Statewide Catastrophic Incident Planning Team (SCIPT)

6 November 2019, 1:00 – 4:00 PM
Camp Murray - Building 20 SEOC

I. Welcome, Administrative Announcements, and Introductions – Nichole Benardo, WA EMD

II. Critical Transportation Outreach Brief Out – Michael Roberson, WA EMD


IV. BSST Update – Dan Banks, WSDOT

V. State Catastrophic Incident Annex Planning Update – Michael Roberson, WA EMD

VI. Logistics – Gap Identification and Analysis:
   a. Staging Area Locations – Mark Douglas, Logistics Supervisor
   b. CPODs – Mark Douglas, Logistics Supervisor
   c. Navy Beach Landing Sites by Lat/Long – Mark Douglas, Logistics Supervisor

~~BREAK~~

VII. RRAP Updates:
   a. Transportation – Brittney Miller, WSDOT
   c. Airport Survivability – Patrick Wright, Aviation Planner WSDOT

VIII. RCPGP Update – Jason Biermann, Snohomish County DEM

IX. M9 Study Overview – Marc Eberhard, University of Washington

X. Administrative Items:
   a. Planning Framework Version 2 – Michael Roberson, WA EMD
   b. 2020 Quarterly Schedule – Nichole Benardo, WA EMD

XI. Good of the Order/Open Forum - Nichole Benardo, WA EMD
State Catastrophic Incident Planning Team
Q4 Meeting

06NOV2019
WELCOME

- Welcome
- Administrative Announcements
- Introductions
  - Name
  - Title
  - Where you work
Q 4 Meeting Agenda

I. Critical Transportation Outreach Brief Out – Michael Roberson, WA EMD

II. Fuel Planning Update – Eli King, Energy Emergency Manager, State ESF 12

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## Critical Transportation Outreach Brief Out

<table>
<thead>
<tr>
<th>Date</th>
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<th>Status</th>
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<td>Awaiting addition of Spokane Fault to BSST</td>
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<tr>
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<td>On Region 4 Feb Agenda to discuss</td>
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</table>
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• Eli King, Energy Emergency Manager, State ESF 12
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BSST Update

• Dan Banks, WSDOT

• https://wsdot.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=8196b518702343ef82fec575f9581b2a
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Washington State
Catastrophic Incident Planning Update

November 2019
Catastrophic Incident Annex (CIA) Structure to the State CEMP

• The Catastrophic Incident Annex closely aligns with the Framework.

• Changes language of life saving and sustaining strategies to capabilities to better align with the new Washington State Comprehensive Management Plan (CEMP) and federal guidance
  • CEMP Base Plan
    • CIA All Catastrophe Annex
      • CSZ
      • Volcano
      • Pandemic
      • Radiological

• Anticipated promulgation of the (CIA) All Catastrophe’s Base Plan end of 2019
Strategy and Core Capability Model (Existing Model)

- **Strategies**
  - Critical Transportation
  - Mass Care Services
  - Public Health, Healthcare, EMS, Mortuary Services
  - Fatality Management
  - Utilities Restoration: Energy, water and wastewater, and Information Communications Technologies

- **Core Capabilities**
  - Logistics and Supply Chain Management
  - Operational Communication
  - Operational Coordination
  - Situational Assessment

Primary and Supporting Capability Model (New Model)

- **Primary Capabilities**
  - Critical Transportation
  - Mass Care Services
  - Public Health, Healthcare, EMS
  - Fatality Management
    - Mortuary Services
  - Infrastructure Systems
    - Energy
      - Grid
      - Fuel
    - Water
    - Waste Water
    - Communications
      - Information Communications Technology

- **Supporting Capabilities**
  - Logistics and Supply Chain Management
  - Operational Communication
  - Operational Coordination
  - Situational Assessment

Michael Roberson, michael.Roberson@mil.wa.gov, 253-625-3943
Cascadia Rising 2022
Concepts and Objectives Meeting
Wednesday December 4, 2019
9:00 AM – 12:00 PM
Camp Murray, Building 80

Robert Sabarese, robert.sabarese@mil.wa.gov, 253-512-7478  Wally Braden, wally.braden@mil.wa.gov, 253-512-7040
Contact Information

Michael Roberson
Planning Supervisor
Emergency Management Division
Washington Military Department
253-625-3943
michael.roberson@mil.wa.gov
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Logistics – Gap Identification & Analysis

• Mark Douglas, WA EMD Logistics Supervisor
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M9 Study Overview

