response structures during emergencies to ensure functionality and/or restoration and repair of statewide telecommunication assets and infrastructure.

### **Lead Entities**

#### **Washington State Military Department (MIL)**

Office of the Chief Information Officer/Washington Technology Solutions (OCIO/WaTech)  
Utilities and Transportation Commission (UTC)

### **Current Efforts**

#### **Coordinating Communications Plans**

- **Washington Comprehensive Emergency Management Plan (CEMP) – ESF-2 Annex**

The ESF-2 Annex of the state's CEMP provides guidance and procedures for emergency communications between the SEOC and federal partners, Washington's 39 counties, 29 tribes, and other relevant political sub-divisions. This annex was last updated in 2008 and is due for revision in the next calendar year.

- **The Washington Emergency Communications and Coordination Working Group (WECCWG)**

The WECCWG gathers tri-annually to review past emergencies and exercises, prepare for future communication needs and standardize efforts in emergency communications. The WECCWG works in conjunction with the Infrastructure Resilience Sub-Committee (IRSC) and FEMA Regional Emergency Communication and Coordination Working Group (RECCWG). WECCWG meetings focus on a variety of topics relating to the resilience of communication systems. Additionally, the IT Division specifically hosted a meeting with many WECCWG participants to lay the groundwork for enhancing statewide emergency communications architecture and procedures on July 21, 2017.

- **Infrastructure Resilience Sub-Committee (IRSC)**

The IRSC is a sub-committee of the state’s Emergency Management Council (EMC). It is an active community that facilitates improved coordination, planning, and response among public and private sector lifeline operators, to include communication infrastructure owners and operators. A leading theme at IRSC meetings in 2017 is public-private information exchange.

### **Systems, platforms, and/or applications for emergency communications**

- **OMNIXX.** WSP emergency communication relay. It allows users to send and receive text-based messages over dedicated law enforcement networks. These messages can be of an administrative nature or contain data elements for insertion into local, state, and federal databases.
- **AlertSense.** Text based emergency alert system. Multi-modal alert delivery across all communication channels is the key to quickly and effectively reaching each person who needs to be warned. Recipients can be selected geographically by drawing an impact area on a map, and by the expressed notification interests of targeted opt-in subscribers.
- **Lahar Sirens.** Volcanic mudslide emergency broadcast system. The Mount Rainier Volcano Lahar Warning System is a loose-knit, emergency notification and warning system developed by the United States Geological Survey in 1998, and now operated by the Pierce County Department of Emergency Management and several cities. Its purpose is to assist in the evacuation of the Puyallup River Valley in the event of a volcanic eruption of Mount Rainier.
- **FEMA Radio.** Radio system provided by FEMA. FEMA National Radio System (FNARS) is a FEMA high-frequency (HF) radio network to provide a minimum essential emergency communications capability among federal, state, local, and territorial governments in times of national, natural, and civil emergencies. Federal call signs for state emergency operations centers and FEMA facilities nationwide.
- **FEMA satellite phone.** Emergency Satellite phone provided by FEMA and housed in the SEOC. This allows direct access to FEMA during emergencies when terrestrial lines are down or congested.
- **Emergency Alert System (EAS).** Methods and systems for mass distribution of alert messaging to the public. EAS is the primary means for providing the public with critical alert information

about an emergency or disaster. Under EAS requirements, radio, TV and cable TV stations must participate at the National level or specifically request a waiver from the Federal Communications Commission (FCC). Further, they are encouraged to voluntarily participate in state and local EAS plans.

- **All Hazards Alert broadcast (AHAB).** It is a pole-mounted voice/tone siren system with an intense blue light that is deployed along WA coastline. It is used to warn citizens of Washington of impending tsunami events along coastal areas.
- **WMD Mobile Emergency Communications Vehicle (MECV).** The MECV is a suite capable of providing satellite and radio connectivity for voice, video and data transmission in remote locations statewide. Satellite trailer can provide 3GB uplink and downlink via sprint services and provides an estimated 100 users with connectivity. It has some limited print and data visualization displays in the cabin. Requires a minimum of two personnel to deploy during an activation.
- **Forward-Looking Infrared (FLIR).** Gyro-stabilized color camera with zoom lens and infrared optics. Real-time air-to-ground audio/video/data microwave downlinks from multiple platforms like WSP aircraft, etc. Provides long-range, day and night, search and surveillance capabilities.
- **High-Frequency (HF).** The operations secure high-frequency network is a secondary emergency back-up communications capability for intra and inter-state use. Operating on eight discrete frequencies, point-to-point long-range communications between the state EOC and fixed or mobile HF stations can be established as needed. Currently, in addition to the state EOC, fixed HF stations are located at each WSP district communications center.
- **State Agency Emergency Network (STAEN).** This system is utilized to contact the directors of our various departments at the state level via 800 MHz radio system.
- **Radio Amateur Civil Emergency Services (RACES).** A special part of the amateur operation sponsored by FEMA. RACES was primarily created to provide emergency communications for civil defense preparedness agencies and is governed in FCC Rules and Regulations, Part 97, Subpart E, Section 97.407. Today, as in the past, RACES is utilized during a variety of emergency/disaster situations where normal governmental communications systems have sustained damage or when additional communications are required. Situations that RACES can be used include: natural disasters, technological disasters, terrorist incidents, civil disorder, and nuclear/chemical incidents or attack.
- **Comprehensive Emergency Management Network (CEMNET).** Emergency Management Division operates a statewide very high frequency (VHF) low-band radio system, as the primary backup communication link between the SEOC, local EOCs and Tribal EOC's throughout the state.
- **On-Scene Command and Coordination Radio (OSCCR).** OSCCR serves as the "Primary Command Channel" for incidents involving two or more responding agencies. The primary

frequency is 156.135 MHz is maintained by Washington State Department of Transportation and Military Department's Emergency Management Division.

- **National Alert Warning System (NAWAS).** This is an automated telephone system used to convey warnings to the US-based federal, state, and local governments. It is operated and fully funded by FEMA. System consists of 2,200 phones on a party line. The original mission of NAWAS was to warn of an imminent enemy attack or missile launch upon the United States. NAWAS still supports this mission but the emphasis is on natural and technological disasters.
- **State/Federal Networks.** The Washington Military Department (MIL) operates on the State Government Network, Army National Guard Network and Air National Guard Network. ESF2's primary mission in support for these networks is to maintain access to networks and coordinate resources. Efforts include local carrier and service provider coordination. Overseeing outage restorations and COOP efforts.
- **Government Emergency Telecommunications (GETS).** GETS allows a card holder to access the phone system by entering a coded sequence during emergencies when the landline systems are overburdened.
- **Wireless Priority Service (WPS).** WPS works the same as GETS, but only on cellular networks.
- **Telecommunication Service Priority (TSP).** TSP tags data and telephone circuits on carrier's systems as essential emergency service which gives them the highest priority during outages to be repaired. All WMD and National Guard circuits are TSP registered.
- **Land Mobile Radios (LMR).** LMRs are provided on a limited basis to key leaders within MIL as a method of communication via radio with emergency responders statewide via WSP. ESF-2 responders also carry LMRs for better availability.
- **Avaya phone system.** Local phone system to Camp Murray runs on the state network. This system is crucial for connecting many of the alert systems housed in the SEOC and is the primary voice system for the SEOC.
- **Cisco phone system.** Local phone system to Camp Murray and 39 separate sites around Washington run on the federal network. It is a backup system for the SEOC and has three jump kits that can be set up in field locations during emergencies. The primary location is Camp Murray and COOP is in Spokane.
- **Satellite phones.** SEOC has 12 satellite phones issued to department and state agency leadership. This is voice communication only. The governor, Adjutant General, and Emergency Management Division Director have Satellite phones for use during a catastrophic emergency. This phone system is tied to 66 designated satellites with guaranteed service by the provider even in the most remote areas, so long as a signal can be obtained.

- **WSP Microwave.** Microwave relay system hosted by Washington State Patrol. The SEOC has two microwave connections to the WSP radio network. One points to a location in Parkland, WA, and the other to Capitol peak near Olympia.

**Gaps and Barriers**

- ESF-2 goals have focused on connecting the State EOC to state agencies/federal/local/tribal partners. It has not focused on connecting to other critical infrastructure sectors or facilities (i.e., it has not done outreach to energy facilities or healthcare facilities, as an example).
- Although OSCCR is supported by the state government, use of the system requires ownership of radio hardware. Many entities at the local & tribal levels cannot afford to purchase the hardware necessary to utilize the network.
- OSCCR does not have complete coverage over the entire state – there are still coverage gaps in certain areas that need to be addressed with additional transmitter or repeater sites.
- OSCCR has not been adopted for use by all entities that it is designed to serve. Not all entities believe their response efforts warrant the use of OSCCR or they are unaware of OSCCR so they utilize alternative communication methods that may be less reliable and do not interoperate with other communications.

**Implementation Plan**

Estimated cost of the following action items is around \$1 million.

**Short Term (1-5 years)**

**Action Description:** Leveraging the WECCWG and the IRSC meetings, planners from MIL’s IT Division and Emergency Management Division need to create an emergency communication framework to incorporate infrastructure owner/operators from both the public and private sectors. The framework should initially focus on other lifeline sectors (energy, transportation, water/wastewater) as well as school districts and other important community support facilities.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** OSCCR needs specific system upgrades and enhancements to ensure it is reliable following a large seismic event. Augmenting the OSCCR system with a satellite-based backhaul system will ensure the system is reliable even if its terrestrial transmitters are damaged or destroyed due to a catastrophic earthquake. In addition, 16 radios need replacement and numerous WAVE consoles need replacement/upgrades.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	1		
<b>Cost (estimated)</b>		2	

**SCORE: 6 – Medium**

## Conclusion

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Significant work has already occurred to increase Washington’s resilience to withstand earthquakes and tsunamis, yet numerous opportunities remain to further this effort. There are many high-priority actions that can be accomplished at very little cost, though they will require labor, reprioritizing of staff time, and coordination across many entities. There are also key actions that will require significant funding to accomplish, such as conducting seismic safety assessments on our school buildings, inventorying our earthquake-vulnerable buildings, and supporting construction of tsunami vertical evacuation structures along the coast. Many of these actions will require significant effort, legislative support and funding, but they are critical for making Washington resilient. To be successful we need to establish a body, with corresponding authority and funds, to further the state’s resilience goals by facilitating efforts across state agencies. This requires the continued support of the governor, Resilient Washington Subcabinet, Legislature, and entities involved in the development of this report.

### POLICY/LEGISLATIVE CONSIDERATIONS

- Establish, with corresponding authority and funds, a body to further the state’s resilience goals by facilitating efforts across state agencies.
- Continue the Resilient Washington Subcabinet. (*GOV & WA EMD, All*)
- Update RCW 28A.320.125 (6)(d) that requires for school safety drills from “may” to “must” incorporate an earthquake drill annually using the state-approved earthquake safety technique “drop, cover, and hold on.” Previous legislation in 2016 allows a school district to voluntarily include this type of drill but falls short of requiring earthquake safety drills. (*OSPI, R1*)
- Require school districts to develop Hazard Mitigation Plans (HMP) either on their own, or by participating in a city or county mitigation planning process. (*OSPI, R1*)

- Require school districts to develop and maintain comprehensive continuity of operations plans (COOP) in coordination with cities and counties, including provision for mutual aid (e.g. facility-sharing) between districts. *(OSPI, R1)*
- Develop a state-level disaster recovery fund and programs to support local jurisdiction rehousing and recovery needs for small-to moderate disasters where federal individual assistance programs and funding are not available. *(WA EMD & COM, R3)*
- Mandate that seismic evaluations be completed as part of real estate transactions to ensure full disclosure of a property’s condition between buyers and sellers to include attaching the record of repairs for damage due to geologic hazards to property deeds for full information in building permit processes. *(Real Estate Commission, DNR, R3)*
- Develop a mandatory building retrofit code that includes funding for code development, enforcement and financing options for building retrofits. *(DES, State Building Code Council, R3)*
- Develop an earthquake insurance authority program, along with financial incentives for improved affordability options. Consider a regionalized approach, working with other Pacific Coast states. *(OIC, R3)*

## Near Term Implementation Cost

The estimated funding required to accomplish the highest-priority actions (high priority, low effort and low cost) listed in this report is at least \$27.6 million. This is based upon best estimates and only includes one-time expenditures. Some of the costs, such as the construction cost from recommendations 6 or 9 are not included and are indeterminate at this time. Determining the actual and ongoing costs (public and private) will require further analysis. The remaining high-, medium-, and low- priority actions that require longer-term solutions could require significant capital investment.

## COMMONALITIES

A number of actions identified by the workgroups are similar. They fall under four categories: Assessment, Inventorying, Data Collection and Storage; Building Code Revision; Outreach and Training; and Multi-Agency. There is a lot of potential for leveraging resources and effort to save on costs for these actions.

### Assessment, Inventorying, Data Collection and Storage

Several workgroups identified the following actions as high priorities: inventorying vulnerable buildings (schools, hospitals and unreinforced-masonry buildings, historic buildings, etc.) and infrastructure; collecting relevant data; storing this data so it is easily accessible; and conducting risk assessments using the data. These are critical first steps for understanding the highest-risk structures and prioritizing

mitigation actions so that key facilities such as hospitals and schools are operational following an earthquake.

## **Building Code Revision**

To improve the safety of our buildings we must also revise our building codes. A key example is the development of technical standards for the retrofit of URM buildings. The City of Seattle has been actively pursuing the development of a retrofit program, which may be used as a guideline and adapted for other local jurisdictions. Another recommendation is developing mandatory requirements for mitigating geologic hazards within local and/or state through land use planning and zoning, such as California’s Alquist-Priolo Act. This requires:

- Detailed, consistent hazard assessment (liquefaction, ground failure, ground amplification etc.) statewide
- Minimum standards for engineering mitigation
- Performance based standards and education of which standard the building meets (life safety, non-collapse etc.)
- Requiring real estate transaction disclosures to include hazard maps from the Washington Geological Survey at a minimum

It is also important that geologic hazard maps (liquefaction, ground failure, ground amplification etc.) be updated and included in building codes or made mandatory in GMA.

## **Outreach and Training**

The need for expanding outreach and training is vital for getting Washington State prepared. Some key areas include training stakeholders how to utilize the WAsafe program to rapidly conduct post-disaster building assessments; train COM staff on how to review emergency plans as the Evergreen Sustainable Development Standard (ESDS) v3.0 is implemented; train and deploy historic preservation specialists to be part of building assessment teams; improve earthquake insurance take-up rates by increasing public-private sector collaboration on earthquake insurance outreach efforts through education campaigns and drills like the “Great Washington ShakeOut;” develop an outreach program for local jurisdictions, property owners, engineers, and architects to inform them of the availability of the Building Occupancy Resumption Program (BORP) and Advisory Placard programs, which allow building owners to rapidly reopen following an earthquake; determine how to best leverage existing training and outreach opportunities that may be available for small-to-medium sized businesses within Washington; and develop a comprehensive training and exercise plan to prepare state agency employees to staff ESF-6 in the SEOC following a catastrophic incident.

## Multi-Agency Collaboration

Most actions require multi-agency coordination and could be leveraged across entities. These actions were specifically identified by the workgroups: multi-agency legal mapping of “lifeline sectors” (energy, transportation, and communication & water/wastewater) in an emergency vs. governor’s Emergency Proclamation; update the Infrastructure Systems Target Capability Assessment in the State Preparedness Report (SPR) based on new knowledge of the effects of a 9.0 CSZ event; develop a proposal for establishing a long-term disaster recovery fund, which can be used to support transitional housing and infrastructure for disaster survivors that have been displaced and lack rehousing options; undertake a comprehensive assessment and inventory of earthquake-vulnerable buildings across Washington, and make the data publicly available; and establish a stakeholder business continuity workgroup.

# Appendices

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## ACRONYMS

AAG – Assistant Attorney General  
AAR – After-Action Report  
AASHTO – American Association of State Highway and Transportation Officials  
AIA – American Institute of Architects  
ARC – American Red Cross  
ASCE – American Society of Civil Engineers  
AWB – Association of Washington Businesses  
BCA – Benefit Cost Analysis  
BORP – Building Occupancy Resumption Plan  
BPA – Bonneville Power Administration  
BRE – Business Re-Entry  
CalOES SAP – California Office of Emergency Services Safety Assessment Program  
CEA – California Earthquake Authority  
CHRDRT – Cultural and Historic Resources Disaster Response Team  
COM – Department of Commerce (Sometimes abbreviated to “Commerce”)  
COOP – Continuity of Operations Plan  
CREW – Cascadia Region Earthquake Workgroup  
CRI – Community Resilience Initiative  
CSZ – Cascadia Subduction Zone  
DAHP – Washington State Department of Archaeology and Historical Preservation  
DES – (Washington State) Department of Enterprise Services  
DHHS – U.S. Department of Health and Human Services  
DHS – Department of Homeland Security (Federal)  
DNR – (Washington State) Department of Natural Resources  
DOH – Washington State Department of Health  
DOT – Department of Transportation (May Refer to Local, or Federal DOT; WSDOT for State)  
DRBT – Disaster Resistant Business Toolkit  
ECY – Washington State Department of Ecology  
EDC – Economic Development Council  
EMC – Emergency Management Council  
EOC- Emergency Operation Center  
EPAT – Earthquake Performance Assessment Tool  
EQ - Earthquake  
ESDS – Evergreen Sustainable Development Standard  
ESF – Emergency Support Function  
ESS – Emergency Standby Services  
FCC – Federal Communications Commission  
FEMA – Federal Emergency Management Agency  
FRA – Federal Railroad Administration  
FTE – Full-Time Employee  
GIS – Geographic Information Systems (Mapping software)

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GMA – Growth Management Act  
GOV – Office of the Governor  
GPS – Global Positioning System  
HIZ – Home Improvement Zone  
HMP – Hazard Mitigation Plan  
ICOS – Information and Condition of Schools (OSPI database)  
IEBC – International Existing Building Code  
IRSC – Infrastructure Resilience Subcommittee  
JBLM – Joint Base Lewis-McChord  
LEP – Limited English Proficiency  
MIL – Washington Military Department  
MRC – Medical Reserve Corps  
NERC – North American Electric Reliability Corporation  
NTHMP – National Tsunami Hazard Mitigation Program  
NWPPCC – Northwest Power Conservation Council  
OCIO – Office of the Chief Information Officer (State)  
ODW – Office of Drinking Water  
OIC – Office of the Insurance Commissioner (State)  
OSPI – Office of the Superintendent of Public Instruction  
PDM – Pre-Disaster Mitigation  
PNSN – Pacific Northwest Seismic Network  
PPRC – Pollution Prevention Resources Council  
PSIG – Pounds per Square Inch  
PUD – Public Utility District  
RCW – Revised Code of Washington  
RSF – Recovery Support Function  
RWS – Resilient Washington State  
SBA – Small Business Administration  
SBCC - State Building Codes Council  
SEAW – Structural Engineers Association of Washington  
SEO – State Energy Office  
SEOC – State Emergency Operations Center  
SHB – Substitute House Bill  
SSC – Seismic Safety Committee  
TAG – The Adjutant General  
TSA – The Salvation Army  
URM – Unreinforced Masonry  
UTC – Utilities and Transportation Commission  
UW – University of Washington  
WA – Washington (State)  
WA EMD – Washington State Emergency Management Division  
WABO – Washington Organization of Building Officials  
WAC – Washington Administrative Code  
WAFAC – Washington Fire Action Council  
WAsafe – Washington Safety Assessment Facilities Evaluation Program  
WAVOAD – Washington Voluntary Organizations Active in Disaster

WCCE – Washington Chamber of Commerce Executives  
WECC – Western Electricity Coordinating Council  
WECCWG – Washington Emergency Communication Coordination Work Group  
WSDOT – Washington Department of Transportation  
WSSDA – Washington State School District Administration

## COMPLETE WORKGROUP ACTION IMPLEMENTATION PLANS

### **Recommendation 1 *Gap Analysis and Action Implementation Plan***

*Prepared by the Washington Geological Survey (DNR) and the Office of the Superintendent of Public Instruction (OSPI)*

#### **RECOMMENDATION 1: MAKE SCHOOLS RESILIENT: STRUCTURALLY, SOCIALLY, EDUCATIONALLY**

- A) **As part of a single statewide project, perform consistent, cost-effective, comprehensive assessments of school buildings to prioritize the seismic risk of the state’s schools. Apply the new SSC-developed assessment process, which addresses seismic hazard, liquefaction, and structural and non-structural deficiencies.**
- **Stakeholders:**
    - Anyone that has children in school or will have children in school.
    - OSPI, school districts, teachers, students, Public & Private schools, ESDs, DNR, the public associations: WA State School District Admin. (WSSDA), WA Maintenance Operators Administrators (WAMOA), WA Assoc. of School Business Officials (WASBO), WA Assoc. of School Administrators (WASA).
  - **Needs/Expectations for achieving the Action:**
    - Initially we would like to see school seismic safety surveys done throughout the state for every school district and school building by geologists and engineers. Then once we have an inventory and evaluation we can determine a priority for building remediation. We can then develop plans and funding mechanisms for the remediation.
    - Funding, legislative action, time and staffing
  - **Current Efforts:**
    - DNR and structural engineers along with EMD and FEMA have done pilot studies at several school locations throughout state.
    - Development of a Pre Disaster Mitigation program within the Office of the Superintendent of Public Instructions (OSPI) Information and Condition of Schools (ICOS) inventory system. The system uses statewide GIS Hazard data to identify the hazards for each school facility, with additional building information included along with tables displaying the levels of hazard and risk for each campus or building. The system

- includes not only information regarding earthquake but also volcanic activity, landslide, flood, tsunami and wildland urban interface fires.
- 25 district Hazard Mitigation Plans (HMPs) completed or nearly completed, drawing on the campus-level and building-level building data collected in OSPI's ICOS database.
  - Development of an Earthquake Performance Assessment Tool (EPAT) that can provide quantitative estimates of the level of damage expected for any public K-12 school building in WA State for a range of earthquake ground motions. This tool is simpler to use than HAZUS and includes consideration of the time-history of building codes in WA and refined fragility estimates for schools built at different times.
- **Gaps & Barriers to achieving the Action:**
    - The biggest barrier is funding for the initial investigations by geologists and engineers.
    - Funding, time and staffing for follow up once initial investigations have been conducted
    - Funding: a) OSPI Staff, b) Technical consultants for HMPS, c) Geologists/Engineers/Architects to enter the hazard and risk data into Information and Condition of Schools (ICOS)
  - **Available Resources:**
    - DNR has some staff and seismic equipment that can be used. We've also already established the methodology.
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## **ACTION Implementation**

Action Leads: Scott Black OSPI School Facilities, Dave Norman, Tim Walsh and Corina Forson DNR leads

- **Actions Needed:**
    - More funding needs to be made available for doing the initial evaluations of buildings.
    - After initial evaluations more funding has to be identified for developing plans for remediation and eventually completing the work on the buildings themselves.
    - Update and refine OSPI Information & Condition of Schools (ICOS) with hazard and risk data. Engage districts and provide technical support to school districts.
    - Once all building information is entered into ICOS, run statewide report to identify school building risks to hazards. Prioritize school buildings statewide per highest risk. Based on report provide next step Engineering report using new Earthquake Performance Assessment Tool (EPAT) -designed by a sub group of Earthquake Engineering Research Institute (EERI).
    - Based on the Statewide risk assessments performed across the state, prioritize the highest risk buildings and provide State funding to retrofit or replace the identified buildings.
    - Establish Earthquake School Retro fit Grant program that could be maintained year after year for continuing to retrofit or replace buildings prioritized in the above assessments.
  - **Implementation Plan:**
    - **Medium Term (5-10 yrs):**
-

- Ask for capital or other funds to do the school evaluations over a six-year to eight-year period using detailed inside and outside of building ASCE 41 methodology
- Based on the priorities revealed from the assessment, devise a plan to repair or replace school buildings, beginning with those with the highest level of risk.
- Update and refine OSPI Information & Condition of Schools (ICOS) with hazard and risk data. Engage districts and provide technical support to school districts.
- Once all building information is entered into ICOS, run statewide report to identify school building risks to hazards. Prioritize school buildings statewide per highest risk. Based on report provide next step Engineering report using new Earthquake Performance Assessment Tool (EPAT) -designed by a sub group of Earthquake Engineering Research Institute (EERI).

<b>Action Description: Perform consistent, cost-effective, comprehensive assessments of school buildings to prioritize the seismic risk of the state’s schools.</b>			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Request capital funding to perform the school evaluations over a six to ten-year period (DNR and engineers) using ASCE 41 methodology</li> <li>• Update and refine OSPI Information &amp; Condition of Schools (ICOS) with hazard and risk data. Engage districts and provide technical support to school districts</li> <li>• Once all building information is entered into ICOS, run statewide report to identify school building risks to hazards. Prioritize school buildings statewide per highest risk. Based on report provide next step Engineering report using new Earthquake Performance Assessment Tool (EPAT) -designed by a sub group of Earthquake Engineering Research Institute (EERI).</li> </ul>		
<b>Effort (estimated)</b>	<ul style="list-style-type: none"> <li>• OSPI staff time to oversee grant project. DNR Staff and/or hired engineer consultants to travel across the state performing the Engineering study (EPAT) based on school buildings identified in OSPI report.</li> </ul>		
<b>Cost (estimated)</b>	<ul style="list-style-type: none"> <li>• High ~ <b>\$15 M</b> to assess all schools for seismic safety, done by DNR Geologists and contracted engineers using detailed ASCE 41 methodology.</li> <li>• Additionally, ask for up to \$10K per school district to gather and enter building specific information into ICOS (depending on number of buildings and complexity of construction – many areas built over years using different types of construction). \$10,000 per district (295 districts) could be up to \$2.95 million.</li> </ul>		

	<ul style="list-style-type: none"> <li>Up to \$20,000 per district (depending on number of buildings) for OSPI staff time/ DNR and or selected consultants to perform risk assessments using the (EPAT) \$20K per 295 districts is up to \$5.9 million</li> </ul>		
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**SCORE: 5/med**

**Long-Term:** Repair or replace schools as outlined in the plan.

<b>Action Description:</b> Perform consistent, cost-effective, comprehensive assessments of school buildings to prioritize the seismic risk of the state’s schools.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>Based on Statewide Benefit Cost Analysis performed across the state, prioritize the largest risk buildings and provide State funding to retrofit or replace the identified buildings</li> <li>Establish Earthquake School Retrofit or replacement grant program that could be maintained year after year for continuing to retrofit or replace buildings prioritized in the above Assessments</li> </ul>		
<b>Effort (estimated)</b>	OSPI staff time to oversee selection process identification of allowable project costs and construction.		
<b>Cost (estimated)</b>	<p>Very, Very High: There are roughly 6,000 K-12 buildings (not counting portables). If 5 percent to 10 percent are high priority for retrofits and the average cost is \$1.5 million (based on the Oregon grant) this is <b>\$450 million to \$900 million</b>...perhaps higher including portables with weak foundation and larger buildings.</p> <p>Programs could duplicate the Oregon state retrofit program. Legislature can fund over many biennium to achieve the overall goal of the program. Oregon original grant funded up to \$1.5 million per school retro fit, but their last grant program cap was raised to \$2.5 million.</p>		

**SCORE: 5/Med**

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**B) Enact legislation that requires school districts to conduct at least one earthquake safety drill per school year. Schools in mapped tsunami hazard zones should conduct a pedestrian evacuation drill annually. Such a law should explicitly require drop, cover, and hold as the state’s approved earthquake safety technique.**

- **Stakeholders:**
  - Families, children, OSPI, school districts, schools, teachers
    - Children and families would have a better understanding of what earthquake safety is and what to do during an earthquake
- **Needs/Expectations for achieving the Action:**
  - Legislative support and action
- **Current Efforts:**
  - SHB 1279
- **Gaps & Barriers to achieving the Action:**
  - New legislative wording does include both EQ and tsunami drills; however, the EQ drill is a “may” as opposed to a “must”
- **Available Resources:**
  - We believe this could be done within existing resources. It’s just a matter of identifying that one of the required drills is an earthquake drill. SB 1279 aims to do this.

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## **ACTION Implementation**

Action Leads: Mike Donlin OSPI School Safety, Dave Norman, Tim Walsh and Corina Forson DNR leads

- **Actions Needed:**
  - Update SHB 1279 – Drill requirements to require earthquake drop cover and hold drill. Change term “May” to “will.” Continue to fund and use existing Great WA Shakeout Earthquake Drill registration to track metrics related to progress and participation
  - Establish statewide process for collecting information regarding earthquake and other drills
- **Implementation Plan:**
  - **Short Term:**
    - DNR and OSPI meet to lay out a legislative strategy.
    - Let districts and schools know of the new legislation.

<b>Action Description: Enact legislation that requires school districts to conduct at least one earthquake safety drill per school year.</b>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Update HB 1279 – Drill requirements to require earthquake drop cover and hold drill. Change term “may” to “will”</li> <li>• DNR and OSPI meet to layout a legislative strategy</li> <li>• Let districts and schools know of the new legislation.</li> </ul>		
<b>Effort (estimated)</b>	Education of legislators and educators across the state.		
<b>Cost (estimated)</b>	None, can do with existing funds		

**SCORE: 5/med**

**Long-Term:** Use the existing Great Washington ShakeOut Earthquake Drill registration to track metrics related to progress and participation for EQ drills.

<b>Action Description: Enact legislation that requires school districts to conduct at least one earthquake safety drill per school year.</b>			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Continue to Fund and Use existing Great WA Shakeout Earthquake Drill registration to track metrics related to progress and participation</li> <li>• Establish statewide process for collecting information regarding earthquake and other drills</li> </ul>		
<b>Effort (estimated)</b>	Fund development and implementation of safety drill requirements		
<b>Cost (estimated)</b>		\$30,000 per year	

		<p>Reaching out to schools using promotional materials</p> <p>Don't leave earthquake registration /participation as a standalone system. Develop process/system to collect and retain records of all safety drills. Note: Rapid Responder System (WA Sheriffs and Police Chiefs WASPC) is available to districts currently and has been funded through Legislature for many biennia as part of School Mapping. This system has ability to track drills.</p>	
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**SCORE: 6/Med**

**C) Enact legislation that requires all school districts to develop mitigation plans, whether on their own or by participating in a city or county mitigation planning process.**

- **Stakeholders:**
  - OSPI, districts, schools, children, FEMA, Legislators
- **Needs/Expectations for achieving the Action:**
  - Funding, time and staffing, guidance on developing plan
- **Current Efforts:**
  - Pre-Disaster Mitigation (PDM) efforts
- **Gaps & Barriers to achieving the Action:**
  - Funding, time and staffing
- **Available Resources:**
  - None

## ACTION Implementation

Action Leads: Scott Black OSPI School Facilities, Dave Norman, Tim Walsh and Corina Forson DNR leads

- **Actions Needed:**
  - Continue to finalize and obtain FEMA approval for 25 pilot district Hazard Mitigation plans (HMP).
  - Work with districts that do not currently have HMP to develop and obtain FEMA approval.
  - Funding, time and staffing
- **Implementation Plan:**
  - **Short Term:**
    - Continue to finalize district hazard mitigation plans to make them eligible for federal funding (when available) through the Hazard Mitigation Grant Program (HMGP).
    - Identify/secure needed resources to implement PDM.

<b>Action Description:</b> Enact legislation that requires all school districts to develop mitigation plans, whether on their own or by participating in a state, city, or county mitigation planning process.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Continue to finalize and obtain FEMA approval for 25 pilot district Hazard Mitigation plans (HMP).		
<b>Effort (estimated)</b>			Low effort for finalizing the Pilot District HMP's.
<b>Cost (estimated)</b>			Existing funding is sufficient to finalize the Pilot District HMP's

**SCORE: 9/ High**

### Medium-Term:

- Work with districts that do not currently have a HMP to develop plan utilizing OSPI documentation or utilize information from OSPI Pre-Disaster Mitigation Program and develop annex to their County HMP

<b>Action Description:</b> Enact legislation that requires all school districts to develop mitigation plans, whether on their own or by participating in a city or county mitigation planning process.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Survey school districts to determine which districts have Hazard Mitigation Plans (HMP) or are annexed into their counties plan. Work with districts that do not have a HMP to develop plan that can be approved by FEMA using the OSPI developed chapters or using ICOS information and becoming an annex of their county plan.	
<b>Effort (estimated)</b>		Moderate effort necessary for districts. To develop a plan or be annexed to County plan. Plan should contain ICOS hazard/risk information if annexed to County.	
<b>Cost (estimated)</b>	Update and refine OSPI Information & Condition of Schools (ICOS) with hazard and risk data. Engage districts and provide technical support to school districts to develop HMP. If hazard and risk data is already apart of district information in ICOS, costs will be less. Up to \$10,000 per school district.		

**SCORE: 5/med**

**Long-Term:**

- Districts maintain hazard mitigation plans by regularly revising and updating them.

<b>Action Description:</b> Districts maintain hazard mitigation plans by regularly revising and updating them.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Keeps HMPs up-to-date in terms of	
<b>Effort (estimated)</b>		Medium effort, ongoing workload	
<b>Cost (estimated)</b>		Plans are updated every five years and can be incorporated into district planning process using existing staff. \$5k per district every five years. \$1.475M every 5 years. (\$5k x 295 districts).	

**SCORE: 6/Med**

**D) Enact legislation that requires all school districts to develop and maintain comprehensive continuity of operations plans, including provisions for mutual aid (e.g. facility-sharing) between districts.**

- **Stakeholders:**
  - OSPI, districts, schools (public & private), ESDs
- **Needs/Expectations for achieving the Action:**
  - WSSDA HB 1003 model policy; time, staff, resources
- **Current Efforts:**
  - HB 1003 (2016) calls for a model policy for natural disaster school infrastructure recovery. That model policy includes/refers to a (required) Continuity of Operations Plan (COOP).
- **Gaps & Barriers to achieving the Action:**
  - Training and implementation
- **Available Resources:**
  - None

**ACTION Implementation**

Actions Leads: Mike Donlin OSP School Safety; Dave Norman, Tim Walsh and Corina Forson DNR leads

- **Actions Needed:**
  - Time, staff training resources
  - HB 1003 requires WSSDA to develop model policy around natural disaster response. Policy requires districts to have a Continuity of Operations Plan (COOP).
  - Maintaining/updating COOP on a selected cycle.
  - Mutual Aid agreements
- **Implementation Plan:**
  - **Short Term:**
    - Train school districts develop continuity of operations plans.

<b>Action Description:</b> Enact legislation that requires all school districts to develop and maintain comprehensive continuity of operations plans, including provisions for mutual aid (e.g. facility-sharing) between districts.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• HB 1003 requires WSSDA to develop model policy around natural disaster response. Policy requires districts to have a Continuity of Operations Plan (COOP).</li> </ul>		
<b>Effort (estimated)</b>		Extensive training time and effort	
<b>Cost (estimated)</b>		Med – High  295 school districts having new requirement will require in depth training and technical assistance.	

**SCORE: 7/med**

- **Long Term:**
  - Schools and districts maintain plans through regular training, updates, and exercises.

