The 2013 Oregon Resilience Plan: Bridging the Gaps – A Five Year Review

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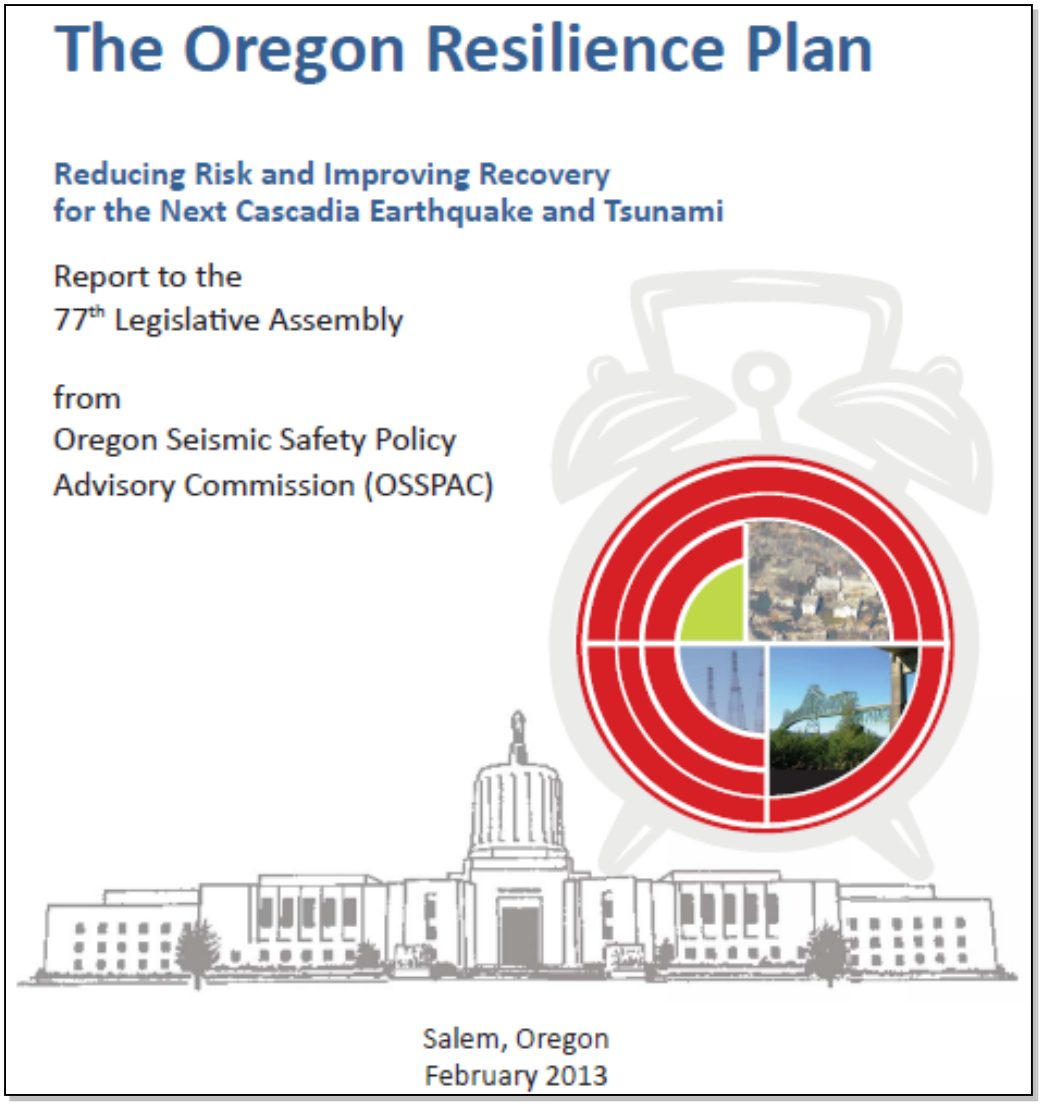
CLACKAMAS COUNTY
DISASTER MANAGEMENT

