

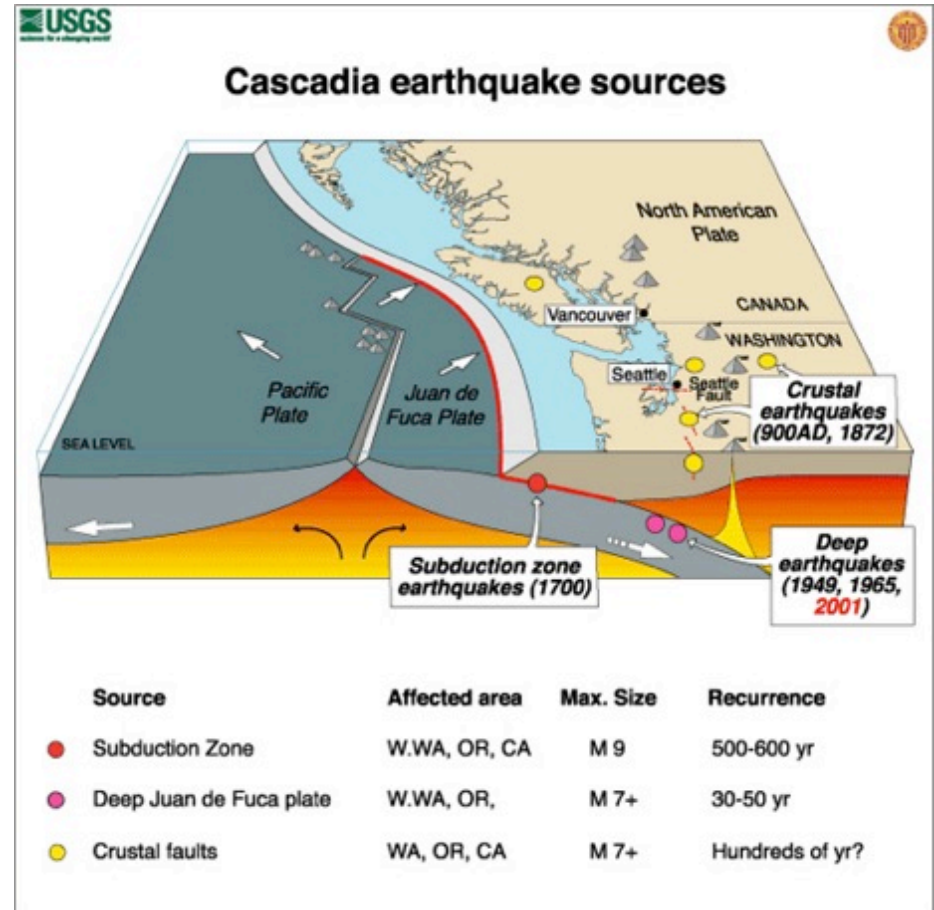
# Surviving a Cascadia Subduction Zone Earthquake



*Cascadia EarthScope Earthquake & Tsunami Education Program*  
Brynne Walker – Washington Emergency Management October 2014