• Marc Eberhard, University of Washington
Closing

• **Administrative Items**
  • Planning Framework Version 2
  • 2020 Quarterly Schedule

• **Good of the Order/Open Forum**
Thank You Veterans
Effects of Cascadia Subduction Zone M9 Earthquakes

Marc Eberhard, Professor
Jeffrey Berman, Professor
Nasser A. Marafi, Postdoctoral Research Associate
Brett Maurer, Assistant Professor

University of Washington
Cascadia Subduction Zone M9 Earthquake

• 10% Chance of ~M9 Occurring in 50 Years

• Likely to Cause:
  – Tsunamis
  – Ground Shaking
  – Landslides
  – Liquefaction

• Initial Damage to:
  – Ports, Airports
  – Lifelines (roads, utilities, etc.)
  – Buildings
  – Bridges

• Effects on:
  – Response
  – Recovery
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  - Lifelines
  - **Bridges**

- Effects on:
  - Response
  - Recovery
M9 Project

NSF EAR-1331412
PI Alison Duvall, Earth and Space Sciences
 Former-PI John Vidale (now at USC)

Co-PIs:
Dan Abramson, Urban Design and Planning
Jeff Berman, Civil & Environmental Engineering
Ann Bostrom, Daniel J. Evans School of Public Policy & Governance

Art Frankel, U.S. Geological Survey
M9 Project

Tsunami → Buildings & Infrastructure

Liquefaction → Community Planning & Enhanced Resilience

Landslides → Integrated Risk Maps

Early Warning → Community Engagement
M9 Project – Ground Motions

- 50 Cascadia earthquake realizations publicly available on DesignSafe
- Improved understanding of shaking amplification by the Seattle basin

Art Frankel
Erin Wirth
*Nasser Marafi
John Vidale
*Ian Stone
*Mika Thompson

Rupturing towards Seattle
M9 Project – Tall Buildings

- Recommendations for the **design of tall buildings**
- **Implemented** by City of Seattle (2018)
M9 Project – Landslides

- Created **landslide inventory** for Oregon Coast Range & advanced probabilistic **modeling of coseismic landslides**
M9 Project – Soil Liquefaction

Liquefaction involves the incremental generation of porewater pressure, and thus is sensitive to the duration of a ground motion.

- Investigated the effects of long-duration ground motions on liquefaction triggering and damage
M9 Project – Tsunamis

• Advanced probabilistic modeling of tsunami inundation scenarios

Randy LeVeque
Frank Gonzalez
Mike Motley
*Xinsheng (Shawn) Qin
M9 Project – Influences of Perceptions on Preparedness

- Advanced understanding of how perceptions influence earthquake preparedness and preferences for earthquake early warning

What was your first response during the shaking for your most memorable earthquake experience?

If you were to experience an earthquake when you were indoors, what do you think your first response would be during the shaking?

- Drop, cover, and hold on (22%)
- Immediately leave the building (19%)
- Other (please specify) (21%)
- Protect people, pets or property nearby (7%)
- Stop what I was doing but stay put (5%)
- Turn off gas or open flames (2%)

55% 40% 36% 22% 16% 10% 5% 7% 2%
• Led multiple community planning & hazard mitigation workshops
Follow-Up Projects

– Effects of Local Site Conditions, 2019-2020. (USGS/WSDOT)

– Impacts of M9 Earthquakes on Bridges, 2020-2021. (WSDOT)

– Public Communication Tools, 2020-2022. (Abramson, NSF)

– Research Coordination Network. (Bostrom, NSF, Under Review)
What About Bridges???
Outline

M9 Simulations → Properties of Ground Motions → Effects of 1D Site Amplification → Performance of Idealized Bridges

\[ V_s = 600 \text{ m/s} \]
PNW Seismic Wave Velocity Model (Stephenson, USGS)

M9 CSZ Simulations (Art Frankel and Erin Wirth, USGS)

Selecting Rupture Parameters

Seismic Wave Velocity Model → Finite-Difference Simulations

Low Frequency Motions (>1s) → Generate Broadband Motions

Stochastically Generated Motions

Reference: Frankel, A., Wirth, E., Marafi, N, Vidale, J., Stephenson., W. “Broadband Synthetic Seismograms for Magnitude 9 Earthquakes on the Cascadia Megathrust Based on 3D Simulations and Stochastic Synthetics”, BSSA, 2018
Two Example Realizations