The Oregon Resilience Plan

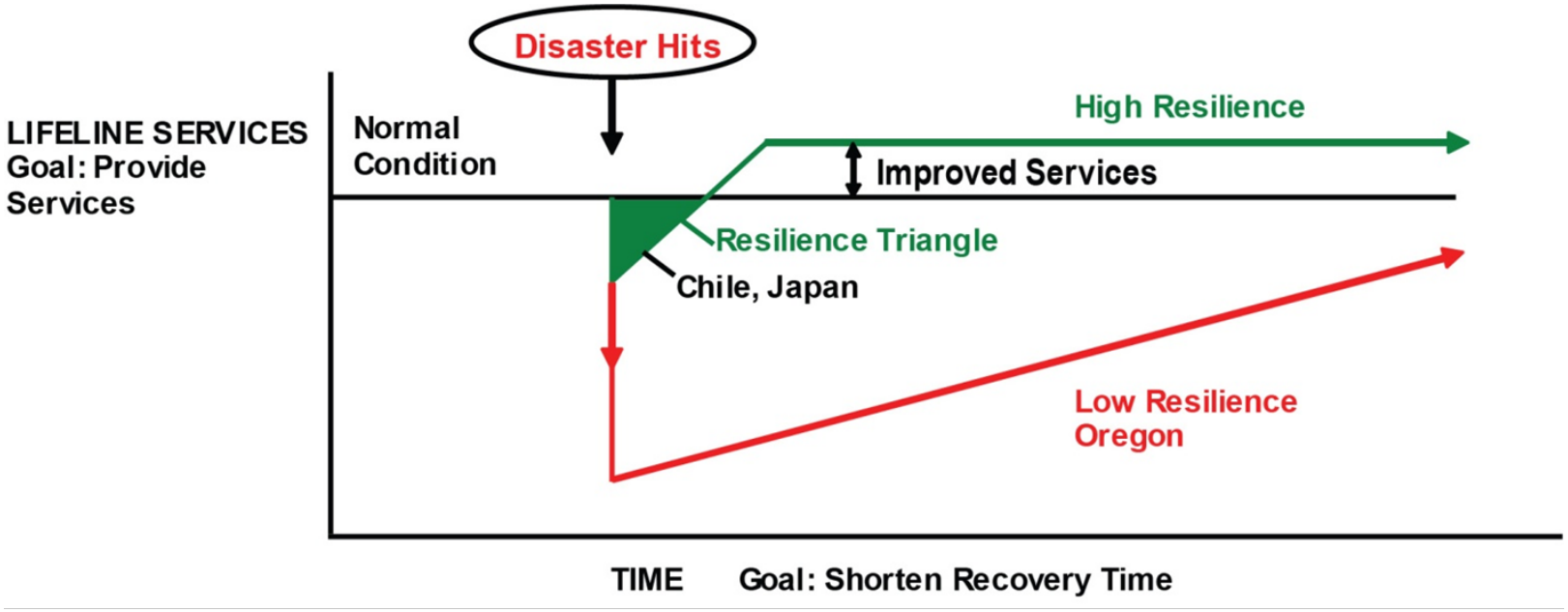


50-year Comprehensive Plan

- ❑ **Save Lives**
- ❑ **Protect our Economy**
- ❑ **Preserve our Communities**

- ❑ 169 volunteers
- ❑ $0 Funding
- ❑ One-year Schedule

Our Definition of Resilience

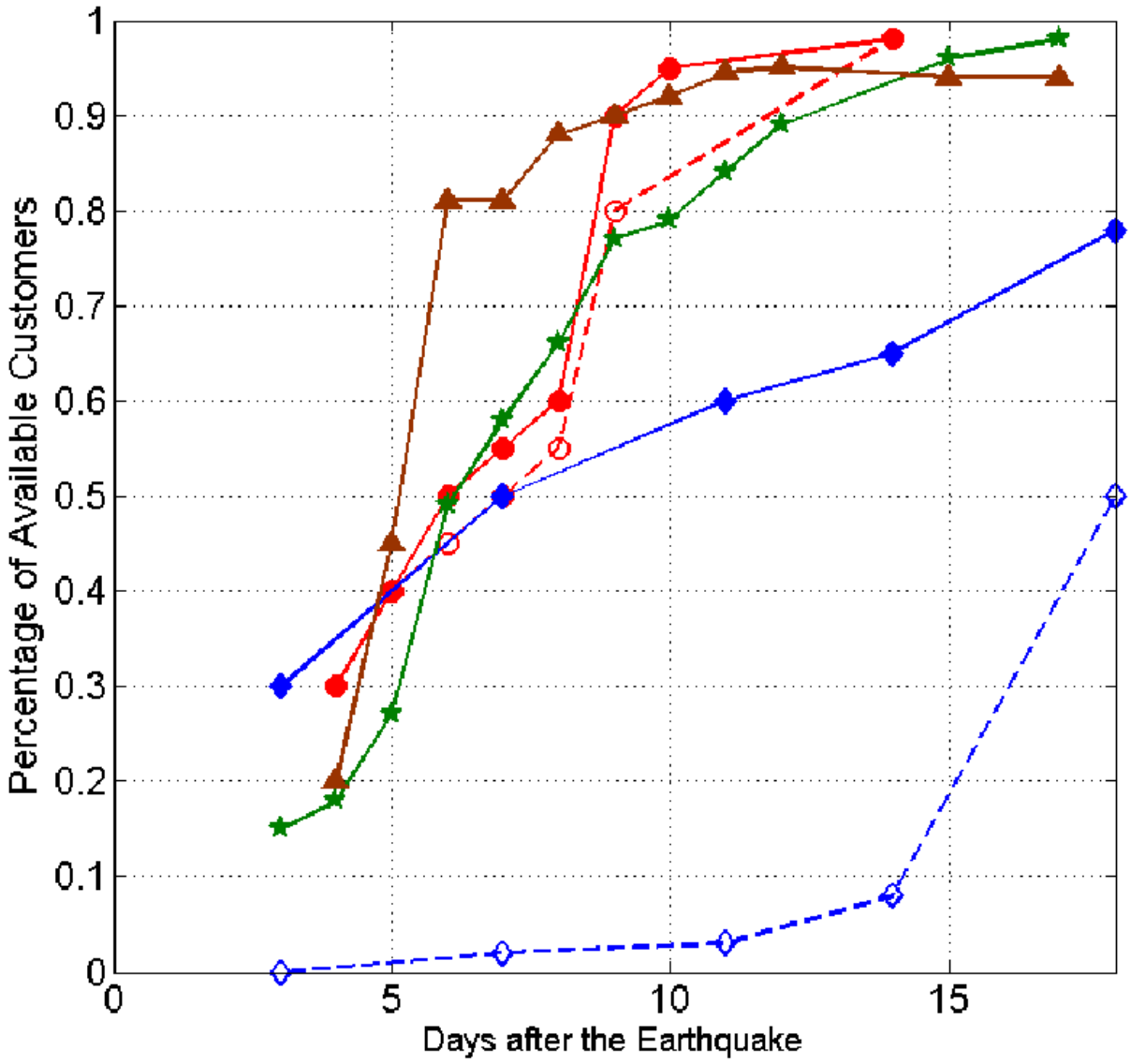


(Yumei Wang)

Resilience: Save lives, Reduce Losses, Speed Recovery, & Rebuild Better

Sustainability without **Resilience** is NOT sustainable!

Chile M8.8, Feb 27, 2010



Source: (TCLEE) Technical Council on Lifeline Earthquake Engineering Preliminary Report

Empirical restoration times for power delivery, water distribution, and telecommunications.

The letters C and T indicated the cities of Concepción and Talcahuano, respectively.

Both cities are in Region VIII, whose capital is Concepción. Although

Eight Task Groups

Business and Work force Continuity

Coastal Communities

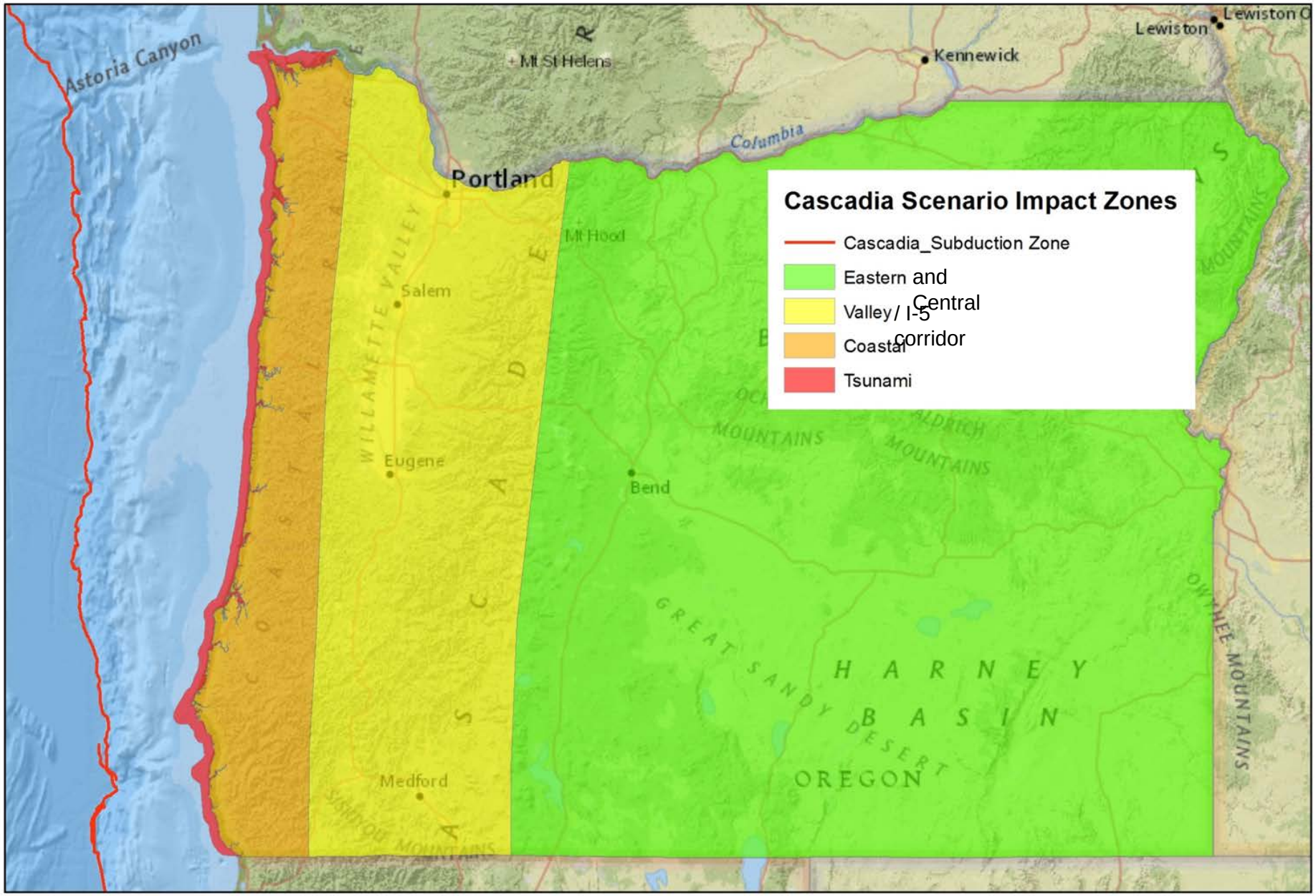
- Critical/Essential Buildings
- Energy
- Information and Communications
- Transportation
- Water and Waste Water

Magnitude 9.0 Earthquake/Tsunami Scenario

Oregon Resilience Planning Steps

- **Assess performance** of existing critical facilities and lifeline systems, and estimate timeframes required to restore functions at present conditions;
- Develop **resilience goals based on business and community needs** for each zone;
- Define **acceptable target timeframes** to restore functions to meet resilience goals; and
- Prepare **recommendations for statewide policies and actions** to achieve the desired performance targets.

Four Geographic Zones



Current Resilience Gap

Business can only tolerate **two to four weeks** of disruption of essential services

Critical Service	Zone	Estimated Time to Restore Service
Electricity	Valley	1 to 3 months
Electricity	Coast	3 to 6 months
Police and fire stations	Valley	2 to 4 months
Drinking water and sewer	Valley	1 month to 1 year
Drinking water and sewer	Coast	1 to 3 years
Top-priority highways (partial restoration)	Valley	6 to 12 months
Healthcare facilities	Valley	18 months
Healthcare facilities	Coast	3 years

ORP – Target States of Recovery

KEY TO THE TABLE

TARGET TIMEFRAME FOR RECOVERY:

Desired time to restore component to 80–90% operational

Desired time to restore component to 50–60% operational

Desired time to restore component to 20–30% operational

Current state (90% operational)

TARGET STATES OF RECOVERY: WATER & WASTEWATER SECTOR (VALLEY)

	Event occurs	0–24 hours	1–3 days	3–7 days	1–2 weeks	2 weeks–1 month	1–3 months	3–6 months	6 months–1 year	1–3 years	3+ years
Domestic Water Supply											
Potable water available at supply source (WTP, wells, impoundment)		R	Y		G			X			
Main transmission facilities, pipes, pump stations, and reservoirs (pacistons) operational		G					I				
Water supply to critical facilities available		Y	G				I				
Water for fire suppression—at key supply points		G		X							
Water for fire suppression—at fire hydrants				R	Y	G			X		
Water available at community distribution centers/points			Y	G	X						
Distribution system operational			R	Y	G				X		

(To be continued on next page)

KEY TO THE TABLE

TARGET TIMEFRAME FOR RECOVERY:

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Current state (90% operational)

	Event occurs	0–24 hours	1–3 days	3–7 days	1–2 weeks	2 weeks–1 month	1–3 months	3–6 months	6 months–1 year	1–3 years	3+ years
Wastewater Systems											
Threats to public health & safety controlled			R	Y		G			X		
Raw sewage contained & routed away from population		R		Y			G		X		
Treatment plant(s) operational to meet regulatory					R			Y	G		X

KEY TO THE TABLE

TARGET TIMEFRAME FOR RECOVERY:

Desired time to restore component to 80–90% operational

Desired time to restore component to 50–60% operational

Desired time to restore component to 20–30% operational

Current state (90% operational)

G

Y

R

X

What do the findings mean?