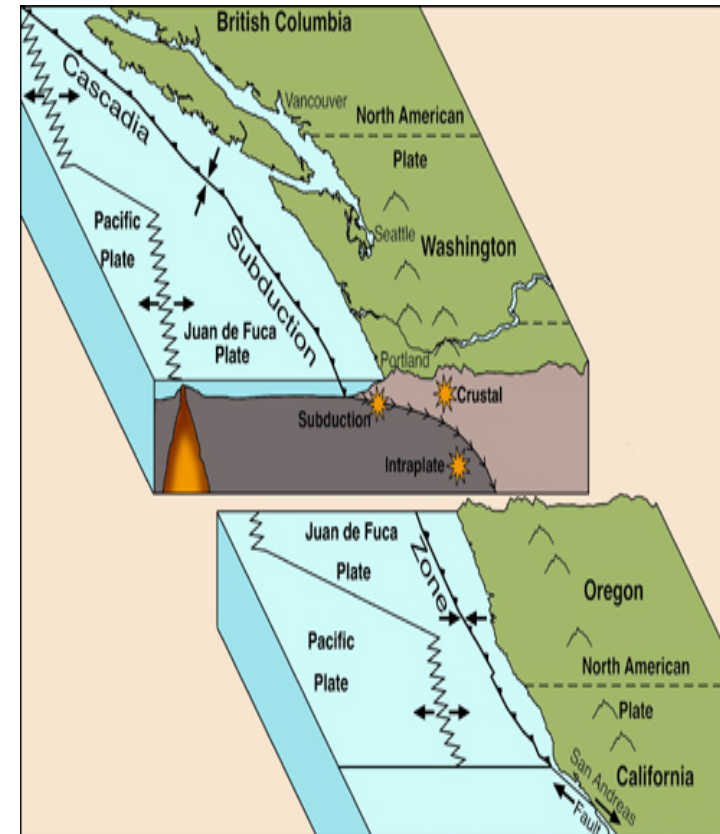
# Washington's Earthquake Hazard

- Ranked # 2 in the nation for earthquakes
- 1,000 plus earthquakes each year



# Local Cascadia Earthquake

- Capable of a magnitude 8 to 9.0+ Earthquake
- Intense shaking
- Coastal subsidence and or uplift
- Liquefaction
- Tsunamis
- Aftershocks