<b>Action Description:</b> Enact legislation that requires all school districts to develop and maintain comprehensive continuity of operations plans, including provisions for mutual aid (e.g. facility-sharing) between districts.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Maintaining/ updating COOP on a selected cycle.</li> </ul>		
<b>Effort (estimated)</b>		Once COOP are developed the maintenance is minimal work for the districts and OSPI.	
<b>Cost (estimated)</b>			Cost are low to districts to maintain and update COOP

**SCORE: 8/High**

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**E) Promote Relevant Science Education Standards in the Essential Learning Requirements.**

- **Stakeholders:**
  - Children, parents, teachers, OSPI, Districts, legislators.
    - An educated public is more prepared to survive and be resilient in the face of a disaster. Learning about earthquakes and preparedness throughout K-12 education is vital for building resilience in the Washington populace
- **Needs/expectations for achieving the action:**
  - Staff and funding to develop and implement School Earthquake Safety Initiative (SESI) curricula
  - Support from OSPI and districts to require SESI lessons in classrooms
- **Current Efforts:**
  - Some SESI lessons are being taught in classrooms by EERI and DNR volunteers
- **Gaps & Barriers to achieving the Action:**
  - Training and implementation
  - Funding

- **Available Resources:**
  - None

**ACTION Implementation**

Actions Leads: Mike Donlin OSP School Safety; Dave Norman, Tim Walsh and Corina Forson DNR leads

- **Actions Needed:**
  - Time, staff training resources
  - Support and implementation requirements from OSPI, School Districts, private schools
  - Funding to implement and train teachers in SESI curricula
- **Implementation Plan:**
  - **Short Term:**
    - Develop plan to implement SESI curricula, what the needs are, how it can be accomplished, what if any legislative action needs to be taken, what resources are needed

<b>Action Description:</b> Promote Relevant Science Education Standards in the Essential Learning Requirements.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Develop plan to implement SESI Curricula, what the needs are, how it can be accomplished, what if any legislative action needs to be taken, what resources are needed</li> </ul>		
<b>Effort (estimated)</b>	Extensive training time, collaboration between EERI, OSPI, Districts, DNR, Teachers		
<b>Cost (estimated)</b>		Medium-High ~\$1M over 5 years to develop a plan for implementation	

**SCORE: 6/med**

- **Long-Term:**

- Schools and districts implement and maintain SESI curricula and update it as new data become available or new tools are developed.

<b>Action Description:</b> Promote Relevant Science Education Standards in the Essential Learning Requirements.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Schools and districts are then required to implement SESI curricula in K-12 school across Washington.</li> <li>• Maintain and update curricula as necessary</li> <li>• Ongoing training and teacher development to ensure the newest tools and data are being used</li> </ul>		
<b>Effort (estimated)</b>	Initially there will be a huge amount of effort to train teachers across the state. There will be a ton of effort needed to get buy in from districts to implement this education. There will be cost and effort needed to get the tools and materials in all the classrooms/schools.	Once the plan is developed and the SESI curricula is required and the teachers have been trained the maintenance and upkeep effort will not be a big burden.	
<b>Cost (estimated)</b>	High \$5M/ annum in the beginning and then less \$ as time goes on. This is an ongoing project and will continually require funding for teacher training, implementation, maintenance, tools etc.		

**SCORE: 5/med**



## RESILIENT WASHINGTON RECOMMENDATION 2

Washington Military Department | Emergency Management Division

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# Background: Resilient WA Recommendation #2

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[Resilient Washington State: Final Workshop Report.](#)

[Resilient Washington State: Final Report.](#)

[Governor's Directive 16-19.](#)

## Stakeholders

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The primary stakeholders to this workgroup are identified in the Recommendation #2 section of the Resilient Washington State Report and as identified by the Governor's Directive 16-19. These primary stakeholders identified additional relevant organizations to be included in the discussion.

### PRIMARY STAKEHOLDERS

#### Utilities & Transpiration Commission (UTC)

The UTC is Washington's economic regulator for private Investor Owned Utilities (IOUs) that provide electricity, natural gas distribution, land-line telecom service, water, pipeline (natural gas and hazardous liquids), and regulates rail and transportation safety in Washington. The UTC does not dictate the day-to-day business functions of any entity under its jurisdiction nor does the UTC own any assets that provide utility service. However, the UTC does have technical staff assigned the state emergency operations center and safety inspectors that deployed following an emergency.<sup>1</sup>

#### Department of Commerce – State Energy Office (SEO)

The SEO reviews key energy issues including natural gas, alternative fuels, energy efficiency, renewable energy development, greenhouse gas emissions, energy supply and prices. The SEO coordinates energy-related emergency response and preparedness in the state, including staffing of the Emergency Support Function 12 (ESF12) in the WA State Emergency Operations Center. In this role, SEO personnel provide for the effective use of available electric power, natural gas and petroleum products required to meet essential needs and to facilitate restoration of energy systems affected by an emergency or disaster.

The SEO manages the Washington State Energy Program projects and the Clean Energy Fund programs and provides technical and policy support to the Northwest Power and Conservation Council, state agencies and state congressional officials on federal and regional energy policies and legislation. SEO

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<sup>1</sup> The UTC supports the EOC with respect to energy and communications related emergency support functions. In addition, UTC Pipeline and Rail Safety inspectors would likely be deployed at the request of the federal Pipeline and Hazardous Materials Safety Administration or Federal Railroad Administration, respectively, following a natural disaster

financial and technical assistance is funded by the U.S. Department of Energy. The SEO provides energy policy support, analysis, and information for the Governor, Legislature, Commerce and others.

### **Northwest Power and Conservation Council (NWPCC)**

The 1980 [Northwest Power Act](#) authorized Idaho, Montana, Oregon, and Washington to develop a regional power plan and fish and wildlife program to balance the Northwest's environment and energy needs. This act requires the NWPCC to develop a plan to ensure an adequate, efficient, economical, and reliable power supply for the region. Working with regional partners and the public, the Council evaluates energy resources and their costs, electricity demand, and new technologies to determine a resource strategy for the region.

### **WA Department of Health Office of Drinking Water**

Nearly 6 million people in Washington drink water from public water systems regulated by the state Department of Health. In partnership with local health jurisdictions, the department works to prevent public health threats to drinking water supplies, and to respond quickly when an actual or potential threat to the safety of drinking water occurs. Both conduct water system inspections (sanitary surveys) as a critical preventative measure to determine any potential threats to a water system's drinking water from source to tap. In addition to surveillance activities, the department responds to numerous drinking water threats and emergencies,

### **ADDITIONAL STAKEHOLDERS (*THIS LIST IS NOT COMPREHENSIVE*)**

- Bonneville Power Administration (BPA)
- Local and regional Consumer-Owned Utilities / Public Utility Districts
- Privately Owned Utilities
- Utility Cooperatives
- Investor Owned Utilities
- Climate Solutions
- Federal Communications Commission (FCC)
- Federal Emergency Management Agency (FEMA)
- Federal Energy Regulatory Commission (FERC)
- Federal Railroad Administration
- Industrial Customers of Northwest Utilities (ICNU)
- National Association of Regulate Utility Commissioners (NARUC)
- Northwest Gas Association (NWGA)
- Northwest Industrial Gas Users (NWIGU)
- Northwest Power Pool (NWPP)
- NW Energy Coalition
- Oregon Department of Energy
- Oregon Public Utility Commission
- Pacific Northwest National Laboratory (PNNL)

- Pacific Northwest Pollution Prevention Resource Center (PPRC)
- Peak Reliability
- Pipeline and Hazardous Materials Safety Administration
- Renewable Northwest
- University of Washington (UW)
- US Department of Energy
- US Environmental Protection Agency
- WA Department of Ecology
- WA Department of Enterprise Services
- WA Department of Natural Resources
- WA Department of Transportation
- WA Military Department
- WA State Patrol
- WA Technological Solutions
- Washington PUD Association
- Western Electricity Coordinating Council (WECC)
- Western States Petroleum Association (WSPA)

## Actions Taken To-Date & Actions Needed

<p><b>PRIORITY ACTIONS:</b></p> <p>2a. Maintain a state lifelines working group under the Washington State Emergency Management Council to facilitate improved coordination, planning, and response among public and private sector lifeline operators.</p>	<p><b>RECOMMENDED ORGANIZATIONS:</b></p> <p>EMD</p>
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### RECOMMENDATION 2A – ACTIONS TAKEN

Infrastructure Resilience Sub-Committee (IRSC) of the Emergency Management Council (EMC) continues to be an active community concerned with improved coordination, planning, and response among public and private sector lifeline operators. This group directly addresses recommendation 2a.

The IRSC meets once a quarter to discuss issues and programs that support infrastructure resilience statewide and reports these discussions to the EMC. The IRSC is attended by federal, state and local government representatives as well as both public and private organizations who own or are responsible for infrastructure within the state of Washington. The IRSC is concerned with any infrastructure issues that fall under one of the [16 Critical Infrastructure Sectors](#) as defined by the U.S. Department of Homeland Security. The IRSC is a public private partnership for information sharing, collaborating and developing approaches to a wide range of hazards to critical infrastructures within Washington State. Generally, the sub-committee meets to identify critical assets and hazards, and to generate planning, mitigation and/or policy suggestions. Specifically, the committee:

- provides content revisions for the Washington State Comprehensive Emergency Management Plan (CEMP) – Catastrophic Incident Annex. This will include sector-specific planning

appendices for the 4 lifeline sectors (Energy, Communication, Transportation, Water/Wastewater)

- validates the Planning Strategies, Capability Targets and Desired Outcomes for infrastructure related sections of the Washington State Preparedness Report
- provides quarterly updates, program & policy suggestions to bi-monthly EMC meetings
- explore standards to formalize information sharing between public emergency response organizations and infrastructure owner/operators
- creates a system that sets infrastructure restoration priorities based on the identification of facility dependencies and interdependencies.

The IRSC is not a decision-making body for allocation of emergency resources, and does not receive funding.

## RECOMMENDATION 2A – ACTIONS NEEDED

The IRSC should expand its membership to more fully incorporate members from both publicly and privately held lifeline owners and operators. The Emergency Management Division is currently exploring the feasibility of establishing a steering committee composed of lifeline sector stakeholders. This ties into the target capability assessment identified under the implementation action plan.

**2b.** Develop and adopt model statewide codes for design performance standards for each utility type. Examine incentives for replacement programs that eliminate non-ductile (rigid) pipelines and replace them with ductile (flexible) alternatives that are less susceptible to breakage in seismic events.

UTC with ASCE  
(lead); State  
Building Codes  
Council

## RECOMMENDATION 2B – ACTIONS TAKEN

### Electricity

BPA adopted a seismic design standard that specifies how to design and strengthen transmission facilities to withstand the hazards associated with seismic activity. The seismic standard provides design requirements that will enable essential electrical facilities to remain in service or be capable of being returned to service in a reasonable and timely manner. Much progress has been made in improving the resiliency of the transmission system including the recent installation of a first-of-its-kind support system known as base isolation technology on a critical transformer on the Vancouver, Washington Ross Complex. This state-of-the-art technology will decrease the likelihood of damage and increase the likelihood of system availability during and after a major seismic event. More information on BPA's asset management strategies:

- [BPA Transmission Management Strategy](#)
- [BPA AC Substation Asset Management Strategy](#)

Many Investor-Owned Utilities (IOUs) as well as publicly owned utilities maintain continuity of operations and emergency response plans that include design performance standards, however these utilities are too numerous to go into detail here. Additionally, these plans often include company proprietary or sensitive security information that should not be published. In light of this, the COM SEO

and MIL EMD maintain programs that focus on coordination with both public and privately owned electric utilities to ensure adequate information occurs in preparation for and response to a catastrophic earthquake.

## **Natural Gas**

About 10 years ago, The State Building Codes Council (SBCC) looked at requiring earthquake shutoff valves on the customer side of the meter. The SBCC did not adopt the requirement, instead referring to local policy. The SBCC did approve the use of corrugated stainless-steel tubing (CSST), which is now allowed under the fuel gas code. The SBCC is open to considering a new requirement for earthquake shutoff valves for the next code cycle in 2018.

Since 2009, the US Pipeline and Hazardous Material Safety Administration has begun requiring Excess Flow Valves for new or replaced service lines. The latest rules also require curb valves for the same construction.

## **Water**

### **The Water Sector Specific Plan (WSSP)**

Washington's Emergency Management Division (EMD) developed the Washington Infrastructure Protection Plan (WIPP) in February 2008. As part of the 2008 WIPP, state agency leads were asked to develop Sector-Specific Plan, to be appendices to the WIPP. DOH ODW developed such a plan for the Water/Wastewater sector in 2010 that provides a foundation for response to a catastrophic incident.

### **EPA Studies/Documents**

[Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities.](#) This guide encourages water and wastewater utilities to work with their local mitigation planners to implement priority projects using FEMA or other source funding. It provides an overview of the mitigation process, along with practical examples of mitigation projects to address the impacts of earthquakes, tornados, floods, drought, wildfires and power outages.

[Incident Action Checklist – Earthquake.](#) The actions in this checklist are divided up into three “rip & run” sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from an earthquake.

### **Water Supply Forum**

[Water Supply Forum - Regional Water Supply Resiliency Project Earthquake Vulnerability Assessment Technical Memorandum.](#) The objective of this study was to examine the resilience of water utilities in the three-county region (King, Pierce, and Snohomish Counties) following an earthquake and to identify regional strategies that would increase their resiliency. Water supply is considered critical for a resilient community; therefore, the results are quantified in terms of restoration times and economic impacts.

### **Water System/Earthquake Studies**

[Research of Earthquake Resistant Ductile Iron Pipe \(ERDIP\) for fault crossing.](#) This study proposes a method for designing a water pipeline system to withstand fault displacements by using Earthquake

Resistant Ductile Iron Pipe (ERDIP). An ERDIP pipeline is capable of absorbing the large ground displacements that occur during severe earthquakes by movement of its joints (expansion, contraction, and deflection). Existing ERDIP pipelines have been exposed to several severe earthquakes such as the 1995 Kobe Earthquake and the 2011 Great East Japan Earthquake, and there has been no documentation of their failure in the last 40 years.

## **Wastewater**

The WA Department of Ecology has personnel assigned in their agency Continuity of Operations Plan dedicated to works with wastewater treatment facilities following a disaster. Regulation over building codes and building performance standards is beyond Ecology's scope and likely falls within local and state building code enforcement organizations.

## **Information & Communication Technology**

The WA Military Department IT Division has been asked to convene a Statewide Project Team to address catastrophic emergency communications. The project team is comprised of FEMA, OCIO (FirstNet), Washington State Patrol, Washington State Department of Transportation, the Washington National Guard, and the Affiliated Tribes of Northwest Indians (ATNI).

The charter of this project team is to:

- (1) identify and agree upon primary and secondary command and control voice nets to be hardened for fallback radio communications for interagency response and lifesaving operations, and
- (2) propose a statewide solution with associated costs for maximum access/distribution and resiliency of these systems.

The State Project Team will decide on which existing systems should be enhanced/distributed and present them to the SIEC for review/approval. Following SIEC approval, requirements will be determined for enhancement costs and presented to the legislature by the Emergency Management Division Director for state funding in accordance with the Governor's direction.

## **RECOMMENDATION 2B – ACTIONS NEEDED**

Specific messaging and public information should be pre-built for quick distribution of fliers and pre-disaster outreach.

- Reinforce economic incentives to regulated IOUs to maintain preparedness. This may include:
  - Encouraging a more active role by all regulated entities in local, state, and regional exercises and planning.
  - Reviewing and updating reliability procedures, MOU's, and sharing agreements for economic impact and to encourage cooperation and develop direct mechanisms for cost recovery.
  - Examining direct incentives for investment in resiliency and preparedness improvements that are proposed by IOUs.

- Analyzing the capability and efficiency of using ductile pipe in hazardous liquid pipelines as outlined in Recommendation 2b with the understanding that ductile materials may not be appropriate for certain critical applications or may be cost-prohibitive in many uses.
- Encouraging natural gas distribution companies and other gas pipelines to participate in exercises and planning as is required of hazardous liquid pipeline operators.
- Provide to all IOUs contacts within State Emergency Management offices and actively encourage the development of private-public relationships.
- Require all IOU's to submit annual reliability reports that include emergency response procedures.
- Work with all regulated utilities to identify standard best practices for developing resilient infrastructure.

## Water

The Water Sector Security Council should be reestablished to evaluate the survivability of all Washington water systems. It should include perspectives from the “larger” systems (Tacoma, Seattle Public Utilities, etc.) and the few hundred “medium” systems (Spanaway, Sumner, etc.). The development of a decision matrix outside of the disaster situation could significantly help in responding to this particular disaster. Subsequent steps include identifying key infrastructure/critical resource priorities. This is a process that requires coordination between energy, transportation, and water/wastewater. Attention will be focused on the following:

- Survivability from an earthquake
- Cost/benefit analysis to evaluate priorities for response (e.g. a smaller water system serving 2 functional hospitals versus a larger water system serving 5 nonfunctional hospitals)
  - Staging areas for rescue crews operating in the disaster area
  - Triage locations for medical evacuations
  - Access by repair crews
- Prioritizing energy needs
  - Refineries
  - Water systems needing priority restorations of power
- Identifying which roads are expected to survive or can utilized expedited repair?
  - Coupled with which water systems are expected to survive or can utilized expedited repair?
  - Coupled with which portions of the power network are expected to survive or can utilized expedited repair?
- Effective communication with Water systems and emergency responders.

## Wastewater

Regulatory authority over wastewater treatment facilities is mixed between the WA Department of Ecology and state & local building code councils. Due to the unique designs of many of our state's 250 water treatment facilities, local & regional offices generally have the best knowledge of each facility. Much coordination is needed to understand building performance standards and how they relate to seismic risk. Ecology may be a logical agency to take this on for the state, however the scope of

their interactions with wastewater facilities has been limited to regulating water quality discharged from the facilities.

## Electricity

First, the state should complete a survey of utilities to identify current state continuity and emergency plans. Second, a regulatory gap assessment should be performed to identify where federal jurisdiction ends and when state regulatory authority begins. Finally, the state should draft design performance standards for electrical utilities that are achievable and realistic given the current situation.

## Natural Gas

Within the natural gas arena, a clear definition of which areas for replacement of pipelines are a priority is necessary. Specifically, flexible connectivity may not be the most important matter for natural gas resiliency. Natural gas distribution will have challenges up the entire pipeline, from large transport to small distribution pipes.

## Petroleum

It is important to recognize that the petroleum distribution system is privately owned by a moderately large number of entities and is only lightly regulated. For this reason, increasing resiliency for the petroleum fuels industry is challenging. COM-SEO should take the lead on working with the US Department of Energy to understand what work is currently being done with petroleum producers and distributors to encourage resilient business practices.

**2c.** Request that the Northwest Power and Conservation Council examine the feasibility of establishing an interoperable power network (including interoperable parts) within Washington and throughout the Pacific Northwest and/or western United States.

Office of the  
Governor, State  
Legislature,  
NWPC

## RECOMMENDATION 2C – ACTIONS TAKEN

While the NW Power and Conservation Council develops plans to meet the region's need for a reliable power system, it does not directly address electric system planning for resiliency in the event of an earthquake or other disaster. However, it has long played a role in evaluation and analysis of various components of the electric system, from large, centralized generation to distributed energy efficiency resources. Currently NWPC is convening advisory groups who are working to incorporate technologies like storage and demand response into regional planning. To the extent that these kinds of technologies are of particular interest to the region in resiliency planning, NWPC will be an important resource for helping identify the costs of additional infrastructure. Additional NWPC resources:

- [Seventh Power Plan](#)
- National Governor's Association Policy Academy on Grid Modernization; slides from opening workshop February 2, 2017; panel "[Keeping the Electrons Flowing: Modernizing the Power Sector to Improve Resiliency and Reliability](#)"

- The work of the NW Power and Conservation Council’s [Demand Response Advisory Committee](#) may be useful as it looks at ways to enable regional utilities to control or influence electricity demand at times when the system is stressed
- The work of the NW Energy Efficiency Alliance (NEEA), especially on [emerging technologies](#)
- [NWPPCC primer on the physics of the power system](#)

BPA engaged the Electric Power Research Institute in 2014 to develop a spare transformer strategy. This project explored the development of substation spare equipment to expedite the restoration of the power grid following a major disruption. Project goals include:

- Updating and improving BPA’s existing spare transformer strategies (Emergency Restoration Guides) by applying quantitative tools developed by EPRI.
- Measuring how transformer repair/replace decisions and sparing strategies that effect BPA’s ability to deliver power at cost.

## RECOMMENDATION 2C – ACTIONS NEEDED

It is currently unknown if there is the capability or willingness to put at standard in place to allow for component interchangeability and redundancy within the industry. An established standard for interchangeability and redundancy would require a multistate effort and may be more in line with the missions of the Utilities and Transportation Commission (UTC), the Bonneville Power Administration (BPA), and the WECC to address, given that the NWPPCC has no regulatory authority in this area.

The NWPPCC can analyze the economic aspects of an interchangeability and redundancy effort, however. This workgroup recommends creating a sub-workgroup to clearly define “interoperable systems” as written in Recommendation 2c, and what additional infrastructure would be called for by a resiliency plan. This working group should include Commerce, UTC, BPA, NWPPCC and representatives from the utilities. This workgroup should clearly define technologies – solar, batteries, transformer, etc. The Western Electricity Coordinating Council (WECC), the Northwest Power Pool (NWPP), and other stakeholders should also be included in the development of strategies to address this recommendation.

While freestanding micro- or nano-grids inclusive of photovoltaic panels could be developed for state, municipal, and county sites (including police, hospital and fire facilities) there again would need to be a prioritization of facilities for this work and a fund source identified to complete this type of work. The scope of this issue spans beyond the electric industry into other sectors and it needs a funded group to create a prioritized list of facilities, a budget, and a dedicated funding source to pay for infrastructure upgrades.

<p><b>2d.</b> Codify a framework for identifying and communicating which essential facilities will have priority for restoration of utility service following an earthquake. Such a framework will provide greater certainty during the response and recovery phases for critical facilities, etc.</p>	<p><i>Proposed life-lines working group (lead); State Legislature</i></p>
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## RECOMMENDATION 2D – ACTIONS TAKEN

Leveraging the expertise of the IRSC, the WA Military Department’s Emergency Management Division’s Infrastructure Program is working with the WA State Fusion Center to establish a survey-to-database tool. This tool will allow emergency planners to prioritize based on identified dependencies and interdependencies of critical infrastructure facilities. This tool would leverage federal infrastructure data present in the Infrastructure Protection (IP) Gateway to identify infrastructure locations to be analyzed with the tool.

## **RECOMMENDATION 2D – ACTIONS NEEDED**

Identification of tiered/triage system that provides a framework for prioritizing utility restoration requires research and needs to be data driven. Leveraging the expertise of the IRSC, the WA Military Department’s Emergency Management Division’s Infrastructure Program is working with the WA State Fusion Center to establish a survey-to-database tool. This tool will allow emergency planners to prioritize based on identified dependencies and interdependencies of critical infrastructure facilities. This tool would leverage federal infrastructure data present in the Infrastructure Protection (IP) Gateway to identify infrastructure locations to be analyzed with the tool.

A tiered/triage system for supply and restoration will be a controversial subject. Additionally, restoration of service is dependent upon the functionality of the system to which power is being restored. Based on this, earthquake scenarios on different fault lines would have unique tiered/triage tactics. A list of specific scenarios to plan to as well as impacted areas should be developed in order to create functional planning constructs.

Codification of response activities and restoration priority may not result in the anticipated outcome and could result in priority being given to an area where restoration is not only impractical, but infeasible. An analysis of the feasibility in multiple earthquake scenarios needs to be done before codification is actively pursued.

**2e.** Expand existing requirements regarding facilities that must have backup generators to include any facility that is critical to response and recovery operations. Connection to two different electrical substations alone should not satisfy these new requirements.

State Legislature

## **RECOMMENDATION 2E– ACTIONS TAKEN**

There are multiple regulatory agencies that may have existing requirements that should be identified and cross-walked before any additional regulations/requirements are implemented. For example, the Washington State Department of Health (DOH) likely has regulatory authority over hospitals; however police/sheriff/fire offices are probably overseen by cities or counties.

## **RECOMMENDATION 2E – ACTIONS NEEDED**

Additional research is required to determine who has regulatory authority, what facilities currently have backup generation, and how many days of generation would be needed under given circumstances. These efforts may have been completed, to some degree, for the Cascadia exercise.

Identify gas stations that are generator ready. This list had been populated in about 10 years ago but has not been updated since then. Incentivizing actions should be provided to stations that meets criteria for survivability, capacity, serviceability, and evacuation route proximity.

2f. Conduct an analysis of the potential economic losses associated with power outages that may result from a variety of earthquake scenarios. (This is to help implement Recommendations 2d and 2e.)

Dept. of  
Commerce

## RECOMMENDATION 2F– ACTIONS TAKEN

In November of 2011 the Department of Homeland Security released their *Analytics Baseline Study for the Cascadia Earthquake and Tsunami* from their Homeland Infrastructure Threat and Risk Analysis Center (HITRAC). Commonly referred to as the “the Cascadia HITRAC study”, this large report covers the comprehensive modeling and simulation of the effects of a Cascadia subduction zone earthquake on the region’s population centers and infrastructure networks. The report includes a chapter titled “Economic Consequence Analysis” that provides projected high-level economic impacts to the region.

## RECOMMENDATION 2F – ACTIONS NEEDED

WA should investigate using a Department of Energy (DOE) tool called Interruption Cost Estimate Calculator ([www.ICEcalculator.com](http://www.ICEcalculator.com)). This tool focuses on shorter term outages but may have some flexibility to be adapted for prolonged outages. A detailed scope and scale of study is needed, as well as funding to pay for the study. Alternatively, a funded university study could be explored.

## Needs & Expectations to Perform Actions

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In order to fully address and achieve Recommendation 2, a clearly delineated multiyear work plan and planning/work prioritization is critical. Additional funding and staffing would be required to define the scope of work and data requirements needed. Planning at this level has the potential to impact the capacity of existing staff to address current planning priorities, such as ESF updating and planning for smaller emergencies. Therefore, the prioritization of this workload needs to be upheld and consistent. This work plan needs to consider the limited regulatory authority that exists within the energy sector, limited staff available to complete this work, and the potential for discussion regarding restoration prioritization or additional regulation to be contentious.

Beyond the NW Power and Conservation Council there are many avenues for pursuing Recommendation 2 for electric utilities. Utilities, including the Bonneville Power Administration, and transmission system operators may already be engaging in the process of evaluating their systems for vulnerabilities, but this sub-cabinet should investigate that possibility. Utilities and transmission operators may also be mitigating those vulnerabilities. It would be helpful to survey them, to determine which utilities are already engaged and which are not, share best practices between different utilities, and seek their feedback on any barriers they face in mitigation activities. This would help illustrate whether and what role the state can play in encouraging or supporting mitigation.

Actions that fall within the jurisdictional authority of the Utilities & Transpiration Commission:

Specifically, through RCW 80.28.020

*Whenever the commission shall find...that the rules, regulations, practices or contracts ...are unjust, unreasonable, unjustly discriminatory or unduly preferential, or in any way in violation of the provisions of the law...the commission shall determine the just, reasonable, or sufficient rates, charges, regulations, practices or contracts to be ... observed and in force.*

And RCW 81.88.065

- 1) *Each gas pipeline company shall design, construct, operate, and maintain its gas pipeline so that it is safe and efficient. Each gas pipeline company is responsible for the conduct of its contractors regarding compliance with pipeline safety requirements.*
- 2) *The commission shall develop and administer a comprehensive program of gas pipeline safety in accordance with this chapter.*

## **Gaps & Barriers to Address Recommendation**

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There are four primary barriers to implementing the above recommendations:

### **CLARIFICATION OF FOCUS AND TERMINOLOGY**

Recommendation 2 includes priority actions that must be better defined by subject matter experts in each respective area. Some areas that specifically lack focus include:

- An examination of ductile versus non-ductile pipelines. The definition and engineering principles for this recommendation need to be clarified by the requesting authority before action can be implemented. Further, ASCE is listed as co-lead for implementing this recommendation but may not have all the necessary expertise. Additional resources may be needed from the American Petroleum Institute and the American Society of Mechanical Engineers.
- Regulation responsibilities for “house to street” natural gas connections.
- Further definition of what characteristics are important in establishing a regional interoperable power network.

Further, these experts must create workplans that are housed with a given agency that is designated as responsible for maintaining continuity of the effort across agencies and through longer timelines.

### **NO SINGLE REGULATOR OVER CONCERNED STAKEHOLDERS**

WA Department of Commerce’s State Energy Office (SEO) has little regulatory authority over energy utilities or providers, which makes meeting Recommendation 2 objectives more difficult. The Utilities & Transpiration Commission regulatory authority over energy utilities that are investor-owned.

The liquid fuels (petroleum) portion of the energy markets is largely unregulated, which causes challenges regarding assessing and increased resiliency. The petroleum industry is large and has extensive resources, but many of these resources and response mechanisms are closely held information or proprietary. It is entirely possible this sector may be able to respond to a CSZ type of incident, but how that response would unfold is unknown.

## **GAPS IN KNOWLEDGE**

The state does not have a comprehensive understanding of the overall resilience of utilities. There may be barriers for utilities in: understanding and identifying vulnerabilities, evaluating mitigation options, coordinating with other organizations and community partners, engaging ratepayers where needed, and funding the options chosen. Data that is necessary to make informed planning decisions is either scattered or non-existent.

## **LIMITED RESOURCES**

The expertise to properly carry out the functions listed above in Section 2 is extensive and for the most part does not currently reside within the position descriptions of individuals from the responsible agencies. For example, the resiliency analysis currently attempted at UTC is scattered across eight employees and constitutes a small portion of each employee's responsibilities. Work to address this report is currently assigned as part of employees "other duties" rather than on a dedicated, full time basis. Staffing, expertise and the funding to obtain both is not enough to meet daily work requirements and address major stakeholder outreach that would be necessary to fully implement the items identified in Recommendation 2. Because of this, prioritization of work must be done. Further, time is a limiting factor - Implementing new economic incentive structures and auditing the utilities' resiliency buildout will take time to put into action.

Specific resources lack to address water/wastewater system resiliency includes:

- Lack of funding for coordination with California water utilities currently testing some forms of earthquake resistant pipes. Collaboration by Western Washington utilities on such a project could yield positive results.
- Lack of funding to update or develop sector specific recovery and mitigation plans for Washington State water systems.
- Staffing dedicated to developing a master recovery plan for Key Resource\Critical Infrastructure for the Nexus of Energy\Transportation\Water.
- Creating and maintaining a functional WSSP with details for responding and coordinating the recovery of water systems in a disaster.
- Severely lacking Laboratory resources for clearance sampling for the recovery of Water systems

# Implementation Plan

**SHORT TERM (1-5 YRS):** (Actions that are achievable with current resources; with reprioritizing existing resources/personnel and or are critical for achieving medium-term and long-term actions.)

<b>Action Description: Target Capability Assessment</b>			
<p>Detailed attention needs to be given to the Infrastructure Systems Target Capability Assessment in the State Preparedness Report (SPR). The current SPR lists a Target Capability for Response, however it is in need of updating based on new knowledge of the effects of a 9.0 CSZ event. Additionally, a new Target Capability is needed for Recovery.</p> <p>Multi-agency coordination; 1 FTE, 1 Executive from each state agency listed below and an AAG. (Governor’s Office, UTC, COM, DOH, WMD, OCIO, DES for fuel contracting, WSDOT); Coordination with relevant federal agencies will need to be accomplished (DHS, BPA, WECC/NERC, FEMA, FHMSA, FRA).</p>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	Multi-agency coordination; 1 FTE, 1 Executive from each state agency listed below and an AAG. (Gov Office, UTC, Commerce, DOH, WMD, OCIO, DES for fuel contracting, SDOT); Federal assessment will need to be accomplished (DHS, BPA, WECC/NERC, FEMA, FHMSA, FRA)		
<b>Cost (estimated)</b>		X	

**Action Description: Legal Mapping of “lifeline sectors” (Energy, Transportation, and Communication & Water/Wastewater) Emergency vs. Governor’s Emergency Proclamation**

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	Analysis of statutory authority of “lifeline infrastructure sector” emergency would take a short duration of effort and clarification from the AAG on the scenarios to implement either or both		
<b>Cost (estimated)</b>			X

<b>Action Description: Prepopulated Public Information Campaign</b>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>		Prepopulate a public information campaign. Some of this information is already in existence but will need to be tailored for catastrophic event. This information needs to be tailored to the technical and organizational environments of utility providers, going beyond current personal preparedness public information campaigns. It needs to be designed to be consistent and replicable by infrastructure owner/operators across the state.	

<b>Cost (estimated)</b>			X
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<b>Action Description: Jurisdictional/Regulatory Gap Assessment</b>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	Multi-agency coordination; 1 FTE, 1 Executive from each state agency listed below and an AAG. (Gov Office, UTC, Commerce, DOH, WMD, OCIO, DES for fuel contracting, SDOT); Federal assessment will need to be accomplished (DHS, BPA, WECC/NERC, FEMA, FHMSA, FRA)		
<b>Cost (estimated)</b>		X	

**Action Description: Utility Assessment (Assessment of operations, current infrastructure resiliency and plans for asset deployment, continuity of operations, communications (both internal and external), response plans (immediate, near term, long term). This is a specific catastrophic incident capability for a CSZ Event. (Cascadia Subduction Zone).** The goal is to create sector wide plans for all the lifeline sectors (Energy, Transportation, and Communication & Water/Wastewater) in addition to linkages relating to Mass Care and Bulk Fuel distribution. **Assessments may be done via questionnaires and confidential briefings with jurisdictional telecoms, electric, natural gas and water companies.**

**NOTE: Parallel efforts will need to be done with interstate pipeline companies that transport hazardous liquids and gases such as natural gas, gasoline and other compounds.**

**This effort could be scalable by doing the assessments on utilities serving larger population bases.**

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		X	
<b>Effort (estimated)</b>	4 FTEs, 1 Executive; Develop industry-specific questionnaires; have expertise to understand responses to each questionnaire. Continually refine and monitor IOU progress toward resiliency.		
<b>Cost (estimated)</b>	X – ongoing headcount and time		

**MEDIUM TERM (5-10 YRS):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Create a State Emergency/Disaster Fund (THIS NEEDS TO BE A MULTI WORKGROUP ACTION)			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	Requires legislative support and fund source that is continuing into perpetuity. Could have a resiliency competitive fund round annually for funds over and above a dedicated amount.		

	Fund should not be allocable to programs outside of non-federally funded disasters/emergencies or resiliency projects.		
<b>Cost (estimated)</b>	X		

# Appendices

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## APPENDIX A: UTC 2017-2019 STRATEGIC BUSINESS PLAN

Reliability review is currently a strategic goal of the UTC’s 2017-2019 Strategic Business Plan.

*Ensure that regulated companies provide safe and reliable infrastructure on which the state’s economy depends.*

*Tactical Goal: Enhance the reliability of regulated utility services.*

...

*The commission works closely with utilities to ensure they are using all reasonable means to provide reliable service, respond to outages, and enhance their network reliability. However, companies may in some cases choose not to make adequate network investments to replace and upgrade aging infrastructure due to the pressures of increased competition, consumer-owned sources of alternative energy, and flat revenues.*

*Objective: The commission will monitor network investment levels and activities as part of various regular proceedings, including energy company rate cases and integrated resource plan workshops and presentations. The commission will revise its rules and other requirements as necessary to address areas where investment and preventive actions are insufficient to ensure adequate network reliability.*

...