- Complex Inter-dependencies

- Damage vs. Impacts
  - Costs - Replace & Rehabilitate
  - Capacity - Loss of Service
  - Value - Society & Economy

- Need for detailed assessments/data

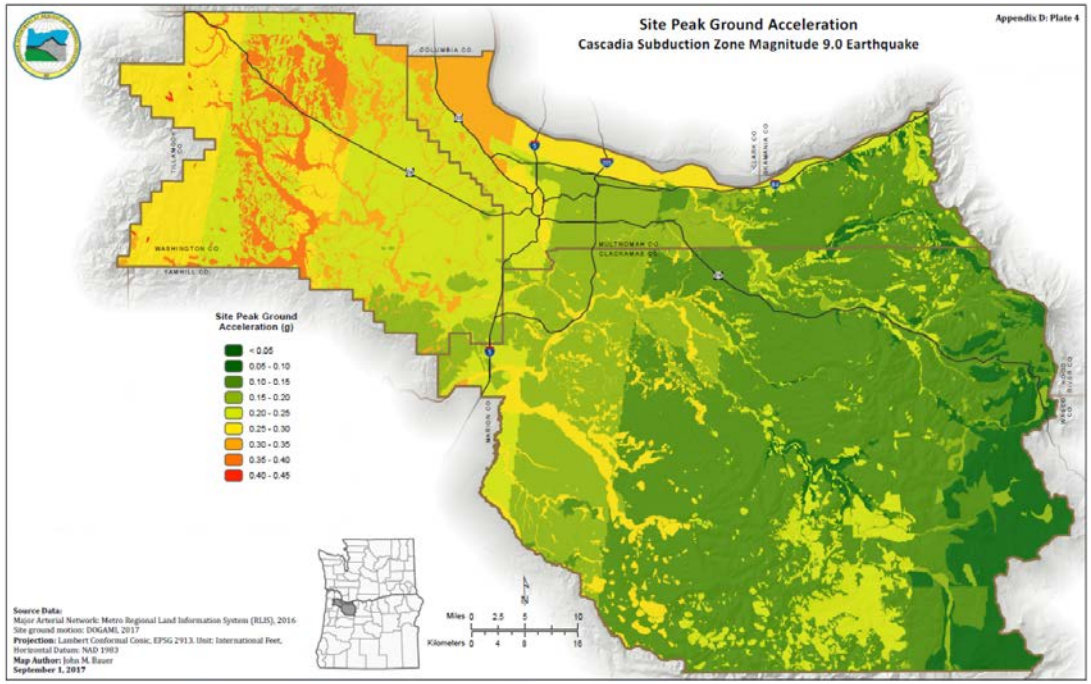
Current Examples - 2018

1. Hazard – Multi-EQ Impact Analysis
2. Buildings
   - City of Portland - Unreinforced Masonry Buildings
   - Schools
     - Oregon Seismic Rehabilitation Grant Program
     - Beaverton School District
3. Infrastructure
   - Oregon DOT Bridges
   - Portland Water Bureau – Details!
   - Multnomah County – Burnside Bridge
4. City of Portland
   - Resilient Infrastructure Planning

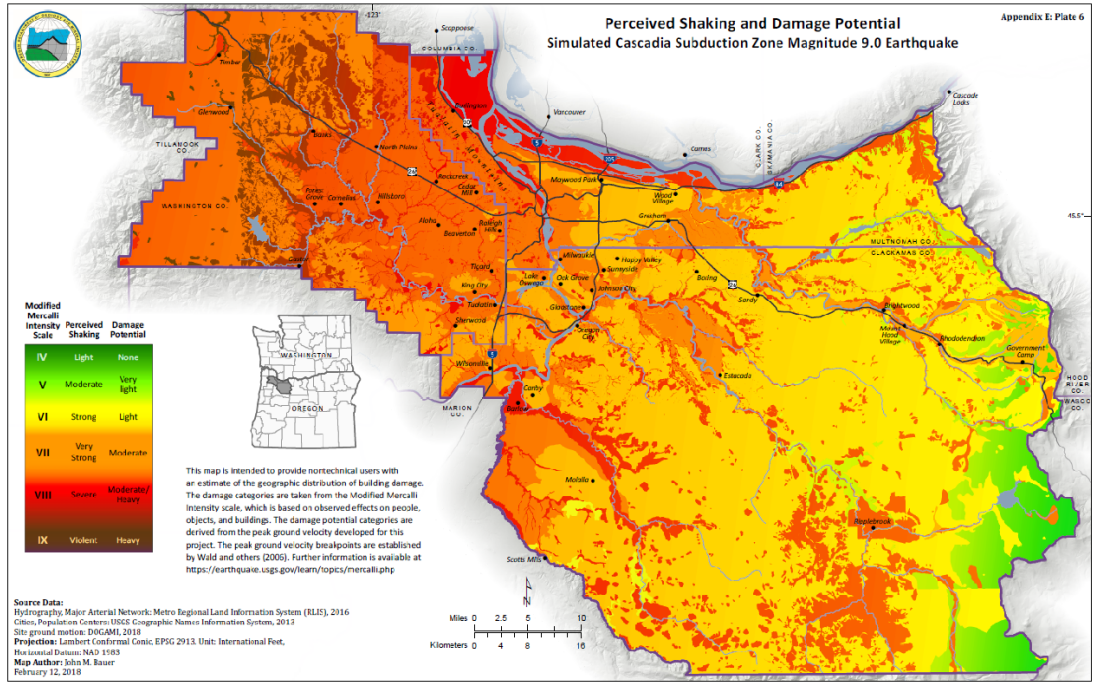
EARTHQUAKE REGIONAL IMPACT ANALYSIS for Clackamas, Multnomah, and Washington Counties

M9.0 Cascadia Subduction Zone Fault

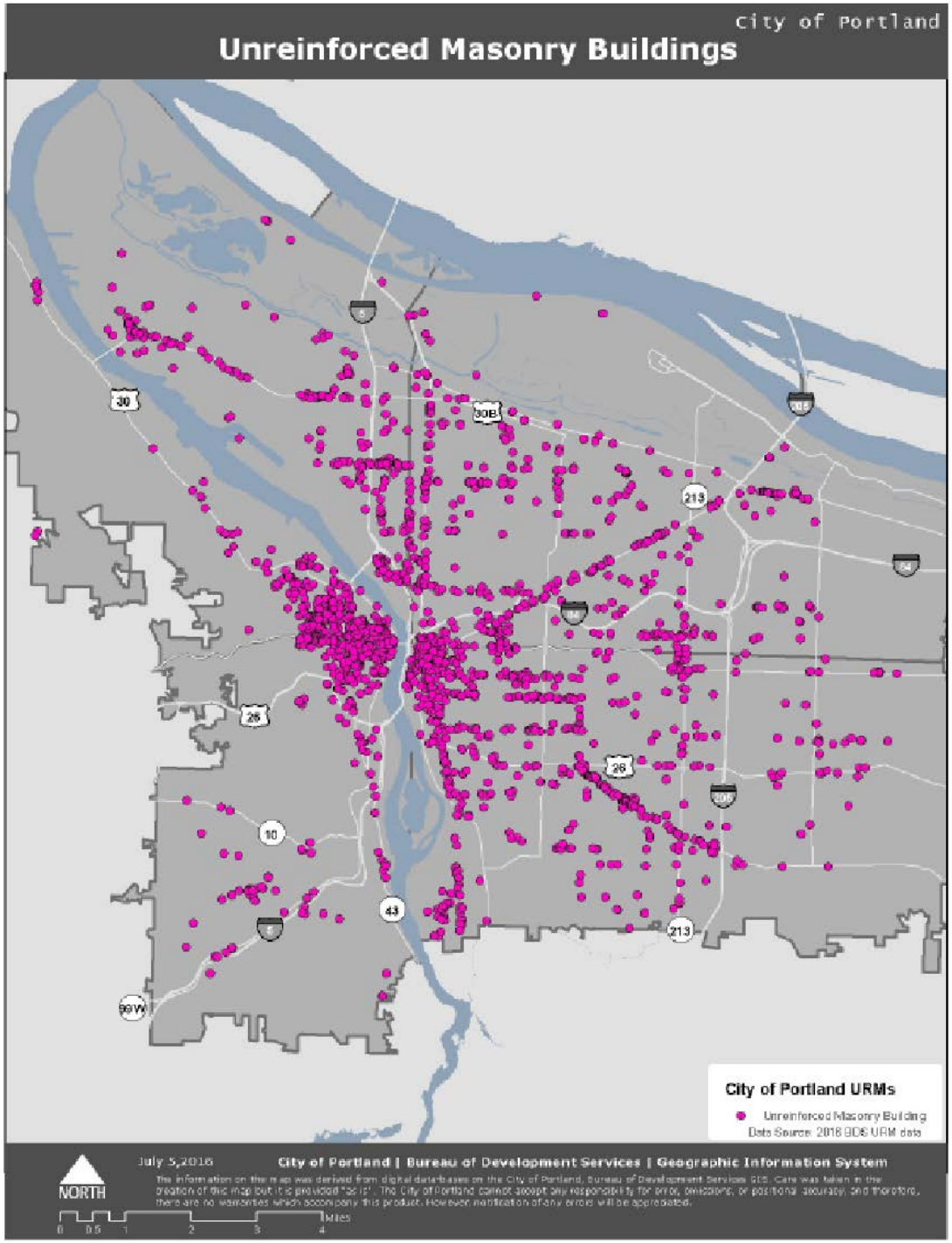
Site Peak Ground Acceleration



Perceived Shaking and Damage Potential



RDPO
Regional Disaster Preparedness Organization
Unified. Prepared. Resilient.



Building Inventories?

- Quantity
- Quality

SCHOOLS - Performance Goals
Retrofit ≤ Resilience?

SEISMIC REHABILITATION GRANT PROGRAM

The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

Who Can Apply?