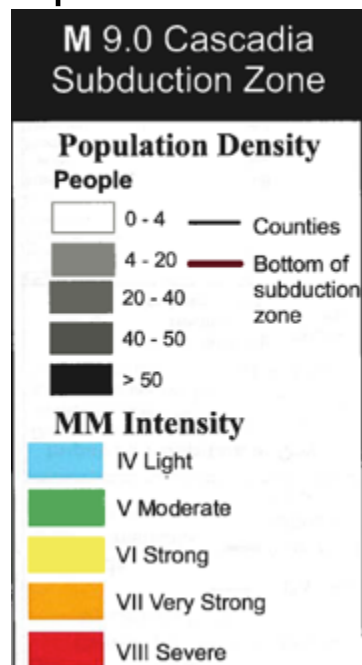


*What are the odds? 13 – 14% in the next 50 years*

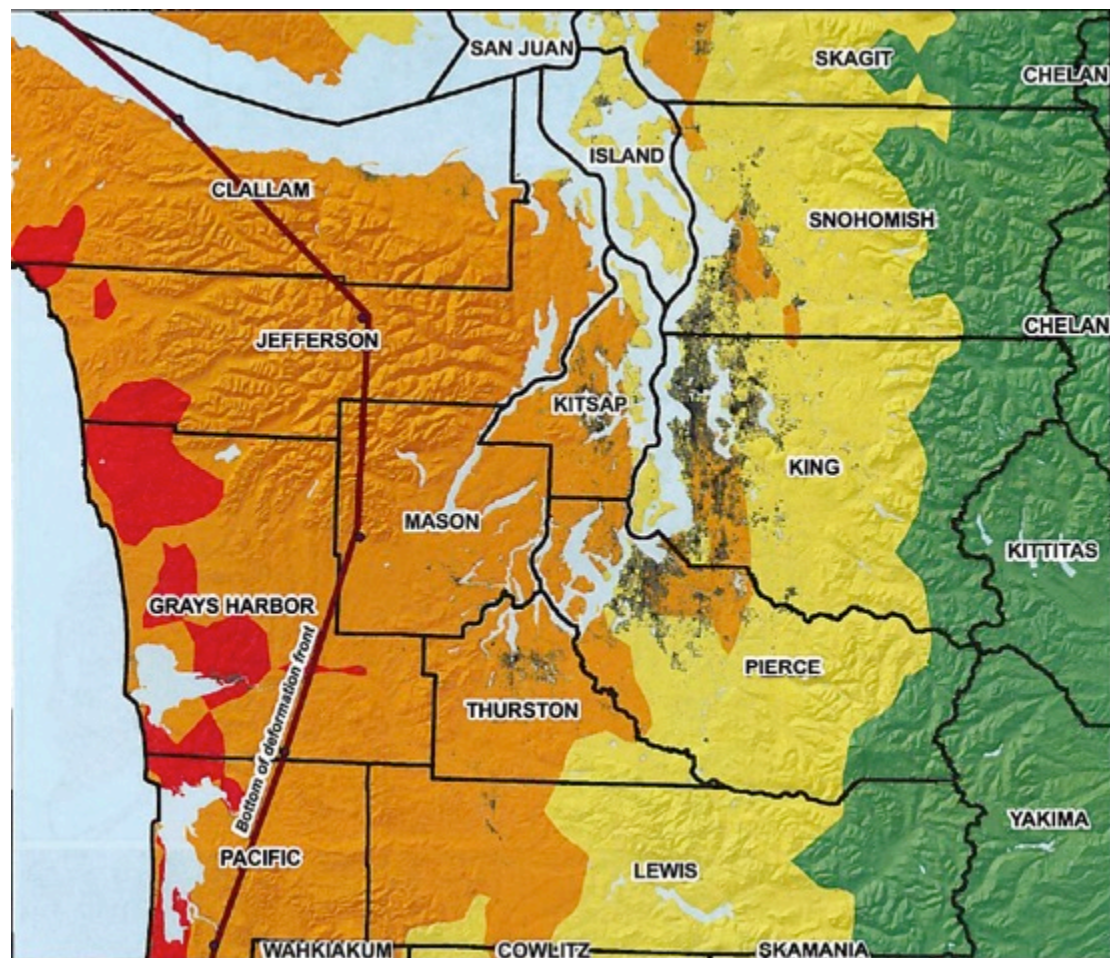


# What are the Impacts?

- 23 counties in WA impacted
  - ✓ Roads impassable and bridge damaged
  - ✓ Buildings collapsed or severely damaged
  - ✓ Utility and communications systems disrupted or destroyed



## Ground Motion Shaking



***Impacts based on a Cascadia 9.0 Scenario***

<https://fortress.wa.gov/dnr/seismicscenarios/>



# Damage to Schools



- Non-structural damage
- School buildings will be damaged and unusable
- Buildings will require inspection

***Functionality of schools in Pacific county will initially be as low as 12%***

# Damage to Homes



Approx. 276,000 single family homes will have between slight and complete damage.

- 18,385 house holds will be displaced
- 11,630 individuals will require public sheltering

# Damage to Businesses



- Billions in damages
  - ✓ Damage to buildings including the cost of structural and nonstructural damage, damage to contents and loss of inventory
- Loss income will be in the billions
- Long term recovery
  - ✓ Many businesses will not recover