Realization #1: Rupturing **towards** Seattle

Realization #2: Rupturing **away** from Seattle

Reference: Frankel, A., Wirth, E., Marafi, N, Vidale, J., Stephenson., W. “Broadband Synthetic Seismograms for Magnitude 9 Earthquakes on the Cascadia Megathrust Based on 3D Simulations and Stochastic Synthetics”, BSSA, 2018
Time Histories

Seattle (in basin)

Realization #1 (towards Seattle)

Variation in Amplitude

Realization #2 (away from Seattle)

Variation in Frequency Content
Time Histories

Realization #1 (towards Seattle)
Variation in Amplitude

Realization #2 (away from Seattle)

Seattle (In basin)

Graham (Outside basin, similar $R_{rup}$)

Variation in Frequency Content

Regional Variation
Outline

M9 Simulations

Properties of Ground Motions

• Acceleration Response Spectra
• Spectral Shape
• Duration

Effects of 1D Site Amplification

Surface

$V_s = 600 \text{ m/s}$

Performance of Idealized Bridges
Acceleration Response Spectra, $S_a$

**Forks**

**Graham**

**Seattle**

- Realization
- Geometric Mean
Regional Variation of $S_a$

Decrease in $S_a$ with Distance
$Z_{2.5}$: A measure of Basin Depth

- Depth to sediment layer with $V_s = 2500$ m/s
Deep Sedimentary Basin

\[ \ddot{S}_a(2.00s) \]

\begin{align*}
48^\circ N & \quad 47^\circ N \\
123^\circ W & \quad 122^\circ W
\end{align*}

\[ Z_{2.5}, \text{ km} \]

\begin{align*}
8^\circ N & \quad 7^\circ N \\
123^\circ W & \quad 122^\circ W
\end{align*}

Seattle

La Grande
Outline

USGS M9 Simulations → Properties of Ground Motions → **Effects of 1D Site Amplification** → Performance of Idealized Bridges

- $V_s = 600 \text{ m/s}$
1D Site Amplification

- 30 Simulations
- E-W and N-S Directions
- 10 Locations

![Map with locations: Forks, Seattle, Graham]
1D Site Amplification

- 30 Simulations
- E-W and N-S Directions
- 10 Locations
- Site Classes (C2, C4, D1, D3)
- 30 profiles per site class (Ahdi et al.)

Data available from Ahdi et al. for PNW velocity profiles:
1D Site Amplification

Forks

$S_a, g$

Period, sec

$S_{a, \text{soil/class}}/S_{a, \text{baseline}}$

$Z_{2.5}$ value = 0.8 km
Organization

M9 Simulations → Properties of Ground Motions → Effects of 1D Site Amplification → Performance of Idealized Bridges

Surface

$V_s = 600 \text{ m/s}$
SDOF Parametric Study

• SDOF Properties
  – WSDOT 17
  – Overstrength factor = 1.5
  – Displacement ductility = 5
• 4 periods
  – 0.2s, 0.5s, 1.0s, 2.0s
• 4 SDOF systems
  – Elastic
  – Elastic Perfectly-Plastic
  – Ibarra-Medina-Krawinkler (IMK) without cyclic deterioration
  – IMK with cyclic deterioration
SDOF Parametric Study

Forks

- $F_y/W$ vs. Period, sec
- $S_{\text{SoilClass}}(F_y/W)$ vs. Period, sec
- $\delta_{\text{rel}}/\delta_y$ vs. Period, sec

Sites and Conditions:
- Site C
- Site D
- C2
- C4
- D1
- D3
- Baseline
SDOF Parametric Study

Seattle

![Graphs showing data](image-url)
SDOF Parametric Study

Graham

![Charts showing data for SDOF Parametric Study with varying parameters and trends over period.](Image)
# Conclusions

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<th>Coast</th>
<th>Outside Basin</th>
<th>In Basin</th>
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<tr>
<td>Spectral Accelerations</td>
<td>High (as expected)</td>
<td>Low</td>
<td>Amplified (1s to 4s)</td>
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<tr>
<td>Spectral Shapes</td>
<td>Normal</td>
<td>Normal</td>
<td>More Damaging (0.5s to 3s)</td>
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<tr>
<td>Duration</td>
<td>Long</td>
<td>Long</td>
<td>Long</td>
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<tr>
<td>Expected Damage to New Bridges</td>
<td>High (Very Short $T_n$) &lt;br&gt; Moderate (Mod. Or Long $T_n$)</td>
<td>Low</td>
<td>High (Long $T_n$) &lt;br&gt; Low (Short $T_n$)</td>
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Some Big Remaining Issues

– Discrepancies with RRAP Resiliency Assessment (2019)

– Extent of Liquefaction within Basin

– Impacts of Utility Lifelines?