Public K-12 school districts, community colleges, and education service districts are eligible for the grant program. For emergency services facilities, the emphasis is on first responder buildings. This includes: hospital buildings with acute inpatient care facilities, fire stations, police stations, sheriff's offices, 9-1-1 centers and Emergency Operations Centers (EOCs).

A new application round begins **July 2, 2018, and closes November 16, 2018, at 5:00 pm.** There will be $75 million for school projects and $10 million for emergency service projects. The maximum award for the seismic program has been updated to $2.5 million per building. We encourage all school retrofits to be designed to seismic immediate occupancy standards. However, at a minimum, school projects must design the retrofit to seismic life safety standards unless the project is for a shelter which then must be designed to seismic immediate occupancy standards. All emergency service building projects must design the retrofit to seismic immediate occupancy standards in order to be eligible for a grant. Our goal is to announce awards by the end of April 2019.

Please email Gloria Zacharias or call 503-986-0132 if you have any questions or need further information.

Eligible Projects and Activities

Eligible Activities

- Structural improvements including non-structural
- Architecture & Engineering
- Project management

business oregon

seft CONSULTING GROUP

BEAVERTON SCHOOL DISTRICT RESILIENCE PLANNING FOR HIGH SCHOOL AT SOUTH COOPER MOUNTAIN AND MIDDLE SCHOOL AT TIMBERLAND

BEAVERTON, OREGON

July 10th, 2015
SEFT Project Number: B14030.00

New High School at South Cooper Mountain

New Middle School at Timberland

SEFT Consulting Group
4800 SW Griffith Drive, Suite 135
Beaverton, OR 97005

- **Impact of Cascadia Subduction Zone Earthquake on the Evaluation Criteria of Bridges**
  - TECHNICAL REPORT SPR 770 – December 2016

- **Bridge Seismic Retrofit Measures Considering Subduction Zone Earthquakes**
  - Final Report SPR 741 – July 2015

- **Seismic Retrofit Benefit Considerin Statewide Transportation Assessment**
  - Final Report SRS 500-480 OTREC 444 – June 2015

Water System Seismic Study Project Objective

- Comply with the Oregon Resilience Plan (ORP)
  - i. Complete a seismic risk assessment of PWB's water system.
  - ii. Produce an infrastructure mitigation plan to meet or exceed the water recovery goals (target states of recovery) listed in the ORP.

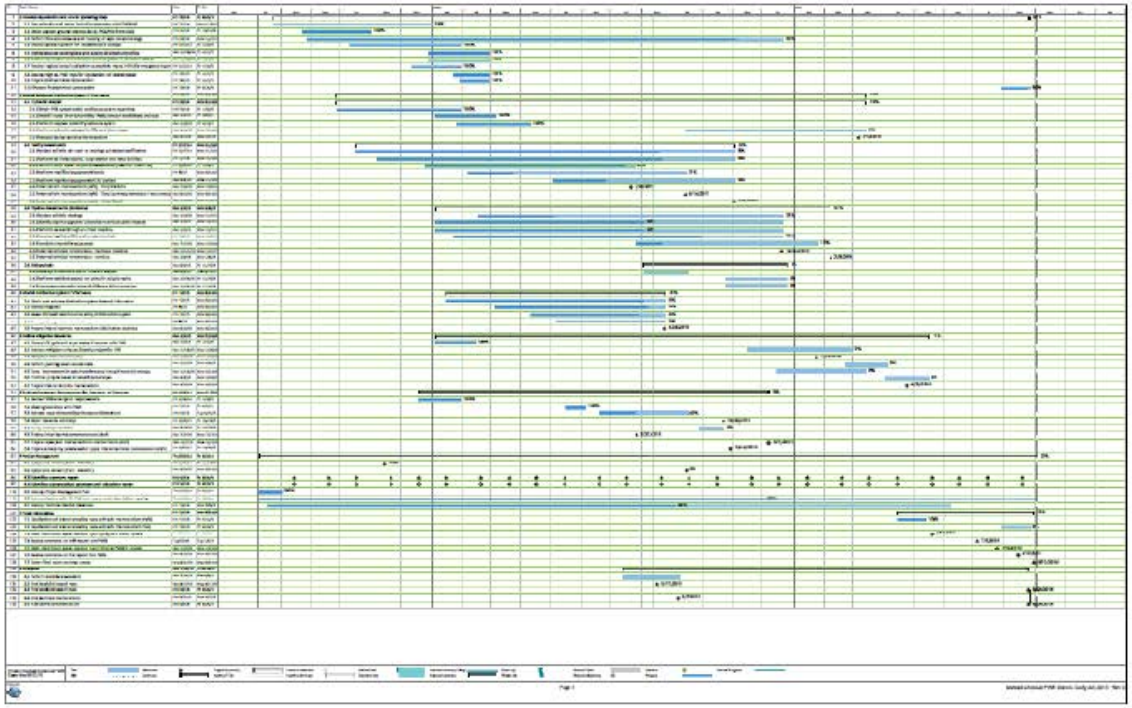
Huge Thanks to Michael Stuhr!

Michael Stuhr, P.E.
Email | Biography | Calendar

Michael.Stuhr@portlandoregon.gov

Water System Seismic Study Schedule & Budget

- Total Budget - $1.6 million
- Consulting Budget - $1.1 million
- Schedule Duration – 30 months (complete June 2017)

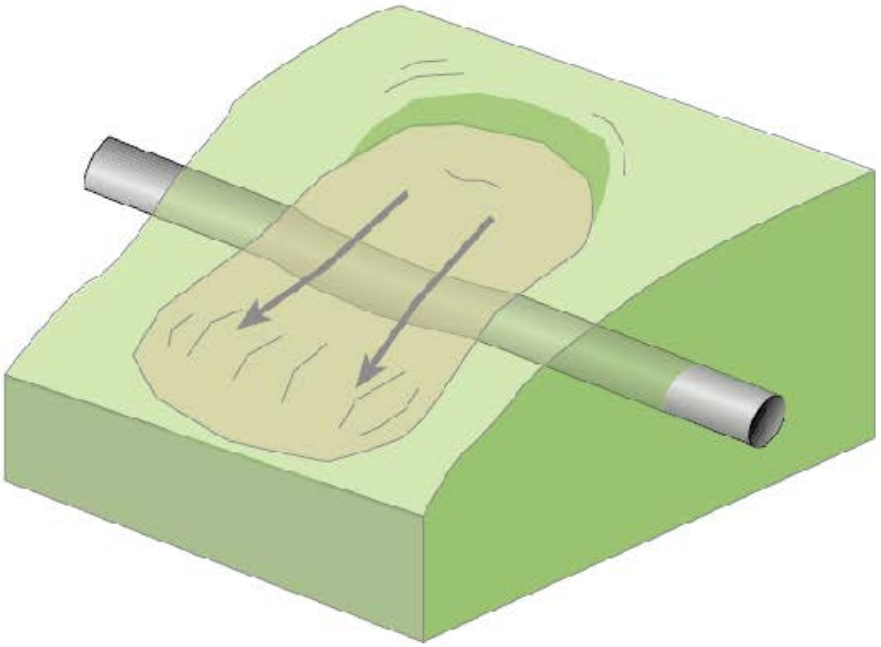


Water System Seismic Study Tasks

- Task 1 – Determine Permanent Ground Deformation (PGD)
- Task 2 – Assess pipeline and facility performance
- Task 3 – Model backbone system performance
- Task 4 – Emergency preparedness and response
- Task 5 – Develop & prioritize mitigation measures

Task 1 – Determine Permanent Ground Deformation

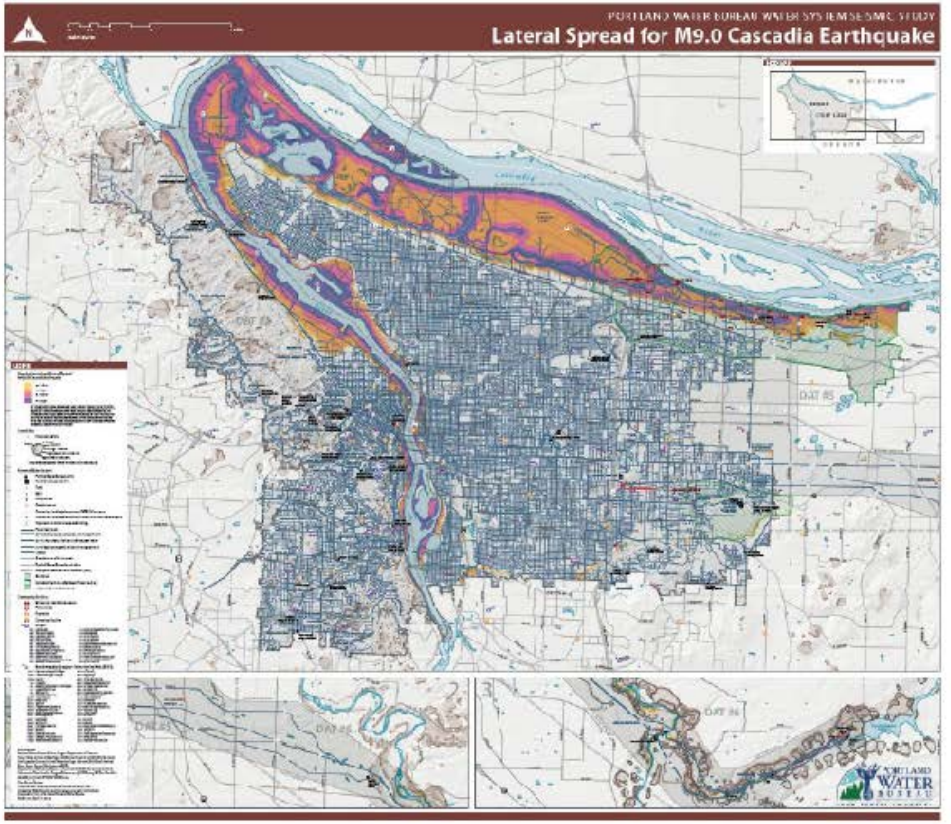
- Liquefaction results from strong ground shaking
  - Occurs in saturated soil profiles with significant sand content
  - Results in a semi-fluid state
  - Loss of soil strength and bearing capacity
  - Settlement and lateral spread