# Roads Damaged



***Expect heavy damage to roadways from liquefaction and landslides***

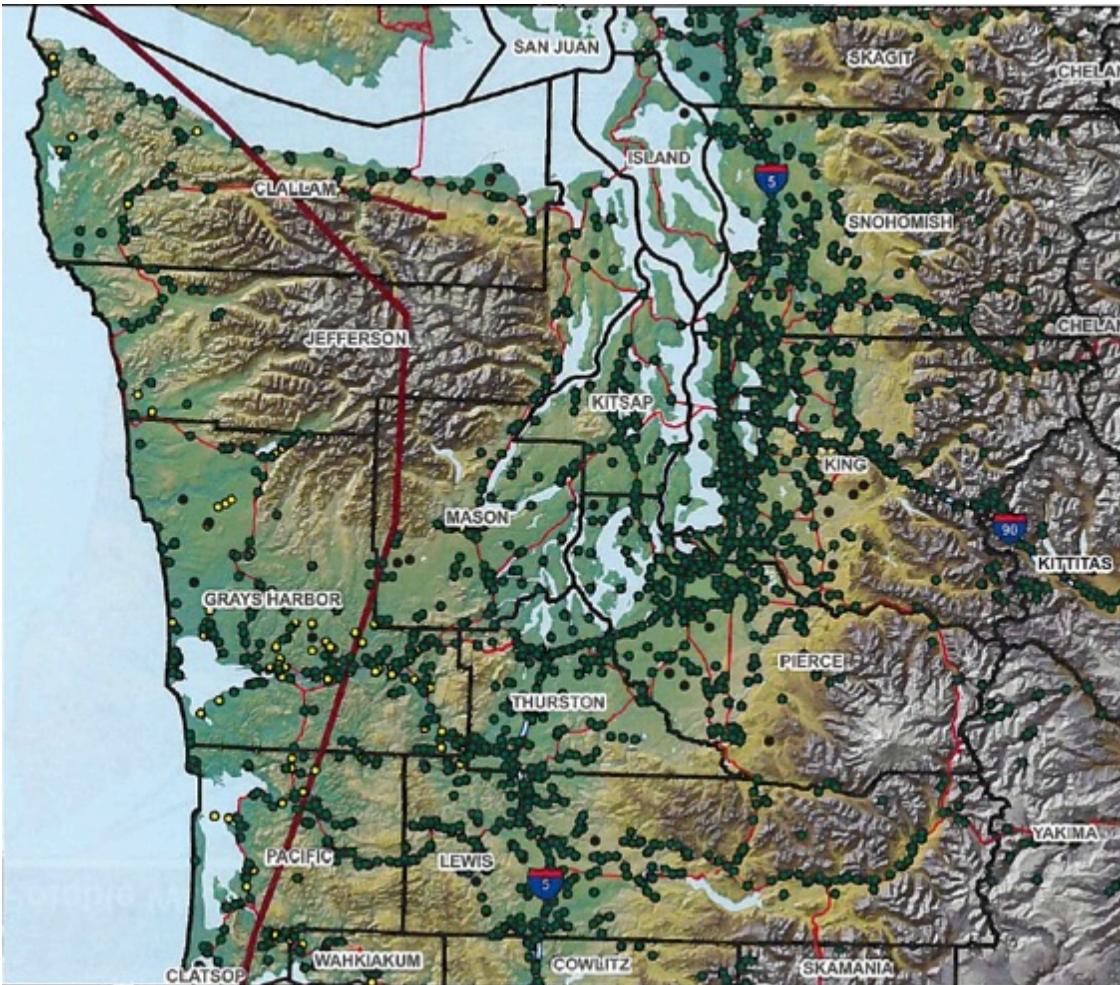
# **Landslides – Roads Blocked**



***Oso Landslide – March 2014***



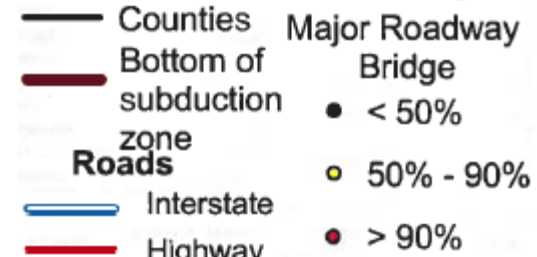
# Bridges will Collapse



## M 9.0 Cascadia Subduction Zone

### Highway Bridge Damage (at least moderate)

Damage is expressed as the probability that a given Bridge will realize at least moderate damage.



County	# of Bridges Needing Inspection	# of Bridge Engineers Needed*
Clallam	95	13
Grays Harbor	269	36
Island	6	1
Jefferson	54	7
King	1,033	138
Kitsap	83	11
Mason	92	12
Pierce	402	54
San Juan	9	1
Snohomish	466	62
<b>Total</b>	<b>2,509</b>	<b>224</b>

- Bridges would have moderate to total damage
- Coastal communities would be cutoff from damage suffered on the interstate and major coastal highways.
- The restoration of the entire transportation network could take 3 to 5 years.



# Aftershocks



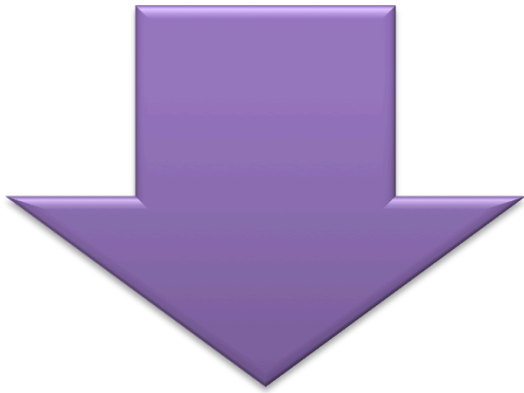
***The earthquake will be followed by thousands of aftershocks, a few of which could be large enough to cause additional damage and produce tsunamis***

# Injuries



***It is estimated that we can have 7,246 injuries with 288 deaths – educational institutions could expect at least 1,082 injuries and 45 deaths***

# Survive the Earthquake



## Prevention

- Modify Your Environment



## Protection

- Modify Your Behavior







# Prepare in Six Steps

## 1- Identify Hazards

- Start now by identifying items that may fall, topple, or slide
- Secure potentially hazardous and valuable items

