RH2 ENGINEERS

• 120 Staff
• 41 Years of Service
• Services
  • Planning
  • Design
  • Construction Management
  • Permitting
• Civil, Electrical, Mechanical, Structural Engineers
• Control Systems Northwest

8 OFFICES IN WA AND OR
SEISMIC RESILIENCE SERVICES

Seismic Planning
- Emergency Response Plans
- Risk Assessment & Mitigation Plans
- *ShakeAlert*

Structural Performance Assessments
- Vulnerability Assessments
- Benefit-Cost Analyses
- Seismic Resilience Capital Planning

Seismic Design & Retrofits
- Earthquake Pipe
- Foundation Anchoring
- Structural Bracing
UTILITIES REQUIRE A SECURE ALERT

USGS
science for a changing world

PNSN SENSOR NETWORK

PNSN
Pacific Northwest Seismic Network

SORT AND VERIFY

CUSTOM SOFTWARE APPLICATION

UTILITY SCADA SYSTEM

ShakeAlert
User Display
• Technology Transfer Agreement (TAA) – April 2017
• Commercial Partner – Fall 2019
  • Water & Wastewater
ADVANCED SEISMIC CONTROL (ASC)

A device that can process the ShakeAlert signal, operate an algorithm, and send command
ASC EVOLUTION

Industrial grade equipment and programming for more robust, reliable equipment matching water industry standards

- Web-based user interface
- Automatic updates
- Reinitiates connection if lost
- Historic event log
- Secure – discrete outputs
- Requirements
  - Uninterruptible Power Supply
  - Internet Connection
  - 4 – 20MA Analog input/outputs or, ethernet connection
WHAT DOES IT DO?

Local Intensity, Reaction Time, Probability

Distance

Probability

Magnitude

USGS Algorithms & ASC Device

Local Intensity, Reaction Time, Probability
Premeditated Action Plan

- *Remove the burden on operators to make split second decisions*

**Series of Actions**

```plaintext
If <Condition> Then
   <do this>
Elseif <Condition> Then
   <do this>
Elseif <Condition> Then
   <do this>
Else 'If none of the conditions are true'
   <do this>
"nd If
```
ACTIONS AT PLANTS AND PUMP STATIONS

- Cut power to avoid electrical fire
  - *Switch off* backup generators
- Turn off pumps & motorized equipment to avoid additional damage
  - Ramp down pumps to avoid pressure surges
ACTIONS AT RESERVOIRS

- Close valves before seismically-actuated isolation valves
- Consider throttling not fully closing
- Redundant reservoirs: close one, not both in case of false alarm
- Reduce water level for sloshing freeboard
ACTIONS IN THE PIPE NETWORK

- **Close Valves**
  - Major transmission lines
  - Isolate backbone system to keep it pressurized
  - Consider throttling not fully closing
  - Consider isolating areas anticipated to have many leaks/breaks
  - Time to close large valves
OTHER EARLY WARNING ACTIONS

- Staff Safety
- Emergency Operating Procedures
WATER SYSTEMS ARE CATCHING ON

- RH2 is working with 8 water systems, and potentially 12 more this year.
- Looking to start implementing similar programs in wastewater
IMPLEMENTATION IN WASHINGTON

First ASC Device installed for NE Sammamish Sewer and Water District – April 2018
CITY OF EVERETT

• First Priority: Life Safety
  • 80% Probability
  • MMI = 4
  • Staff notification and dispatch

• Second Priority: Infrastructure Protection
  • 80% Probability
  • MMI = 4
  • Water & Sewer Pump Shut-Down

• Third Priority: Notify Wholesale Customers
IMPLEMENTATION IN GRANTS PASS

First Advanced Seismic Control (ASC) Device installed in Oregon – September 2018
PORTLAND STATE UNIVERSITY

- Automated Building Control Systems
- Data Center near HVAC well water settling tank
  - Using the ASC device to drain the tank
- Prevents potential shorting transfer switches, power disruption to Data Center, water reaching battery terminals, fire, explosion
IF YOU HAD WARNING…

What operational state do you want to leave your facilities until physical access is possible again?
RH2 Engineering

- Rick Ballard, rballard@rh2.com
- Rachel Lanigan, rlanigan@rh2.com
- Michele Campbell, mcampbell@rh2.com
- Lee Tumbleson, ltumbleson@rh2.com