*Performance measure: the commission will measure and compare company operations over time, including the average length of outages, the annual number of outages that exceed five minutes, the number of customers affected, and the time required to restore service...*

### Energy

The UTC receives and reviews annual reliability reports from electric investor-owned utility companies (Avista Corporation, Pacific Power & Light, and Puget Sound Energy). The reports themselves do not contain emergency preparedness information. It is the intent of UTC staff to request and develop emergency preparedness information during the current review period. The last audit of an IOU's emergency preparedness policies was the review of the electric IOUs' response to a major outage in December 2006 (also known as the Hanukah Eve Storm) and the consultant's report filed in 2007 on that incident in Docket UE-072300. In UE-131799, the Commission held a workshop on Electric and Natural Gas Cybersecurity practices and policies. This led to the development of an annual report regarding Critical Infrastructure Security that is included in the annual electric reliability reports.

### Wireline Telecommunications

The UTC receives and reviews the emergency contact information for telecommunications companies annually in Docket UT-071049. Additionally statutes and rules (RCW 80.36 and WAC 480-120) require telecommunications companies to maintain system service quality, safety, and reliability. UTC staff met with WMD, CenturyLink, Comcast, and Frontier and received briefings on network security initiatives in the industry, 911 systems, and recovery in the event of disasters as an outcome of natural and other outages between 2014 and 2016. UTC staff is currently reviewing reliability and resiliency factors in telecommunications networks as required in Commission orders in Dockets UT-140280 and UT-140597.

### Water

The UTC has oversight and jurisdiction over rates charged by private water systems, which represents a small fraction of public water works. As an economic regulator over private water systems which focuses on rates charged to end users, the UTC does not have authority over the quality of water delivered. That authority resides solely with the Washington Department of Health. In 2014, the UTC held a workshop to discuss with water providers statewide the importance and issues around cyber security, reliability and service protection.

### Natural Gas and Hazardous Liquids Pipelines.

The UTC has adopted in rule through WAC Chapters 480-75 and 480-93 numerous safety and construction regulations regarding natural gas and hazardous liquid pipelines, including those related to seismic activity. By reference, these safety standards include provisions of federal rules (49 CFR Parts 191, 192, 194 and 195). The UTC pipeline safety division serves as developer and enforcer of these safety standards for pipelines operating solely within the State. The UTC pipeline safety program also

inspects interstate pipelines, but the federal Pipeline and Hazardous Materials and Safety Administration sets standards and provide enforcement for such pipelines.

#### “Other” Related Functions

- UTC staff serving as external Emergency liaisons to WMD contributed to development of the Governor’s Comprehensive Emergency Management Plan (CEMP) and Continuity of Operations Plan.
- The UTC has worked closely with the National Association of Regulatory Utility Commissioner (NARUC) on utility reliability initiatives, training, whitepapers and reports with recommended actions, and NARUC resolutions related to reliability, safety and cybersecurity protections.
- The UTC was a principle in developing the 2015 Washington State Significant Cyber Incident Annex to the CEMP and annual review/revisions as required.

UTC staff participated in the Washington Emergency Communications Coordination Working Group (WECCWG.) WMD established the core working group WECCWG for updating CEMP Annexes (Cybersecurity and Communications) with Primary Support Agencies WMD, UTC.

## APPENDIX B: PPRC RECOMMENDATIONS

**Summary:** The Pacific Northwest Pollution Prevention Resource Center (PPRC) is a nonprofit organization that provides outreach to businesses for pollution prevention and resource efficiency. To minimize impacts of utility operations, due to an earthquake and tsunami, PPRC makes the following recommendations. Many elements of utilities that contain hazardous material appear on existing hazard risk-map available to citizens or emergency response personnel. Some changes in process and infrastructure are necessary to integrate private generation of energy and processing of waste. Changes should facilitate use of electricity from these privately generated alternative sources even when the power grid is down. Government may consider working with utilities to fund an organization similar to Energy Trust of Oregon that can incentivize and promote alternate sources of energy and processing of waste. A community based backup approach may be easier and cheaper approach than ruggedize each utility.

**Background on PPRC:** The Pacific Northwest Pollution Prevention Resource Center (PPRC) is a nonprofit organization established in 1991 that is the Northwest's leading source of high quality, unbiased pollution prevention (P2) information. PPRC works collaboratively with businesses, government, non-government organizations, and other sectors to promote environmental protection through pollution prevention. PPRC acts as an outreach organization to help business reduce waste, improve safety, improve efficiency, and save cost. PPRC has substantial experience in helping business with education, audit, analysis, training, and certification with various matters related to hazard material and resource efficiency.

**Recommended Approach for Utility Preparation for a Mega Disaster:** PPRC has expertise in reduction of pollution and improving resource efficiency. Anyone can access data from Environmental protection agency (EPA), department of ecology. These agencies get information on hazardous materials and spills through Trier II and TRI reports. However, preparation for a mega quake or tsunami will require going beyond the current processes and approaches. This document illustrates these aspects and provides some examples. We outline a general frame work and it is not meant to be an exhaustive list of action items. In general PPRC we propose three key steps to improve preparation for major disaster.

1. **Hazard material risk-map:** A geographic map of area of interest that would show potential geologic faults, location of hazardous material, hazardous waste storage and the area that could be affected due to a breach. Such a map will not only help in the gathering and movement of people and first responders, but identify pre-disaster improvements to minimize release. The first version of the map will use existing hazardous material and/or waste information from various publically available databases. One key gap Hazard material inventory statement (HMIS) gathered as part of compliance fire code is not available in a database. The first version will indicate information gaps that should be added in future versions of the map. Here is how this map is different from various tools on websites for EPA, Washington State Department of Ecology, and United States Geographical Survey (USGS).

- 1.1. The risk-map must show multiple data layers such as geographic location, potential natural dangers (liquefaction, landslide, flood, etc.), locations of certain hazardous materials, along with quantities. Currently, a risk map like PPRC is suggesting, does not exist to our knowledge. There are a few examples of risk maps, but none combine geological information with hazardous material and waste storage.
- 1.2. Ecology's maps have two key deficiencies. Tier II reports and data for hazard material is available only if the material quantity meets or exceeds a minimum quantity. For most hazardous material minimum quantity is 10,000 Lbs. Several locations have hazardous material in quantities less than this. In case of a disaster, even a very small amount of certain materials can create significant danger to citizens and businesses. Secondly, many hazards posed by substations, transformers, fuel tanks, are not on the EPA or DOE maps. An explosion of a transformer that uses oil for cooling can pose significant hazard to citizen escaping the area or first responders trying to help communities.
- 1.3. The hazard locations in Ecology's maps appear as a diamond. The diamond indicates that the hazardous material is stored at this location, in amounts equal to or above the minimum quantity. Unfortunately the map does not indicate size of the area unsafe for leak or spill of specific hazardous material at a site. Most people that are using today's map would not be able to decide how far out is safe or which route is safer. A new map should show ovals covering area that may be affected by hazardous material or waste release or spill. This information should be updated periodically based upon actual quantities of material.
2. **Education and best practices:** There are a number of ways communities and business could reduce risks and thus improve preparedness for a major disaster. Education about various dangers, best practices and drills will significantly improve preparedness. Some examples of best practices are (a) Select emergency assembly area and escape route with knowledge about hazardous materials and geological dangers. (b) Have a well-publicized risk management plan for various hazards. (c) Use alternate, less dangerous materials for example, use LED lights instead of florescent or HID, or use natural gas instead of propane. (d) Use segments of flexible pipes for flow of all materials including fire retardant (sprinkler) systems. (e) Make sure hanging or standing objects (e.g., display screens, file cabinets) are bolted to foundation wall structure. (f) Make sure heavy objects (e.g. server racks, tanks) are installed in ways that can move to reduce stress when the ground shakes.
3. **Preparation of lack of basic life support services:** It is estimated that many basic life support services such as water supply, waste management, supply of gas or electricity, or transportation may be out for several months after a disaster. Clearly, we need to prepare for alternative to energy production (gas and electricity) and treatment of waste. At the same time we need to ensure high efficiency of use of these resources. Efficiency becomes extremely important when resources become scarce or non-existent due to the disaster. We must prepare and practice these methods now.

With these approaches, PPRC has developed the following recommendations discussed below.

### **Vulnerabilities and Recommendations Regarding Utilities**

Following are six recommendations for utilities to consider, supported by discussion of the deficiencies and potential remedies. The numbers and text italics refer to focus items for workgroup 2

*2a: Washington State Emergency Management Council to facilitate improved coordination, planning, and response among public and private sector lifeline operators:*

Deficiencies: Several locations where utilities may have hazardous material onsite do not appear on the public maps from EPA or Department of Ecology. Some examples of such sites are: electric substations, transformers, sewer/septic tanks, bio digesters, fuel tanks and lines.

Proposal: Utilities need to identify elements with hazard material and provide location of such elements on a risk-map. It is important to identify such elements (substations, transformers, septic, etc.) and hazardous material storage, even if the quantity may be lower than the minimum required for a Tier II report or reporting to HMIS. For example many substations or electrical transformers that use emersion oil for cooling are located in communities and alongside roads that may be used as escape routes or routes to reach citizens by emergency responder. Damage to a transformer not only can cause fire but spread of hazardous gas.

*2b: Develop and adopt model statewide codes for design performance standards for piping systems for each utility type:*

Deficiencies: Many gases, water or other hazardous materials use rigid connections that could break due to intense shaking of a mega earthquake. PPRC observed that many businesses that implement a fire retardant systems or sprinkler system also use rigid pipes. Intense shaking could disable any of these systems, including the sprinkler system that may be needed to douse a fire as a result of a disaster.

Proposal: New building code for flexible connection can be one remedy but such a change an implementation of the code will likely take a long time. PPRC proposes that a faster adoption could be achieved via either some sort of incentive (rebate) program for adoption of flexible pipe connections or part of some voluntary certification program. A success of such program requires education, training and evangelism.

*2c: Interoperable power network (including interoperable parts)*

Deficiencies:

- Washington State uses net metering for integration of alternative sources for electricity. One drawback of net metering, when the power grid is down, even though one has an alternate electric source, net metering cannot be used. Some may want store power in batteries but if net metering prevents use of any power during an outage of the grid saving power in batteries is not useful. In short net meter may reduce the value of battery power available as energy storage for emergencies.
- Most business facilities lack implementation of demand-response. Even for residential customers demand-response is used predominantly for metering.

- The State of Washington relies on rebate coupons versus the state of Oregon, whose funds come from utilities, and is aggregated for use by the Oregon’s Energy Trust. Lack of large aggregated funds makes it difficult to provide incentives for larger programs for generation of alternate energy or processing of waste such as bio-digesters.

Proposal:

- Develop structure that will easily allow citizens and communities to use alternate energy when the power grid is down. Promote communities generation of alternate energy and alternate local processing of waste.
- Demand response can be used to control setting or powering on or off elements. Adopt this wider scope (control of resources) of demand response that goes beyond metering.
- Establish organization similar to Oregon’s Energy Trust to promote alternate energy, energy efficiency and bio-digesters.

*2d: Codify a framework for identifying and communicating which essential facilities:*

Deficiency: Utilities and their framework do not appear on GIS system accessible to public.

Proposal: Include this data layer on the risk-map discussed earlier.

*2e. Expand existing requirements regarding facilities that must have backup generators to include any facility that is critical to response and recovery operations.*

Deficiency: Limited backup power and backup power support a large community will be expensive.

Proposal:

- Promote local and distributed generation of electricity and processing of waste
- Demand response to integrate multiple producers

*2f. Conduct an analysis of the potential economic losses associated with power outages.*

Deficiency: Need analysis of potential impact of power outage. Power outage itself may create leaks and spills of hazardous material.

Proposals:

Impact of power loss should also comprehend impact due to stoppage in processing of sewer and a fuel spill.

# RESILIENT WA WORK GROUP 3

## COMBINED IMPLEMENTATION INFORMATION

### Planning

**Gap analysis Action:** Planning: Supporting the planning efforts of local jurisdictions, including Tribes.

**Action Lead:** Department of Commerce (developed by John Schelling)

**Stakeholders:** All cities and counties within Washington State, Department of Enterprise Services-State Building Code Council, Federal Emergency Management Agency, Washington State Emergency Management Division, Department of Archeology and Historic Preservation.

**Needs/Expectations for achieving the Action:** The local government comprehensive plan is an important first step to incorporating resiliency and risk reduction strategies at a community level. Strategies can be implemented through development regulations, critical area ordinances (CAOs) and other mechanisms once a comprehensive plan has been approved by the local jurisdiction. A desired end state would entail locally adopted comprehensive plans, development regulations and capital improvement plans (programs) that consider the impacts of disasters on the natural and build environments in order to ensure actionable local strategies are developed and, when adequately resourced, implemented. For communities that are not fully planning under the GMA, and may not have an up-to-date comprehensive plan, considering the effects of disasters within the context of a local hazard mitigation plan with actionable risk reduction strategies in conjunction with their CAO, should also yield positive outcomes.

#### Current Efforts:

- The Department of Commerce engages local governments to support their planning efforts through guidance and technical assistance. The Department of Commerce is currently updating the Critical Areas Handbook that will offer to local government’s guidance on updating their Critical Areas Ordinance to current standards and best available science. The handbook may also prove useful to Washington’s 29 Federally Recognized Tribes, who are not subject to state planning law, but who may wish to implement measures to voluntarily improve their community resilience. Previous guidance was published by the Department of Commerce entitled “Optional Comprehensive Plan Element for Natural Hazard Reduction” and was designed to assist local jurisdictions integrate hazards reduction with land use planning. However, the guide has become outdated and does not reflect current policy at either a federal or state level.
- Additionally, the Department of Commerce conducted a survey of all cities and counties within Washington to ascertain their existing level of planning about community resilience from disasters. The survey queried all local jurisdictions on their desire for a publication that would enable them to enhance their existing efforts in order to increase resiliency.

Survey results indicated that more than 54% of respondents do not consider disaster recovery within the context of their existing land use planning efforts while 25% did make such considerations. Fewer than half (45%) of respondents indicated that they incorporate information from a FEMA approved Hazard Mitigation Plan into the land use planning efforts. Finally, 75% of respondents indicated that their planning efforts would benefit from a guidebook that outlines how to integrate natural hazards risk reduction and disaster recovery into short- and long-range community planning efforts. Hazards that respondents would like to see included within such a publication included: earthquakes (88%), landslides (79%), floods (70%), wildfires (46%), volcanoes (42%), tsunamis (29%), and drought (33%). Respondents were also overwhelmingly consistent with their responses that development of such products not result in a future unfunded mandates within the Growth Management Act.

Planning considerations and/or model ordinance development related to historic preservation and reducing the seismic vulnerability of historic structures as well as the inclusion of tools and resources from the Washington State Department of Archeology and Historic Preservation (DAHP) may be especially relevant for inclusion within a planning guidebook or other publication geared toward local communities and tribes.

- The Department of Commerce currently participates in the Coastal Hazards Resilience Network (CHRN), which is convened by the Washington State Department of Ecology, to identify coastal hazards and support collaborative efforts between federal and state partners to address locally identified needs. The CHRN also provides interagency engagement and information sharing in order to leverage various programs that individually may not be able to address a local issue, but when coupled with another CHRN member's program, may be more effective in accomplishing a project or goal.
- The Department of Commerce currently facilitates quarterly planners' forums and locally requested short courses on a routine basis. Planners' forums and/or short courses can be tailored to locally relevant themes including resilience and disaster recovery.
- The Washington Military Department's Emergency Management Division, Department of Ecology, Department of Natural Resources, and the Department of Commerce actively participate in and support local community resilience planning through the Federal Emergency Management Agency's RiskMap program. While initially focused on coastal counties, this federal-state program is designed to facilitate local hazard and risk assessment with the aim of generating concrete mitigation and risk reduction strategies that can be incorporated into local planning efforts. These efforts are currently ongoing with work underway in Whatcom County.
- In addition to participation within the RiskMap program, the Department of Commerce is currently completing a strategic planning initiative to support and enhance local community resilience efforts, including planning, energy assurance and sustainability, community development, and infrastructure investments. Staff from a variety of Commerce programs are

conducting community engagement from April 24, 2017 – April 28, 2017 to capture local needs, issues, and concerns in order to ensure specific strategies pursued by the department meet the mark. Outcomes of this effort are intended to dovetail with and support strategies from the Governor’s Resilient Washington Subcabinet as well as to provide a forum for capturing local needs and sharing them with relevant stakeholders.

### **Gaps & Barriers to achieving the Action:**

Some actions, such as developing an outline for a community resiliency planning guidebook or a fact sheet on disaster resiliency, may be accomplished within existing resources. However, funding for local government comprehensive plan updates to incorporate this information and for Commerce to provide increased levels of technical assistance may be necessary to fully realize the potential of this activity. Of special note is that smaller jurisdictions with a single planner or a contractual arrangement for planning services may have difficulties implementing recommendations without additional resources.

It should also be noted that local jurisdictions are not required to address cultural and historic resources in their growth management planning work. As a result, planning assistance for communities takes on greater urgency for jurisdictions to undertake this effort to include disaster preparedness and response for historic buildings and districts. Fifty-five cities and counties have local historic preservation commissions that provide a valuable resource. Also, these local programs are eligible to apply to DAHP for funding to undertake preservation planning activities. Ensuring local programs are aware of such funding may be a relevant component of an education and outreach campaign.

### **IMPLEMENTATION\***

**Actions Needed:** Planning: Supporting the planning efforts of local jurisdictions, including Tribes.

**Primary Outcome: Improved community resilience through better guidance and technical assistance to local governments.**

Implementation Actions:

- Define how resiliency relates to the GMA. Incorporate a Community Resiliency Guidebook into the Growth Management Services Unit’s annual work program.
- Select an inter-agency committee to advise the development of the guidebook, including content.
- Complete the guidebook over a one-year period.
- Outreach to local governments in order to educate about the guidebook and applicability to local planning and development.
- Conduct an assessment of guidebook effectiveness and compile ideas for future updates.

**Action Matrix:** Fill out a matrix for each action.

Short-term

<b>Action Description:</b> Supporting the planning efforts of local jurisdictions, including Tribes.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Improved community resilience through better guidance and technical assistance to local governments.	
<b>Effort (estimated)</b>		The effort has several phases, including stakeholder engagement, product development, and associated outreach to local governments and tribes.	
<b>Cost (estimated)</b>		Additional staffing and/or consultant support will be needed for product development; delivery of training and provision of technical assistance to local governments may also require additional resources, but some components can be incorporated into existing trainings, such as planning short courses and planner's forums.	

**SCORE: 6/med**

<b>Action Description:</b> Define how resiliency relates to the GMA and Get a Community Resiliency Guidebook into the Growth Management Services Unit’s annual work program.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	After the completion of the Department of Commerce’s Community Resilience Initiative, define which resulting recommendations relate to the Growth Management Act and could best be implemented through local comprehensive plans and development regulations.		
<b>Effort (estimated)</b>			The Department of Commerce’s Community Resilience Initiative is currently underway. Subsequent level of effort is projected to be low.
<b>Cost (estimated)</b>			The cost for the Department of Commerce’s Community Resilience Initiative is already accounted for in terms of staff costs. Subsequent costs can be achieved within existing resources.

**SCORE: 9/HIGH**

<b>Action Description:</b> Select an inter-agency committee to advise the development of the guidebook including content.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Establishment of interagency committee to develop guidebook.	
<b>Effort (estimated)</b>			Finding committee members and holding monthly meetings will take a minimal amount of effort
<b>Cost (estimated)</b>			Required staff time is anticipated to be covered from within existing resources.

**SCORE: 8/High**

<b>Action Description:</b> Complete the guidebook over a one-year period.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Complete guidebook development	
<b>Effort (estimated)</b>	One (1) additional FTE and possibly a consultant contract may be required to complete the development of the guidebook		
<b>Cost (estimated)</b>		The anticipated cost would fall within the medium range.	

**SCORE: 5/med**

<b>Action Description:</b> Outreach to local governments to educate about the guidebook and applicability to local planning.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Conduct outreach to local governments.	
<b>Effort (estimated)</b>		May involve developing new Short Course content and Regional Planners' Forum content with resultant staff travel and face-to-face interaction with local governments across Washington.	
<b>Cost (estimated)</b>		The costs are anticipated to be in the medium range.	

**SCORE: 6/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Conduct assessment of guidebook effectiveness and compile ideas for future updates.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>			Conduct guidebook assessment 5 years after publication.
<b>Effort (estimated)</b>		Staff time needed to review local government comprehensive plans and development regulations.	
<b>Cost (estimated)</b>		The costs are anticipated to be in the medium range.	

**SCORE: 5/med**

**Gap analysis Action: Develop and Disseminate a Disaster Preparedness and Resilience Plan and Toolkit for Cultural and Historic Resources-Development of a template for cities, counties, and tribes to adopt that articulate and detail strategies, tasks, and tools needed to prepare those resource types and their stakeholders for disaster and provide a platform for rapid recovery.**

**Stakeholders:** local/tribal government planners; local government emergency managers; local/tribal cultural resource/historic preservation commissions & staff; local/tribal historic preservation officers; affiliated interest groups (i.e. historical societies, museums, archives, etc.); historic property owners; business owners; closely related professional groups (i.e. CRM consultants, architects, engineers); building industry (i.e. developers, building officials, building contractors, real estate); Main Street organizations; tourism organizations; arts organizations (i.e. 4Culture); federal and state agencies (i.e. DAHP, FEMA, NPS, State Parks), WABO.

**Needs/Expectations for achieving the Action:** a template document that articulates specific tasks and strategies for local jurisdictions and tribes to adopt as a disaster preparedness and recovery plan for cultural and historic properties; include effort to incorporate the plan/toolkit into local emergency preparedness planning frameworks and plans.

Need is for funding to hire a qualified consultant tasked with gathering and assessing what has already been developed elsewhere; work with stakeholders; create and design the template based upon Washington state context; do education and outreach.

**Current Efforts:** Databases have been developed and are being enhanced at DNR, DAHP, and other agencies that provides useful information; model materials/websites have been developed in other states/jurisdictions; some local and tribal governments have incorporated historic preservation considerations in emergency management plans; workshops on this topic have been held at forums around the state; Department of Ecology’s Cultural Resources Oil Spill Response Team can serve as a model for stakeholder responses.

**Gaps & Barriers to achieving the Action:** Funding needed to acquire qualified consultant; acceptance and implementation by local governments.

## **IMPLEMENTATION**

### **Preservation Plan/toolkit**

**Action Lead: Department of Archaeology and Historic Preservation (DAHP)**

**Actions Needed: Develop and Disseminate a Disaster Preparedness and Resilience Plan and Toolkit for Cultural and Historic Resources**

Implementation steps: *1) Recruit stakeholder workgroup; select, hire, and brief consultant; 2) Scan and evaluate existing resources, materials, case studies; etc. 3) Draft document and circulate to stakeholders for comments; revise draft as appropriate and re-circulate for 2<sup>nd</sup> round of review and comments; finalize document; 4) Disseminate to stakeholders; conduct training and outreach; and 5) Conduct periodic (not longer than 5 years) review of the document, revise as needed, and circulate.*

(Clearly state and define each action needed to achieve this part of recommendation 3. Each action will need to be categorized (short-term, medium-term and long-term) and populated into an action matrix with the following information: priority, effort estimate and cost estimate. *See below.*)

**Action Description:** Development of a template for cities, counties, and tribes to adopt that articulate and detail strategies, tasks, and tools needed to prepare those resource types and their stakeholders for disaster and provide a platform for rapid recovery.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	This task is high priority in order to provide jurisdictions (cities, counties, tribes, districts) with defined tasks, procedures, protocols, and data to plan for, respond to, and recover from a disaster event in a rapid, efficient, and effective way.		
<b>Effort (estimated)</b>		Recruiting stakeholder groups and selecting consultant can be accommodated with existing DAHP staff at approximately 10 to 15% of staff time on an annual basis for 1.5 to 2 years. Low level of complexity for consultant recruiting, stakeholder group meetings, contract administration, and monitoring; but moderate level of complexity for evaluating consultant materials.	
<b>Cost (estimated)</b>		Estimated cost: \$150,000 for consultant contract, plus \$20,000 for contract administration, related travel expenses, and	

		supplies. DAHP will contribute some staff time with estimated value of \$20,000/year. Total estimated cost: \$200,000	
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**SCORE: 7/med**

<b>Action Description:</b> Develop a template for cities, counties, and tribes to adopt that articulate and detail strategies, tasks, and tools needed to prepare those resource types and their stakeholders for disaster and provide a platform for rapid recovery---Periodically update and revise.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Conduct periodic (not longer than 5 years) review of the document, revise as needed, and circulate for implementation. Important to keep materials updated and revised accordingly to be useful and accurate if an event were to occur.	
<b>Effort (estimated)</b>		Moderate level of effort to undertake review and analysis of the document and update as needed to reflect new information and experience accumulated over the previous years. May require consultant services	
<b>Cost (estimated)</b>		Total estimated cost: \$100,000 including staff time, expenses, & consulting services	

**SCORE: 6/med**

**Gap Analysis Action: Develop and implement a funding program for the seismic retrofit of privately and publicly owned historic unreinforced masonry (URM) buildings. Program will provide financial incentive and technical assistance to owners of historic URM buildings to complete needed retrofit work.**

**Stakeholders:** Public and private owners of historic URM buildings/structures; local historic preservation agencies; Tribes; professional service providers (i.e. historical architects, engineers, building contractors, etc.) building officials/inspectors; private/non-profit historic preservation organizations; developers; financial advisors; Washington Association of Building Officials; Structural Engineers Association; Main Street organizations.

**Needs/Expectations for achieving the Action:** Experience and research demonstrates that URM buildings and structures are particularly vulnerable to damage, even total loss, as a result of an earthquake. In Washington they are also frequently located in seismically unstable areas such as in fill, shorelines, or near steep slopes. Although historic URM buildings face safety challenges, they are also vital economic resources that provide housing, office space, workplaces, schools, cultural and recreational spaces. Finally, historic URM buildings and structures are often iconic resources that define a community's character, sense of place and well-being. But historic URM buildings require careful evaluation and treatment to retrofit *and* to preserve historic character. The need/expectation of this action includes: 1) Improve the resilience of historic URM buildings and structures in order to improve life safety; and 2) Long-term preservation of historic URM buildings/structures to aid the rapid recovery of a community's economic, social, and cultural well-being; preserve and protect a community's iconic places, historic character, and sense of place.

**Current Efforts:** For decades historic URM buildings and structures have been seismically retrofitted by both private and public owners. Often taking advantage of historic preservation tax incentives or public funding sources, many historic buildings have enjoyed retrofits in conjunction with larger rehabilitation efforts. However, it is thought that the number of existing URM buildings/structures far outnumber the number of such buildings that have not been seismically retrofitted. This program is intended to reach property owners who are not aware/not able to undertake retrofitting work on their properties. This action is modeled on DAHP's existing Historic County Courthouse Rehabilitation Grant program and Washington Heritage Barn Grant program. Both programs have enjoyed nearly 10 years of successful rehabilitation of historic properties using seed funding from the Legislature's Capital Budget.

**Gaps & Barriers to achieving the Action:** State legislation and funding; additional staff capacity to administer the program.

## **IMPLEMENTATION**

### **Historic URM funding program:**

**Action Lead: Department of Archaeology & Historic Preservation (DAHP)**

**Actions Needed: Develop and implement a funding program for the seismic retrofit of privately and publicly owned historic unreinforced masonry (URM) buildings. Program will provide financial incentive and technical assistance to owners of historic URM buildings to complete needed retrofit work.**

Implementation steps: *1) Configure the program; convene advisory committee of stakeholders to define program parameters such as funding criteria, eligibility requirements, funding priorities, application procedures, etc.; 2) Assemble URM data and identify data gaps; 3) Evaluate and configure WISAARD to enhance its utility for collecting and storing URM data on statewide basis; 4) acquire program staffing and/or consulting services; 5) implement grant cycles to include promotion, application review, contract management, project monitoring, project closeout. Effort will include legislative action as well as legal, financial, and audit review.*

**Action Matrix:** Fill out a matrix for each action.

<b>Action Description:</b> Develop and implement a funding assistance program for the seismic retrofit of privately and publicly owned historic unreinforced masonry (URM) buildings and structures.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Historic URM buildings and structures are highly susceptible to damage from an earthquake and pose a serious life and safety risk. This high level of risk is borne out of experience from previous earthquakes in Washington and across the globe. Undertaking seismic retrofit of URM buildings is critically important for public health and safety, the state’s economy, but also for the rapid recovery of a community’s well-being, sense of place and historic character. Since candidates for assistance will be designated/eligible historic		

	properties, the program may be coupled with applicable historic preservation incentive programs.		
<b>Effort (estimated)</b>	High level of effort and complexity for drafting and enacting needed legislation/capital budgeting; high level of effort of agency time to implement program with an anticipated high demand for service for technical assistance, project review, coordination, communication, and administration. An estimated 2 new FTE's at DAHP and/or partnering agencies plus consulting services to implement the program in the short term. Existing historic property grant programs at DAHP serve as models.		
<b>Cost (estimated)</b>	Request for \$20M for seismic retrofit capital funding for first biennium to assist an estimated 15 to20 property owners to test the program and resolve any unforeseen problems that may arise in the first biennium of implementation. However, increased capital funding will be sought in subsequent biennia to		

	<p>realize greater benefits of the program in a shorter time frame.</p> <p>Estimated \$2M for program administration costs during program years 1-5. Costs to include staff salaries/benefits, legal services, financial tracking/accounting services, travel, supplies, steering committee staffing, etc. There may be some savings in admin costs by partnering with other agencies.</p>		
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**SCORE: 5/med**

<b>Action Description:</b> Continue funding assistance for seismic retrofit of privately- and publicly-owned unreinforced masonry (URM). Program will provide incentive and assist owners of historic URM buildings to complete needed retrofit work. Scaling-up the program for greater impact.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<p>URM buildings are highly susceptible to damage from an earthquake and pose a serious life safety risk. This high level of risk is borne out of experience from previous earthquakes in Washington and across the globe. Undertaking seismic retrofit of historic URM buildings is critically important for public health and safety, the state's economy, and rapid recovery of a community's well-being, historic character, and sense of place. Since URM buildings that would be candidates for assistance will be designated/eligible historic</p>		

	properties, the program shall be coupled with applicable historic preservation incentive programs.		
<b>Effort (estimated)</b>	High level of effort for an anticipated high demand on the program including for technical assistance, project review, coordination, communication, and contract administration. Utilize the services of 4 FTE's at DAHP and/or partnering agencies plus consulting services to implement the program. Effort will also include legal, financial, and audit services; promotion/publicity; program evaluation and revision as necessary. May need legislative action for re-appropriations.		
<b>Cost (estimated)</b>	<p>Request for \$50M for seismic retrofit capital funding for third and fourth biennia to assist an estimated 25 to 35 property owners. Additional capital funding will go further in meeting anticipated need in shorter time frame.</p> <p>Estimated \$6M for program administration costs for managing the program including steering committee meetings, staff salary/benefits, travel, supplies; legal, financial, auditing services; contract management; possible environmental reviews;, etc.</p> <p>There may be some savings in admin costs by partnering with other agencies. The estimated administrative costs will fluctuate</p>		

	depending upon capital budget funding for the program.		
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**SCORE: 5/med**

<b>Action Description:</b> Continued funding assistance for the seismic retrofit of privately and publicly owned historic unreinforced masonry (URM). Program will provide incentive and assist owners of URM buildings to complete needed retrofit work.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	URM buildings are highly susceptible to damage from an earthquake and pose a serious life and safety risk. This high level of risk is borne out of experience from previous earthquakes in Washington and across the globe. Undertaking seismic retrofit of historic URM buildings is critically important for public health and safety, the state's economy, and rapid recovery of a community's well-being, historic character, and sense of place. Since URM buildings that would be candidates for assistance will be designated/eligible historic properties, the program shall be coupled with applicable historic preservation incentive programs.		
<b>Effort (estimated)</b>	High level of effort for an anticipated high demand on the program including for technical assistance, project review, coordination, communication, and contract administration. Utilize the services of 4 FTE's at DAHP and/or partnering agencies plus consulting services to implement		

	the program. Effort will also include legal, financial, and audit services; promotion/publicity; program evaluation and revision as necessary; may need legislative action for re-appropriations.		
<b>Cost (estimated)</b>	<p>Request for \$50M for seismic retrofit capital funding for fifth and sixth biennia to assist an estimated 25 to 35 property owners. Additional capital funding will go further in meeting anticipated need in shorter time frame.</p> <p>Estimated \$6M for program administration costs for managing the program including steering committee meetings, staff salary/benefits, travel, supplies; legal, financial, auditing services; contract management; possible environmental reviews; etc. There may be some savings in admin costs by partnering with other agencies. The estimated administrative costs will fluctuate depending upon capital budget funding for the program.</p>		

**SCORE: 5/med**

**Gap Analysis Action: Create Cultural and Historic Resources Disaster Response Team (CHRDRT).**

Based upon other operating resource-based disaster event response frameworks, the CHRDRT will be a pre-disaster formulated response team comprised of emergency management staff collaborating with cultural and historic resource stakeholders. The CHRDRT response will follow a planned sequence of events to include: 1) cultural resource data creation and sharing; 2) Execution of a pre-disaster localized disaster plan tailored to the needs and resource base of the affected jurisdiction(s); 3) a communication

“tree” of stakeholders and emergency managers; 4) deployment of pre-qualified cultural and historic resource personnel to impacted areas; 5) preparation of damage assessment reports; and 6) monitoring and technical support of restoration/mitigation efforts.

**Stakeholders:** Federal and state agencies (i.e., EMD, FEMA, DAHP, COM, etc.); Tribal governments; property owners, building industry (i.e. building officials, WABO, contractors, etc.); WaSafe; professional services (archaeologists, anthropologists, architects, engineers, building contractors); museums/cultural institutions; higher education institutions; Main Street organizations; local historic preservation agencies; etc..

**Needs/Expectations for achieving the Action:** 1) Recruitment of CHRDRRT members with a commitment of the team members for ongoing coordination, cooperation, training, communication and collaboration; 2) Recruitment and commitment of an agency to serve in the role of coordinating and executing the CHRDRRT’s disaster response; 3) Protocols and agreement documents for data sharing; 4) Development of localized cultural/historic resources disaster response plans; 5) communication and mobilization plans and procedures; 6) Funding for 2 FTEs and necessary supplies and equipment for coordinating staff members plus legal and financial accounting support staff; and 7) Regular and ongoing training, coordination, communication, and evaluation amongst CHRDRRT participants.

**Current Efforts:** Oil Spill and Wildfire response teams already operational and serve as models for the CRDRRT; WISAARD database and data sharing agreements are operational.

**Gaps & Barriers to achieving the Action:** Commitment by, and financial support to, an agency to serve in the coordinating role for the CHRDRRT.

## **IMPLEMENTATION**

### **Cultural Historic Resources Disaster Response Team:**

**Action Lead: Department of Archaeology and Historic Preservation (DAHP)**

**Actions Needed: Create and Implement Cultural and Historic Resources Disaster Response Team.** 1) Recruitment of CHRDRRT members with a commitment of the team members for ongoing coordination, cooperation, training, communication and collaboration; 2) Recruitment and commitment of an agency to serve in the role of coordinating and executing the CHRDRRT’s disaster response; 3) Protocols and agreement documents for data sharing; 4) Development of localized cultural and historic resources disaster response plans; 5) communication and mobilization plans and procedures; 6) Funding for 2 FTEs and necessary supplies and equipment for coordinating staff members plus legal and financial accounting support staff; and 7) Regular and ongoing training, coordination, communication amongst CHRDRRT participants plus evaluation and revisions after drills or actual events.