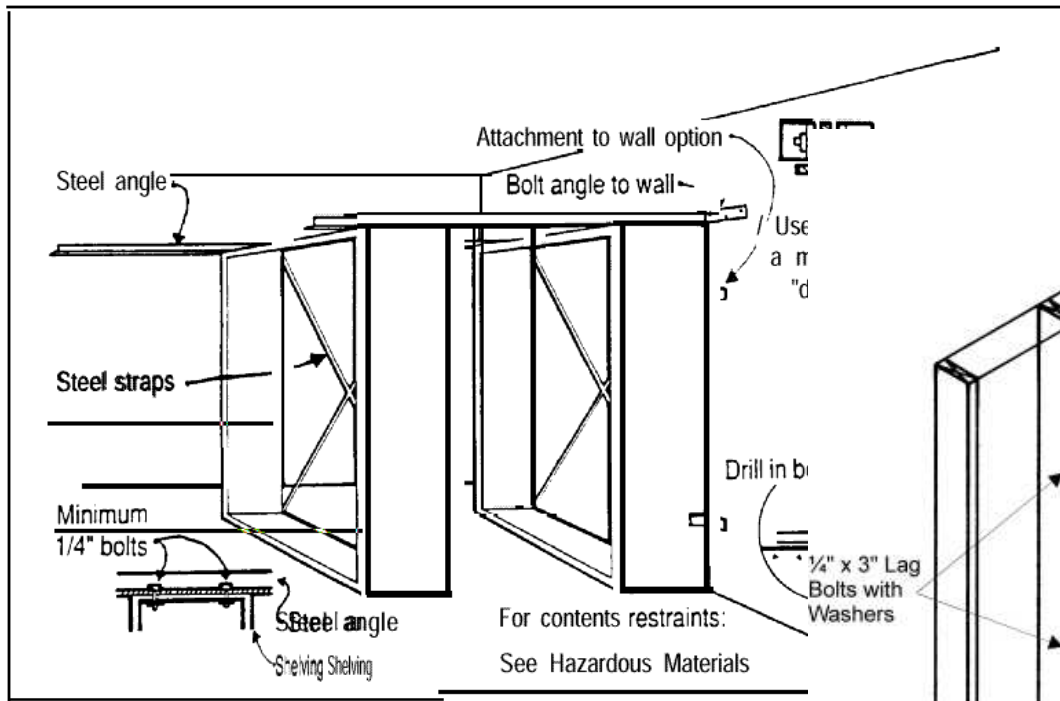


# How to Secure a Bookcase

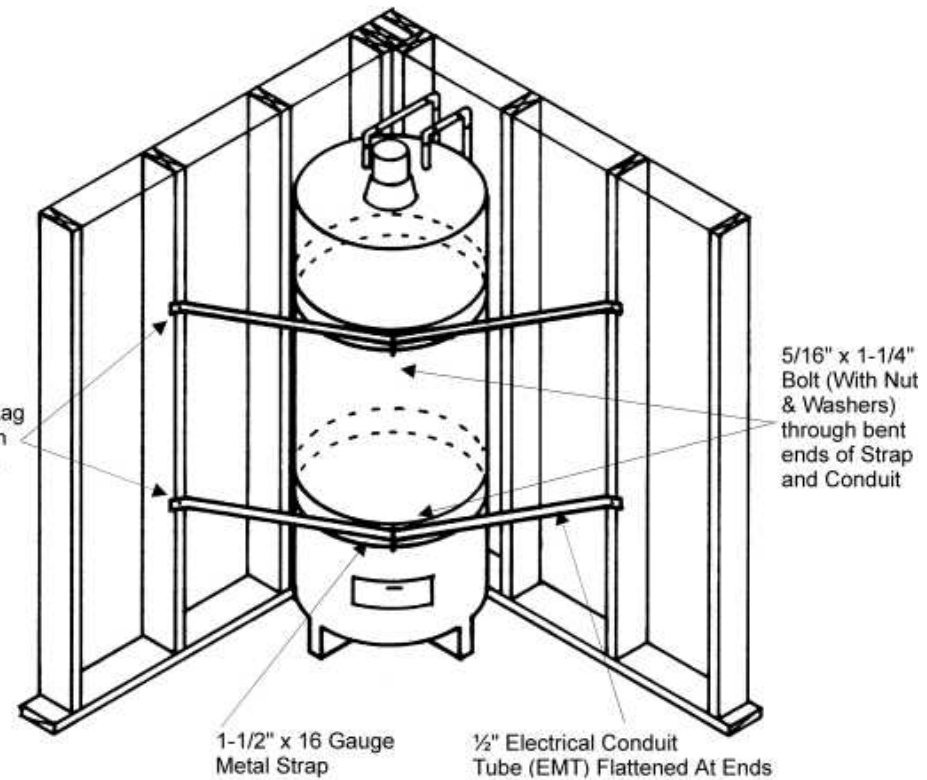
## Option #2 Securing a Bookcase without drilling holes in Furniture

Video can be found at: [http://www.emd.wa.gov/preparedness/  
prep\\_personal\\_prep\\_video\\_index.shtml#HowtoSecure](http://www.emd.wa.gov/preparedness/prep_personal_prep_video_index.shtml#HowtoSecure)

