Seattle Fault Earthquake Scenario
Objective

- Intent of the scenario study:
  - Influence legislature (No Seismic Safety Commission)
  - Increase awareness of a real threat
  - Start (or continue) a conversation
  - Have some public policy debate
  - Increase our region’s preparedness

- Develop recommendations and impetus for effective actions to protect:
  - Lives
  - Critical facilities
  - Key infrastructure
Overview

- Project conceived in 2002 - EERI board wanted presence
- Scenario rollout in 2005 - 3 years
- Builds on previous work and current research
- Authored by multidisciplinary project team typical of EERI:
  - Seismologists
  - Geologists
  - Geotechnical Engineers
  - Civil and Structural Engineers
  - Land Use Planners *
  - Emergency Managers
  - Economists *
  - Social Scientists
- Run by 12 person oversight committee
Collaborative Public-Private Effort

- American Society of Civil Engineers (ASCE) –
  - Geotechnical
  - Lifelines
- Structural Engineers Association of Washington (SEAW) –
  - Structural
  - Critical facilities
- Cities of Seattle and Bellevue
  - Emergency management
- Cascadia Earthquake Region Workgroup (CREW)
  - Business impacts
- Earthquake Engineering Research Institute (EERI)
  - Board representative
  - Editor (paid)
  - Administrative support (paid)
- United States Geological Survey (USGS)
  - Seismology/groundmotion
  - Mapping/GIS
  - Financial support – rollout meeting venue
- University of Washington (UW) –
  - HAZUS (also paid consultant)
  - transportation
- Washington State Emergency Management Division
  - Editor (paid)
  - Publishing
Project Participants/ Schedule

- 4000+ volunteer hours
- Need people that would produce
- Monthly Oversight Committee meetings
  - Technical group meetings as required
- Firm management
- Dragged on too long
  - Hayward Scenario presented at EERI Annual Conference may have been preferable because of fixed deadline
- Many people came and went – some contributed, some didn’t
- Many ideas were offered – ultimately “some” made it into the document
  - Kickoff meeting at the U of Washington – 60 people attended
Editors

- Started with EERI staff person
- Time/budget drawn out
- Ultimately Washington State Emergency Management Division stepped in to wrap up providing editing and publication
- Washington State EMD editor pulled together graphics
Scenario Selection and Study Area

- Washington – 3 source zones
  - CREW
    - Subduction event
    - Very broad area – Vancouver BC to Cape Mendocino CA
  - EERI – Seattle Fault Scenario
  - Deep Benioff - 2001 Nisqually Earthquake
- Magnitude 6.7 – believable, geologic evidence
  - Another scenario (with very long return period) developed by others to show overtopping of sea wall
  - Tsunamis excluded (well before Sumatra event)
- Study area
  - Focused on King County/Seattle
  - Pierce and Snohomish Counties were peripheral
  - More than half state’s population
    - Six of the 10 largest cities in state
  - Cornerstone of state’s economy
  - For simplicity – excluded Kitsap County
M6.7 Scenario Ground Motions

Peak Ground Acceleration

- M6.8 2001 Nisqually
- M9.0 Cascadia

- 0.0g
- 0.25g
- 0.5g
- 0.75g

Map showing areas affected by different levels of ground motion:

- Everett
- Redmond
- Issaquah
- Kent
- Tacoma
- Seattle
- Kent
- Issaquah
- Redmond
- Everett

Modeled fault line is highlighted in the map.
Study Organization

Phase I
- Ground motions and soil effects

Phase II
- Lifeline and transportation systems
- Building and critical facilities

Phase III
- Business impacts
- Recovery and response
- Recommended actions

Performed sequentially – became scheduling issue
GIS and HAZUS

• USGS provided GIS and produced all maps

• HAZUS
  – Consultant paid to develop study area
  – Used to provide overall impacts
    • Causalities
    • Critical facilities
    • Building impacts

• Experience/previous studies used to focus on lifeline, transportation, and structural performance issues
Results

- Deaths – 1,600
- Dollars - $33B
- Downtime – weeks to years
Special Scenario Color

• Neighborhood assessments
  – Focus on selected heavily impacted areas
  – URM's Pioneer Square – Seattle
  – Small city older construction
  – Small city modern construction

• Human impacts narrative tried to present non-technical view point
Recovery and Response

• Seattle and Bellevue emergency management personnel
• Only significant input from local jurisdictions
• Critical in providing a comprehensive picture
Rollout and Impact

- USGS sponsored space in conference center
- 400 attendees representing broad cross section of regional officials and technical personnel
- Great resource for garnering support for earthquake funding
- No clear impact on legislature
- Several changes in WSDOT bridge upgrade policies
QUESTIONS ?