Task 1 – Determine Permanent Ground Deformation

Deliverables

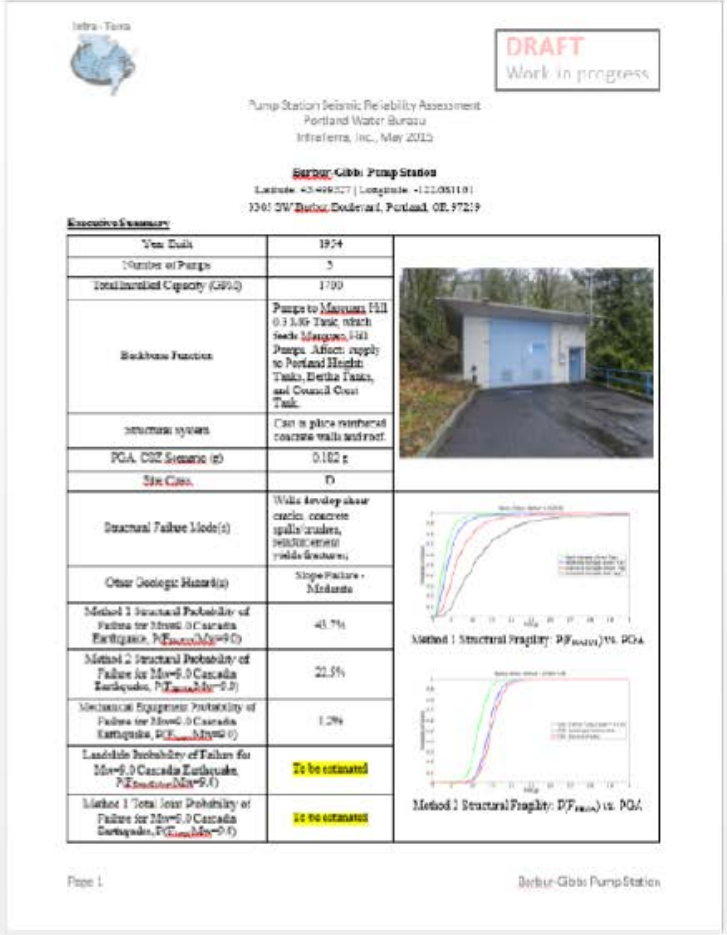
- Worked with Oregon Dept of Geology & Mineral Industries (DOGAMI) and 1000s of bore logs
- Four (4) PDF Maps along with four new ArcGIS layers in the City's GIS mapping system
  - Liquefaction Hazard
  - Lateral Spread
  - Ground Settlement
  - Landslide Deformation



Task 2 – Assess Pipeline and Facility Performance

Facility Assessment

- As-built drawings and design specs
- Site reconnaissance
- Total (38) Pump Stations
- Total (58) Tanks



DRAFT
Work in progress

Pump Station Seismic Reliability Assessment
Portland Water Bureau
Infrastructure, Inc., May 2015

Barbur-Gibbs Pump Station

Latitude: 45.469527 | Longitude: -122.685110
3301 SW Barbur Boulevard, Portland, OR 97219

Executive Summary

Year Built	1974
Number of Pumps	3
Total Installed Capacity (GPM)	1700
Backbone Function	Pumps to Marquam Hill 0.3 MG Tank, which feeds Marquam Hill Pumps. Allows supply to Portland Heights Tanks, Bertha Tanks, and Council Crest Tank.
Structural system	Cast in place reinforced concrete walls and roof.
PGA, 2% Scenario (g)	0.182 g
Site Class	D
Structural Failure Mode(s)	Walls develop shear cracks, concrete spalls/crushes, vertical cracks/ruptures, reinforcement yields/fractures.
Other Geologic Hazard(s)	Slope Failure - Moderate
Method 1 Structural Probability of Failure for Mw=9.0 Cascadia Earthquake, $P(F_{Structure}\|Mw=9.0)$	45.5%
Method 2 Structural Probability of Failure for Mw=9.0 Cascadia Earthquake, $P(F_{Structure}\|Mw=9.0)$	22.5%
Mechanical Equipment Probability of Failure for Mw=9.0 Cascadia Earthquake, $P(F_{Mechanical}\|Mw=9.0)$	1.2%
Landslide Probability of Failure for Mw=9.0 Cascadia Earthquake, $P(F_{Landslide}\|Mw=9.0)$	To be estimated
Method 1 Total Joint Probability of Failure for Mw=9.0 Cascadia Earthquake, $P(F_{Total}\|Mw=9.0)$	To be estimated

Method 1 Structural Fragility: $P(F_{Method1})$ vs. PGA

Method 2 Structural Fragility: $P(F_{Method2})$ vs. PGA

Page 1

Barbur-Gibbs Pump Station

Task 2 – Assess Pipeline and Facility Performance

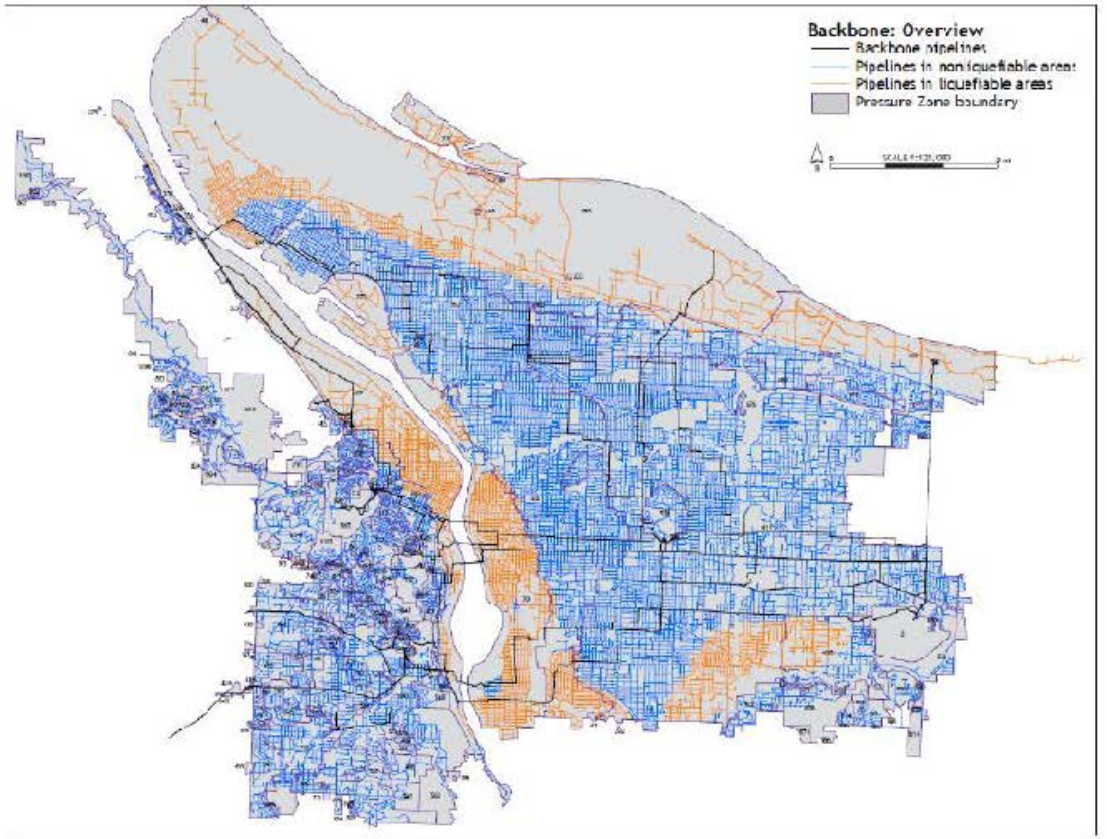
Pipeline Assessment & Fragilities

- As-built drawings and design specs (type, joint, backfill, burial depth)
- Permanent and transient ground deformation damage assessment