(Clearly state and define each action needed to achieve this part of recommendation 3. Each action will need to be categorized (short-term, medium-term and long-term) and populated into an action matrix with the following information: priority, effort estimate and cost estimate. *See below.*)

<b>Action Description:</b> Create Cultural and Historic Resources Disaster Response Team (CHRDRT)— Laying the Groundwork for Team Implementation and Success			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<p>Cultural and historic resources are highly vulnerable to damage and loss in a disaster event; yet they also play significant economic, social, and cultural roles in our communities. Implementation of the CHRDRT comprises an effective and agile approach to preparing, responding, and recovering of these resources based upon data sharing, communication, localized plans, and rapid deployment of qualified personnel. Short term actions needed are: 1) Recruitment of CHRDRT members with a commitment of the team members for ongoing coordination, cooperation, training, communication and collaboration; 2) Recruitment and commitment of an agency to serve in the role of coordinating and executing the CRDRT’s disaster response; 3) Protocols and agreement documents for data sharing; 4) communication and mobilization plans and</p>		

	procedures; 6) Funding for 2 FTEs and necessary supplies and equipment for coordinating staff members plus legal and financial accounting support staff		
<b>Effort (estimated)</b>		An estimated 2 FTEs over the first five years; however likely more dedicated FTEs needed during initial stages of the CHRDRT; Moderate level of complexity with strong skills needed in communication, organization, and strategic planning; moderate level of expertise in GIS and data base software.	
<b>Cost (estimated)</b>			\$3 M over the course of years 1-5 of the program with funding concentrated in an average of 2 FTEs over the five year period; supplies, equipment, training, and travel; Costs will likely include consultant services for GIS database development and coordination.

**SCORE: 8/HIGH**

<b>Action Description: Create Cultural and Historic Resources Disaster Response Team (CHRDRT)— For localized CHR Disaster Plans</b>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Development of localized cultural/historic resources disaster response plans. The success, response, and effectiveness of the CHRDRT will depend upon its ability to access, understand, and implement in response to a disaster. Developing these plans (or linking to existing plans) will need to be implemented.	
<b>Effort (estimated)</b>		Moderate level of effort and complexity; an estimated .5 FTE is expected to be needed over the course of years 1-5; strong computer, database, and GIS skills will be needed. This effort might also be detailed to a qualified consultant.	
<b>Cost (estimated)</b>		\$500,000	

**SCORE: 6/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Deployment of CHRDRT – For drill or actual event			
<i>(Medium and Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<p>Cultural and historic resources are highly vulnerable to damage and loss in a disaster event; yet they also play significant economic, social, and cultural roles in our communities.</p> <p>Implementation of the CHRDRT comprises an effective and agile approach to preparing, responding, and recovering of these resources based upon key elements comprised of: data sharing, communication, localized plans, and rapid deployment of qualified personnel. In the medium and long terms, the deployment of the CHRDRT for events and drills are a high priority. This action would also include response debriefings, ongoing evaluation of CHRDRT efforts and change to the program as appropriate.</p>		
<b>Effort (estimated)</b>	<p>CHRDRT response to actual events and drills will require a high level of effort in terms of staff time, coordination, communication, and</p>		

	deployment of resources. Much of the effort will involve re-directing engaged personnel from their regular duties/assignments.		
<b>Cost (estimated)</b>	\$500,000 for a disaster preparedness drill for the CHRDRT inclusive of both drill planning and implementation of the drill itself. Costs include staff time for CHRDRT coordinators, support staff, and participating entities; travel, equipment, and supplies; consulting services. Donation of in-kind services and staff time not included. In the event of an actual disaster, the estimated cost of CHRDRT deployment would be multiplied by a factor of 5 at minimum.		

**SCORE: 5/med**

## **Best Practices**

NOT specifically addressed: Make recommendations based on a synthesis of best practices (e.g. Cali EQ authority; Portland’s residential retrofit program etc.) to make efforts easier to address. Lead contact was Blee@oakharbor.org

Not Specifically addressed: Develop/identify process for capturing and sharing best practices (local stakeholders) lead contact was Maximilian and Brian

NOT specifically addressed: Investigate FORTIFIED home programs through insurance institutes for business and home safety (IBHS). Lead contact was Stacy@oic.wa.gov.

## Action Items 3A

**Gap analysis Action:** Development of process and providing a central data repository for an initial and maintainable inventory of vulnerable building stock for use by local communities and tribes in risk assessment and risk-reduction activities, including life-safety, economic, and property, and community risks.

**Action Lead:** Department of Commerce

**Stakeholders:** Local/tribal government building officials, local/tribal government planners; local government emergency managers; local/tribal cultural resource/historic preservation commissions & staff; local/tribal historic preservation officers; affiliated interest groups (i.e. historic property owners; Washington Association of County Assessors, Washington Association of Building Officials, Washington Association of Business, local Chambers of Commerce, Washington Association of Realtors); closely related professional groups (i.e. consultants, architects, engineers); building industry (i.e., developers, building officials, building contractors, real estate professionals); federal and state agencies (i.e., DAHP, Commerce, DES, FEMA, HUD); University of Washington; Economic stakeholders include landowners and lending institutions.

**Needs/Expectations for achieving the Action:** Desired Outcomes –

1. A consistent and comprehensive approach to identify vulnerable structures at greatest risk of earthquake damage, a consistent data dictionary and repository of collected information, and strategies for local jurisdictions, tribes, and state government to use the information as a component of their disaster preparedness, mitigation, response and recovery planning efforts.
2. The County Assessor within each of Washington’s counties maintains or is responsible for a database of building characteristics and attributes for structures within their geopolitical boundaries. As opposed to developing an entirely new database or system, the initial concept is to leverage existing building data repositories maintained by the Assessor’s office and to add this additional building characteristic.
3. Funding to hire a qualified consultant tasked with gathering and assessing what has already been developed elsewhere; work with stakeholders; create and a process based upon Washington state context; completion of a prioritized assessment; education and outreach; and the provision of tools for local communities that seek to implement retrofit programs.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

- Unreinforced Masonry Buildings (URMs) are one of the most vulnerable building types for earthquake-prone regions of the country like Washington state. A typical URM is a brick building built prior to 1940 that lacks the steel reinforcement and structural connections needed to stand up to seismic motion. Given the risk of structural collapse and falling bricks, URMs

pose a public safety concern to people in and nearby the buildings. While vulnerable, URM are important to protect and preserve as they are often designated historic structures or older buildings that contribute to the character of our towns and cities. They also house many small businesses and often comprise the majority of buildings within a community's central business district, which is important to maintaining the economic strength of our communities. Other types of vulnerable structures located in communities include non-ductile concrete frame and soft-story apartment buildings.

- While some individual jurisdictions have made efforts to catalogue URM in their communities, there is no central data source to estimate the number and locations of these buildings statewide. In addition, no one is fully aware of local communities that have inventoried non-ductile concrete frame or soft-story buildings. In order to understand the magnitude and geographical distribution of the risk both at a community- and statewide scale, and to estimate the potential costs to reduce the risk through seismic retrofit, it will be necessary to conduct an inventory.
- Databases that include URM historic properties, which may have vulnerabilities, have been developed and are being enhanced at the Department of Archeology and Historic Preservation.
- The City of Seattle has undertaken several inventories of URM structures. In addition to physical inventories, they have developed both policy and technical committees comprised of stakeholders and subject matter experts to understand the physical and policy-oriented aspects of URM retrofitting, including funding options, standards, and code/ordinance language to enable a mandatory retrofit program.
- Local jurisdictions and many tribes currently have FEMA approved Hazard Mitigation Plans, which include an inventory of critical and essential facilities. This may entail both publicly- and privately-owned facilities, but does not include building types. Such inventories may, however, provide a starting point for some local inventory efforts.
- Members of the Recommendation 3 workgroup have supported an Amazon Catalyst Grant application by the University of Washington's Center for Collaborative Systems for Security, Safety, and Regional Resilience to develop a prototype a citizen-expert crowdsourcing platform that engages hackers, building residents, property owners, and engineers to inventory unreinforced masonry buildings for local government earthquake planning and policy development.
- A request was included in the 2017-2019 Capital Budget for the Department of Commerce to initiate an assessment process of URM structures and 2017 HB 1075 Section 1053 requested funding for the Department of Commerce to contract for a seismic study regarding suspected unreinforced masonry buildings in Washington state. The study would have included a list and map of suspected unreinforced masonry buildings, excluding single-family housing, and be produced by utilizing existing survey and data sources to the greatest extent possible.

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

- Current risk assessments completed through the FEMA and state RiskMap process are not comprehensive due to the fact that some building inventories are more robust than others.
- State agency and private sector databases which may be used to facilitate risk management activities on loans, grants, etc. may not capture exposure to URM or proximity to a mapped tsunami hazard zone.
- Funding will be needed to acquire or support qualified staff and/or consultants to complete an assessment using existing data, or if directed, to collect new data
- Understanding of existing capability to expand Assessor's databases to accept inventory information and to export the data in formats used for risk assessment.
- Acceptance and implementation by local governments and stakeholder communities of a process for inventory collection and data transmission to Assessor's offices.

### **IMPLEMENTATION\***

**Action Lead:** Department of Commerce, Washington Emergency Management, Association of Building Officials, Structural Engineering Association of Washington.

**Actions Needed: Completion of an inventory of existing earthquake-vulnerable buildings and a repository of information accessible to stakeholders**

**Primary Outcome:** Provision of data that includes an inventory of vulnerable building stock for use by local communities and tribes in risk assessment and risk reduction activities, including life-safety, economic, property, and community-based risks.

Implementation Actions:

- Convene a stakeholder advisory committee including representatives of the Washington State Association of County Assessors (WSACA), Washington Association of Building Officials (WABO), Washington State Building Code Council (WA SBCC), Washington Building Owners and Management Association (BOMA), and other interested parties that play a role in building ownership, assessment, building attribute collection and inventory.
- Conduct a Request for Proposals (RFP) process for a qualified contractor to develop and deploy a statewide assessment process to identify earthquake-vulnerable buildings within Washington. Earthquake vulnerable buildings include in the assessment are assumed to include unreinforced masonry (URM), concrete tilt-up, and soft-story buildings.
- Complete an assessment of existing database/building inventory systems used by local jurisdictions in order to determine what data exists and ascertain any commonalities within data or systems that can be leveraged for future efforts. Such an assessment will also include whether

existing systems are capable accommodating new building information, and if so, what costs may be associated with enhancing existing systems.

- Deployment of the building assessment process and initiate data collection if resources are appropriated by the Legislature
- Compile data provided by inspectors that conducted building assessments into formats required by local assessors if existing systems will be used. If a new system is required to accommodate this information, data derived from the assessments will be compiled into the requisite format.
- Include information about data and where it can be found within broader public education and outreach efforts that may be initiated as part of the Resilient Washington.

**Estimate Cost:** (This is the cost to complete this action: Low = \$0 to \$50,000, Medium = \$50,001 to \$500,000, and high = greater than \$500,000.)

**Available Resources:** Completion of a statewide inventory of earthquake-vulnerable buildings and provision of collected data is not currently possible within existing or anticipated resources.

**Resources Needed:**

- 4 FTE (1 - Full-time Project/Program Manager, 1 - Data Steward/Database Administrator, 2 - Project Support Staff)
- Contract and associated budget for professional services necessary to retain qualified professionals (engineers, architects, plan reviewers, etc.) for completion of building assessments
- Short- and mid-term legal assistance services provided by Attorney General's Office and/or outside legal counsel
- Recommend that the stakeholder, assessment report and pilot program be completed initially. Although they are lower cost, their work informs the entire inventory assessment.

**Total Cost Estimates:** The initial estimated costs are high. Initial up-front costs are estimated to be within the high range; however, an assessment will only need to be completed one time. On-going annual costs to maintain information if existing databases are used is estimated to be low.

**Short Term (1-5 yrs):**

<b>Action Description:</b> Completion of an inventory of existing earthquake-vulnerable buildings and a repository of information accessible to stakeholders			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Provision of data that includes an inventory of vulnerable building stock for use by local communities and tribes in risk assessment and risk reduction activities, including life-safety, economic, property, and community-based risks.		
<b>Effort (estimated)</b>	The effort has several phases, including stakeholder engagement, product development, training for internal staff administering the program and external stakeholders on planning requirements and will require a high level of effort over the long-term in order to complete.		
<b>Cost (estimated)</b>	4 FTE (1 - Full-time Project/Program Manager, 1 - Data Steward/Database Administrator, 2 - Project Support Staff). A significant contract and associated budget for professional services necessary to retain qualified professionals (engineers, architects, plan		

	<p>reviewers, etc.) for completion of building assessments will be required.</p> <p>Given the potential legal considerations, both short- and mid-term legal assistance services would be required by Attorney General's Office and/or outside legal counsel. This does not include any additional funding to incentivize or support renovation, retrofitting, or further risk reduction actions.</p>		
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**SCORE: 5/med**

<b>Action Description:</b> Convene a stakeholder advisory committee including representatives of the Washington State Association of County Assessors (WSACA), Washington Association of Building Officials (WABO), Washington State Building Code Council (WA SBCC), Washington Building Owners and Management Association (BOMA), and other interested parties that play a role in building ownership, assessment, building attribute collection and inventory.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Establish an advisory committee comprised of key stakeholders that would be essential to ensuring the success of the project and fully understanding the current situation	
<b>Effort (estimated)</b>		Moderate FTE impacts may occur as this would require broad multi-	

		agency coordination and potentially extensive stakeholder engagement, depending upon authorizing direction.	
<b>Cost (estimated)</b>		Reprioritizing of staff time from Commerce as well as staff from collaborating agencies (DES, MIL) would be required.	

**SCORE: 6/med**

<b>Action Description:</b> Conduct a Request for Information (RFI) process to solicit information from qualified contractors on their proposed solutions to develop and deploy a statewide assessment process to identify earthquake-vulnerable buildings within Washington. Earthquake vulnerable buildings include in the assessment are assumed to include unreinforced masonry (URM), concrete tilt-up, and soft-story buildings.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Conduct a Request for Information (RFI) process to fully understand program requirements and potential costs	
<b>Effort (estimated)</b>		Staff time devoted to crafting and reviewing responses to an initial RFI would be moderate	
<b>Cost (estimated)</b>			The cost to develop and deploy an RFI is estimated to be low.

**SCORE: 7/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Conduct a Request for Proposals (RFP) process for a qualified contractor to develop and deploy a statewide assessment process to identify earthquake-vulnerable buildings within Washington. Earthquake vulnerable buildings include in the assessment are assumed to include unreinforced masonry (URM), concrete tilt-up, and soft-story buildings.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Request for Proposals (RFP) process for a qualified contractor to develop and deploy a statewide assessment process to identify earthquake-vulnerable buildings within Washington.	
<b>Effort (estimated)</b>		Staff time devoted to crafting and reviewing responses to an initial RFI would be moderate	
<b>Cost (estimated)</b>			The cost to develop and deploy an RFI is estimated to be low.

**SCORE: 7/med**

<b>Action Description:</b> Complete an assessment of existing database/building inventory systems used by local jurisdictions in order to determine what data exists and ascertain any commonalities within data or systems that can be leveraged for future efforts. Such an assessment will also include whether existing systems are capable accommodating new building information, and if so, what costs may be associated with enhancing existing systems.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Complete an assessment of existing database/building	

		<p>inventory systems used by local jurisdictions in order to determine what data exists and ascertain any commonalities within data or systems that can be leveraged for future efforts.</p> <p>\$65,000: Study to inform stakeholders and database work. Examination of 1) assessor's data, 2) historical preservation data, 3) fire districts, 4) building code information, 5) county by county permitting information, and 6) examine the possible availability of insurance underwriting information. Establish validity of captured data, both overlap and missing information, make recommendations for methodology to capture initial inventory and procedures for maintaining valid information</p>	
<b>Effort (estimated)</b>	The level of effort assumed for undertaking an assessment of all existing building data and data management systems expected to be high.		
<b>Cost (estimated)</b>	- The cost assumed for undertaking a comprehensive assessment of		

	<p>earthquake vulnerable buildings across Washington anticipated to be within the high range.</p> <ul style="list-style-type: none"> <li>- \$330,000.00: Complete a pilot of fire department buildings to establish at baseline. (Approximately 1200 in state, census data shows avg. of 11% of all buildings in WA built prior to 1940, costing assumes 132 buildings requiring an engineering evaluation at 10 hrs/building.</li> <li>- Initial sampling to provide methodology to extrapolate risk state-wide risk assessment. Establish tools to train building inspectors to update building statistics. Initial work is a pilot only. See below for balance of evaluation.</li> </ul>		
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**SCORE: 4/low**

<p><b>Action Description:</b> Deployment of the building assessment process and initiate data collection if resources are appropriated by the Legislature</p>			
<p><i>(Medium-Term)</i></p>	<p><b>High</b></p>	<p><b>Medium</b></p>	<p><b>Low</b></p>
<p><b>Priority</b></p>	<p>Deployment of the building assessment process and initiate data collection if resources are appropriated by the Legislature</p>		

<b>Effort (estimated)</b>	The level of effort assumed for undertaking a comprehensive assessment of earthquake vulnerable buildings across Washington is anticipated to be high.		
<b>Cost (estimated)</b>	<p>The cost assumed for undertaking a comprehensive assessment of earthquake vulnerable buildings across Washington with additional data warehousing or cloud access to store and serve data is anticipated to be within the high range.</p> <ul style="list-style-type: none"> <li>- Given limited baseline data, developing a long-term cost estimate remains a challenge. For initial planning purposes only, an estimate of \$20-40,000,000 is provided here based on an assumption that includes an inventory of structures built prior to 1940 and comprised of: 1) Multi-family, 2) Public, 3) Commercial buildings. Completion of the pilot program will be essential in further informing this cost estimate.</li> </ul>		

**SCORE: 5/med**

**Long Term (10+ yrs):** (Actions that will require additional resources and take longer than 10 years to achieve.)

<b>Action Description:</b> Compile data provided by inspectors that conducted building assessments into formats required by local assessors if existing systems will be used. If a new system is required to accommodate this information, data derived from the assessments will be compiled into the requisite format.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Compile data provided by inspectors that conducted building assessments into the appropriate formats.	
<b>Effort (estimated)</b>		The level of effort assumed for undertaking a comprehensive assessment of earthquake vulnerable buildings across Washington is anticipated to be medium.	
<b>Cost (estimated)</b>		The cost assumed for undertaking a comprehensive assessment of earthquake vulnerable buildings across Washington is anticipated to be within the medium range.  - \$275,000: Assumes acquisition of data warehousing software and compilation / cleaning of data to establish database Does not include ongoing support of the material after initial setup	

**SCORE: 6/med**

<b>Action Description:</b> Include information about data and where it can be found within broader public education and outreach efforts that may be initiated as part of Resilient Washington.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Include information about data and where it can be found within broader public education and outreach efforts that may be initiated as part of the Resilient Washington. See earlier information on Assessment Report		
<b>Effort (estimated)</b>			The level of effort assumed for undertaking a comprehensive assessment of earthquake vulnerable buildings across Washington is anticipated to be medium
<b>Cost (estimated)</b>			The cost assumed for undertaking a comprehensive assessment of earthquake vulnerable buildings across Washington is anticipated to be within the low range (assuming this aspect is leveraged as part of a larger public education effort)

**SCORE: 9/HIGH**

**Gap analysis Action: Evergreen Sustainable Development Standard v3.0 – Emergency Plan**  
**Criterion 8.2**

**Action Lead:** Department of Commerce (John Schelling)

**Stakeholders:** Affordable Housing Developers, Architects and Engineers, Construction Industry, Non-profit Housing Providers, LIHTC Investors, Department of Commerce Housing Finance Unit, Other State/Local Public Funders of Affordable Housing, Property Managers, Tenants

**Current Efforts:** The Evergreen Sustainable Development Standard (ESDS), now in version 3.0, is a green building performance standard required of all affordable housing projects receiving capital funds from the Washington State Housing Trust Fund. ESDS is compliant with RCW39.35D.080 and contains criteria that safeguard health and safety, increase durability, and promote sustainable living, preserve the environment, and increase energy and water efficiency.

The ESDS criterion are informed by the Enterprise Green Communities standard, building and energy code, and best practices from across a wide spectrum of the construction industry. In February 2016, after much stakeholder review and process, a provision requiring Emergency Planning was included in the ESDS. This requirement applies to affordable housing projects funded with WA State Department of Commerce Housing Trust Fund dollars. The criterion is a mandatory requirement of ESDS v3.0.

**Needs/Expectations for achieving the Action:** In requiring that our non-profit affordable housing providers develop emergency plans specific to their property the intention is to:

1. ensure life safety;
2. inform property management, site staff, and maintenance about building and site specifications that will need to be managed during and following an emergency to ensure the long-term viability of the asset;
3. to direct efforts that staff and residents can personally take in preparing for, responding to, and recovering from various types of emergencies;
4. and ensuring the effective sheltering-in-place and re-housing of tenants as well as emergency-sheltering of people living within the larger community that may be left homeless following an emergency.

**Gaps & Barriers to achieving the Action:**

1. Across the board lack of expertise related to planning for a multitude of emergencies.
2. Lack of COM staff expertise to review plans and provide technical assistance.
3. Increased liability associated with COM staff “approving” emergency plans for implementation.
4. Mitigation, response and recovery efforts associated with a plan could increase costs of producing and operating affordable housing projects.

**IMPLEMENTATION\***

**Action Lead:** Department of Commerce

**Actions Needed: Development and Implementation of a Hazard Mapping Criterion and Associated Mapping Products as part of the Evergreen Sustainable Development Standard (ESDS) v3.0**

**Primary Outcome: Improved resilience of affordable community housing stock and an enhanced ability for affected populations to shelter in place through reduction of publicly funded projects within high-hazard zones.**

Implementation Actions:

- Engage existing stakeholders within the affordable housing community including representatives of the affordable housing commission, local emergency management community, and other interested parties that building, operate, affordable housing projects in order to fully understand existing issues in implementing a hazard identification and risk assessment criteria as part of ESDS v3.0.
- Complete a requirements and data review in order to determine what existing geographic information system (GIS) data exist, including FEMA RiskMap data, and could be leveraged and what new resources may be necessary to complete a hazard identification and risk assessment to support emergency planning efforts.
- If existing data can be leveraged, begin scoping how data may be integrated into a comprehensive hazard identification and risk assessment tool for end users. If existing data cannot be leveraged or additional data needs to be collected and/or compiled, begin drafting an outline for a scope of work and identifying a process for data acquisition, funding, and technology needs.
- Finalize development of the hazard mapping tool and user manual for ESDS users to ensure that they have the necessary information to complete a robust hazard and risk assessment.
- Review and revise the Housing Trust Fund application documents and process to integrate the use of hazard and risk assessment modeling into the decision making process.
- Review and revise ESDS and tools to integrate the use of hazard and risk assessment modeling into the criterion.
- Following implementation of the hazard mapping tool, complete an assessment of effectiveness and modify templates, training, technical assistance, etc. based on stakeholder feedback. Mitigation costs, associated with the use of this tool, will also need to be studied and analyzed to determine if the use of the tool has a third-order effect on the cost to build and number of provided affordable housing units.

**Estimate Cost:** (This is the cost to complete this action: Low = \$0 to \$50,000, Medium = \$50,001 to \$500,000, and high = greater than \$500,000.)

**Available Resources:** Completion of a statewide inventory of earthquake-vulnerable buildings and provision of collected data is not currently possible within existing or anticipated resources.

**Resources Needed:** Contract and associated budgets for professional services necessary to develop planning templates, development of training modules for Commerce staff in order for effective delivery of technical assistance, and travel support for delivery of technical assistance, training, and completion of small-scale exercises of approved emergency plans.

**Total Cost Estimates:** The initial estimated costs are high. Initial up-front costs are estimated to be within the high range; however, an assessment will only need to be completed one time. On-going annual costs to maintain information if existing databases are used is estimated to be low.

**Action Matrix:** Fill out a matrix for each action.

**Short Term (1-5 yrs):**

<b>Action Description:</b> Development and Implementation of a Hazard Mapping Criterion and Associated Mapping Products as part of the Evergreen Sustainable Development Standard (ESDS) v3.0.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Improved resilience of affordable community housing stock and an enhanced ability for affected populations to shelter in place through reduction of publicly funded projects within high-hazard zones.		
<b>Effort (estimated)</b>	The effort has several phases, including stakeholder engagement, product development, and modification of existing businesses processes to incorporate		

	new data into application processes.		
<b>Cost (estimated)</b>		Additional staffing or consultant support will be needed for training development efforts; delivery of training and provision of technical assistance will also require additional resources.	

**SCORE: 6/med**

<b>Action Description:</b> Engage existing stakeholders within the affordable housing community including representatives of the affordable housing commission, local emergency management community, and other interested parties that building, operate, affordable housing projects in order to fully understand existing issues in implementing a hazard identification and risk assessment criteria as part of ESDS v3.0.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>			Engage existing stakeholders within the affordable housing and hazard mapping communities
<b>Effort (estimated)</b>			Moderate FTE impacts may occur as this would require broad multi-agency coordination and potentially extensive stakeholder engagement, depending upon authorizing direction.
<b>Cost (estimated)</b>			Reprioritizing of staff time from Commerce as well as staff from

			collaborating agencies (DES, MIL, ECY, DNR) would be required.
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**SCORE: 7/med**

<b>Action Description:</b> Complete a requirements and data review in order to determine what existing geographic information system (GIS) data exist, including FEMA RiskMap data, and could be leveraged and what new resources may be necessary to complete a hazard identification and risk assessment to support emergency planning efforts.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Complete a requirements and data review for a GIS based hazard mapping tool suitable for affordable housing project risk assessment	
<b>Effort (estimated)</b>		Development of hazard mapping tool requirements by Commerce (or via contractor)	
<b>Cost (estimated)</b>			The cost to complete a requirements assessment for the hazard mapping tool is anticipated to be within the low range.

**SCORE: 7/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> If existing data can be leveraged, begin scoping how data may be integrated into a comprehensive hazard identification and risk assessment tool for end users. If existing data cannot
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be leveraged or additional data needs to be collected and/or compiled, begin drafting an outline for a scope of work and identifying a process for data acquisition, funding, and technology needs.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Begin scoping how data may be integrated into a comprehensive hazard identification and risk assessment tool for end users	
<b>Effort (estimated)</b>		Developing a comprehensive scope for data integration and/or outlining a process for data acquisition, funding, and technology requirements will require a medium amount of staff impact and is estimated to require 0.5 FTE for a period 10-12 months.	
<b>Cost (estimated)</b>			The cost to develop a scope of data integration and/or outline data acquisition and development process is estimated to fall within the low range.

**SCORE: 7/med**

<b>Action Description:</b> Develop hazard mapping tool and user manual for ESDS users and COM staff to ensure that they have the necessary information to complete and review a robust hazard and risk assessment for projects.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>

<b>Priority</b>	Develop hazard mapping tool for ESDS users and COM staff		
<b>Effort (estimated)</b>	The level of effort assumed for development and delivery of a hazard mapping tool is anticipated to require a high level of effort and a minimum of 2 FTEs may be necessary to complete development and associated products.		
<b>Cost (estimated)</b>		The cost assumed for development and delivery of training is expected to be within the medium range.	

**SCORE: 6/med**

<b>Action Description:</b> Review and revise the Housing Trust Fund application documents and process and the ESDS and tools to integrate the use of hazard and risk assessment modeling into the decision-making process and criterion.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Assess current policies, processes and tools to determine changes needed to integrate hazard and risk assessment modeling into the application process and ESDS criterion.		

<b>Effort (estimated)</b>	The level of effort assumed for conducting the review and development of new tools and criterion is high and would most likely need to be provided by a third-party contractor.		
<b>Cost (estimated)</b>		The cost assumed for development and delivery of needed tools and revised criterion is expected to be within the medium range.	

**SCORE: 6/med**

<b>Action Description:</b> Following implementation of the hazard mapping tool, complete an assessment of effectiveness and modify templates, training, technical assistance, etc. based on stakeholder feedback.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>			Conduct a program assessment to identify areas of improvement
<b>Effort (estimated)</b>			The level of effort assumed for undertaking a completing a program assessment is anticipated to be low.
<b>Cost (estimated)</b>			The cost assumed for undertaking a program assessment is anticipated to be within the low range.

**SCORE: 7/med**

<b>Action Description:</b> Following implementation of the hazard mapping tool and use of the data in the HTF application process, mitigation costs associated with the use of this tool, will need to be studied and analyzed to determine if the use of the tool has a third-order effect on the cost to build and number of provided affordable housing units.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>			Develop an analysis tool and conduct a 5-10 year study to determine outcomes.
<b>Effort (estimated)</b>			The level of effort assumed for undertaking this work is anticipated to be low.
<b>Cost (estimated)</b>			The cost assumed for undertaking this work is anticipated to be within the low range.

**SCORE: 7/med**

**Gap analysis Action: Evergreen Sustainable Development Standard – Proposed Hazard Mapping Criterion**

**Action Lead:** Department of Commerce (John Schelling)

**Stakeholders:** Affordable Housing Developers, Architects and Engineers, Construction Industry, FEMA, Dept. of Natural Resources, Non-profit Housing Providers, LIHTC Investors, Department of Commerce Housing Finance Unit, Other State/Local Public Funders of Affordable Housing, Property Managers, Tenants

**Current Efforts:** The Evergreen Sustainable Development Standard (ESDS), now in version 3.0, is a green building performance standard required of all affordable housing projects receiving capital funds from the Washington State Housing Trust Fund. ESDS is compliant with RCW39.35D.080 and contains criteria that safeguard health and safety, increase durability, and promote sustainable living, preserve the environment, and increase energy and water efficiency.

The ESDS criterion are informed by the Enterprise Green Communities standard, building and energy code, and best practices from across a wide spectrum of the construction industry. Periodically, the criterion are reviewed by a stakeholder led workgroup and updated to ensure that the standard remains relevant to the efforts of creating a sustainable and efficient affordable housing built environment. As the practice of hazard mapping becomes more developed, and the data more readily useable for decision making, there is a great potential to use this information in decision making related to siting, funding, and construction requirements of affordable housing projects. It has been recommended that the stakeholder workgroup, during the next ESDS review and update, determine if hazard mapping and any related mitigation requirements should be incorporated into the standard.

**Needs/Expectations for achieving the Action:** In developing ESDS criterion related to the use of hazard mapping, the intention would be to ensure the long-term durability and sustainability of publicly funded assets and keep poverty from being concentrated in high-hazard zones.

**Gaps & Barriers to achieving the Action:**

1. For many communities, the development of hazard mapping tools is an on-going process with data not available in all areas of the state for each type of hazard that could apply.
2. Technical expertise is needed to use the tools effectively.
3. Costs of using the hazard mapping tools and mitigation efforts to overcome identified hazard issues if building moves forward could increase the costs of producing and operating affordable housing projects.

**IMPLEMENTATION\***

**Action Lead:** Department of Commerce

**Actions Needed: Implementation of Evergreen Sustainable Development Standard v3.0 (ESDS) Emergency Planning Criterion**

**Primary Outcome: Improved resilience of affordable community housing stock within areas of seismic risk and an enhanced ability for affected populations to shelter in place through functional emergency planning.**

Implementation Actions:

- Engage existing stakeholders within the affordable housing community including representatives of the affordable housing commission, local emergency management community, and other interested parties that building, operate, affordable housing projects in order to fully understand existing issues and gaps in implementing the emergency planning criteria in ESDS v3.0.
- Develop planning templates and checklists for owner and management staff required to comply with ESDS criterion to ensure that emergency operations plans not only address proscribed topical areas, but the content is adequate and practical for implementation by the end users.

- Develop a training for owner and management staff required to comply with ESDS criterion in conjunction with a technical assistance program to deliver and support training and facilitate small-scale exercises of plans developed based on emergency planning criterion.
- Provide training to Commerce staff involved in emergency plan review to ensure emergency plans are functional.
- Following implementation of the program, complete an assessment of effectiveness and modify templates, training, technical assistance, etc. based on stakeholder feedback.

**Total Cost Estimates:** The initial estimated costs are high. Initial up-front costs are estimated to be within the high range; however, an assessment will only need to be completed one time. On-going annual costs to maintain information if existing databases are used is estimated to be low.

**Action Matrix:** Fill out a matrix for each action.

**Short term**

<b>Action Description:</b> Implementation of Evergreen Sustainable Development Standard v3.0 (ESDS) Emergency Planning Criterion.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Improved resilience of affordable community housing stock within areas of seismic risk and an enhanced ability for affected populations to shelter in place through functional emergency planning.	
<b>Effort (estimated)</b>		The effort has several phases, including stakeholder engagement, product development, training for internal staff administering the program and external stakeholders on planning requirements.	

<b>Cost (estimated)</b>		Additional staffing will be needed for product development; delivery of training and provision of technical assistance to applicants, and to complete plan review and facilitation of exercises to test approved plans.	
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**SCORE: 6/med**

<b>Action Description:</b> Engage existing stakeholders within the affordable housing community including representatives of the affordable housing commission, local emergency management community, and other interested parties that building, operate, affordable housing projects in order to fully understand existing issues and gaps in implementing the emergency planning criteria in ESDS v3.0.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Engage existing stakeholders within the affordable housing community	
<b>Effort (estimated)</b>		Moderate FTE impacts may occur as this would require broad multi-agency coordination and potentially extensive stakeholder engagement, depending upon authorizing direction.	
<b>Cost (estimated)</b>		Reprioritizing of staff time from Commerce as well as staff from collaborating agencies (DES, MIL) would be required.	

**SCORE: 6/med**

<b>Action Description:</b> Develop planning templates and checklists for ESDS users to ensure that emergency operations plans not only address proscribed topical areas, but the content is adequate and practical for implementation by the end users.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Develop emergency planning template and associated checklists for ESDS 3.0 users	
<b>Effort (estimated)</b>	Development of emergency operations planning templates and checklists for ESDS 3.0 users will require a significant level of effort.		
<b>Cost (estimated)</b>		The cost to develop planning templates and checklists is anticipated to be within the medium range.	

**SCORE: 5/med**

<b>Action Description:</b> Provide training to Commerce staff involved in emergency plan review to ensure emergency plans are functional.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Development and delivery of a training curriculum to Commerce staff that review and approve emergency plans		

<b>Effort (estimated)</b>		The level of effort assumed for development and delivery of a training curriculum is anticipated to be a medium level of effort	
<b>Cost (estimated)</b>			The cost assumed for development and delivery of training is expected to be within the low range.

**SCORE: 8/HIGH**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Develop a training for ESDS users in conjunction with a technical assistance program to deliver and support training and facilitate small-scale exercises of plans developed based on emergency planning criterion.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Develop a training curriculum and support for a technical assistance program to deliver training to ESDS 3.0 users and conduct small-scale exercises of draft and/or approved plans.	
<b>Effort (estimated)</b>		Staff time devoted to crafting and reviewing responses to an initial RFI would be moderate	
<b>Cost (estimated)</b>		The cost to develop and deploy end user training and delivery of technical assistance is anticipated	

		to be a medium range cost.	
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**SCORE: 6/med**

<b>Action Description: Following implementation of the program, complete an assessment of effectiveness and modify templates, training, technical assistance, etc. based on stakeholder feedback.</b>			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>			Conduct a program assessment to identify areas of improvement
<b>Effort (estimated)</b>			The level of effort assumed for undertaking a completing a program assessment is anticipated to be low.
<b>Cost (estimated)</b>			The cost assumed for undertaking a program assessment is anticipated to be within the low range.