– Consequences for Emergency Management Community (e.g., Selection of response lifelines)
Thank You
Meeting Notes

- **New BSST/HSST contact will be Dan Banks, Emergency Preparedness Planner**
  - Desk: (360) 705-7153
  - Cell: (360) 489-5868
  - Brittney Miller’s last day at WSDOT is 11/07/2019.

- **Fuel Planning Update**
  - Eli has been working on the State’s Fuel Action Plan.
    - Has visited almost all of the Washington Homeland Security Regions
    - Did a presentation at the Washington State Emergency Management Association Annual Conference in September.
  - The Washington State Fuel Needs Assessment Tool is available for agencies to add in their information
  - She is in the process of the first draft to identify fuel depots
    - Asking about security on structures
  - GridEx V Scheduled for Nov 13th.
  - Next steps in Fuel Planning Workgroup will be:
    - State waivers implementation
    - Local fuel planning guide
    - Discussion on emergency fuel contracts
  - FEMA has a Fuel Supply Chain Technical Assistance Program and they are willing to expand the cohort in Washington if your jurisdiction is interested in participating please let Eli know.

- **BSST Update**
  - [https://wsdot.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=8196b518702343ef82fe575f9581b2a](https://wsdot.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=8196b518702343ef82fe575f9581b2a)
  - The BSST/HSST tool has the definitions of the severity of damage within the tool.
  - Dan will be sending the HSST to Jim Buck so Clallam County can begin the process of adding the HSST to the GIS tool they developed.

- **Washington State Catastrophic Incident Planning Update**
  - The Catastrophic Incident Annex has been modified in format only to align more closely with CPG 101 and the Washington State CEMP.
  - The change is to align with Core Capabilities.
    - Mortuary Services was moved to under Fatality Management
    - Utilities Restoration was changed to Infrastructure Systems
    - Water and Waste Water were separated
• **Logistics – Gap Identification and Analysis**
  o Currently working on Beach Head Locations
    ▪ Doing Site surveys
      • Awaiting Clallam, Jefferson, Grace Harbor and Pacific Counties data.
      • Jim Buck gave signed letter from Sheriff to Robert and said he can get a copy to Mark as well.
  o RCPGP will help identify CPODs based on Jurisdictions

• **RRAP Updates**
  o Transportation
    ▪ Nothing new to add
  o Water Systems in Western & Central Washington
    ▪ Potential Outcomes
      • Determination of potentially viable post-CSZ water sources
      • Data sets that “type” surface, ground, and finished water sources based on post-CSZ viability and accessibility
      • Development of post-CSZ planning factors
      • Identification of optimal areas/zones for Points of Distribution
  o Airport Survivability
    ▪ 20 Airports in Priority List
      • Doing 10 surveys ~ 4 hours long each
      • 09DEC2019
        o WR Fairchild
        o Bremerton
        o Sanderson Field
        o Olympia

• **RCPGP update**
  o Oct 23rd Kickoff
  o Reviewed Grant Application
  o Transportation RRAP
  o Grant
    ▪ Viable Goal
      • Released today
        o Engage Private sector maritime community
  o Kristen, Project manager RCPGP Grant: (425)388-3879
    ▪ Goal is to tell the community where they will go to get their resources
    ▪ Focusing on the final mile
    ▪ Working with a contractor
      ▪ Data
        o Gather
        o Analysis
          ▪ Where to place CPODs
      ▪ Focusing on 8 county region of Puget Sound + 7 cities who wrote support letters
      ▪ Need a good operational plan so it can be replicated beyond this region
• Focusing on how to extend the budget to make it last beyond the three year mark.
• RSP Contractor
  o Trying to get to contract by January 2020
• M9 Presentation
  o Big Takeaways
    ▪ M9 and RRAP scientists will be having a meeting in the next couple of weeks to discuss variations in the study results and review the planning assumptions that led to those results.
  o They may post an update based on the results of both studies.
    ▪ Many participants expressed interest in learning the outcome of the meeting.

Please take the Survey Monkey Poll to decide the next meeting.

https://www.surveymonkey.com/r/25J5TGY

Poll is now closed.