Task 2 – Assess Pipeline and Facility Performance

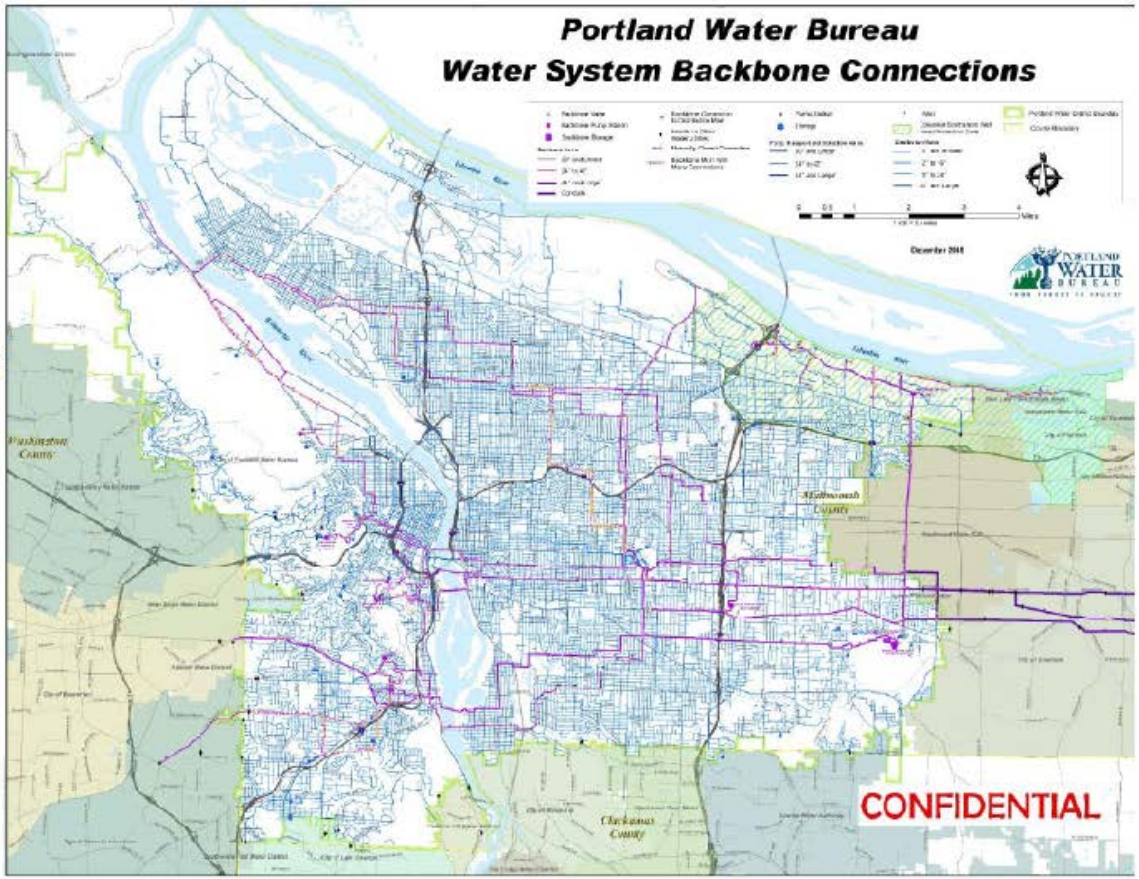
Pipeline Failures

- TGD
  - 1 failure every 16 miles (1 break every 80 miles and 1 leak every 20 miles)
- PGD
  - 12 to 16 failures each mile



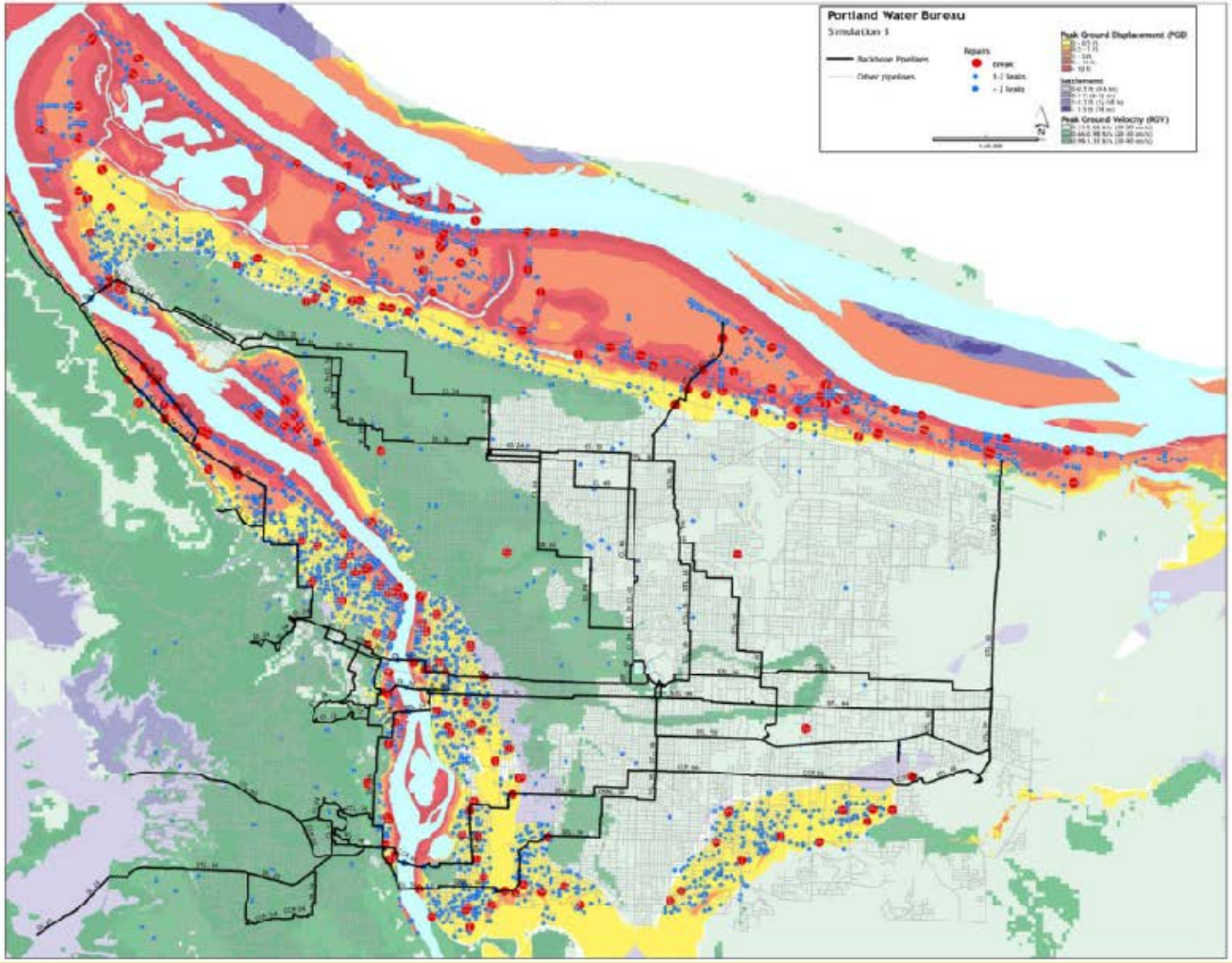
Task 3 – Model Backbone System Performance

- Identified backbone including significant pipelines and critical facilities
- Used PWB's hydraulic model of the distribution system
- ORP goal is to have the backbone in service within 24 hours of the event



Task 3 – Model Backbone System Performance

- Monte Carlo simulation of pipe leak and break locations



Task 4 – Emergency Preparedness & Response

Review Emergency Plans:

- Repair Plan
- Fire Flow Plan
- Potable Water Plan

Task 4 – Emergency Preparedness & Response

Repair Plan

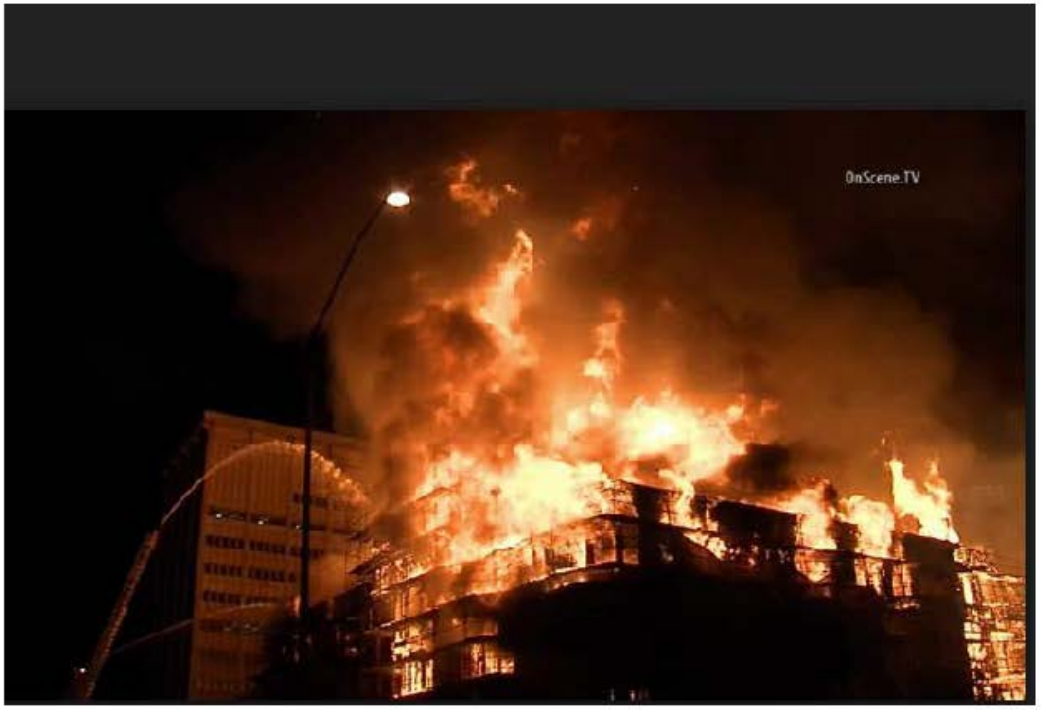
Target States of Recovery

- Harden System
- Repair Capabilities
  - Internal Resources
  - Repair Times
  - Mutual Assistance
  - Emergency Contracts
- Operational Changes