**SCORE: 7/med**

**Gap analysis Action: Washington State Housing Recovery Support Function Development**

**Action Lead:** Department of Commerce, Department of Social and Health Services, Washington Emergency Management (submitted by John Schelling)

**Stakeholders:**

Department of Commerce, Washington State Emergency Management Division, Department of Social and Health Services, Office of the Insurance Commissioner, supporting state and federal agencies, local jurisdictions, tribes, housing authorities, Washington Association of Voluntary Organizations Active in Disasters (WAVOAD), Association of Washington Housing Authorities, Compass Housing Alliance, Low Income Housing Institute, Salvation Army, nonprofit affordable housing sector.

**Current Efforts:**

In emergency/disaster situations, where the capacity of the local jurisdiction is exceeded, the Department of Commerce, in collaboration with Washington Emergency Management, the Department of Social and Health Services, and the U.S. Department of Housing and Urban Development, previously maintained the responsibility to convene a disaster housing task force (DHTF). However, with recent advances in national doctrine on recovery planning in general, and housing in particular, the concept of a DHTF has evolved into a Housing Recovery Support Function (HRSF) in alignment with the National Disaster Recovery Framework and the development of the Washington Restoration Framework.

Currently, the Emergency Management Division, and the Departments of Commerce and of Social and Health Services, have undertaken the effort to develop a plan that identifies and organizes partners into scalable, operationally-viable recovery support functions (RSF) that can be activated, as needed, to support disaster recovery.

Many local jurisdictions also have a high degree of need for assistance with the development of a concept of operations or planning to address the recovery effort. Based on this need, the HRSF is focused on utilizing existing housing programs to transition from temporary housing to permanent housing; provide housing solutions in the community to prevent permanent displacement; support local jurisdictions and housing providers in recovering essential functions; support the integration of mitigation measures in new housing development; and supporting housing restoration. Implementation of our collective approach has also expanded to involve organizations, such as Airbnb, which have recently developed a business line of support for providing housing options for individuals and families displaced during a disaster.

An overall goal of the RSF is to support the local jurisdiction in defining priorities, determining available State and Federal resources, resolve policy disputes and service challenges, and ensure that housing assistance is provided in an efficient and effective manner.

To support further support the HRSF development, a workshop was convened on March 28, 2017 to with a broad base of stakeholders to identify current approaches, discuss existing gaps in disaster housing delivery, and begin to formalize a new concept of operations. Based on the workshop and additional stakeholder outreach, a draft HRSF plan has been developed and is currently undergoing review. This document and the process by which it was developed will be able to serve as a template for development of future RSFs that support the Washington Restoration Framework.

#### **Needs/Expectations for achieving the Action:**

The goal of the Housing Recovery Support Function is to have an operational plan that allows the State to provide comprehensive support to our communities through better resource coordination and interagency collaboration on program delivery given the current state of existing resources and capabilities.

#### **Gaps & Barriers to achieving the Action:**

1. Staffing availability to respond to all levels of RSF activation;

2. Existing programs are over-subscribed as they currently serve a pre-disaster population in need of housing resources;
3. Because of program restrictions, guidelines, and laws related to existing program resource uses, it can be very cumbersome to redirect existing resources for emergency/disaster purposes.
4. Multiple, competing priorities within the community often exist in relation to recovery of housing stock and proving support to people in need of housing resources.
5. Lack of dedicated disaster recovery funding accessible by state agencies to support local jurisdiction housing and recovery needs, especially in small to moderate disasters in which federal assistance and support is not available.

### **IMPLEMENTATION\***

**Action Lead:** Department of Commerce, Department of Social and Health Services, Washington Emergency Management

**Actions Needed: Formalization and Implementation of the Washington State Disaster Housing Recovery Support Function (RSF)**

**Primary Outcome: Improved capability to deliver pre-disaster planning for housing recovery and delivery of post-disaster transitional housing for disaster survivors that been displaced and lack rehousing options.**

Implementation Actions:

- Engage stakeholders that have been identified as part of the Housing RSF within the draft Housing RSF plan and other necessary participants
- Develop operational procedures, job aids, and staffing requirements necessary for various RSF activation scenarios.
- Complete a functional recovery exercise to validate Housing RSF plans and operational readiness
- Develop proposal for long-term disaster recovery funding, which can be used to support transitional housing and infrastructure for disaster survivors that have been displaced and lack rehousing options.

**Total Cost Estimates:** The initial estimated costs are high. Initial up-front costs are estimated to be within the high range; however, an assessment will only need to be completed one time. On-going annual costs to maintain information if existing databases are used is estimated to be low.

**Action Matrix:** Fill out a matrix for each action.

**Short Term (1-5 yrs):** (Actions that are achievable with current resources; with reprioritizing existing resources/personnel and or are critical for achieving medium-term and long-term actions.)

<b>Action Description:</b> Formalization and Implementation of the Washington State Disaster Housing Recovery Support Function (RSF)			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Improved capability to deliver pre-disaster planning for housing recovery and delivery of post-disaster transitional housing for disaster survivors that been displaced and lack rehousing options.		
<b>Effort (estimated)</b>		The effort has several phases, including stakeholder engagement, procedure and job aid development, identification and analysis of options for establishment of a long-term disaster recovery fund; and associated training for entities supporting RSF activation.	
<b>Cost (estimated)</b>		Depending upon the timeframe for production of procedures and materials, etc. some actions can be completed within existing resources, but will take longer to complete.	

**SCORE: 7/med**

<b>Action Description:</b> Engage stakeholders that have been identified as part of the Housing RSF within the draft Housing RSF plan and other necessary participants			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Engage stakeholders that have been identified as part of the Housing RSF		
<b>Effort (estimated)</b>		Moderate FTE impacts may occur as this would require broad multi-agency coordination and potentially extensive stakeholder engagement, depending upon authorizing direction.	
<b>Cost (estimated)</b>			Reprioritizing of staff time from Commerce as well as staff from collaborating agencies (COM, MIL, DSHS) would be required.

**SCORE: 8/HIGH**

<b>Action Description:</b> Develop operational procedures, job aids, and staffing requirements necessary for various RSF activation scenarios.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Develop operational procedures, job aids, and staffing requirements necessary for various RSF activation scenarios.		

<b>Effort (estimated)</b>	The level of effort required to develop operational procedures for each Housing RSF entity is estimated to be high and may require 2 FTE to accomplish within a 2-3 year period.		
<b>Cost (estimated)</b>		The cost to develop operational procedures, job aids, and staffing requirements necessary for various RSF activation scenarios is anticipated to be within the medium range. Resources do not currently exist within each of the Housing RSF agencies to develop such plans.	

**SCORE: 6/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Complete a functional recovery exercise to validate Housing RSF plans and operational readiness			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Complete a functional recovery exercise to validate Housing RSF plans and operational readiness		

<b>Effort (estimated)</b>		Developing a comprehensive scope for data integration and/or outlining a process for data acquisition, funding, and technology requirements will require a medium amount of staff impact and is estimated to require 0.5 FTE for a period 10-12 months.	
<b>Cost (estimated)</b>		The cost to develop and conduct a functional exercise of the Housing RSF Plan, procedures, and job aids  is anticipated to be within the medium range. Resources do not currently exist within each of the Housing RSF agencies to exercise such plans.	

**SCORE:7/med**

<b>Action Description:</b> Develop proposal for long-term disaster recovery funding, which can be used to support transitional housing and infrastructure for disaster survivors that have been displaced and lack rehousing options when federal Individual Assistance declaration has not been provided.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Develop proposal for long-term disaster recovery funding, which can be used to support transitional housing and infrastructure for disaster survivors that		

	have been displaced and lack rehousing options when federal Individual Assistance declaration has not been provided.		
<b>Effort (estimated)</b>			The level of effort assumed for a decision package to establish a disaster recovery fund, which can support housing and infrastructure recovery is estimated to be low.
<b>Cost (estimated)</b>			The cost assumed for development of a decision package is expected to be within the low range.

**SCORE: 9/High**

**Gap analysis Action: Identify critical infrastructure/buildings that need to be reoccupied and constructed/retrofitted to a higher standard.:** NO assessment submitted. Action Lead Maximilian Dixon and Brian Turbush

**Gap analysis Building Assessments (3A): of state and local assets (high risk).:** NO assessment submitted. Action lead Blee@oakharbor.org supported by Scott.black@12.wa.us, Greg.griffith@dahp.wa.gov, and Gala.gulacsik@fema.dhs.gov

### **Action Items 3B**

**Gap analysis Action: Seismic Evaluations (3B) – Mandate that seismic evaluations be completed as part of real estate transactions in order to ensure full disclosure of a property’s condition between buyers and sellers.**

**Action Lead:** Real Estate Commission, Department of Enterprise Services – State Building Code Council, Washington Department of Natural Resources

**Stakeholders:**

Property Owners – Individual owners, corporate owners, real estate investment groups, government owners.

Property Sellers – Same as above.

Property Buyers – Same as above.

Real Estate Professionals – Agents, brokers, condition assessment professionals.

Public – Users of buildings.

Others – Insurance providers, financial professionals, lenders.

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

Currently there is no requirement to evaluate or disclose the expected seismic performance of a building in a real estate transaction. Some lenders require what is known as a Probable Maximum Loss (PML) or Scenario Expected Loss (SEL) as a condition of providing funding on a property. The Probable Maximum Loss is a monetary loss figure typically expressed as a percentage of the replacement cost that has a 10% chance of being exceeded for a ground motion with a recurrence interval of 475 years (the typical design hazard). The PML is intended to be an upper bound estimate of damage, not an average predictor. There is a 90% chance of the damage being equal to or less than the PML. The PML process is defined by *ASTM E 2026-07, Standard Guide for Seismic Risk Assessment of Buildings*. The process only considers financial loss associated with an earthquake and has significant variability in potential results. There are examples of lenders requiring seismic upgrade work to be completed in order to reduce the PML to a level acceptable to them as a condition of providing funding. There are other more modern evaluation techniques that have been developed and may be more appropriate for a clear picture of seismic performance. See Current Efforts below.

Utilizing the sale of a building as a mandatory trigger to report on seismic performance is an opportune time given all of the other disclosures and requirements that go along with a property sale. Making the information available to all of the stakeholders will drive awareness of seismic performance and will likely ultimately result in a more resilient building inventory.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

As noted above there are real examples of seismic upgrades being required and completed as a result of lender requirements to achieve a specified PML. This is lender specific.

A recent effort to develop a building rating system has been completed by the US Resilience Council (USRC – [www.usrc.org](http://www.usrc.org)). The USRC system includes consideration of safety, building damage

expressed as repair cost, and recovery expressed as time to regain basic function. The USRC rating process is designed to be consistent, repeatable, and verifiable by an independent review.

There are efforts in many building jurisdictions to require seismic evaluations of certain vulnerable building types but no known current examples that require evaluations as a part of the sale process.

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

1. Dialog and collaboration between the various stakeholders to identify the advantages and barriers to mandating seismic evaluation as a condition of property sale.
2. Development of stakeholder support.
3. A consistent, repeatable, and verifiable evaluation methodology. The USRC System can be used to achieve this action.
4. Legislative support to carry forward a mandate to require seismic evaluation as a condition of property sale.

### **IMPLEMENTATION\***

Submitted by John Schelling

**Action Lead:** Real Estate Commission, Department of Enterprise Services – State Building Code Council, Washington Department of Natural Resources

**Actions Needed: Develop draft legislation and a program for disclosure of a building and a property’s seismic condition**

**Primary Outcome: Improved awareness of potentially vulnerable structures through disclosure of the seismic performance of a building and whether or not it is located within a mapped tsunami hazard zone**

Implementation Actions:

- Establish a working group of key stakeholders, including representatives of the real estate, insurance, finance, engineering, geology, and building management industries and other relevant parties that need to be engaged.
- Define the scope of a disclosure program and what level of building performance or code provisions may need to be identified.
- Examine potential options to amend Revised Code of Washington (RCW) 64.06 Real Property Transfers – Sellers’ Disclosures related to disclosure of the current seismic condition of a building and whether or not it’s located in a mapped tsunami hazard zone based upon official maps produced by WA DNR.

- Develop draft legislation that could be adopted at a state level through modification of the RCW or model code language that could be adopted by local jurisdictions via ordinance and provide

**Estimate Cost:** (This is the cost to complete this action: Low = \$0 to \$50,000, Medium = \$50,001 to \$500,000, and high = greater than \$500,000.)

**Available Resources:** Development of disclosure information and drafting proposed legislation is not currently possible within existing or anticipated resources.

**Total Cost Estimates:** The initial estimated costs are within the medium range. Initial up-front costs are estimated to be within the medium range and operational costs may vary depending upon the final program scope.

**Action Matrix: Short Term (1-5 yrs):**

<b>Action Description:</b> Develop draft legislation and a program for disclosure of a building and a property's seismic condition			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Improved awareness of potentially vulnerable structures through disclosure of the seismic performance of a building and whether or not it is located within a mapped tsunami hazard zone	
<b>Effort (estimated)</b>	The effort has several phases, including stakeholder engagement, program development, and authorizing legislation.		
<b>Cost (estimated)</b>		Additional staffing will be needed for training development efforts; delivery of training and provision of technical assistance to the real	

		estate and building community will also require additional resources.	
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**SCORE: 5/med**

<b>Action Description:</b> Establish a working group of key stakeholders, including representatives of the real estate, insurance, finance, engineering, and building management industries and other relevant parties that need to be engaged.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Engage key stakeholders and convene a working group		
<b>Effort (estimated)</b>		The level of effort required to convene the working group is expected to be medium to medium-high depending upon the amount of staff time required to support the workgroup.	
<b>Cost (estimated)</b>			Reprioritizing of staff time or recruitment of additional staff may be required to support the workgroup.

**SCORE: 8/HIGH**

<b>Action Description:</b> Define the scope of a disclosure program and what level of building performance or code provisions may need to be identified.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Define the scope of a disclosure program and what level of building performance or code provisions may need to be identified.	
<b>Effort (estimated)</b>		The level of effort required to may require 1 additional FTE to accomplish within a 1 year period.	
<b>Cost (estimated)</b>		The cost to develop program requirements is anticipated to be within the medium range. Resources do not currently exist to develop such a program.	

**SCORE: 6/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Examine potential options to amend Revised Code of Washington (RCW) 64.06 Real Property Transfers – Sellers’ Disclosures related to disclosure of the current seismic condition of a building and whether or not it’s located in a mapped tsunami hazard zone based upon official maps produced by WA DNR.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Examine potential options to amend Revised	

		Code of Washington (RCW) 64.06	
<b>Effort (estimated)</b>		Developing various options will require a medium amount of staff impact plus engagement of legal services and is estimated to require 1 FTE for a period 10-12 months.	
<b>Cost (estimated)</b>		The cost to develop options  is anticipated to be within the medium range. Resources do not currently exist for such development.	

**SCORE: 6/med**

<b>Action Description:</b> Develop draft legislation that could be adopted at a state level through modification of the RCW or model code language that could be adopted by local jurisdictions via ordinance and provide.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Develop draft legislation that could be adopted at a state or local level	
<b>Effort (estimated)</b>			The level of effort assumed drafting authorizing legislation is estimated to be low.
<b>Cost (estimated)</b>			The cost assumed for drafting authorizing legislation is expected

			to be within the low range.
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**SCORE: 8/High**

**Gap Analysis Action: Adopt and Implement Bolts-Plus Retrofit Program for URM Buildings**

**Action Lead:** Jon Siu/Erika Lund

**Stakeholders:** Professional associations (SEAW, AIA, ASCE, WABO, BOMA, BIAW, WSEMA, AIEM, cities/counties associations), local jurisdictions (building departments), the public, tenants, building owners, financial industry (banks, insurance), realty industry, seismologist/USGS, FEMA, construction industry, historic preservationists, etc.

**Needs/Expectations for achieving the Action:**

End Goal: Retrofit URMs across the state to increase life safety, increase resilience, preserve neighborhood character/historic preservation.

Expectations of stakeholders will vary widely.

- Some will not want this implemented at all, due to cost, disruptions, and administrative burden
- Bolts-Plus standard will increase life safety, resilience, and neighborhood/historic preservation in small to moderate earthquakes.
- Incentivizing above-minimum retrofitting will further increase resilience (speed recovery after a moderate earthquake) and increase neighborhood/historic preservation

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

- Seattle URM Retrofit Policy program. Technical standard developed, policy recommendations made to require Bolts-Plus retrofit. Outreach/education pilot project conducted. Infographic materials developed.
- Legislation introduced in 2017 session to study prevalence of URMs statewide. Original bill proposed and funded revolving loan fund for historic buildings to retrofit buildings for seismic safety.

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

- Money for owners to pay for retrofits => building owner resistance to requirement
- High level of political effort to make changes to building codes
- Balancing other competing policy needs with life safety, such as affordable housing, small business retention, retention of neighborhood/historic character (potential for incentivizing

building demolition), impact on under-represented communities who are likely to be more heavily affected

**IMPLEMENTATION**

**Actions Needed:** Adopt and Implement Bolts-Plus Retrofit Program for URM Buildings

Implementation steps (see below): 1) Conduct inventory of URMs; 2) Develop technical standards -- Bolts-Plus and “aspirational” (above code minimum) standard; 3) Pass enabling legislation to require State Building Code Council to adopt URM retrofits to technical standard. Legislation would include financial incentives and assistance for building owners. Should also include financial package for building departments to add staff to implement and enforce.; and 4) Implement URM Retrofit Program.

**Action Matrix:** Fill out a matrix for each action.

**Short Term (1-5 yrs):**

<b>Action Description:</b> Conduct inventory of URMs (see Recommendation for Workgroup 3A)			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	Need coordinator to compile information, deal with appeals, answer questions from public, etc.		
<b>Cost (estimated)</b>		1 FTE plus crowd-sourcing	

**SCORE: 6/med**

<b>Action Description:</b> Develop technical standards -- Bolts-Plus and “aspirational” (above code minimum) standard			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>		<ul style="list-style-type: none"> <li>• Partial FTE for coordination</li> <li>• Have starting point with Seattle standard</li> </ul>	

		<p>for Bolts-Plus—can be tweaked. Would involve SEAW and other NGO volunteers.</p> <ul style="list-style-type: none"> <li>Developing “aspirational” standard would be more difficult</li> </ul>	
<b>Cost (estimated)</b>			<p>Need coordinator. Technical expertise likely to be provided by volunteers.</p>

**SCORE: 8/HIGH**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Pass enabling legislation to require State Building Code Council to adopt URM retrofits to technical standard. Legislation would include financial incentives and assistance for building owners. Should also include financial package for building departments to add staff to implement and enforce.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	<ul style="list-style-type: none"> <li>Politically difficult due to cost of retrofits (up to \$60/square foot)</li> <li>Must have financial incentives and assistance to gain acceptance</li> </ul>		
<b>Cost (estimated)</b>	<ul style="list-style-type: none"> <li>Includes consultant(s) for public process, benefit/cost analysis, develop financial incentive/assistance proposals</li> <li>Partial FTE to coordinate consultants</li> <li>Financial package will be large</li> </ul>		

**SCORE: 5/med**

**Long Term (10+ yrs):** (Actions that will require additional resources and take longer than 10 years to achieve.)

<b>Action Description:</b> Implement URM Retrofit Program			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	<ul style="list-style-type: none"> <li>• 1 FTE program manager to track implementation across state</li> <li>• Enforcement personnel need to be hired, trained at local jurisdiction level</li> </ul>		
<b>Cost (estimated)</b>	See “Effort”		

**SCORE: 5/med**

<b>Action Description:</b> Adopt and Implement Bolts-Plus Retrofit Program for URM Buildings			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Address collapse prevention in the most vulnerable buildings; further improve community resilience if an above-code minimum standard is also included.		
<b>Effort (estimated)</b>	The effort has several phases, including URM inventory, technical standards development, development of legislation and an accompanying financial incentives		

	package, and implementation.		
<b>Cost (estimated)</b>	Part to full time project manager needed depending on phase; consultant needed for legislative/finance work; support and training to local level jurisdictions for implementation and enforcement. Volunteer efforts key to containing costs.		

**SCORE: 5/med**

**NOT SURE WHERE THIS GOES only gap analysis not action implementation: funding program for URM retrofit Gap analysis Action:** Develop and implement a seismic retrofit of privately and publicly owned unreinforced masonry (URM) funding program. Program will provide incentive and assist owners of URM buildings to complete needed retrofit work. Program shall develop criteria and priorities for targeting retrofit funding to maximize program benefit and value. When and where needed, the program will provide technical assistance to property owners. Since a substantial percentage of URM buildings that would be candidates for assistance will be designated/eligible historic properties, the program shall be coupled with applicable historic preservation incentive programs.

**Stakeholders:** property owners, building industry (i.e. building officials, WABO, contractors, real estate interests); professional services (architects, engineers, contractors); lending institutions; Main Street organizations; local historic preservation agencies; federal and state agencies (i.e. COMM, DAHP, EMD, FEMA, WABO).

**Needs/Expectations for achieving the Action:** URM buildings are highly susceptible to damage from an earthquake and pose a serious life and safety risk. While many URMs have been retrofitted, an unknown but likely larger number have not. Barriers to completing building retrofits include not only access to capital but also assistance to property owners to understand and negotiate the technical aspects of a retrofit project. Needs associated with this action include a capital allocation to fund retrofit work and state/local agency capacity to administer the program including developing guidelines, monitoring contracts, and providing technical assistance.

**Current Efforts:** Historic preservation tax incentives and capital budget funded projects have been devoted to retrofitting URM buildings on an ongoing basis. Representative Pettigrew has introduced HB 1995.

**Gaps & Barriers to achieving the Action:**

Obtaining necessary funding and staff capacity to implement the program

**Action Items 3C**

**Gap analysis Action: Building Codes 3C part 1.** Provide model code language for adoption by local jurisdictions in order to ensure that unsafe buildings do not kill or injure occupants. Include mandatory parapet retrofit or removal. Only retrofit options shall be applicable to buildings and structures with a historic designation or determined eligible for a historic designation.

**Action Lead:** Tim Nogler

**Stakeholders:** State Building Code Council, , Historic Preservation offices, the public, tenants, building owners, architects, engineers, developers, realtors, homebuilders, general contractors, city and county elected officials and building officials, Washington Association of Building Officials, Structural Engineers Association

**Needs/Expectations for achieving the Action:** *State the desired end goals for achieving this action:* Improve the resilience of buildings in areas of high seismic hazard to improve life safety and increase the number of people able to shelter in place, while protecting the architectural character of historically designated historic buildings/structures or those determined to be eligible for designation.

*Will this meet the needs/expectations of the stakeholders you identified?*

**Current Efforts:** *What has been achieved so far and what is currently being worked on regarding this action?*

Model code language is in place to address unsafe buildings and parapet retrofit.

The state building code council adopts the building codes published by the International Code Council, including the International Existing Building Code (IEBC). Currently the 2015 edition of the IEBC is in effect statewide. The state adoption includes reference to **101.6 Appendices:** “The code official is authorized to require rehabilitation and retrofit of buildings, structures, or individual structural members in accordance with the appendices of this code if such appendices have been individually adopted. Appendix A, Guidelines for the Seismic Retrofit of Existing Buildings, is hereby adopted as part of this code without any specific adoption by the local jurisdiction.” (WAC51-50-480101).

Section A113.6 of the Appendix A Guidelines applies to parapets:

“Parapets and exterior wall appendages not conforming to this chapter shall be removed, or stabilized or braced to ensure that the parapets and appendages remain in their original positions. The maximum height of an unbraced unreinforced masonry parapet above the lower of either the level of tension anchors or the roof sheathing shall not exceed the height-to-thickness ratio shown in Table A1-F. If the required parapet height exceeds the maximum height, a bracing system designed for the forces determined in accordance with the building code shall support the top of the parapet. Parapet corrective work must be performed in conjunction with the installation of tension roof anchors. The minimum height of a parapet above any wall anchor shall be 12 inches. Exception: If a reinforced concrete beam is provided at the top of the wall, the minimum height above the wall anchor may be 6 inches.”

The IEBC applies where there is an alteration, addition or repair to an existing building, and assumes the building owner applies for a permit. The seismic reinforcing for walls and parapets is triggered with an alteration involving over 50 percent of the aggregate area of the building or 25 percent of the roof area of a building. The local official can declare a building unsafe, with the support of the local elected officials and prosecutors office. A local ordinance and a fund source would be needed to require all existing buildings to upgrade.

**Gaps & Barriers to achieving the Action:** State and/or local legislation requiring building retrofits accompanied by funding for enforcement and compliance. Need to have Representation of the insurance industry on the State Building Code Council

## **IMPLEMENTATION**

**Actions Needed:** Develop model code language to apply to high seismic areas, and assign levels of risk depending on type and occupancy of buildings. The model code language would include administrative and technical provisions to improve resilience of the buildings, life safety of the occupants and increase the number of people able to shelter in place.

**Estimate Cost:** High. \$10 million +

**Available Resources:** Current staff resources inadequate to meet basic mandate of maintaining updates to building codes for new buildings. Volunteers from professional organizations would be needed.

**Action Matrix:** Fill out a matrix for each action.

**Short Term (1-5 yrs):** (Actions that are achievable with current resources; with reprioritizing existing resources/personnel and or are critical for achieving medium-term and long-term actions.)

**Action Description:** Develop models of local legislation requiring mandatory or voluntary building retrofits accompanied by a capital program that provides financial and technical assistance or incentives for seismic retrofitting of vulnerable buildings and structures, especially URMs.

Improve the resilience of (existing) buildings in areas of high seismic hazard to improve life safety and increase the number of people who will be able to shelter in place. Provide model code language

for adoption by local jurisdictions in order to ensure that unsafe buildings do not kill or injure occupants (in the event of an earthquake). This should include mandatory parapet retrofit, or for buildings not designated as historic, removal.

**Gaps & Barriers to achieving the Action:** State and/or local legislation requiring building retrofits accompanied by funding for enforcement and compliance.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Develop support for model legislation to require retrofit of vulnerable buildings	
<b>Effort (estimated)</b>		Organize and conduct public meetings to engage building owners, realtors and the public; take comments on policy to require retrofits to address impacts to businesses; consider costs	
<b>Cost (estimated)</b>		4 FTE to organize and document stakeholder meetings, create a webpage and listserv to publish and regularly update meeting information, and to provide research and analysis, conduct studies, present findings to stakeholder groups, write reports, and draft rules.	

**SCORE: 6/med**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

<b>Action Description:</b> Pass legislation to authorize mandatory building retrofit code, including funding for code development, enforcement and building retrofit.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Develop and pass legislation to require building retrofit		
<b>Effort (estimated)</b>	Create a coalition of stakeholders and legislators, agencies and the Governor’s Office to develop and introduce legislation. Work with key sponsors and legislative leadership to schedule hearings and workshops to present findings of need, assessment of risk, examples of successful programs.		
<b>Cost (estimated)</b>	4 FTE to provide technical support, legal analysis, construction cost studies, lobbying and testimony at public hearings.		

**SCORE: 5/med**

**Long Term (10+ yrs):** (Actions that will require additional resources and take longer than 10 years to achieve).

<b>Action Description: Implement codes</b>			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Provide technical support and training for building owners, construction industry and regulators and the public.		
<b>Effort (estimated)</b>	Develop an ongoing “Resilient Washington Buildings” program as a resource for cities and the industry.		
<b>Cost (estimated)</b>		X	

**SCORE: 6/med**

<b>Action Description: Retrofit Buildings</b>			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Notify building owners, issue permits, conduct inspections, create inventory of retrofits.		
<b>Effort (estimated)</b>	Retrofit Buildings		
<b>Cost (estimated)</b>	Costs for administration and enforcement separate from construction costs for retrofits.		

**SCORE: 5/med**

**Gap analysis Action: Researching and capturing where we are at with building codes and creating a baseline:** Not specifically addressed in action spreadsheet.

**Gap analysis Action: Decrease lag-time between fault discovery and including this information in updating building code.** Not specifically addressed in action spreadsheet.

**Gap analysis Action: Fully fund state building code council:** Not specifically addressed in action spreadsheet.

**Gap analysis Action ASCE: 7-16, chapter 6 tsunami**

**Submitted by: Keily Yemm and Maximilian**

**Stakeholders:** State Building Code Council, Historic Preservation offices, the public, tenants, building owners, architects, engineers, developers, realtors, homebuilders, general contractors, city and county elected officials and building officials, Washington Association of Building Officials, Structural Engineers Association

**Needs/Expectations for Achieving the action:**

- Currently the state has not adopted tsunami specific building codes. Even if Washington State’s Building Code Council (SBBC) adopts all or part of the new tsunami resilience chapter 6 (7-16) developed by the American Society of Civil Engineers (ASCE), the state does not have the manpower to access or enforce compliance.
- The expectations would be that Tsunami-resilient building codes are adopted and more resources are dedicated to the enforcement of the updated codes, especially for critical infrastructure in high risk tsunami zones

**Current Efforts:** Identification of Gap

**Gaps & Barriers:** see one pager/combined gap analysis matrix for what was listed

1. Resolving the tsunami modeling minimum 100-meter wave height issue (2500-year event choice variance)
2. Determining if SBBC Council advisory group has a tsunami subject matter expert. If not, offer up EMD services via state Tsunami Program Coordinator Reach out to Tim Nogler and John siu.
3. Community Education and outreach activities regarding ch6, if it is officially adopted.

**Action Items 3D**

**Group Lead:** Paul Brallier (SEAW)

**Group Participants:** Jon Siu (WABO), Kevin Scarlett (DOH), Maximillian Dixon (EMD), Ray Cockerham (WABO), Joyce Lem (SEAW), Steven Dombrowski (AIA), Jim Westcott (AIA)

**Gap analysis Action: Rapid Assessment Program (3D): Institute a rapid, consistent, and comprehensive fast-tagging building assessment program that may be used in all local jurisdictions to help get people back into structures**

**Stakeholders:**

Primary Stakeholders – Those implementing the Rapid Assessment Program

- State of Washington EMD
- Washington Association of Building Officials (WABO);
- Structural Engineers Association of Washington (SEAW);
- American Institute of Architects, Washington Council and Seattle Chapter (AIA)
- American Society of Civil Engineers, Seattle Section (ASCE)
- Washington State Department of Health (DOH)

General Stakeholders – Those in need of this Rapid Assessment Program

- General Public – Homeowners and Tenants
- Building Owners
- Private Businesses
- Essential Facilities – Hospitals, Fire, Police, Emergency Operations Centers
- Emergency Shelters
- Health Care Facilities
- Public Works
- Prisons
- Local Jurisdictions
- Schools and Places of Public Assembly

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

- A rapid building safety assessment program will reduce impacts on shelter needs and help communities re-occupy safe buildings. It will also assist public works, essential facilities and medical facilities to resume operations.
- WAsafe is a coalition of the four non-governmental organizations listed as stakeholders: WABO, SEAW, AIA, and ASCE, assisted by Washington State Department of Health (DOH). The ultimate goal is for WAsafe to develop and implement a comprehensive and sustainable program to train, enroll, and dispatch volunteers to support local jurisdictions in performing post-disaster building safety assessments.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

Washington's Safety Assessment Facilities Evaluation Program (WAsafe) for training and dispatching post-earthquake building inspectors utilizes volunteers and mutual aid resources to provide professional engineers and architects and certified building inspectors to assist local governments in safety assessments of their built environment in the aftermath of a disaster.

Currently training for volunteers is provided through Cal OES, however an effort is underway to transition to the WAsafe curriculum which is presently being developed.

DOH manages an online database application called WAserv. The application is a platform for DOH and primary public health and response partners to manage and notify volunteers associated with their individual organizations. WAsafe has been given access to WAserv in order to manage, track, communicate, and notify volunteers who can assist with building safety assessments after an earthquake or other disaster. These volunteers would be dispatched to the requesting Emergency Operations Centers for mobilization and deputization by the local Building Official or other Authority Having Jurisdiction (AHJ) over building safety assessments.

There are currently over 500 volunteers listed in the WAserv database. In the near future WAsafe is intended to be a comprehensive program to train, register and dispatch volunteers to perform post-disaster building safety assessments.

Building officials are responsible for conducting building safety assessments in their jurisdictions. As a rapid building safety assessment program is established, it needs to be closely coordinated with Building Officials that will necessarily be responsible for their local jurisdiction.

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

- The WAsafe program is not fully developed (see Complete Development and implementation of WAsafe Program below).
- The WAsafe program is not fully integrated with EMD ESF3 operations
- The vast majority of local EOCs and building departments are not aware of the WAsafe program (see Outreach to Local Emergency Managers and Building Officials below)
- WAsafe is staffed by volunteers from the NGOs, who are themselves volunteer organizations. The WAsafe volunteers have other, non-volunteer responsibilities. This work is being accomplished on a time-available basis by volunteers from the NGO's.

## **IMPLEMENTATION**

<b>Action Description:</b> Integrate WAsafe dispatch procedures with EMD ESF3 procedures.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>			X- See integrate wasafe with EMD ESF 3 plan
<b>Cost (estimated)</b>			x-See integrate wasafe with EMD ESF 3 Plan

**SCORE: 9/HIGH**

<b>Action Description:</b> Commence WAsafe volunteer self-registration drive for CalOES SAP-trained volunteers.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		X	
<b>Effort (estimated)</b>		x	
<b>Cost (estimated)</b>			x

**SCORE: 7/med**

<b>Action Description:</b> WAsafe volunteer training curriculum needs to be completed and recognized by EMD and FEMA.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>			<b>Curriculum by WAsafe Volunteers</b> <b>Review by EMD:</b> <b>Review by FEMA:</b>
<b>Cost (estimated)</b>			x

**SCORE: 9/med**

<b>Action Description:</b> Develop credentials and credentialing procedures that will be recognized statewide so volunteers do not have to re-register with each local EOC.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		x	
<b>Effort (estimated)</b>		x	
<b>Cost (estimated)</b>			x

**SCORE: 7/med**

<b>Action Description:</b> Define/clarify volunteer vetting process for enrollment through WAsafe			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>			<b>WABO, WAsafe &amp; EMD</b>
<b>Cost (estimated)</b>			<b>Cost for Badging by WABO</b>

**SCORE: 9/HIGH**

<b>Action Description:</b> Arrange for WAsafe Credentials and Badging of CalOES SAP trained volunteers.			
<i>Medium-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>		x	
<b>Cost (estimated)</b>			x

**SCORE: 8/HIGH**

<b>Action Description:</b> Outreach to Local Emergency Managers and Building Officials to inform them of the procedures for requesting and utilizing volunteer building safety assessors following a disaster.			
<i>Long-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<b>?</b>		
<b>Effort (estimated)</b>		<b>?</b>	
<b>Cost (estimated)</b>			<b>?</b>

**SCORE: 8/HIGH**

<b>Action Description:</b> Develop simple, clear procedures for requesting and implementing building safety assessments need to be included in each Emergency Operations Center (EOC) throughout the state and with EMD ESF 3.			
<i>Long-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<b>X</b>		
<b>Effort (estimated)</b>			<b>WAsafe Volunteer and/or EMD Staff</b>
<b>Cost (estimated)</b>			<b>X</b>

**SCORE: 9/High**

<b>Action Description:</b> Outreach / Training: Training is needed for each EOC on this topic.			
<i>Long-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<b>X</b>		
<b>Effort (estimated)</b>			<b>WAsafe Volunteer and/or EMD Staff</b>
<b>Cost (estimated)</b>			<b>X</b>

**SCORE: 9/High**

\*Action: Integrate WAsafe with EMD ESF3 – See Maximilian’s Action Implementation Plan

**Gap analysis Action: Complete Development and Implementation of WAsafe Program**

**Stakeholders:**

- State of Washington EMD
- Washington Association of Building Officials (WABO);
- Structural Engineers Association of Washington (SEAW);
- American Institute of Architects, Washington Council and Seattle Chapter (AIA)
- American Society of Civil Engineers, Seattle Section (ASCE)

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

- Complete development and implementation of a comprehensive program to train, enroll and dispatch qualified volunteers to support jurisdictions in performing post-disaster building safety assessments.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

See Rapid Assessment Program above.