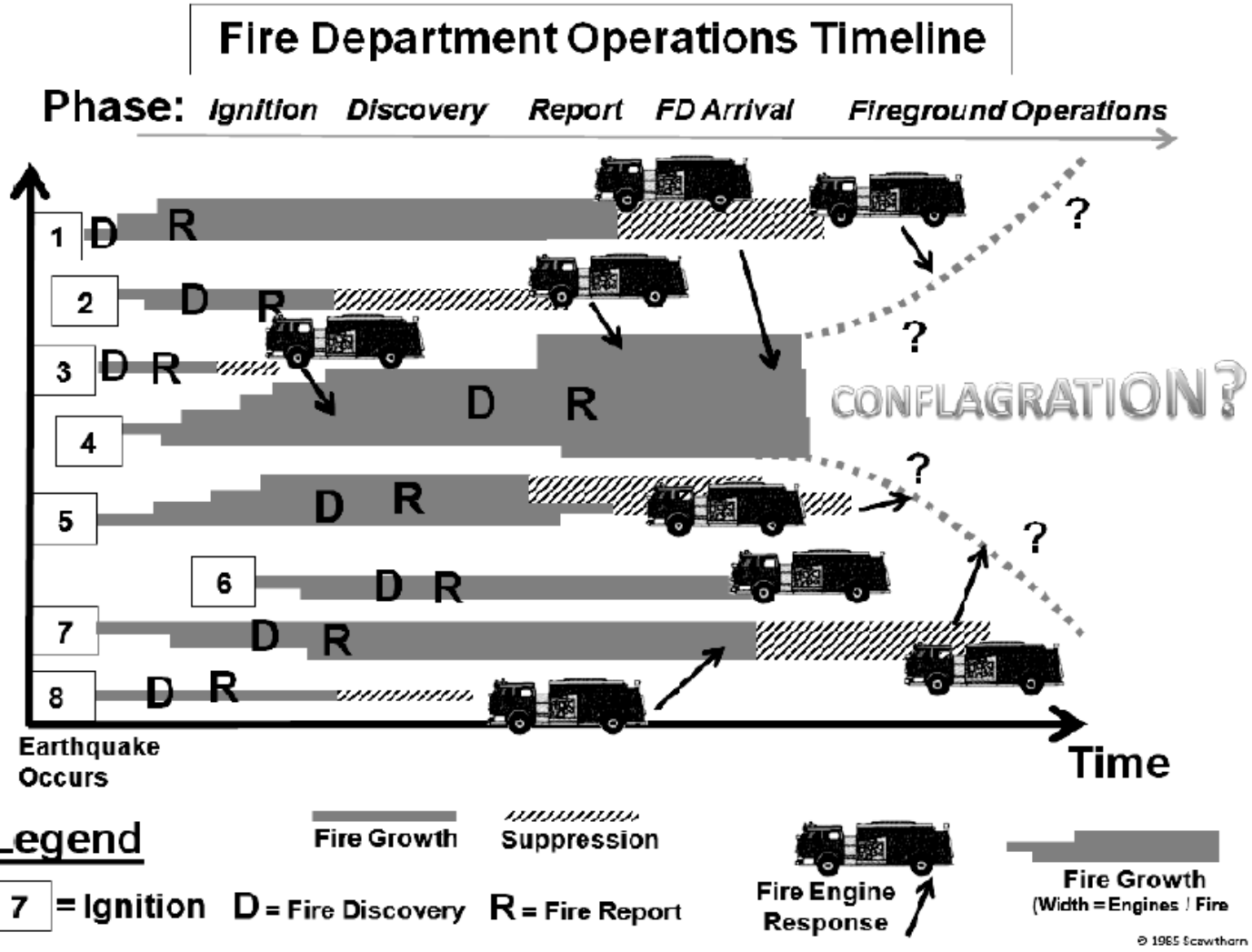
Task 4 – Emergency Preparedness & Response

Fire Plan

- ✓ Share information with the Fire Bureau
- ✓ Equipment options
- ✓ Number of Ignitions
- ✓ Hydrants may be dry

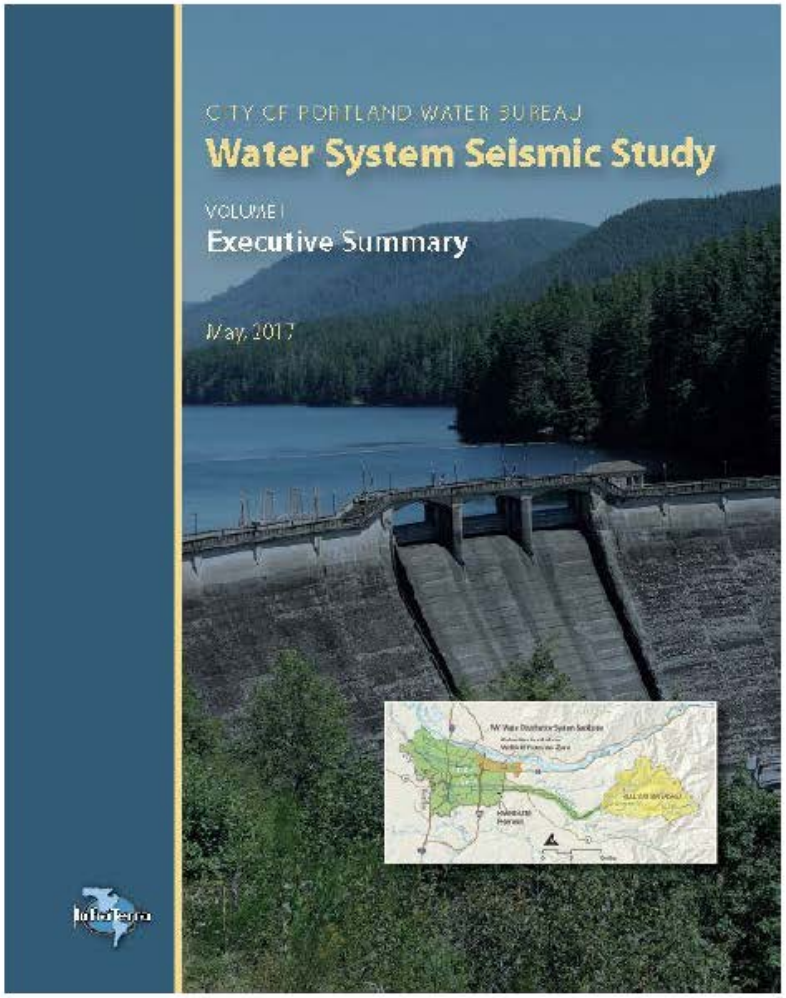


Task 4 – Emergency Preparedness & Response



Task 5 – Develop & Prioritize Mitigation Measures

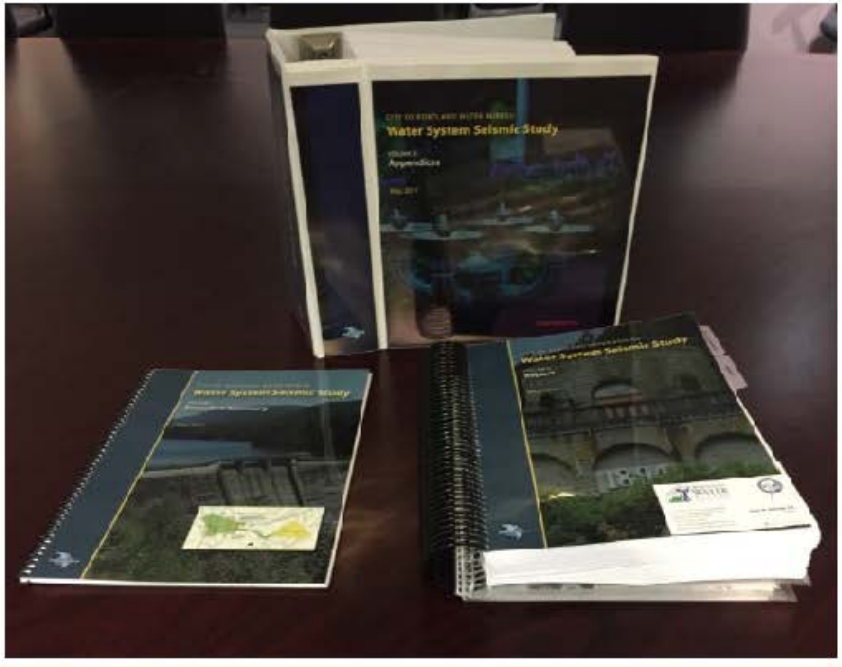
- Define mitigation measures which will allow PWB to meet Target States of Recovery in ORP
- Prioritize upgrades (high, medium, low)