- WAsafe has access to DOH’s WAserve database.
- WAsafe member organizations are enrolling volunteers through WAserve.
- Interim/preliminary WAsafe dispatch procedures have been developed. Two volunteer callout tests have been conducted.
- WAsafe volunteers have begun developing training materials (adapting ATC-20 and CalOES training materials).

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

- WAsafe dispatch procedures need to be integrated with EMD ESF3 procedures (see Integrate WAsafe with EMD ESF3 below).
- WAsafe volunteer training curriculum needs to be completed and recognized by EMD and FEMA.
- Clarify / Define volunteer vetting process for enrollment through WAserve
- Develop credentials and credentialing procedures that will be recognized statewide so volunteers do not have to re-register with each local EOC

**IMPLEMENTATION**

**Action Description: Complete Development and Implementation of WAsafe Program.**

*Long-Term*

**High**

**Medium**

**Low**

**Priority**

**Effort (estimated)**

**Cost (estimated)**

**Gap analysis Action: Integrating WASafe into WA EMD and ESF 3 operations**

**Expectations:**

ESF 3 leaders and EMD SOP's:

- Build relationships & lines of communication with WASAFE organization leaders
- WASafe program is recognized and integrated into EMD ESF3 response operations
- Includes WASAFE in regular strategic planning/operations meetings Current Efforts: (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)
- Are able to dispatch WASafe volunteers to local EOCs and building departments when and where they are needed.

**Current Efforts**

- Discussing the inclusion of “private sector support partner” role in EMD’s CEMP
- Facilitating the communication/collaboration between DES and WASAFE
- Discussing the inclusion of WASAFE in EMD’s MRR section SOP’s
- Developing mission packages for mutual aid that include WASAFE
- Tied into all resource request processes, including WebEOC, OPS rfa@mil.wa.gov email, OPS call in, RACES amateur radio
- WA EMD Resource request form?
- OPS and LOGS SOPs

Current Efforts: (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

- Are able to dispatch WASafe volunteers to local EOCs and building departments when and where they are needed.important

## Gap and Needed Resources:

- Resources & time DES liaisons have to dedicate towards developing relations with WASAFE
- MOU's that would be needed for formal state assistance agreements with WASAFE
- Development of internal SOP's that include Wasafe, including:
  - -all resource request processes, including WebEOC, OPS, OPS call in, RACES amateur radio
  - -Creating a WA EMD resource request form?
  - -Operations and logistics section in EOC
- Training/exercise on SOP's/ESF 3 operations and mission packages
- Qualifications, such as additional training classes required for NGO Coordinators need to be determined.

## IMPLEMENTATION

**Action Lead:** Maximilian Dixon EMD

### **Actions Needed:**

#### Define the Deployment process

- Reference RCW 38.52.010 – “Emergency Worker”
- Reference WAC 118-04-080 – “Registration and Temporary Registration”
- State/WA EMD
  - Update CEMP responsibilities section to include Wasafe (utilizing existing “support” category similar to American Red Cross)
    - define Wasafe (WABO, ASCE, AIA, SEAW) responsibilities
      - Update ESF 3 CEMP Annex to include:
        - how Wasafe will function within ESF3 and
        - How they will be contacted by WA EMD/SEOC at beginning of activation and for resource requests
  - Define the ways/steps resources can be requested (EMD and DES SOP's)
  - Help create necessary MOU's template between WA EMD and WASAFE (WABO, ASCE, AIA, SEAW)
    - Using American Red Cross template?
  - Support DES and other coordinating ESF liaisons with guidance on integrating private sector support partners
- Local process through building official and incident commander/EOC
  - Outreach, training and SOP's
- DES, ESF 3 Coordinating agency
  - Outreach, training and SOP's

#### Creating Training Package Process/Requirements (Wasafe Coordinators, local Building Officials, Volunteers)

- All:

- Emergency Worker Program, resource request process and deployment training (how it works and registration process (e.g. which classification they fall under) – WA EMD could help Wasafe
- Badging to enable access to assessment areas (Business Re-entry Registration Card Model)? – WA EMD could help Wasafe
- Credentialing process (Wasafe?) - Wasafe
- ICS 100,200,700,800 online classes (how the incident command system works) \*not required for volunteers, but could be available\* - Online and local support?
- Wasafe coordinators:
  - SEOC foundations training (how activations work) – WA EMD hosts
  - ESF coordination process with DES (how to be an ESF liaison/representative/support partner) – WA EMD could help Wasafe
    - Need to develop this after we finalize the above processes/steps and interface with DES
    - This will be a more in depth training for coordinators (both internal processes to WASafe and between DES/WA EMD)

<b>Action Description:</b> Integrate WASafe into EMD ESF3.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	This is critical for achieving Rapid Assessment Program (3D)		
<b>Effort (estimated)</b>		Moderate FTE; changing of internal WA EMD processes, SOPs and plans; develop and execute legal contracts/MOU's; coordinate with ESF lead(s) to change ESF structure; training and outreach	
<b>Cost (estimated)</b>			Minimal \$; some reprioritizing of staff time for WA EMD; impacts to Volcano program; volunteer time from WASafe

**SCORE: 8/High**

**Gap analysis Action: Train volunteer inspectors to assist building officials following a damaging earthquake.**

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**Stakeholders:**

- State of Washington EMD
- Washington Association of Building Officials (WABO);
- Structural Engineers Association of Washington (SEAW);
- American Institute of Architects, Washington Council and Seattle Chapter (AIA)
- American Society of Civil Engineers, Seattle Section (ASCE)
- Washington State Department of Health (DOH)

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

Volunteers will be prepared to support local building departments in performing post-disaster building safety assessments.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

See “Complete development and implementation of WAsafe program” section above.

Currently, and for the past 25 years, training is provided by the following NGOs, using ATC-20, ATC45 or Cal OES SAP\* curricula which are recognized by FEMA:

- Washington Association of Building Officials (WABO);
- Structural Engineers Association of Washington (SEAW);
- American Institute of Architects, Washington Council and Seattle Chapter (AIA)
- American Society of Civil Engineers, Seattle Section (ASCE)

\* ATC-20 Post Earthquake Building Safety Assessment Program  
ATC-45 Post Wind and Flood Disaster Building Safety Assessment Program  
California Office of Emergency Services Safety Assessment Program

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

- WAsafe curriculum to train volunteers needs to be completed and recognized by EMD and FEMA.
- Modifications to ATC-20 and ATC-45 are proposed to specifically address Washington State Laws and FEMA Incident Command Systems ICS 100 awareness.

- Volunteer registration procedures need to be developed in order for volunteers to become registered as part of their training as is done in California, Missouri and Utah (see below for funding for State Level Volunteer Emergency Worker registration under the authority of EMD).

IMPLEMENTATION:

<b>Action Description:</b> Develop volunteer registration procedures in order for volunteers to become registered as part of their training.			
<i>Short-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<b>X</b>		
<b>Effort (estimated)</b>		<b>Volunteers from WAsafe</b>	
<b>Cost (estimated)</b>		<b>Volunteers from WAsafe</b>	

SCORE: 7/med

<b>Action Description:</b> Complete WAsafe curriculum to train volunteers and have it recognized by EMD and FEMA.			
<i>Short-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Modifications to ATC-20 and ATC-45 are proposed to specifically address Washington State Laws and FEMA Incident Command Systems ICS 100 awareness.		
<b>Effort (estimated)</b>	?- recognition with EMD and FEMA would be a heavy lift		
<b>Cost (estimated)</b>			<b>WAsafe volunteers</b>

SCORE: 7/med

<b>Action Description: Provide a series of WAsafe training classes across the state to train new and existing volunteers.</b>			
<i>Short-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		X	
<b>Effort (estimated)</b>		<b>WAsafe Volunteers</b>	
<b>Cost (estimated)</b>			<b>Training materials, venue rentals, WAsafe volunteers</b>

**SCORE: 7/med**

**Gap analysis Action: Address liability concerns regarding volunteers and organizations that train them.**

**Stakeholders:** (i.e. you, the public, tenants, building owners etc.)

- Washington Association of Building Officials (WABO);
- Structural Engineers Association of Washington (SEAW);
- American Institute of Architects, Washington Council and Seattle Chapter (AIA)
- American Society of Civil Engineers, Seattle Section (ASCE)

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

The current Good Samaritan Law does not provide liability protection for organizations that train, enroll, and credential volunteers to respond to disasters. These volunteers come from both the private and public sectors and have been critical in helping local communities respond to past disasters in the United States and other parts of the world.

Although individual volunteers are immune from individual liability in the event of a declared disaster according to the Washington State Emergency Worker Law (RCW 38.52.180), the Washington State Attorney General’s office has said there is no liability protection for organizations that maintain a registry of volunteers. This means non-governmental organizations (NGOs) that train, enroll, credential and organize individual volunteers to respond to disasters could be found to be liable should someone choose to sue them for any reason. In Washington, statewide NGOs that manage a volunteer registry include the Structural Engineers Association of Washington (SEAW), the American Institute of

Architects (AIA), the American Society of Civil Engineers (ASCE) and the Washington Association of Building Officials (WABO).

It is crucial to extend the liability protection for volunteers to include the non-profit organizations that train, qualify, and organize licensed professionals (engineers and architects) or building department personnel (plan reviewers and inspectors) as volunteers to assist local jurisdictions to respond more effectively to a disaster.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

**Governor Inslee signed Senate Bill No. 5185 - Amendments to RCW 38 Emergency Management Act to Provide Immunity from Liability to Professional or Trade Associations Providing Emergency Response Volunteers.**

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

IMPLEMENTATION:

**No Further Action Required – This issue has been completed.**

**Gap analysis Action: Change State Law to allow and provide funding for State Level Volunteer Emergency Worker registration under the authority of EMD.**

**Stakeholders:** (i.e. you, the public, tenants, building owners etc.)

Primary Stakeholders – Those that Implement the Rapid Assessment Program

- State of Washington EMD
- Washington Association of Building Officials (WABO);
- Structural Engineers Association of Washington (SEAW);
- American Institute of Architects, Washington Council and Seattle Chapter (AIA)
- American Society of Civil Engineers, Seattle Section (ASCE)
- Washington State Department of Health (DOH)

General Stakeholders – Those in need of this Rapid Assessment Program

- General Public – Homeowners and Tenants
- Building Owners
- Private Businesses
- Essential Facilities – Hospitals, Fire, Police, Emergency Operations Centers
- Emergency Shelters
- Health Care Facilities

- Public Works
- Prisons
- Local Jurisdictions
- Schools and Places of Public Assembly

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

Ultimately, Washington State needs an office or program, funded and administered by the State, to register and credential qualified volunteer emergency workers to conduct building safety assessments after a damaging event anywhere in the state.

Disasters know no boundaries. Rapid building safety assessors will be needed from across the state. Local resources (Building Officials and volunteer engineers) will be overwhelmed with demands from their own areas. As demonstrated in events and exercises, including the Oso Landslide, disaster response is not a local jurisdiction issue and that volunteers will be required from across the State. It is essential that the State of Washington take on the responsibility of enrolling, registering and credentialing qualified volunteer emergency workers to be able to effectively respond to a disaster. ESF3 needs a consolidated list of potential volunteers, not a list spread out across every county of the State.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

This issue has been the subject of conversations between members of professional organizations and representatives of the State for the past 20 years. EMD conducted a workshop in 2014 with representatives from a wide range of stakeholders that resulted in a report, “Post-Disaster Safety Assessment Program (SAP) Development for the State of Washington,” dated December 2014. The report recommendations imply EMD should take steps to develop and administer such a program. No further progress has been made on this issue. SEAW, WABO, ASCE, and AIA, with the help of DOH, formed the WAsafe coalition to try to fill this gap. However, WAsafe cannot be a permanent, sustainable solution, since it is only staffed by volunteers.

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

No funding has been provided to develop the necessary program. WAsafe is taking steps toward program development and implementation, but progress is slowed by the volunteer nature of the coalition.

There is no statewide organization responsible for implementing a statewide program to register, train, and credential volunteer emergency workers to conduct building safety assessments. Currently, Washington State, with its home rule laws, pushes responsibility and authority for registering volunteer emergency workers to the lowest jurisdiction. This does not work for disaster response. Resources for disaster response need to be able to be marshalled from across the state. Other states such as California, Missouri, and Utah have implemented statewide registration systems. Over 500 of California's volunteers live in Washington State because Washington does not have an effective State wide registration system.

**IMPLEMENTATION:**

**ACTION Description: Establish a volunteer emergency worker registration and credentialing program under the authority and management of EMD.**

<i>Long-Term</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<b>X</b>		
<b>Effort (estimated)</b>		<b>Would require EMD Staff to manage- Requires acceptance and assistance of EMD</b>	
<b>Cost (estimated)</b>		<b>Would require EMD Staff to manage- Requires acceptance and assistance of EMD</b>	

**SCORE: 7/med**

**Gap Analysis Action: The Building Occupancy Resumption Program BORP and BORP Alternatives**

**Stakeholders:** (i.e. you, the public, tenants, building owners etc.)

- Washington Association of Building Officials (WABO);
- Building owners & tenants (private and public sector)
- Private Engineering Consultants

**Needs/Expectations for achieving the Action:** (State the desired end goals for achieving this action. Will this meet the needs/expectations of the stakeholders you identified?)

Provide alternatives for owners to have their buildings assessed for safety, with the potential for reoccupying, sooner than if they had to wait for the local building department to conduct the assessment.

**Current Efforts:** (What has been achieved so far and what is currently being worked on regarding this action? Could include stakeholder efforts.)

The Building Occupancy Resumption Program (BORP) is a program developed by the City and County of San Francisco, Department of Building Inspection (DBI). The program allows San Francisco building owners to pre-certify private post-earthquake inspection of their buildings by qualified engineers and specialty contractors upon DBI acceptance of a written inspection program.

BORP consists of three basic phases. The first is the assessment of the building and preparation of a BORP program, including a building-specific post-earthquake inspection plan. The second phase includes annual update and renewal activities, the maintenance portion of the work. The third phase is the post-disaster implementation of the program.

As an alternative to BORP, the Washington Association of Building Officials (WABO) and the Structural Engineers Association of Washington (SEAW) Liaison Committee issued a White Paper (5-2009) titled “Post-Disaster Contract Safety Evaluations: Guideline –Post-Disaster Contract Safety Evaluations,” sometimes referred to as the “advisory tag system.” This program is modeled on one adopted by the City of Seattle, and allows building owners to contract with private engineering firms to assess the owner’s buildings after a damaging event. In response to the event, the engineering firm conducts the safety evaluation, posts a red/yellow/green “advisory tag,” and reports the result to the local building department. The building department follows with its own assessment, and posts an “official” red/yellow/green placard. The difference between the “advisory tag” program and BORP is there is no requirement for pre-approval by the building department, and no maintenance requirement. While a pre-assessment is recommended, it is not required. The system depends on trust between the building department and the engineering community, and professionalism on both sides. This advisory tag system has been promoted through SEAW (Seattle Chapter) and WABO meetings and trainings.

**Gaps & Barriers to achieving the Action:** (This information will be reported out at the Subcabinet Meeting)

- It is unknown how many local building department jurisdictions have formally adopted and implemented BORP, or how many besides Seattle have adopted an advisory tag program based on WABO/SEAW White Paper 5-2009.
- It is unknown how many local building department jurisdictions are aware of either program. Some WABO members are aware of the White Paper program, as it has been promoted during ATC-20 training sessions.
- Building Officials, building owners and private consulting engineers need to be informed of the BORP and Post-Disaster Contract Safety Evaluations so that they can use the programs.
- Building owners need to understand that it is necessary to arrange for these types of programs in advance of a disaster.

- Both BORP and the advisory tag system have downsides, which may lead local building departments to choose to not adopt either program:
  - BORP only certifies individual engineers, not engineering firms. The building owner is required to submit the names of the engineers to be certified (or re-certified) to the local building department annually. If the engineers are not available at the time of the event, it is unknown whether the building owner is allowed to use the program to reoccupy a building. Enforcing this can be a burden on the local building department. It is unknown how closely San Francisco tracks and enforces this requirement.

The advisory tag system is more flexible for engineering firms and owners, and requires less maintenance by the building department as compared to BORP. However, it relies on trust and professionalism. It also requires what some might see as duplication of effort

### **Implementation**

Action Description: **Outreach program to local jurisdictions, property owners, and private engineers and architects to inform them of the availability of BORP and Advisory Placard programs.**

<i>(Medium -Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		<b>X</b>	
<b>Effort (estimated)</b>			<b>WABO and WAsafe volunteers.</b>  <b>Efforts by private property owners to establish agreements with Building Officials and qualified private building assessors.</b>
<b>Cost (estimated)</b>			<b>WABO and WAsafe Volunteers</b>

**SCORE: 8/med**

### **Action Items 3F**

**Gap analysis Action: Improve consumer EQ preparedness through increased EQ insurance education and take up rate, mitigation efforts, financial incentives and improved affordability.**

**Stakeholders:** EQ insurance consumers, Office of the Insurance Commissioner, Department of Licensing, Department of Financial Institutions, FEMA, reinsurers, municipal or county building departments, escrow companies, title companies, business owners, real estate developers, realtors, mortgage lenders

**Needs/Expectations for achieving the Action:**

- Improve EQ insurance take up rates through increasing affordable options and regular, on-going public education efforts targeted to raise consumer awareness of their property insurance protection gap and the need for EQ insurance. Increase public-private collaboration on EQ insurance education efforts, such as: education campaigns, seminars and workshops; events like the “Great Shakeout.”
- Increase EQ mitigation efforts through education, strong building codes/land use and improved risk modeling. Provide property owners free EQ home inspection program and modification list. Require EQ risk disclosure, list of necessary modifications, and possible EQ insurance in real estate transactions. Require universal application of land use policies and do not allow for local “opt outs,” especially in high-risk areas. Develop strong, targeted building codes/land use planning along with training programs for local building inspectors. Encourage public-private work with insurers and reinsurers to identify risk and engineer solutions.
- Introduce financial incentives to mitigate against property losses and develop options for improved affordability, such as insurer’s premium/mitigation discounts and disaster savings accounts. To improve affordability, introduce insurance products with broader deductible options, such as 5-10-15-20-25% of insured home value. Consider an earthquake authority in the state which could provide more options for affordable products. Support state and federal legislation that promotes resiliency, preparedness and mitigation efforts such as the Tsunami Warning, Education and Research Act of 2017 (Sen. Maria Cantwell).
- Partner with other Pacific Coast state entities to share information or research.

**Current Efforts:**

- The Office of the Insurance Commissioner (OIC) shows that Washington State has an EQ insurance market that is accessible to consumers. The OIC Consumer Advocacy unit answers questions and inquiries from consumers and conducts outreach events regarding EQ insurance. It maintains a webpage dedicated to earthquake insurance and a listing of the top 40 companies authorized to sell EQ insurance in Washington.
- Department of Licensing has a link available for license and consumers to use on landslide hazards. Insurers undertake individual earthquake risk educational efforts with policyholders and industry trade associations support Great Shake Out events through media and social media events and campaigns.
- Insurers provide EQ risk educational efforts with policyholders and industry trade associations support “Great Shakeout” events through media and social media events and campaigns. Insurers have been able to reduce premium for coverage by raising deductibles for the insurance policy.

- The Pacific North West EQ peril is one of the top three EQ zones in the US besides California and New Madrid. Although it is ranked third of the three zones, a significant event could be very destructive and result in significant insured, economic, and societal loss. Insurance and reinsurance can transfer risk of financial ruin away from individual consumers as well as local governments, municipalities and states through combinations of risk transfer products. With the advancement in computer modeling and availability of data, there exist some advanced techniques to assess the underlying risks, in this case EQ risks, in the Pacific North West. The insurance industry and the scientific communities have developed better tools, far beyond the traditional actuarial rating techniques, to determine loss cost for the peril of earth quake shake, earth quake fire following and even have even begun to introduce Tsunami modeling. Given such developments in risk modeling, the insurance and reinsurance industry is gaining a better understanding of risk.

#### **Gaps & Barriers to achieving the Action:**

- The lack of consumer individual risk awareness, understanding of coverage and structure of products, and ultimately the recognition of the true cost of the EQ peril creates low take up rates and resulting protection gap.
- Resources required of state agencies to fund education, training, and possible inspection program costs.
- Identification and coordination of public-private partnerships.
- Establishing an earthquake authority would require legislation, capitalization, and oversight.
- Establishing financial incentives or mitigation discounts would likely require legislation.

#### **IMPLEMENTATION**

**Action Lead:** Stacy Middleton

**Actions Needed:** Improve consumer EQ preparedness through increased EQ insurance education and take up rate, mitigation efforts, financial incentives and improved affordability.

#### **Needs/Expectations for achieving the Action:**

- Improve EQ insurance take up rates through increasing affordable options and regular, on-going public education efforts targeted to raise consumer awareness of their property insurance protection gap and the need for EQ insurance. Increase public-private collaboration on EQ insurance education efforts, such as: education campaigns, seminars and workshops; events like the “Great Shakeout.”
- Increase EQ mitigation efforts through education, strong building codes/land use and improved risk modeling. Provide property owners free EQ home inspection program and modification list. Require EQ risk disclosure, list of necessary modifications, and possible EQ insurance in real estate transactions. Require universal application of land use policies and do not allow for local “opt outs,” especially in high-risk areas. Develop strong, targeted building codes/land use planning along with training programs for local building inspectors. Encourage public-private

work with insurers and reinsurers to identify risk and engineer solutions. Encourage improved risk modeling to better anticipate effects of events.

- Introduce financial incentives to mitigate against property losses and develop options for improved affordability, such as insurer’s premium/mitigation discounts and disaster savings accounts. To improve affordability, introduce insurance products with broader deductible options, such as 5-10-15-20-25% of insured home value. Consider an earthquake authority in the state which could provide more options for affordable products. Support state and federal legislation that promotes insurance product innovation (balanced with consumer protection), resiliency, preparedness and mitigation efforts such as the Tsunami Warning, Education and Research Act of 2017 (Sen. Maria Cantwell).
- Consider regionalizing preparedness efforts by partnering with other Pacific Coast states and their entities to share information and strategies.

**Action Description:** Improve consumer EQ preparedness through increased EQ insurance education and take up rate, mitigation efforts, financial incentives and improved affordability.

<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>	x		
<b>Cost (estimated)</b>		x	

**SCORE: 6/med**

**Implementation Plan:**

Coordinate public and private collaboration on EQ insurance education to raise awareness of property insurance protection gap and need for EQ insurance. Consider and work collaboratively with stakeholders to develop methods for increasing take up rate, mitigation strategies, financial incentives and improved affordability through legislation, data collection and review, and new programs, such as bolt and brace programs, requiring EQ insurance in real estate transactions, stricter land use rules, and stronger building codes. Consider a regionalized approach to preparedness efforts through partnering with other states.

\*Assume efforts and costs are based upon public and private entity stakeholder estimates.

Assume as well that there are on-going ideas in progress and so details cannot be fully fleshed out at this time.

**Short Term (1-5 yrs):** (Actions that are achievable with current resources; with reprioritizing existing resources/personnel and or are critical for achieving medium-term and long-term actions.)

- **Action Description:** Improve EQ insurance take up rates through increasing affordable options and regular, on-going public education efforts targeted to raise consumer awareness of their property insurance protection gap and the need for EQ insurance. Increase public-private collaboration on EQ insurance education efforts, such as: education campaigns, seminars and workshops; events like the “Great Shakeout.” (see Recommendation for Workgroup 3F)

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>		x	
<b>Cost (estimated)</b>			x

**SCORE: 8/High**

Stakeholder input: Interaction with individuals in CA and coordinate efforts. CA is tackling the same issues. This will help with respect to "effort" and potentially shared "cost". Public and private collaboration on EQ insurance education can be coordinated between CA, WA and OR. The private insurance and reinsurance industry can really help here.

**Action Description:** Increase EQ mitigation efforts through education, strong building codes/land use and improved risk modeling. Provide property owners free EQ home inspection program and modification list. Require EQ risk disclosure, list of necessary modifications, and possible EQ insurance in real estate transactions. Require universal application of land use policies and do not allow for local “opt outs,” especially in high-risk areas. Develop strong, targeted building codes/land use planning along with training programs for local building inspectors. Encourage public-private work with insurers and reinsurers to identify risk and engineer solutions. Encourage improved risk modeling to better anticipate effects of events.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>	x		
<b>Cost (estimated)</b>	x		

**SCORE: 5/med**

Stakeholder input: The California Seismic Safety Commission (CCSC) is working with public universities and the CEA to tackle the mitigation efforts and building codes and risk modeling. Incentive programs such as bolt and brace has been effective in encouraging behavior change in some consumers. However, even though a public policy change in requiring

EQ insurance in real estate transactions, stricter land use rules, and stronger building codes and planning are all effective, they will involve significant effort (from many stakeholders) and cost (including time). Public and private work with the (re)insurance industry can be low-hanging fruit as the industry has lots of know-how and can help regulators or stakeholders to understand the latest modeling techniques and methods.

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

**Action Description:** Introduce financial incentives to mitigate against property losses and develop options for improved affordability, such as insurer’s premium/mitigation discounts and disaster savings accounts. To improve affordability, introduce insurance products with broader deductible options, such as 5-10-15-20-25% of insured home value. Consider an earthquake authority in the state which could provide more options for affordable products. Support state and federal legislation that promotes insurance product innovation (balanced with consumer protection), resiliency, preparedness and mitigation efforts such as the Tsunami Warning, Education and Research Act of 2017 (Sen. Maria Cantwell).

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>		x	
<b>Cost (estimated)</b>			x

**SCORE: 8/med**

Stakeholder input: CEA Bolt & Brace is a good example of a mitigation incentive. As for Deductibles, the (re)insurance industry worked with the CEA to offer greater deductible options in their EQ policy. Promoting insurance product innovation is key to finding the intersection between supply (insurance) and demand (consumers) at the right price and right product. As for preparedness, CA is rolling out an early warning system in 2018, the CALOES is doing a great job in pushing this topic.

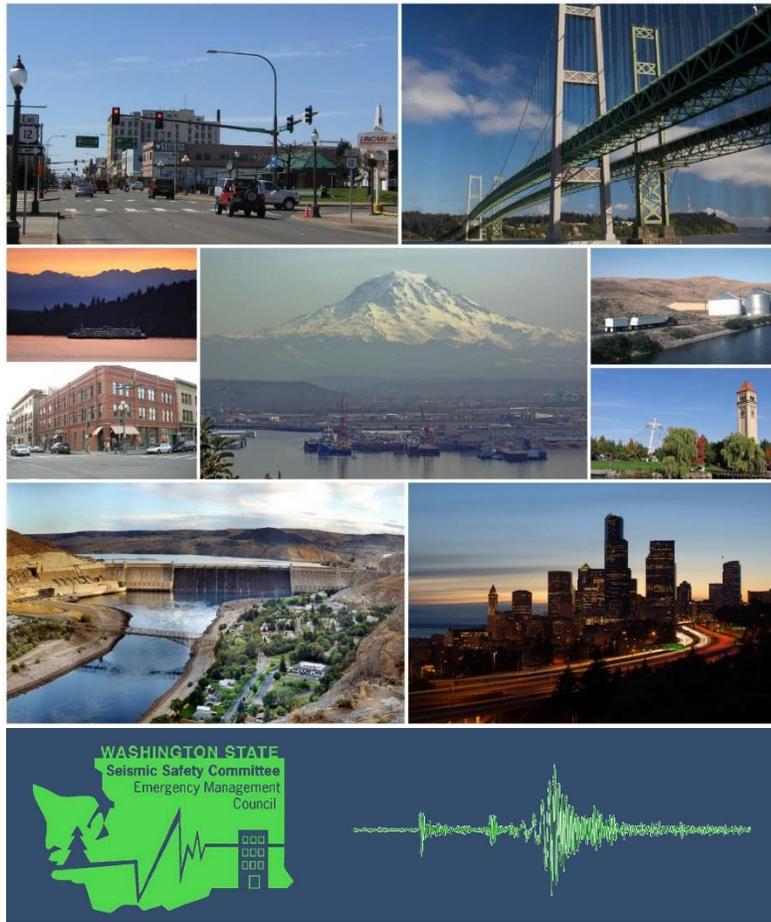
**Action Description:** Introduce financial incentives to mitigate against property losses and develop options for improved affordability, such as insurer’s premium/mitigation discounts and disaster savings accounts. To improve affordability, introduce insurance products with broader deductible options, such as 5-10-15-20-25% of insured home value. Consider an earthquake authority in the state which could provide more options for affordable products. Support state and federal legislation that promotes insurance product innovation (balanced with consumer protection), resiliency, preparedness

and mitigation efforts such as the Tsunami Warning, Education and Research Act of 2017 (Sen. Maria Cantwell).

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	x		
<b>Effort (estimated)</b>	x		
<b>Cost (estimated)</b>	x		

**SCORE: 5/med**

Consider legislation necessary to develop earthquake authority program along with financial incentives for improved affordability options. Consider a regionalized approach, working with other Pacific Coast states.



## RESILIENT WASHINGTON RECOMMENDATION 6

Washington Military Department | Emergency Management Division

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# Background: Resilient WA Recommendation #5

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[Resilient Washington State: Final Workshop Report.](#)

[Resilient Washington State: Final Report.](#)

## Stakeholders

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The primary stakeholders to this workgroup are identified in the Recommendation #5 section of the Resilient Washington State Report and as identified by the Governor’s Directive 16-19. These primary stakeholders identified additional relevant organizations to be included in the discussion.

### PRIMARY STAKEHOLDERS

#### **Washington Military Department, Emergency Management Division (EMD)**

The EMD Private Sector Program provides business outreach, education and public-private coordination for disaster preparedness, response and recovery. It takes a two-pronged approach. First, an outreach campaign targets small/medium sized businesses to connect them to continuity planning resources and educate them about response and recovery procedures. Second, the program works with large businesses to share information and identify gaps in public-private coordination to be addressed through program development.

#### **Department of Commerce**

The WA Department of Commerce has begun an agency wide strategic planning effort that includes a focus on Community Resiliency. As a component of this effort, the agency’s Community Outreach Program fosters ongoing relationships with rural, disadvantaged communities throughout Washington State. Looking at community resiliency holistically, a major component is the resilience of the local economy and individual businesses. Recognizing this, the Community Outreach Program focuses on coordinating workshops around the state between technical experts to raise issues and foster locally-driven solutions addressing business resilience.

#### **Cascadia Regional Earthquake Workgroup (CREW)**

The Cascadia Region Earthquake Workgroup (CREW) formed in the late 1990s to address the regional nature of earthquake hazards in the Pacific Northwest. CREW is a coalition of private and public representatives working together to improve the ability of communities throughout the Cascadia Region to reduce the effects of earthquakes and related hazards, such as tsunamis. CREW work to build stronger relationships within and between the public, private, academic and other nonprofit organizations located and/or operating throughout the Cascadia region, which stretches from northern California to British Columbia.

# Needs & Expectations to Perform Actions

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This recommendation identifies the need of greater continuity planning within the private sector to increase the resilience of critical infrastructure and the economy. The expectation is that the state will support activities to help prepare all businesses, from microbusiness to large corporations, for the hazards that are present in their communities. This necessitates a flexible approach to be successful across diverse industries and locations.

First, an approach of outreach and education should be utilized to connect small & medium size businesses to continuity planning resources. This should include events to raise awareness around hazards and approaches to mitigate and prepare for these hazards. It should also include facilitated workshops, where appropriate, to walk business owners through the process of hazard identification, risk and vulnerability assessments, business impact analysis, and to develop a continuity of operations plan.

Second, a framework should be developed to coordinate with large businesses who are either headquartered in Washington or who maintain significant operations in Washington. This framework should facilitate information sharing and provide opportunities for coordinated planning in mitigation, preparedness, response and recovery.

## *Actions Taken to Address Recommendation*

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### **DISASTER RESISTANT BUSINESS TOOLKIT (DRB TOOLKIT)**

The Cascadia Regional Earthquake Workgroup (CREW) worked with MIL Department's EMD to build a Disaster Resistant Business Toolkit ([www.DRBToolkit.org](http://www.DRBToolkit.org)) in 2010. Modeled after the format tax preparation software uses, this toolkit is designed as an easy guide through generating continuity planning documents. It asks the user a series of structured questions in order to generate a formatted continuity plan. This toolkit is downloadable for free to any WA business. CREW is currently seeking support to convert the DRB Toolkit from an desktop application to a web based application. This will support greater use of the tool and increase usage.

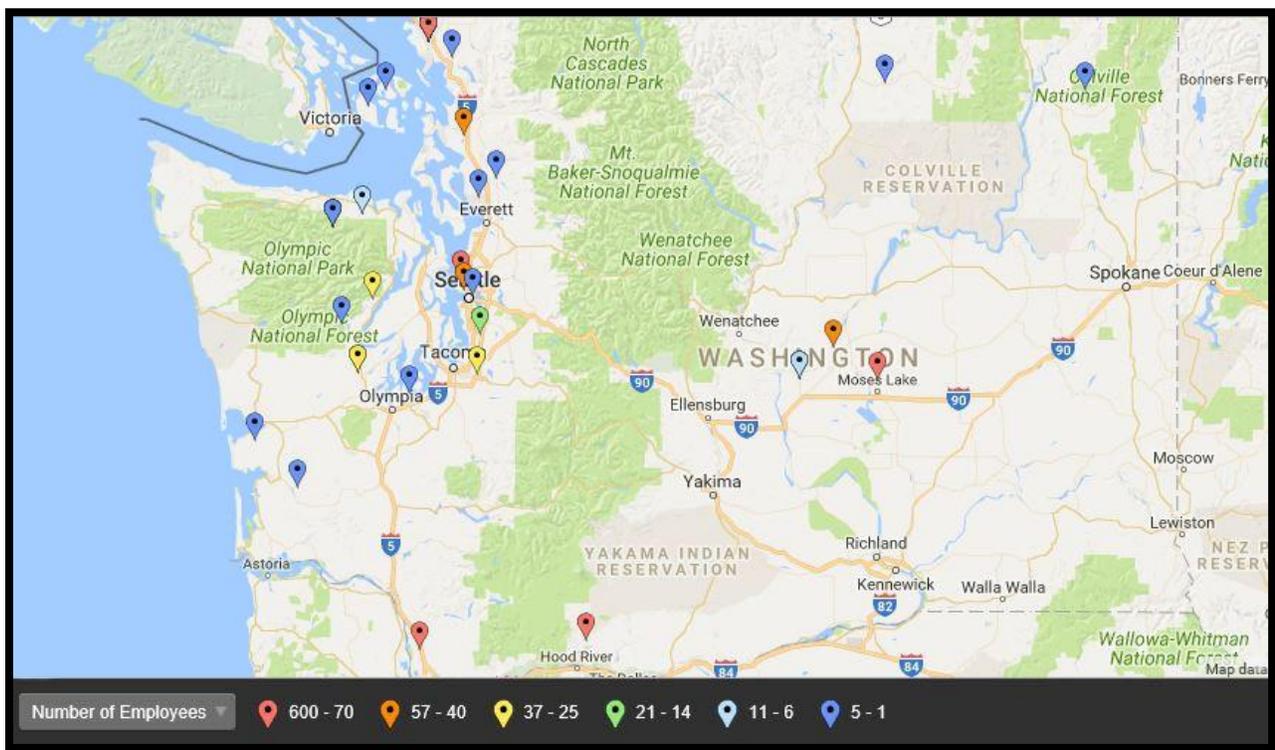
### **BUSINESS RE-ENTRY (BRE) REGISTRATION**

Following years of development, the [Business Re-Entry \(BRE\) Registration](#) program has been approved and be activated pending the completion of necessary software. It is a voluntary information sharing system that provides standard re-entry protocols for use following a natural, technological or manmade disaster. Private sector organizations participate by registering online at the EMD website. EMD provides local (city & county) emergency management organizations access to a database of registrations to make informed decisions when conducting re-entry operations. This process provides a statewide standard business re-entry registration process, with the goal of simplifying the identification of private sector organizations seeking access to affected communities or damaged infrastructure/facilities. The BRE Registration program expedites private sector access to impacted areas to enhance

response and recovery operations, strengthen the resiliency of the commercial sector, and support economic recovery. However, BRE Registration does not grant or guarantee right of access. Access remains solely within the control of the county or city with authority over the affected area.