Task 5 – Develop & Prioritize Mitigation Measures

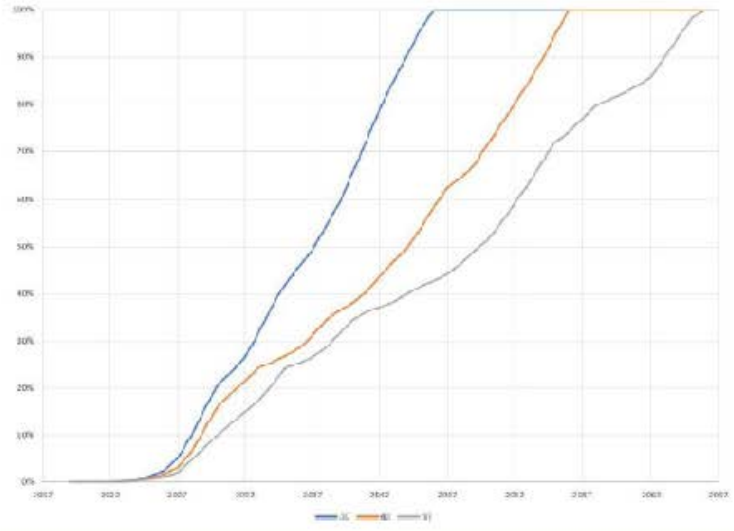
Seismic Study Recommendations

- 36 CIP Improvements ($980 million)
- 16 Non-CIP projects and plans
- Develop an implementation plan



Seismic Implementation Plan

- Further prioritize recommended improvements
- Evaluate staffing requirements
- Schedule and budget for first ten years of CIP work
- Recommendations for administering the seismic program



Seismic Implementation Plan

- Technical analysis is only the beginning
- There are many steps required before implementation:
  - City Council acceptance and approvals
  - Citizen Utility Board and Portland Utility Board reviews
  - Gain funding and staffing approvals
  - Procurement of contracted support
  - Engineering planning
  - Interagency coordination
  - Design
  - Public involvement
  - Land Use
  - Permitting

EARTHQUAKE READY BURNSIDE BRIDGE

BETTER – SAFER – CONNECTED

Portland's aging downtown bridges are not expected to withstand a major earthquake.

Located in the heart of Portland, the Burnside Bridge is a regionally established emergency route across the Willamette River. Multnomah County is taking the lead on making the Burnside Bridge earthquake ready.

Multnomah County

Make your voice heard!

During the September public comment period, you can attend one of two open houses and visit an online open house. Your feedback is needed on the work that has taken place to date. Share your thoughts about the importance of a resilient Burnside Bridge.

Open Houses

WEST

Thur. Sept. 13, 5-7 p.m.
Mercy Corps
43 SW Naito Parkway

EAST

Tue. Sept. 25, 5-7 p.m.
Fair-haired Dumbbell
11 NE Martin Luther King Jr. Blvd.

Online Open House

Can't join us in person? **Go to BurnsideBridge.org from Aug. 31 to Sept. 30.**

Sign up for updates

Sign up for email updates at BurnsideBridge.org.
Your participation and input are important to this process.

BurnsideBridge.org

@MultCoBridges, #ReadyBurnside

Figure 2 illustrates the alternative groupings and subsequent crossing alternatives considered during the Feasibility Study phase.

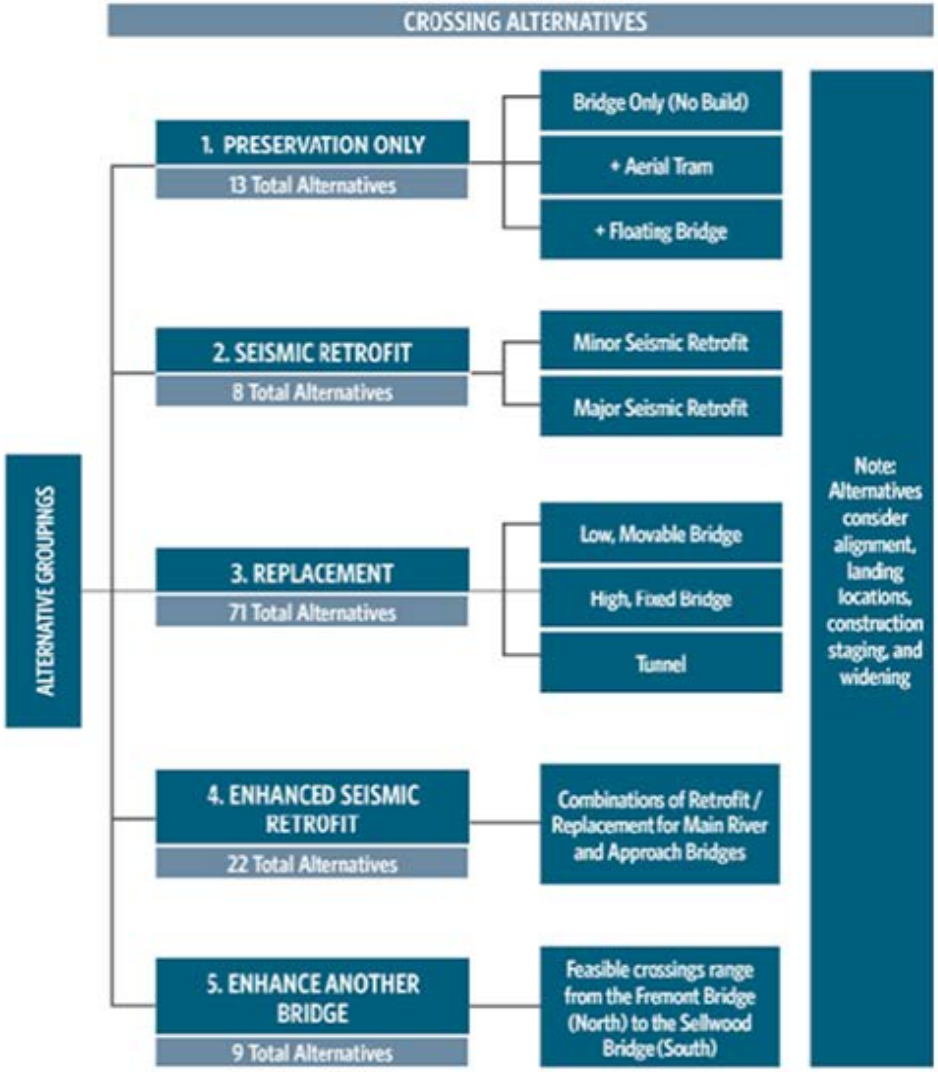


Figure 2: Alternative Groups and Crossing Alternatives

Alternative groupings: Five major crossing types.

Crossing alternatives: Specific river crossing alternatives within each grouping.

MAKE A DIFFERENCE IN YOUR COMMUNITY

Join the Community Task Force

We are recruiting volunteers to serve on a Community Task Force, an advisory group that will provide guidance and recommendations at key decision points during the environmental review of the Earthquake Ready Burnside Bridge Project. An important aspect of this project is to make sure we are hearing from a diverse range of stakeholders that reflect our community values.

CTF members will be asked to serve during the 3-year environmental review, from approximately fall 2018 to fall 2021. Meetings will be held on a weekday evening and may occur monthly or every other month and in a central location convenient to transit. Dinner will be provided. Multnomah County is seeking a diverse group of volunteers (age, gender, race, income level) who use the Burnside Bridge and will depend on it during a major earthquake.

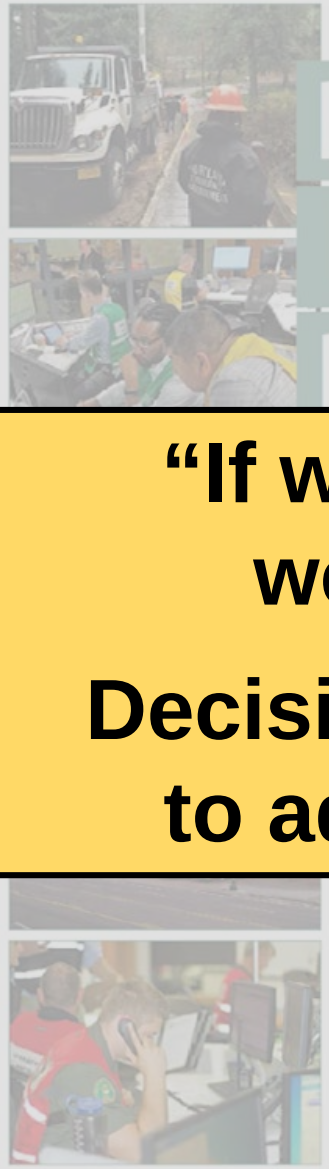
Interested in serving? **Applications are being received through August 17, 2018.** Visit **BurnsideBridge.org** to complete an online application form.

BurnsideBridge.org

@MultCoBridges, #ReadyBurnside

For example, 83 percent of Portlanders expect local government to provide emergency aid within three days of a disaster, and 42 percent say they would leave Portland if electricity and water are not restored within two weeks (PBEM 2017).

https://www.portlandoregon.gov/pbem/article/643122



The Oregon Resilience Plan has identified time-to-recovery goals designed to improve the ability for continued prosperity and a stable economy in the weeks, months and years following a major a disaster.

Portland residents'

emergency aid within three days of a disaster, and 42 percent say they would leave Portland if electricity and water are not restored within two weeks (PBEM 2017).

https://www.portlandoregon.gov/pbem/article/64312

"If we identify key projects as a group we are more likely to get funding.

Decision-makers are waiting for someone to advocate for these improvements."

Thank You

CLACKAMAS COUNTY
DISASTER MANAGEMENT

Jay Wilson
Resilience Coordinator
jaywilson@clackamas.us
503-723-4848