## SMALL/MEDIUM BUSINESS PREPAREDNESS SURVEY

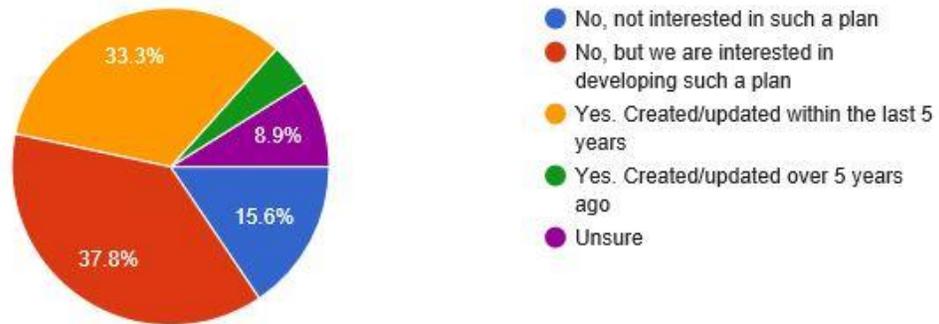
A [Business Preparedness Survey](#) created by the EMD Private Sector Program in collaboration with the Department of Commerce was released through business communities including state & local Chambers of Commerce, County Economic Development Councils, the Association of Washington Businesses, and the Washington Business Alliance. This survey has provided valuable information about the need for business continuity planning assistance in small & medium sized businesses. The figures below provide valuable insight into the preparedness of our state’s small & medium sized businesses, and their awareness of the resources available to help them plan.



*The above image shows the geographic distribution of respondents by number of employees*

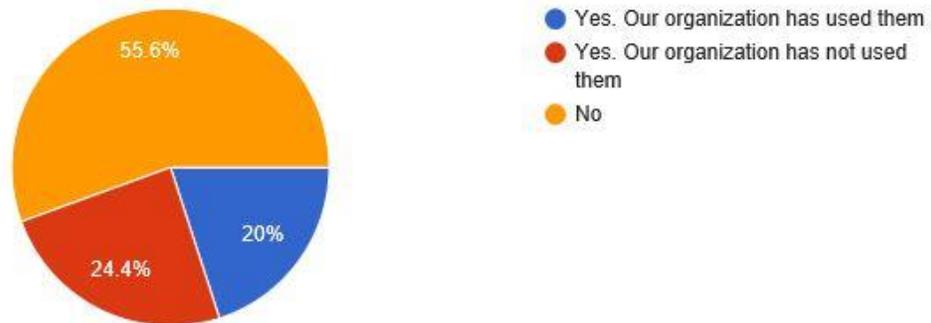
Does your organization have a Business Continuity Plan, Emergency Response Plan, or other relevant plan for disaster preparedness or response? If yes, when was the last time your plan was updated?

45 responses



Are you aware of the various Business Continuity Planning tools available for free online?

45 responses



*The above images above emphasize that just over a third of the respondents have any sort of an emergency response or business continuity plan. Additionally, over half of respondents are unaware of the free tools available and of those who are aware, less than half have used them.*

## BUSINESS PREPAREDNESS WEBSITE

The EMD Private Sector Program maintains a [Business Preparedness website](#) to provides a single page with links to preparedness resources, a [Business Recovery Guide](#), online training, links to partners, and a blog with posts relating to business preparedness news & opportunities. Additionally, the site provides an easy 8 step process for businesses to follow:

1. [Take the “Washington Business Preparedness Survey”](#)
2. [Determine which hazards threaten your business](#). More detailed information on natural hazards our residents face is on the EMD [Threats & Hazards page](#).
3. [Conduct a Risk & Vulnerability Assessment](#)
4. [Conduct a Business Impact Analysis](#)
5. [Create a Business Continuity Plan](#)
6. [Review insurance coverage on an annual basis](#)
7. [Take steps to protect vital records](#)
8. [Develop and test Emergency Evacuation and Shelter-in-Place plans](#)

## BUSINESS RESILIENCE OUTREACH EFFORTS

Between June 2016 and June 2017, the EMD Private Sector Program has presented on continuity planning to 18 different small & medium business audiences reaching over 700 individuals. These events have focused on an overview of hazards, the effect of hazards on business operations, and resources for businesses to create continuity plans, prepare for response & recovery, and mitigate their risk. The Private Sector Program continues to pursue opportunities for future events, coordinating through local governments, private business networks, trade associations, chambers of commerce, and other associated development organizations.

Complimenting the outreach to small & medium businesses, the EMD Private Sector Program performs targeted outreach to large businesses who are crucial employers in the state’s economy and/or are owner/operators of critical infrastructure. While this outreach occurs on a case-by-case basis, emergency management themes common across organizations are used as the focus of program development by EMD’s Private Sector Program and Infrastructure Program. These themes include (but are not limited to): public-private information sharing and restoration prioritization based on identification of infrastructure dependencies.

## BUSINESS RESILIENCE AS PART OF COMMUNITY RESILIENCE

In addition to the efforts led by EMD, the Department of Commerce (COM) has begun an agency wide strategic planning effort that includes a focus on Community Resiliency. Recognizing that economic & business resilience is a crucial part of community resilience, the agency has leveraged its community relationships to conduct and facilitate workshops:

- Business Resiliency Workshop series in that would bring together members of local Chambers of Commerce, insurance industry representatives, local business owners, Washington Fire Action Council (WAFAC) and elected officials from around Eastern Washington.

- Rural community workshops (Okanagan County, South Bend, Raymond with participation from the Shoalwater Bay Tribe, Long Beach, Sunnyside, Grandview to discuss business and critical infrastructure resiliency efforts.
- Home Improvement Zone (HIZ) training with seven counties about land management strategies for defensible space in wildfire affected communities in order to reduce the effects of wildfire and increase community and business resilience

## **Gaps & Barriers to Address Recommendation**

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### **SMALL & MEDIUM SIZED BUSINESS CONSTRAINTS**

Most small & medium sized businesses aren't aware of the hazards in their area or the free continuity planning tools available. Further, these businesses have limited capacity & resources to undertake business continuity planning efforts without significant technical assistance or resourcing. The competitive environment that these businesses operate in necessitates efforts to increase their resilience to be low cost and require minimal staff hours.

### **NO STANDARD FOR VERIFYING PREPAREDNESS OF CRITICAL INFRASTRUCTURE**

There is no single regulator of large businesses that operate infrastructure critical to Washington's communities & economy, nor is there a clear standard for verifying or regulating the continuity plans of these businesses. Further work is needed to define a reporting mechanism for businesses who operate critical infrastructure to verify their level of preparedness. This mechanism must incorporate current regulations and recognize that business continuity planning is often in the interest of businesses and shouldn't require major new additions to the regulatory environment.

### **INSUFFICIENT RESOURCES TO SUPPORT LIMITED ENGLISH PROFICIENCY (LEP) POPULATIONS**

A more extensive Limited English Proficiency (LEP) program is needed to connect with the many diverse Washington businesses & communities. Simply translating printed material does not go far enough – connecting with LEP businesses in meaningful ways requires cultural fluency to enable outreach efforts through LEP business networks. While EMD has a LEP Program, the program has a diverse workload addressing many other important issues and limiting the available support for business resilience outreach activities. Similarly, the Department of Commerce is limited in its capacity to provide economic development technical assistance for LEP business communities.

### **SCOPE OF ACTIVITY CONSTRAINED TO CURRENT RESOURCING**

EMD and the Department of Commerce continue to partner on this issue, however the scale of the outreach and the scope of the material covered is constrained to the current resource allocation and

staffing. Neither agency has full-time equivalent (FTE) positions dedicated to addressing this issue. Additionally, needs are realized that are beyond the scope of current resources:

- Small & Medium sized business continuity planning workshops (where businesses walk out the door with complete plans that include hazard specific information unique to their area)
- Workshops with private sector critical infrastructure operators that focus on mapping out the current landscape of regulations and determining a framework to measure levels of preparedness and verify continuity plans

## Resources Available

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EMD's Private Sector Program has half of a FTE dedicated to supporting business continuity planning efforts statewide. This FTE comes with supporting salary and travel funds, however it does not have a budget dedicated to support program goals.

The Department of Commerce's Community Outreach Program has 3 FTEs that focus on connecting rural communities and tribal nations to programs and resources that improve their economic development, address social issues, and make them more resilient. This program is funded to work towards this mission, however it does not have funding specifically allocated to support business continuity planning workshops or provide detailed technical assistance.

CREW is currently funded with a FEMA NEHRP award to provide regional workshops focused on small business resiliency and seismic mitigation in the Pacific Northwest. Workshops take place both in Oregon and Washington. Additional workshops will be performed in Spanish to better serve recognized small business owners.

## Resources Needed

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Additional funding is needed to support conversion of the Disaster Resistant Business Toolkit (DRBToolkit.org) from a desktop application to a web based application. This will provide software updates, increased functionality and increase the availability of the tool for statewide use. The toolkit is a project previously funded through WA EMD using UASI funds and is free for any Washington Business.

## Implementation Plan

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### SHORT TERM ACTIONS ACHIEVABLE WITH CURRENT RESOURCES

1. Continue the Emergency Management Division's business outreach campaign by continuing to work through partnering business networks to reach small & medium sized business audiences. These presentations are generally 30-60 minutes at a frequency no less than once per month.
-

2. Explore additional resourcing to expand the delivery of the material with greater frequency and help provide greater awareness through a coordinated outreach/education campaign.
3. Establish a stakeholder working group of relevant entities, including EMD, Department of Commerce, Economic Development Councils, Association of Washington Business, Chambers of Commerce, Councils of Governments. Current staff from identified partners can convene a working group within existing resources as part of their work plans.
4. Complete an assessment to determine how to best leverage existing training and outreach opportunities. This assessment should leverage the stakeholder working group previously mentioned.
5. Develop tailored training programs that reflect local hazards, administered regionally around the state. The curriculum will guide businesses through hazard identification, risk assessments, business impact analysis, continuity plan development, and development of a training/exercise plan. Additionally, hosting the curriculum for businesses with limited English proficiency should be explored.
6. Organize and understand current regulation information by the Utilities & Transportation Commission and utility partnerships maintained by the Department of Commerce pertaining to private sector infrastructure owner/operators. Leverage the structure of the quarterly Infrastructure Resilience Sub-Committee (IRSC) of the Governor's Emergency Management Council to achieve this action.

## **LONG TERM ACTIONS REQUIRING ADDITIONAL RESOURCES**

1. Deliver training and provide technical assistance to rural businesses. This will require a moderate effort and additional staff and resources will be necessary to effectively deliver training and technical assistance to the rural business community. The estimated costs for a statewide effort that could be combined with economic development training is anticipated to fall within the medium range. The estimated costs for a statewide effort that could be combined with economic development training is anticipated to fall within the medium range (\$50k - \$500k).
2. Establish state funding for conversion of the Disaster Resistant Business Toolkit ([www.DRBToolkit.org](http://www.DRBToolkit.org)) from a desktop application to a web based application. State funding will ensure this tool is accessible at no cost for all Washington businesses. The estimated costs for this should not likely exceed \$50k.
3. Explore legislation to establish one FTE that is dedicated to increasing business continuity efforts statewide. This position could expand the current efforts of the EMD Private Sector Program to reach a larger business audience with greater frequency. This position would also be able to perform outreach to local jurisdictions to help train and exercise the Business Re-Entry Registration Program. Before this FTE is pursued, stakeholders from Commerce and EMD should discuss the ideal placement of this position to have maximum impact. The estimated cost for this FTE need to cover one FTE at state salary range 54 or 60.



## RESILIENT WASHINGTON RECOMMENDATION 6

Washington Military Department | Emergency Management Division

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# Background: Resilient WA Recommendation #6

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[Resilient Washington State: Final Workshop Report.](#)

[Resilient Washington State: Final Report.](#)

## Stakeholders

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### **WASHINGTON DEPARTMENT OF TRANSPORTATION (WSDOT)**

WSDOT is the lead stakeholder for this recommendation and is responsible for preparing state administered road infrastructure for seismic events. WSDOT also is the lead for administering mitigation efforts to state owned transportation infrastructure and leads state ESF 1 response efforts following a disaster or incident.

### **LOCAL DEPARTMENTS OF TRANSPORTATION AND TRANSIT ORGANIZATIONS**

Departments of Transportation and Mass Transit organizations across the region have a crucial role to play in this recommendation. While WSDOT is the state agency concerned with state owned/operated roadways, many county and city transportation departments have jurisdiction over crucial transportation infrastructure and systems.

### **WASHINGTON MILITARY DEPARTMENT, EMERGENCY MANAGEMENT DIVISION (EMD)**

The Emergency Management Division's Catastrophic Planning Program has a key role in fitting the work to address this recommendation in to the broader catastrophic planning for the state. Additionally, the EMD Infrastructure Program works to connect WSDOT emergency planners to the efforts taking place in other transportation domains (air, land, sea), and in other infrastructure sectors (i.e. Energy, Water/Wastewater, Communications, etc.).

## Actions Taken to Address Recommendation

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### **DEFINING CRITICAL ROUTES FOR PRIORITY RETROFITTING/HARDENING**

WSDOT developed an initial seismic rehabilitation plan in early 1990s, with the goal to strengthen bridges to withstand a 500-year seismic event, such as the Nisqually earthquake of 2001. In 2007, the American Association of State Highway and Transportation Officials (AASHTO) adopted standards to a

1,000-year event. This new standard was implemented at the end of 2007 for all new and retrofit bridges.

In the past 2 decades, WSDOT has addressed bridge seismic retrofit needs through the following actions:

- 316 bridges have been seismically retrofit with one (Bridge 405/16 – I-405/SR167 Connectors Design Build) currently under contract.
- Another 119 have been partially retrofit, but require additional work to meet current seismic standards.
- Investing more than \$195 million on stand-alone projects to strengthen bridges to better withstand earthquakes
- Construction of the following bridges to incorporate 2,500-year seismic standards: the new SR 99 Tunnel, SR 520 floating bridge, and the new Tacoma Narrows Bridge.

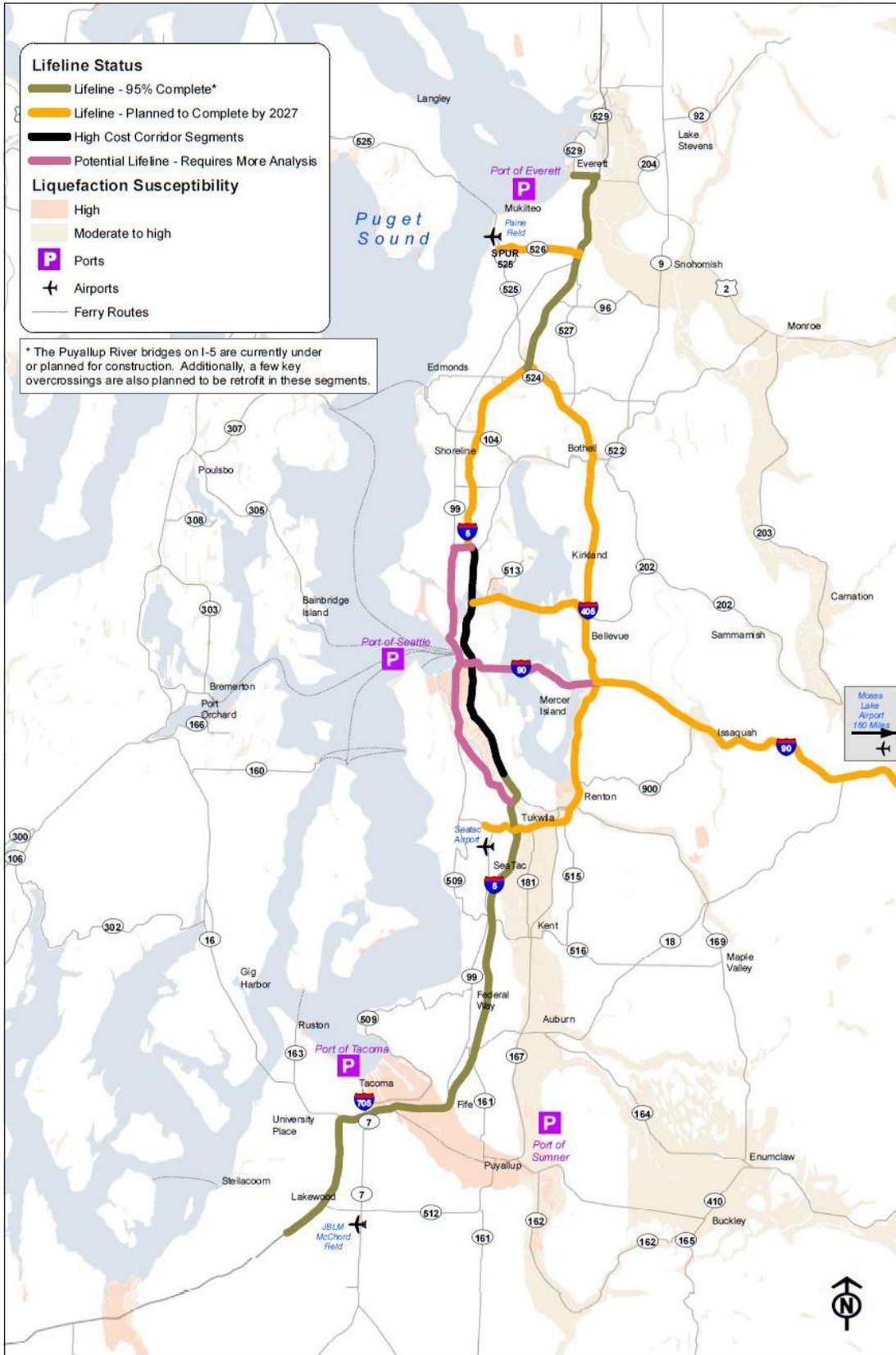
In 2016, the state legislature provided nearly \$170 million for stand-alone seismic retrofit work in a 16-year investment plan. Biennial funding provided – ranged from \$5 million in 15-17 to \$58 million through the 25-27 biennium.

## **SEISMIC LIFELINE ROUTE / SEISMIC RETROFIT PROGRAM**

“Lifeline route” – a series of roads determined as critical to keep open during emergencies to help in the movement of first responders, freight, recovery operations, and public. The Lifeline Route corridor identified is necessary for movement of first responders, freight, general public, and recovery operations following a major seismic event. The stakeholders include all the population of Western WA that would be impacted by the CSZ earthquake; up to 600,000 people. The Seismic Lifeline Corridor direction primarily provides a North-South route, however it also intersects with major East-West routes that would need to be preserved to provide critical services and freight mobility.

- Current lifeline corridor primarily uses I-5, I-405 and 520 and the route’s priority is travel from JBLM to Everett, with the main focus of ground transportation routes between air fields: McChord Field, Paine Field, SeaTac and Moses Lake.
  - Connections to the Port of Tacoma, Port of Seattle and Port of Everett are included.
  - SR 518 connects I-5 to Seatac
  - New construction will enhance the lifeline along SR 167, SR 509 and I-5 Puget Sound Gateway Project
- Since the Cascadia Rising exercise, regular meetings have been held between WSDOT and Emergency Management Department in understanding critical routes and the further definition of roles.
- WSDOT has identified 85 bridges along the current transportation “lifeline corridor”
  - 49 – identified as mainline, critically important/highest priority
  - 22 – mainline bridges have been completed in phase 2 retrofit, at a cost of 39 million

# Bridge Seismic Lifeline Routes - June 2017



## INTERAGENCY AGREEMENTS

WSDOT has coordinated efforts with the following programs, agencies and jurisdictions:

**WA Military Department, Emergency Management Division (EMD)** – WSDOT is a member of several planning efforts and work groups with EMD, including development of a Catastrophic Incident Plan, the Statewide Catastrophic Incident Planning Team, and the Infrastructure Resilience Sub-Committee.

**Seismic Safety Committee** – WSDOT is a participant of the multi-jurisdictional committee under the guidance of the Emergency Management Council.

**Washington CSZ Transportation Systems Regional Resiliency Assessment Program (RRAP)** – Includes the federal Department of Homeland Security Infrastructure Protection for Region 10, EMD, FEMA Region 10, US Coast Guard District 13, and USDOT Region 10. The multi-year assessment was started in 2017 and is scoped to map out the entire transportation system connecting the Federal Staging Area in Moses Lake WA to

**Local emergency planners** – Coordinating with King County, City of Seattle, Snohomish County, and Pierce County on seismic retrofit and identification of local lifeline corridors.

## PLANNING AND PREPAREDNESS

WSDOT's Continuity of Operations Plan and Emergency Operations Plan both identify seismic response and recovery.

WSDOT has regional support to devolve during a seismic incident, with 10 available Emergency Operations Centers (EOCs) located statewide. All six WSDOT Regions have Incident Management Team (IMT) personnel to staff regional EOCs and support seismic response actions.

## Gaps & Barriers to Address Recommendation

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### ADDITIONAL RESEARCH NEEDED

Research for the specific impacts from a CSZ event (2,500-year event) are limited and are not incorporated into the current seismic retrofit plan (1,000-year event) for bridges. There is still a need to expand efforts on the identification of Tsunami threats and impacts to transportation facilities. As mentioned in the response to 6a, Research has not been conducted for a CSZ event and the impact to transportation structures. The current standard for seismic retrofit is a 1,000-year event, however CSZ may be determined as more severe depending on the research results. To initiate this research, the initial steps would be to develop a research plan and to commit resources.

WSDOT research to date related to these hollow core column bridges has been analytical only. Research to investigate possible retrofit options and perform some scale model physical testing has WSDOT

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funding with a July 2017 start and will take approximately 18 months to complete. This research will determine if there is a way to retrofit hollow core column bridges without completely replacing them.

- Hollow core column bridges are especially vulnerable to earthquakes due to their design (the main ring of concrete is about 5 inches thick so there is no internal or external resistance to lateral forces)
- There are 23 bridges/structures in Washington with hollow core columns; 9 of which are scheduled for replacement
- There are 2 hollow core column bridges on the current seismic lifeline route along I-5 and I-405 near South Center (I-5 NB @ milepost 153.65 and I-405 NB and SB Green R bridge @ milepost 0.79 both near the South Center Mall)
- The current seismic lifeline route was planned with the avoidance of most of the hollow core column bridges on I-5 in mind; the route utilizes I-405 to bypass sections of I-5 through Seattle north of the U District, See the image below where this section of I-5 is identified as a “high cost corridor segment”.

## SEISMIC RETROFITTING EXPECTATIONS AND EXPENSES

Retrofit is designed to *prevent structure collapse*. Essentially, bridges may still be too damaged for traffic for several weeks to months, depending on the level of damage from the event. If significant seismic event, assume emergency repairs will be needed for structure to be utilized. Remaining retrofit work to complete the Lifeline Route, the “plan to program” is estimated to be complete within the next 10 years. The cost estimate to address remaining lifeline bridges only:

- \$29 million to retrofit the remaining 23 of 49 highest priority bridges
- \$52 million to retrofit four hollow core bridges; these options still being evaluated.
- \$80 million to retrofit 34 overcrossings, ramps and collector-distributor points not included in the initial 49 “highest priority” list of just bridges
- Total: \$161 million\* -- broad level estimate for currently identified seismic route, will need to be refined and firmed up as projects move forward.

Additionally, liquefaction will affect roadway and bridge stability in identified zones. Retrofit work and estimates do not include subsurface work to mitigate liquefaction, however liquefaction mitigation is addressed in *new construction*.

## PLANNING CONSTRAINTS

Planning and coordination is necessary to expand lifeline routes to additional corridors to address the massive impact of a CSZ event. There are 592 bridges statewide, outside of the current Seismic Lifeline Route, identified as needing at least some seismic retrofit. Current WSDOT and EMD planners are constrained to current planning efforts commensurate with current resourcing.

Written interagency agreements between WSDOT and local jurisdictions for rerouting traffic have not been established. Additional coordination is needed with local jurisdictions to gain understanding and agreement on how local roads could be impacted by an event and/or utilized for a “lifeline route”.

The WSDOT Catastrophic Incident Plan has not been completed. Current plans do not explicitly account for a catastrophic-level incident (like CSZ).

## Implementation Plan (Including Resources)

The scope of the completed retrofitting along the Seismic Lifeline Route to-date was addressed in the “Actions Taken” section. Funding is available and planned to complete this retrofit over the next 10 years; these details are defined below.

Other future considerations for the Seismic Lifeline Route are: expanding the lifeline to connect at I-5 between the Oregon and Canadian borders and to the coast, outreach with local jurisdictions to ensure work on state highways considers critical local lifelines for community resilience, and ensuring enhanced agreements and plans are in place for response and recovery.

Finally, retrofitting bridges along the Seismic Lifeline Route is only one piece of total transportation resilience. To fully prepare transportation for CSZ, there are four hazards to plan for: Seismic, Landslides/Unstable Slopes, Tsunami, and Liquefaction.

### SEISMIC LIFELINE IN PUGET SOUND (FUNDING ALREADY ALLOCATED)

Over the next 10 years, WSDOT will develop biennial budgets to spend the funds allocated towards completing the Seismic Lifeline through the Puget Sound. This work will be planned to maximize funds while achieving the end result of a lifeline hardened for a 1,000-year return seismic incident. It is important to include this in the next steps for CSZ planning, although the funds (~\$170 million) have already been allocated.

The following table identifies the planning stages and approximate budget allocated for each biennium period:

<b>Action Description: 17 – 19 Biennium Seismic Lifeline Retrofit</b>	
The current plan for this stage of the Seismic Lifeline Retrofit to design and develop construction plans for the remaining bridges and structures and to establish prioritization of the remaining bridges to retrofit. Prioritization is based on many factors, such as combining other construction or repair projects with retrofitting to optimize funding and resources.	
<b>Cost (estimated)</b>	\$13,896,000 (Design and prioritization)

Once the design phase is complete, the next steps will be retrofit construction. This will include completion of partial retrofitting that was accomplished on 29 high priority bridges, retrofitting hollow core piling bridges (if achievable based on conclusion of current research project), and retrofitting 34 overcrossings, ramps, and collector-distribution points. Note that the funded ~\$170m may not be enough to accomplish retrofitting on all identified bridges and structures within the current Seismic Lifeline Route.

The following planned actions involve the execution of design and construction retrofitting bridges and structures:

<b>Action Description: 19 – 21 Biennium Seismic Lifeline Retrofit</b>	
<b>Cost (estimated)</b>	\$23,381,000

<b>Action Description: 21 – 23 Biennium Seismic Lifeline Retrofit</b>	
<b>Cost (estimated)</b>	\$14,942,000

<b>Action Description: 23 – 25 Biennium Seismic Lifeline Retrofit</b>	
<b>Cost (estimated)</b>	\$53,942,000

<b>Action Description: 25 – 27 Biennium Seismic Lifeline Retrofit</b>	
<b>Cost (estimated)</b>	\$58,261,000

## **EXPANSION OF THE SEISMIC LIFELINE ROUTE**

As addressed in the Recommendation 6 workgroup findings, the Seismic Lifeline route currently addresses structures along I-5, I-405, and SR 520 from JBLM airfield to Paine Field in Everett (to include Seatac and East to Moses Lake) following a seismic incident. As work on the current identified lifeline nears completion over the next 10 years, work to expand the lifeline will occur.

A recommendation and funding request to expand the lifeline to comprehensive a north/south route from the Oregon Border to the Canadian Border, and east/west from I-5 to the coast and beyond the Cascades connecting communities will be forthcoming. The initial research on expanding the lifeline has not yet been conducted, so the following numbers are a rough estimate of the cost of design and construction:

<b>Action Description: Expansion of the Seismic Lifeline</b>
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<i>(Long-Term)</i>				
	<b>North/South JBLM to Oregon Border</b>	<b>North/South Everett to Canadian Border</b>	<b>East/West routes to I-5 corridor</b>	<b>Pacific Coast to Puget Sound</b>
<b>Cost (estimated)</b>	To be determined based on hazard research for a CSZ incident.			
<b>Total Cost:</b>	Unknown with the potential in excess of \$3 Billion			

## CSZ UNSTABLE SLOPE MITIGATION RESEARCH

WSDOT maintains an unstable slopes database. This database documents known unstable rock and soil slopes (landslides) that currently impact transportation routes. This database does not address or anticipate seismic incidents and the seismic vulnerability of unstable slopes, unrecognized landslide that may be susceptible to seismic failure, nor does it address mitigation of the impacts of seismic slope failure. Although WSDOT does respond to and mitigate slides (rock, land, and mud) that impact transportation routes on a routine basis as part of our general operations, it is anticipated that the current amount of resources available to respond to slide hazards would be overwhelmed from a CSZ incident.

The next step for this hazard is to devote resources to geotechnical research on how unstable slopes would perform during a CSZ incident and plan for either strategically hardening slopes on selected routes or for rebuilding of failed slopes on these state routes. The specifics of this research have not yet been defined; i.e. the first step would be to identify what corridors are a priority for preservation, and devote resources to researching the unstable slopes on one corridor at a time. If applicable, this research would also include presence of liquefiable soils (liquefaction), and the impacts due to slope failure.

The following table illustrates the details of conducting this research:

<b>Action Description:</b> CSZ unstable slope mitigation research	
<i>(Short-Term)</i>	
<b>Effort (estimated)</b>	2 Full Time Employees (Engineering Geologists)
	0.3 Full Time Project Manager
	Outside consulting and contractors Collection of outside data, i.e. LiDAR imagery in coordination with State DNR.
	Geotechnical research equipment

	This project is anticipated to span over a 2 year period
<b>Cost (estimated)</b>	\$800,000 (human resources) \$300,000 (all other resources) Total research cost: ~1.1 million

## CSZ LIQUEFACTION SUSCEPTIBILITY AND MITIGATION RESEARCH

As addressed in Gaps & Barriers, liquefaction hazards have not been addressed for all retrofit projects. It is estimated that to mitigate the liquefaction hazard the cost of retrofit would exceed the cost of new construction. Additionally, the USGS identified liquefaction data needs additional research to fully understand the hazards during a CSZ incident. Further research to identify the liquefaction impacts to bridges is required to correctly estimate the cost and method for this hazard.

Another step for liquefaction hazards would be to identify priority routes and conduct the research on the liquefaction hazards. This research on a corridor-by-corridor basis would be partially included with the geotechnical research proposed under the unstable slopes hazard.

<b>Action Description:</b> CSZ liquefaction susceptibility and mitigation research	
<i>(Short-Term)</i>	
<b>Effort (estimated)</b>	2 Full Time Employees (Geotechnical Engineers) This project is anticipated to span over a 2 year period
<b>Cost (estimated)</b>	\$450,000 (human resources) <b>Note:</b> Management staff and equipment resources shared between the Unstable Slope research and Liquefaction research projects.

## CSZ TSUNAMI MITIGATION

Preparing for a tsunami hazard with regard to a CSZ incident is limited related to transportation. The expected damage to the transportation infrastructure near the coast is significant potentially making evacuation extremely difficult if not impossible. Evacuation routes are identified as well as assembly areas for coastal residents to evacuation to and await evacuation support. WSDOT facilities need to be made resilient which includes relocation of facilities in identified inundation areas.

Communication between WSDOT and local communities is established utilizing the WSDOT radio network. Coastal counties maintain operational communications with WSDOT through emergency radio systems demonstrated with monthly testing.

There are no next steps identified to address tsunami hazards at this time, aside from continuing normal emergency management operations.

## **ENHANCED AGREEMENTS AND PLANNING FOR TRANSPORTATION INFRASTRUCTURE RESPONSE AND RECOVERY**

Another process that will also continue to evolve will be ensuring enhanced agreements and plans are in place for response and recovery. The options to consider presented by the DHS Regional Resiliency Assessment Program (RRAP) will help to create the agreements and plans. The next steps are to continue with emergency management planning and communication with local jurisdictions.

The RRAP project seeks to understand the vulnerabilities and impacts to major highway, airport, seaport, and rail transportation systems in western Washington from a CSZ earthquake to inform: (1) priority routing in emergency response plans to facilitate the transportation of post-disaster commodities and resources; and, (2) inform potential earthquake resilience investments in transport systems/facilities.

WSDOT coordinates with private, military, and local communities to maintain disaster preparedness, strengthening capabilities for integrated earthquake response. Through mutual aid agreements with 33 counties and 122 cities, integrated community exercises, and connecting multimodal methods, WSDOT is actively participating in building transportation resiliency. A few of the next steps to continue improving these relationships are: development of a WSDOT catastrophic incident plan that incorporates multiple agencies and communities. Also, exercises such as the Manchester Fuel Pier Functional Exercise involving the WA State Ferries and the US Coast Guard Sector Puget Sound. Lastly, continuous tests of operational integration such as radio communications between WSDOT Office of Emergency Management and coastal counties.

## RECOMMENDATION 7

**Action Description:** Clarify the goal for hospital structures. What is the intended function of a facility after an event of what magnitude? Having a target allows us to set baseline technical requirements; compare existing building stock to target; identify gaps; project costs and timeframe.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Difficult to enact target changes without a specific goal. Requires executive direction.		
<b>Effort (estimated)</b>	Multiple stakeholders involved including enforcement, design and regulated community. Potential retroactive cost impact create high political sensitivity. Potential confusion from existing federal mandates and current voluntary planning by owners.		
<b>Cost (estimated)</b>			

**Action Description:** Assess, collect and compile existing data for existing hospitals related to long-term functionality after an event. Includes internal data and cross agency data sources in multiple content forms (plans, maps, files, etc.)

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Asset and liability assessments are key to understand current state.		

**Effort (estimated)**

Identifying sources;  
technical review of  
complex existing data;  
investigation of data  
sources and meaning;  
coordination of  
different data sets;  
analysis and processing  
into meaning  
information

**Cost (estimated)**

Time and effort  
dependent on level of  
detail and number of  
sources.

**Action Description: Perform a facility specific, detailed assessment of each hospital within the State of Washington**

*(Short-Term)*

**High**

**Medium**

**Low**

**Priority**

Actual, first-hand  
assessment of each  
facility’s current  
structure and use will  
provide a more accurate  
assessment of risks.

**Effort (estimated)**

Onsite inspection and  
survey of approximately  
100+ facilities in  
locations all over the  
state. Requires trained  
individuals performing  
complex assessments of  
buildings with minimal  
information

**Cost (estimated)**

Whether done internally  
or by contracted vendor,

labor is anticipated to be costly.

**Action Description: Identify other impacts/data that have implication to post disaster hospital functions. Assess priority of building related goals vs. operational/transportation/utility goals**

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Hospital buildings can be strengthened, but may be of diminished value without water, roads, staff, supplies, etc. Where is time best spent? What is readily accomplishable?		

**Effort (estimated)**

**Cost (estimated)**

**Medium Term (5-10 yrs):** (Actions that will require additional resources and are achievable within 10 years.)

**Action Description: Enact changes to the state building codes to address any performance gaps identified in the target state**

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	Existing new construction standards are regularly updates with current technical data. Unless significant gaps are identified, new construction standards are sufficient		

**Effort (estimated)**

Technical advisory team created identify

requirements to correct gaps. Draft code change proposals, attend hearings at national level, respond to challenges resolve

**Cost (estimated)**

Travel to meeting and hearings, rely on private input for code changes,

**Action Description: Assemble group of interested/impacted parties to discuss retroactive seismic of existing hospitals. Currently there are no requirements for retroactive upgrades. Review approach taken by State of California. Provide recommendations to ?**

*(Medium-Term)*

**High**

**Medium**

**Low**

**Priority**

Renovations to existing facilities is costly and disruptive to care. There is no identified funding source for this work. It is unclear what standards we would bring facilities up to. Much work is needed to identify the scope and costs.

**Effort (estimated)**

Anticipate the effort to involve many people, with lack of immediate consensus.

**Cost (estimated)**

**Action Description:** conduct a Supply chain inventory

*(Short-Term)*

**High**

**Medium**

**Low**

**Priority** It is critical to understand what the elements of the supply chain are in order to increase the resiliency

**Effort (estimated)** Moderate FTEs to conduct the survey across multiple systems and private sector and establish a base line supply chain inventory.

**Cost (estimated)**

**Action Description:** Provide authority for the Department of Health (DOH) to pre-register, train and mobilize medical volunteers in support of local communities during an emergency.

*(Short-Term)*

**High**

**Medium**

**Low**

**Priority** Amend current emergency workers Law (RCW 38.52.180) to allow state response agencies, particularly those agencies identified in the state Comprehensive Emergency Management Plan as lead or response agencies under ESF 6 and 8 to register, train and mobilize medical volunteers to prepare and respond as needed during an emergency.

Provide legislative authority to DOH to register, train and mobilize medical volunteers during an emergency.

**Effort (estimated)**

Moderate FTE's

**Cost (estimated)**

**Short Term (1-5 years)**

**Action Description:** Clarify the goal for hospital structures.

Questions remain regarding the intended function of a facility after an event of what magnitude? Having a target allows DOH to set baseline technical requirements; compare existing building stock to target; identify gaps; more accurately project costs and timeframe. Multiple stakeholders involved including enforcement, design and regulated community. The potential for retroactive cost impacts creates high political sensitivity. Potential confusion from existing federal mandates and current voluntary planning by owners.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

**Action Description:** Assess, collect and compile existing data for existing hospitals related to long-term functionality after an event. Includes internal data and cross agency data sources in multiple content forms (plans, maps, files, etc.).

Asset and liability assessments are necessary to understand current situation. Need to identify available sources, technical review of complex existing data, investigation of data sources and relevance, coordination of different data sets, and analysis and processing into meaningful information.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
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<b>Priority</b>	3
<b>Effort (estimated)</b>	2
<b>Cost (estimated)</b>	3

**SCORE: 8 – High**

**Action Description:** Perform a facility-specific, detailed assessment of each hospital within the State of Washington.

Actual, first-hand assessment of each facility’s current structure and use will provide a more accurate assessment of risks. Onsite inspection and survey of over 100 facilities in locations all over the state. Requires trained individuals performing complex assessments of buildings with minimal information. Whether done internally or by contracted vendor, labor is anticipated to be costly.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	2		
<b>Cost (estimated)</b>	2		

**SCORE: 7 – Medium**

**Action Description:** Identify other impacts/data that have implication to post-disaster hospital functions. Assess priority of structural-related goals versus operational/transportation/utility-related goals.

Hospital buildings can be strengthened, but may be of diminished value without water, roads, staff, supplies, etc. Where is time best spent? What is readily accomplishable?

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>	2		
<b>Cost (estimated)</b>	2		

**SCORE: 7 – Medium**

**Action Description:** Conduct a supply chain inventory.

It is critical to understand what the elements of the supply chain are, in order to increase their resiliency. Moderate FTEs to conduct the survey across multiple systems and private sector and establish a base line supply chain inventory.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

**Action Description:** Provide authority for the Department of Health (DOH) to pre-register, train and mobilize medical volunteers in support of local communities during an emergency.

Amend current emergency workers Law (RCW 38.52.180) to allow state response agencies, particularly those agencies identified in the state Comprehensive Emergency Management Plan as lead or response agencies under ESF 6 and 8 to register, train and mobilize medical volunteers to prepare and respond as needed during an emergency. Provide legislative authority to DOH to register, train and mobilize medical volunteers during an emergency.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

### **Medium Term (5-10 years)**

**Action Description:** Enact changes to the state building codes to address any performance gaps identified in the target state.

Existing new construction standards are regularly updates with current technical data. Unless significant gaps are identified, new construction standards are sufficient. Technical advisory team created identify requirements to correct gaps. Draft code change proposals, attend hearings at national level, respond to challenges resolve. Travel to meeting and hearings, rely on private input for code changes.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		2	
<b>Effort (estimated)</b>		2	

Cost (estimated)

3

**SCORE: 7 – Medium**

**Action Description:** Assemble group of interested/impacted parties to discuss retroactive seismic of existing hospitals.

Currently there are no requirements for retroactive upgrades. Review approach taken by State of California. Renovations to existing facilities is costly and disruptive to care. There is no identified funding source for this work. It is unclear what standards we would bring facilities up to. Much work is needed to identify the scope and costs. Anticipate the effort to involve many people, with lack of immediate consensus.

<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		2	
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 6 – Medium**

## RECOMMENDATION 8

Submitted by John Schelling

*Prepared by the Washington Geological Survey (DNR) with help from Art Frankel, USGS*

### **RECOMMENDATION 8: IDENTIFY AND MAP IN GREATER DETAIL SOURCES OF SEISMICITY AND GEOLOGICALLY HAZARDOUS AREAS AND DEVELOP PLANS FOR MITIGATION OF IDENTIFIED HAZARDS**

#### **A) Continue to enhance knowledge of seismic sources impacting the State of Washington through mapping, DNR; PNSN research, field investigation, and seismic monitoring.**

- **Stakeholders:**
  - DNR, U.S. Geological Survey, WA EMD, academic institutions such as University of Washington, local, county, and state agencies, utilities, WASHDOT, private sector businesses
  
- **Needs/Expectations for achieving the Action:**
  - Improve understanding of impacts of strong earthquakes such as M9 on Cascadia subduction zone or M6-7 earthquake on the Seattle fault in order to facilitate mitigation efforts to increase community resilience to large earthquakes. This will help to reduce loss of life and property and ensure that buildings, transportation networks, and infrastructure are operational after the event.
  - Mitigation requires accurate estimates of strong shaking from identified fault sources.
  - More extensive seismic network
  - Update the seismic scenario catalog to help support local jurisdictions and creating mitigation plans. Priority analyses would focus on the 20 most important seismic scenarios in the state.
  - Publish databases necessary to implement seismic provisions of building codes and accurately interpret seismic recordings in real time to allow for quicker response to events
  - Develop 3D geologic models-tools used to make geologic maps that enhance the predictive value of surface geology-for active fault identification and assessment (identifying active faults is best done by starting with LiDAR analysis followed up with field investigations)
  - Compile data into a database that supports hazard mapping and also enables the Pacific Northwest Seismic Network to calibrate their seismic recordings, leading to improved seismic hazard analysis;
  - Collect geological and seismic data at schools for contribution into the school seismic safety analysis method; and work with local jurisdictions on implementation of these tools in CAOs and mitigation plans.
  - Increase rate of detailed geological mapping

- **Current Efforts:**
  - Improving building codes and design standards to make buildings, transportation networks, and infrastructure less vulnerable to earthquake shaking.
  - Currently DNR is collecting seismic shear wave data at schools and coordinating that with structural engineering data
  - Limited staff to populate subsurface databases at DNR
  - Most DNR work is been done under small grants from FEMA and USGS last few years
  
- **Gaps & Barriers to achieving the Action:**
  - Need more comprehensive paleoseismic studies to identify and characterize active crustal faults and to better determine the recurrence times of Cascadia M8-9 interface earthquakes.
  - Need to conduct more studies on active faulting
  - Need better prediction of ground shaking from potential large earthquakes by using computer simulations.
  - Need improved knowledge of the shallow (< 2 km deep) structure of the crust, especially in sedimentary basins (for example, Seattle, Tacoma, Everett, Bellingham) to improve our computer simulations of shaking for future large earthquakes.
  - Need to monitor slip and seismicity in the offshore portion of the Cascadia subduction zone, using seafloor GPS and seismometers.
  - DNR has limited staff for any of the things listed in needs and expectations
  - more funding needs to be identified for building out the seismic network
  
- **Available Resources:**
  - USGS funds research in the region, monitoring, and early warning.
  - NSF funds research and M9 Project at University of Washington that is simulating ground shaking for M9 earthquakes and assessing their effects on buildings and ground failure.
  - Limited DNR funds for one FTE plus 24 channel seismic equipment, gravimeter, and magnetometer
  - lidar funding is available to collect lidar over certain areas. It is intended to get lidar coverage for the entire state which would help with active fault identification.
  
- **Resources Needed:**
  - Funding to conduct systematic seismic exploration studies of the shallow crust in WA State, focusing on sedimentary basins with major population centers. (top priority)
  - Funding for installation and operation of seafloor geodesy and offshore seismic monitoring. Funding to better understand whether turbidites were generated from strong shaking from great earthquakes.
  - Two DNR FTEs for geological mapping
  - Need to have two positions at DNR that work exclusively on earthquakes
  - Two positions at DNR for subsurface database management
  - 2 planning positions at DNR for outreach in working with planners to help implement

- **Implementation Plan:**

- **Short Term:**

- Research and refine appropriate messaging for Earthquake Early Warning
    - Use California’s Alquist-Priolo Act as a template to develop appropriate legislative mitigations for seismic hazards throughout Washington State
    - More staff to assess earthquake hazards, how they affect citizens, and how we can mitigate risk by working with planners and officials
    - With the limited resources DNR has we will complete geophysical assessments in quadrangles that we are mapping
    - Include seismic risk in DNR’s Lidar acquisition program
    - DNR will continue to do geological mapping on two quadrangles per year with external funding
    - Continue to populate subsurface database on a limited part-time basis
    - Continue to apply for outside funding to study sources.
    - Continue to use portable arrays on loan from PASSCAL

**Action Description:** Continue to enhance knowledge of seismic sources impacting the State of Washington through mapping, DNR; PNSN research, field investigation, and seismic monitoring.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Research and refine appropriate messaging for Earthquake Early Warning</li> <li>• Use California’s Alquist-Priolo Act as a template to develop appropriate legislative mitigations for seismic hazards throughout Washington State</li> <li>• Include seismic risk in DNR’s Lidar acquisition program</li> <li>• More staff to assess earthquake hazards, how they affect citizens, and how we can mitigate risk by working with planners and officials</li> </ul>	<ul style="list-style-type: none"> <li>• DNR will complete geologic and geophysical assessments in quadrangles that we are mapping using external funds</li> <li>• Continue to populate subsurface database on a limited part-time basis</li> <li>• Continue to use portable arrays on loan from PASSCAL</li> </ul>	

<b>Effort (estimated)</b>	6 FTEs at DNR, USGS, and UW; funding for Lidar; planner-geologist to work on legislation to implement Alquist-Priolo Act	2 FTE's to work on mapping and active faulting (DNR), 2 FTEs for subsurface database (DNR)	
<b>Cost (estimated)</b>	High > 1M	Medium ~500k	

**SCORE: 5 or 6/med**

• **Medium Term:**

- Continue to research and refine appropriate messaging for Earthquake Early Warning
- Increase bandwidth of telecommunication systems to facilitate rapid dissemination down to the local/individual level (i.e. Japan)
- Systematic paleoseismic studies statewide; comprehensive study of coastal subsidence, offshore turbidites, and lake sediments, to develop chronology of Cascadia M8-9 earthquakes.

<b>Action Description:</b> Continue to enhance knowledge of seismic sources impacting the State of Washington through mapping, DNR; PNSN research, field investigation, and seismic monitoring.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Increase bandwidth of telecommunication systems to facilitate rapid dissemination down to the local/individual level (i.e. Japan)</li> <li>• Systematic paleoseismic studies statewide; comprehensive study of coastal subsidence, offshore turbidites, and lake sediments, to develop chronology of Cascadia M8-9 earthquakes.</li> <li>• Continue to research and refine appropriate</li> </ul>	<ul style="list-style-type: none"> <li>• Support and enhance graduate student education in paleo seismic techniques</li> </ul>	

	messaging for Earthquake Early Warning		
<b>Effort (estimated)</b>	Build relationship with telecommunications groups and work on increasing bandwidth; 2 FTEs at DNR, USGS, and UW for paleoseismic studies and EEW messaging;	2 FTE's to work on mapping and active faulting (DNR), 2 FTEs for subsurface database (DNR)	
<b>Cost (estimated)</b>	High > 1M	Medium ~500k	

**SCORE:5 or 6/med**

- **Long Term:**

- Create statewide hazards and resilience center to integrate scientific findings and develop and implement practical mitigation measures.
- Improve seismic network; there are many gaps in the seismic network and it is necessary to install more stations and modernize older ones
- Update the seismic scenario catalog to help support local jurisdictions and creating mitigation plans. Priority analyses would focus on the 20 most important seismic scenarios in the state
- publish databases necessary to implement seismic provisions of building codes and accurately interpret seismic recordings in real time to allow for quicker response to events
- develop liquefaction and site class maps for counties and cities for appropriate identification for earthquake hazard critical area ordinances
- develop a database that enables the Pacific Northwest seismic network to calibrate their seismic recordings leading to improved seismic hazard analysis
- obtain funding for FTEs for DNR, UW and USGS to do earthquake evaluations, subsurface database management, and geological mapping
- develop 3-D geologic models to help assess active faults
- work with local jurisdictions on implementation of these tools in critical area ordinances and mitigation plans with the desired outcome of a reduction of losses from earthquakes and more effective response after an earthquake
- develop foundational geologic maps and databases that support the geological hazards programs and local and state government
- develop and maintain an Internet accessible subsurface geotechnical database for the state moving data from geotechnical work geophysical surveys, and other deep wells to provide easily accessible and better resource assessments, hazard maps and databases

**Action Description:** Continue to enhance knowledge of seismic sources impacting the State of Washington through mapping, DNR; PNSN research, field investigation, and seismic monitoring.

<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Create statewide hazards and resilience center to integrate scientific findings and develop and implement practical mitigation measures.</li> <li>• Improve seismic network; there are many gaps in the seismic network and it is necessary to install more stations and modernize older ones</li> <li>• Update the seismic scenario catalog to help support local jurisdictions and creating mitigation plans. Priority analyses would focus on the 20 most important seismic scenarios in the state</li> <li>• develop liquefaction and site class maps for counties and cities for appropriate identification for earthquake hazard critical area ordinances</li> <li>• Obtain funding for FTEs for DNR, UW and USGS to</li> </ul>	<ul style="list-style-type: none"> <li>• develop a database that enables the Pacific Northwest seismic network to calibrate their seismic recordings leading to improved seismic hazard analysis</li> <li>• develop 3-D geologic models to help assess active faults</li> <li>• develop foundational geologic maps and databases that support the geological hazards programs and local and state government</li> <li>• develop and maintain an Internet accessible subsurface geotechnical database for the state moving data from geotechnical work geophysical surveys, and other deep wells to provide easily accessible and better resource</li> </ul>	<ul style="list-style-type: none"> <li>• Publish databases necessary to implement seismic provisions of building codes and accurately interpret seismic recordings in real time to allow for quicker response to events</li> </ul>

	<p>do earthquake evaluations, subsurface database management, and geological mapping</p> <ul style="list-style-type: none"> <li>• work with local jurisdictions on implementation of these tools in critical area ordinances and mitigation plans with the desired outcome of a reduction of losses from earthquakes and more effective response after an earthquake</li> </ul>	<p>assessments, hazard maps and databases</p>	
<b>Effort (estimated)</b>	<p>Many FTEs to create plan and staff resilience center, FTEs and funding for seismic network improvement, 2-5 FTEs for updating seismic scenario catalog (USGS), 2 FTEs (DNR) to update liquefaction maps, 2 FTEs that are planner-geologists (DNR, DOC) to work on mitigation plans</p>	<p>2 FTE's to work on PNSN database, 2 FTEs for DNR for 3D models, 2 FTEs to develop and maintain geologic hazards databases, portals and online tools</p>	<p>2 FTEs to publish and maintain databases</p>
<b>Cost (estimated)</b>	<p>Very High &gt; 10 M</p>	<p>High &gt;1M</p>	<p>Medium ~500k</p>

**SCORE: ?**

**B) Prioritize areas for detailed liquefaction and other seismic hazard mapping and accelerate the mapping.**

- **Stakeholders:**

- U.S. Geological Survey, WADNR, PNSN, academic institutions such as University of Washington, local, county, and state agencies, utilities, WASHDOT, WA EMD, private sector businesses, citizens
- **Needs/Expectations for achieving the Action:**
  - Need to prioritize detailed seismic hazard mapping in coastal areas, I-5 corridor, and heavily populated areas within sedimentary basins
  - Develop liquefaction and site class maps for counties and cities at appropriate scales for use as identification tools for earthquake hazard CAOs;
  - Develop foundational geologic maps and databases that support the geological hazards programs and local and state government
  - Develop and maintain an Internet accessible subsurface geotechnical database for the state moving data from geotechnical work geophysical surveys, and other deep wells to provide easily accessible and better resource assessments, hazard maps and databases
- **Current Efforts:**
  - USGS makes national seismic hazard maps that characterize hazard for rock sites.
  - Seattle urban seismic hazard maps (2007) provided more detail on seismic hazard by including soft soils and basin effects.
  - M9 Project maps expected ground shaking for M9 Cascadia earthquakes using computer simulations.
- **Gaps & Barriers to achieving the Action:**
  - Need better models of the shallow crust, including depth to bedrock in the Seattle basin and other basins, as well as the shear-wave velocity to a depth of about 2 km.
  - Need an update of the Seattle seismic hazard maps for a wide range of periods, based on 3D simulations using improved crustal model and source specification.
  - Urban seismic hazard maps should be produced for other higher-risk areas of Washington using computer simulations and detailed mapping of soils and sub-surface structure.
  - Funding and lack of geologists to do the work
- **Available Resources:**
  - Limited funding by USGS
  - DNR has one FTE that could be used to do this work part of this work. And we have the necessary seismic equipment
  - DNR is doing some subsurface database management on a limited basis. We have part of FTE working on that
- **Resources Needed:**
  - Sufficient funding and staffing to develop detailed seismic hazard maps for higher-seismic risk areas of Washington, including Seattle, Tacoma, Bellevue, Redmond, Olympia, Everett, Bellingham, Spokane and Tri-Cities.

- Sufficient funding for developing detailed maps of shallow soils, collecting sub-surface data, and conducting seismic reflection/refraction studies in selected areas to determine shallow structure. This information would be used in computer simulations of ground shaking from future large earthquakes, to map in detail the seismic hazard.
- **Implementation Plan followed by priority, effort, cost:**
  - **Short Term:**
    - Develop a more comprehensive and detailed statewide assessment of liquefaction-prone areas: Prioritize areas where liquefaction is likely to have the highest impact; begin assessment around critical facilities; and do detailed studies of areas that are already of interest based on current mapping.

<b>Action Description:</b> Prioritize areas for detailed liquefaction and other seismic hazard mapping and accelerate the mapping.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>● Develop a more comprehensive and detailed statewide assessment of liquefaction-prone areas: Prioritize areas where liquefaction is likely to have the highest impact; begin assessment around critical facilities; and do detailed studies of areas that are already of interest based on current mapping.</li> </ul>		
<b>Effort (estimated)</b>	2 FTEs at DNR to work on this full time until complete		
<b>Cost (estimated)</b>	Medium-high > 500k		

**SCORE: 5/med**

- **Medium Term:**

- Reference the updated liquefaction hazard maps in building codes and establish a consistent means of communicating maps and related information to local jurisdictions for use as best-available-science under the Growth Management Act (DNR and Commerce)

<b>Action Description:</b> Prioritize areas for detailed liquefaction and other seismic hazard mapping and accelerate the mapping.			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• Reference the updated liquefaction hazard maps in building codes and establish a consistent means of communicating maps and related information to local jurisdictions for use as best-available-science under the Growth Management Act (DNR and Commerce)</li> </ul>		
<b>Effort (estimated)</b>	2 FTEs at DNR and/or commerce to work on this full time, ongoing		
<b>Cost (estimated)</b>	High > 1M		

**SCORE: 5/med**

- **Long Term:**

- Developing mitigation actions appropriate for liquefiable soils and appropriating funding
- Use California’s Seismic Hazard Mapping Act as a template to systematize seismic hazard assessments for input into Growth Management Critical Areas Ordinances

<b>Action Description:</b> Prioritize areas for detailed liquefaction and other seismic hazard mapping and accelerate the mapping.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>

<b>Priority</b>	<ul style="list-style-type: none"> <li>• Developing mitigation actions appropriate for liquefiable soils and appropriating funding</li> <li>• Use California’s Seismic Hazard Mapping Act as a template to systematize seismic hazard assessments for input into Growth Management Critical Areas Ordinances</li> </ul>		
<b>Effort (estimated)</b>	2-5 FTEs at DNR and/or commerce to work on this full time, ongoing		
<b>Cost (estimated)</b>	High > 1M		

**SCORE: 5/med**

**C) Work with the planning and public works departments within local jurisdictions and tribes to develop a model ordinance of mitigation measures and an explanation of how it can be used.**

- **Stakeholders:**
  - *DNR, DOT, PNSN, counties and cities, building owners, DOC, local planning agencies.*
- **Needs/Expectations for achieving the Action:**
  - Work with local jurisdictions on implementation of these tools in critical area ordinances and mitigation plans with the desired outcome of a reduction of losses from earthquakes and more effective response after an earthquake
- **Current Efforts:** None
- **Gaps & Barriers to achieving the Action:** Needs to be carried out at the local level
- **Available Resources:**
- **Resources Needed:** Organization, time, funding
- **Implementation Plan:**

- **Short Term:** Districts develop hazard mitigation plans to make them eligible for federal funding (when available) through the Hazard Mitigation Grant Program (HMGP).

<b>Action Description:</b> Define how resiliency relates to the GMA and Get a Community Resiliency Guidebook into the Growth Management Services Unit’s annual work program.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	After the completion of the Department of Commerce’s Community Resilience Initiative, define which resulting recommendations relate to the Growth Management Act and could best be implemented through local comprehensive plans and development regulations.		
<b>Effort (estimated)</b>			The Department of Commerce’s Community Resilience Initiative is currently underway. Subsequent level of effort is projected to be low.
<b>Cost (estimated)</b>			The cost for the Department of Commerce’s Community Resilience Initiative is already accounted for in terms of staff costs.

			Subsequent costs can be achieved within existing resources.
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**SCORE: 9/HIGH**

<b>Action Description: Complete the guidebook over a one-year period.</b>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Complete guidebook development	
<b>Effort (estimated)</b>	One (1) additional FTE and possibly a consultant contract may be required to complete the development of the guidebook		
<b>Cost (estimated)</b>		The anticipated cost would fall within the medium range.	

**SCORE: 5/med**

<b>Action Description: Outreach to local governments to educate about the guidebook and applicability to local planning.</b>			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Conduct outreach to local governments.	
<b>Effort (estimated)</b>		May involve developing new Short Course content and Regional Planners' Forum content with resultant staff travel	

		and face-to-face interaction with local governments across Washington.	
<b>Cost (estimated)</b>		The costs are anticipated to be in the medium range.	

**SCORE: 6/med**

- **Medium-Term: Conduct assessment of guidebook effectiveness and compile ideas for future updates.**

<b>Action Description: Conduct assessment of guidebook effectiveness and compile ideas for future updates.</b>			
<i>(Medium-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>			Conduct guidebook assessment 5 years after publication.
<b>Effort (estimated)</b>		Staff time needed to review local government comprehensive plans and development regulations.	
<b>Cost (estimated)</b>		The costs are anticipated to be in the medium range.	

**SCORE: 5/med**

- **Long Term: Districts maintain hazard mitigation plans by regularly revising and updating them.**

<b>Action Description:</b> Districts maintain hazard mitigation plans by regularly revising and updating them.
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<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		Review revised plans for consistency with adopted state and local requirements.	
<b>Effort (estimated)</b>		Staff time needed to review local government comprehensive plans and development regulations.	
<b>Cost (estimated)</b>		The cost is estimated to be within the medium range.	

**SCORE: 6/med**

## RECOMMENDATION 9

### *Gap Analysis and Action Implementation Plan*

*Prepared by the Washington Geological Survey (DNR) with help from Pacific Marine Environmental Lab and University of Washington*

#### **RECOMMENDATION 9: IMPROVE LIFE SAFETY IN COMMUNITIES AT RISK OF LOCAL TSUNAMIS**

**Action: Implement/build tsunami vertical evacuation plans developed by local and tribal jurisdictions through “Project Safe Haven” to minimize loss of life during local tsunamis. Secure adequate funding to construct a sufficient number of vertical evacuation structures for the safety of the Washington populace.**

- **Stakeholders:** DNR, EMD, UW, PMEL/NOAA, FEMA, coastal residents, employees of coastal businesses, tourists, U.S. Coast guard, first-responders.
- **Needs/Expectations for achieving the Action:**
  - Constructing enough vertical evacuation structures to ensure that everyone who is in harm’s way from a locally-generated tsunami has an evacuation option, in particular for areas where no natural vertical evacuation is possible. Project Safe Haven has identified 50 such sites.
  - Collaboration with technical partners at DNR, UW, and NOAA, as well as local government to perform detailed inundation modeling for design of tsunami evacuation refuges.
  - Complete inundation and evacuation modeling for all Washington coastline to understand the details of tsunami inundation and where people need to go to get out of harm’s way.
- **Current Efforts:**
  - One structure built at Ocosta Elementary School; one structure in design phase at Long Beach; others in consideration at the Quinault Casino; Port of Grays Harbor to replace the port EOC; a fire station at Ocean Park; planning to move Taholah and Makah Reservation infrastructure out of tsunami hazard zone
  - Efforts are dependent on grant funding at this time
- **Gaps & Barriers to achieving the Action:**
  - Not enough funding available for staff to conduct modeling and planning
  - New design guidelines that change building codes are still in draft form (ASCE 7-16 chapter 6)
  - Site-specific hazard assessments of all remaining candidate sites, including detailed modeling of potential forces on proposed structures.
- **Available Resources:**
  - Limited funding from the National Tsunami Hazard mitigation plan (NTHMP); ad hoc funding from grant programs

## ACTION Implementation

- **Actions Needed:**
  - 1 FTE for coastal tsunami inundation modeling at the Statewide level: DNR.
  - 3 FTEs at DNR to conduct detailed site-specific tsunami inundation modeling for vertical evacuation structures.
  - Support one or more local jurisdiction demonstration projects in order to determine the most cost-effective approach and identify funding options that may be instituted on a regional or local basis.
  - More funding from FEMA grant programs for hazard mitigation and community education.
  - Explicit support for such structures in the common school construction fund.
  - Tax policy to encourage safe haven structures; align with goals of the Aquatic Lands Enhancement Account to secure funding as coastal amenities.
  - Integrate safe haven structures into school funding. Change local zoning to encourage structures in tsunami hazard zones to be designed as safe havens. Mandate new hotel construction to incorporate safe havens. Support development of improved methods for detailed, site-specific modeling assessments of the tsunami hazard.
- **Implementation Plan:**
  - **Short Term:**
    - 2 FTEs for detailed tsunami inundation modeling at selected locations for the pilot project: DNR and UW
    - Support one or more local jurisdiction demonstration projects to determine the most cost-effective approach and identify funding options that may be instituted on a regional or local basis.

<b>Action Description:</b> Implement/build tsunami vertical evacuation plans developed by local and tribal jurisdictions through “Project Safe Haven” to minimize loss of life during local tsunamis. Secure adequate funding to construct a sufficient number of vertical evacuation structures for the safety of the Washington populace.			
<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• 2 FTEs for tsunami inundation modeling at selected locations for the pilot project: DNR and UW</li> <li>• Support one or more local jurisdiction demonstration projects to build a pilot vertical evacuation structure and demonstrate the most cost-effective approaches and identify funding options that may be instituted on a regional or local basis.</li> </ul>		

<b>Effort (estimated)</b>	1 FTE for 1-5 years conducting the modeling and ongoing collaboration with local jurisdictions, contractors, engineers etc.  Numerous engineers and community stakeholders to determine site location and building design.		
<b>Cost (estimated)</b>	High: Based on the long beach berm vertical evacuation and Ocosta School pilot projects we estimate around <b>\$3-5M</b> depending on leverage		

**SCORE: 5/med**

- **Long Term:**
  - 3 FTEs to conduct coastal and Puget Sound tsunami inundation modeling and then follow up with detailed site-specific tsunami inundation modeling for vertical evacuation structures: DNR and UW
  - Integrate safe haven structures into school funding.
  - Change local zoning to encourage structures in tsunami hazard zones to be designed as safe havens. Mandate new hotel construction to incorporate safe havens. Support development of improved methods for detailed, site-specific modeling assessments of the tsunami hazard.
  - Determine funding mechanisms to support construction of vertical evacuation structures in at risk communities through funding mechanisms such as: grant funding, bond funding, State Capital budget support or other funding opportunities. Vertical evacuation structures are necessary in some areas of the outer coast where there is no sufficiently high ground available for tsunami evacuation in the time that would be needed.

<b>Action Description:</b> Implement/build tsunami vertical evacuation plans developed by local and tribal jurisdictions through “Project Safe Haven” to minimize loss of life during local tsunamis. Secure adequate funding to construct a sufficient number of vertical evacuation structures for the safety of the Washington populace.			
<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	<ul style="list-style-type: none"> <li>• 3 FTEs to conduct coastal and Puget Sound tsunami inundation modeling and then follow up with detailed site-specific tsunami inundation modeling for vertical evacuation structures: DNR and UW</li> <li>• Integrate construction of Safe Haven structures into school funding</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	

	<ul style="list-style-type: none"> <li>• Change local zoning to encourage structures in tsunami hazard zones to be designed as safe havens. Mandate new hotel construction to incorporate safe havens. Support development of improved methods for detailed, site-specific modeling assessments of the tsunami hazard.</li> <li>• Determine funding mechanisms to support construction of vertical evacuation structures in at risk communities through funding mechanisms such as: grant funding, bond funding, State Capital budget support or other funding opportunities. Vertical evacuation structures are necessary in some areas of the outer coast where there is no sufficiently high ground available for tsunami evacuation in the time that would be needed.</li> </ul>		
<b>Effort (estimated)</b>	The Safe Haven process identified a need for more than 50 vertical evacuation structures along the outer coast of Washington. This would require new detailed modeling at each site, which would be 3 FTE for 2 biennia, plus engineering teams for 50 structures.		
<b>Cost (estimated)</b>	Very high (at least several million per structure) ~\$150-\$250M Depending on leverage		

**SCORE: 5/med**

# GOVERNOR'S DIRECTIVE # 1

## Implementation Plan

### Short-Term (1-5 years)

**Action Description:** Complete the master bulk fuel contract. DES is developing a master contract with Washington State refineries to provide fuel to the entire state of Washington. The new contract will enable the distribution of fuel post CSZ and will have emergency response language within the contract. A refinery can choose multi-modal (air, rail, road, water, etc.) to transport fuel. There will remain a substantial reliance on ESF #1 (Transportation) to clear routes for the distribution of fuels, however the refinery will be contractually obligated to move fuels into the state or on the coast. The anticipated timeframe for the completion of the new bulk fuel contract is September 2017.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 9 – High**

## GOVERNOR'S DIRECTIVE # 2

### Implementation Plan

#### Short-Term (1-5 years)

**Action Description:** Develop comprehensive agreements (Memoranda of Understanding) with each non-governmental organization that would be involved in a catastrophic response.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		2	
<b>Effort (estimated)</b>			3
<b>Cost (estimated)</b>			3

**SCORE: 8 – High**

**Action Description:** Develop a comprehensive training and exercise plan to prepare state agency employees to staff ESF #6 in the SEOC following a catastrophic incident.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

**Action Description:** Develop and submit budget requests, in the form of decision packages, to fund recruitment of mass care professional(s) with extensive catastrophic incident planning experience.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	3		
<b>Effort (estimated)</b>		2	
<b>Cost (estimated)</b>		2	

**SCORE: 7 – Medium**

### GOVERNOR’S DIRECTIVE # 3

#### **Implementation Plan**

#### **Short Term (1-5 years)**

**Action Description:** Leveraging the WECCWG and the IRSC meetings, planners from the Military Department’s IT Division and Emergency Management Division need to create an emergency communication framework to incorporate infrastructure owner/operators from both the public and private sectors. The framework should initially focus on other lifeline sectors (Energy, Transportation, Water/Wastewater) as well as school districts and other important community support facilities.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>		X	
<b>Cost (estimated)</b>			X

**SCORE: 8 – High**

**Action Description:** OSCCR needs specific system upgrades and enhancements to ensure it is reliable following a large seismic event. Augmenting the OSCCR system with a satellite-based backhaul system will ensure the system is reliable even if its terrestrial transmitters are damaged or destroyed due to a catastrophic earthquake. In addition, 16 radios need replacement and numerous WAVE consoles need replacement/upgrades.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	X		
<b>Cost (estimated)</b>		X	

**SCORE: 6 – Medium**

**Action Description:** CEMNET needs to be expanded. This also includes an additional dispatch console at SEOC COOP location on the east side of the state.

<i>(Short-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>	X		
<b>Effort (estimated)</b>	X		
<b>Cost (estimated)</b>		X	

**SCORE: 6 – Medium**

**Long Term (10+ years)**

**Action Description:** Several of the communication systems maintained for use by the state are in need of upgrades including:

- The Satellite phones the agency provides need to be upgraded to more reliable and robust handsets. The agency needs to conduct training for end users who are issued these devices on use. Additionally, a statewide Satellite Phone roster, call tree, protocols, and exercise schedule must be established.
- The High Frequency network will require upgrades to current hardware to ensure reliability and security at met. This hardware includes mobile hardware and fixed hardware at both the SEOC and WSP.
- The STAEN system will require user hardware upgrades. This system will also require both repeater upgrades and maintenance at the Capitol Peak location.
- In the 5 to 10-year window the agency Mobile Emergency Communications Vehicle will need upgrade to the systems it contains. These items include radio systems, satellite systems and other various technology assets. This asset may also need duplication of its configuration on the eastern side of the state to ensure redundancy on its capabilities during a catastrophic disaster.
- In the 5 to 10-year window the Emergency Alert System will need an upgrade, to include a sustained service contract to ensure security and reliability.

<i>(Long-Term)</i>	<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Priority</b>		X	
<b>Effort (estimated)</b>		X	
<b>Cost (estimated)</b>		X	

**SCORE: 6 – Medium**

**Appendices for detailed information:**

<https://wise.wamil.us/Resiliency/index.html>

<http://mil.wa.gov/weccwg>

<http://mil.wa.gov/emergency-management-division/infrastructure-resilience-sub-committee-irsc>