# Secure furnishings



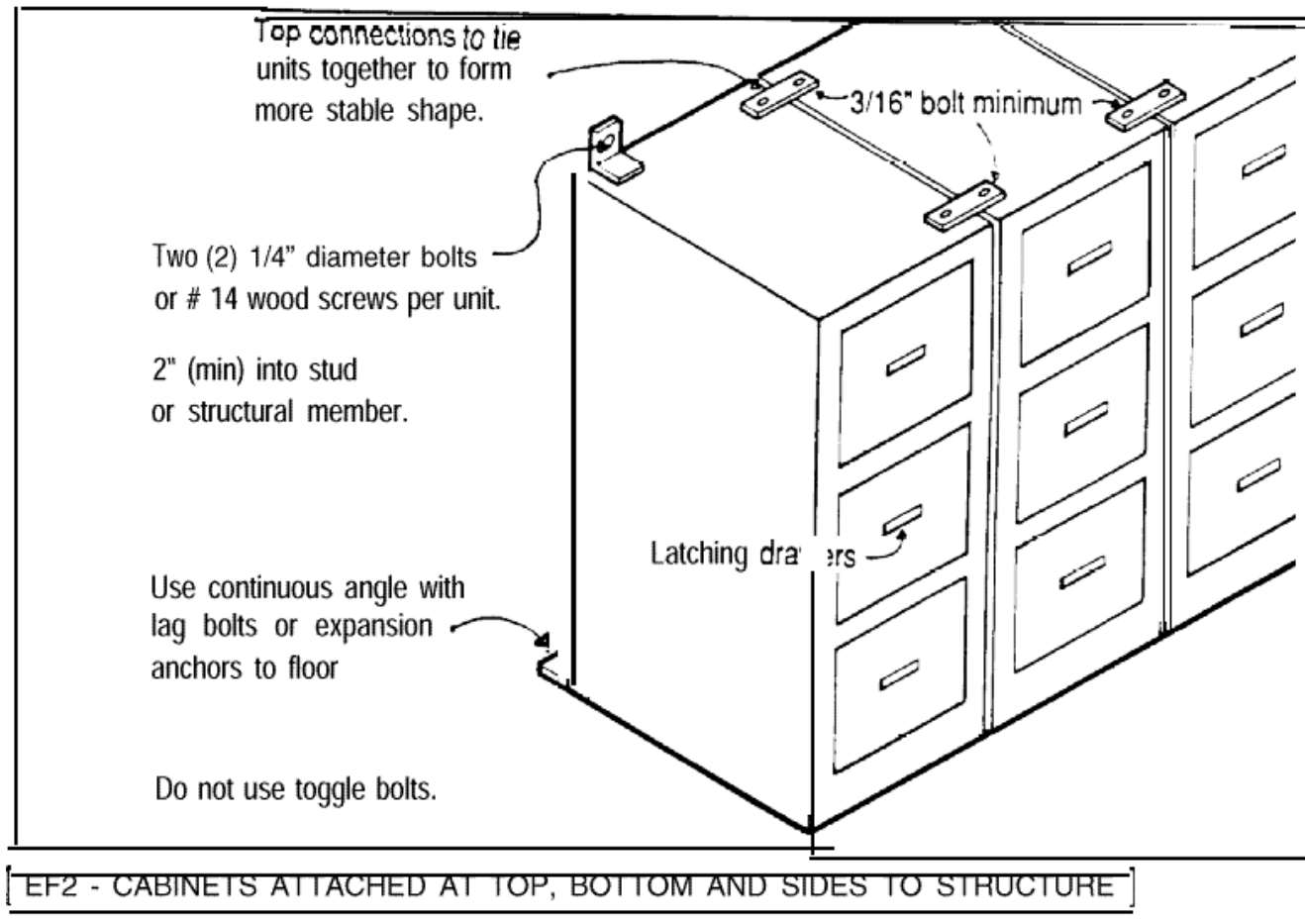
EF6 - BRACING OF LIBRARY SHELIVING (STACKS)



[http://www.emd.wa.gov/preparedness/prep\\_home.shtml](http://www.emd.wa.gov/preparedness/prep_home.shtml)



# Secure furnishings



[http://www.emd.wa.gov/preparedness/prep\\_home.shtml](http://www.emd.wa.gov/preparedness/prep_home.shtml)

# Nothing Above Bed



# Tie Supplies to Bed

- *Flashlight/Head-Lamp*
- *Sturdy Shoes*
- *Leather Gloves*



What if you're in bed when the ground shakes?

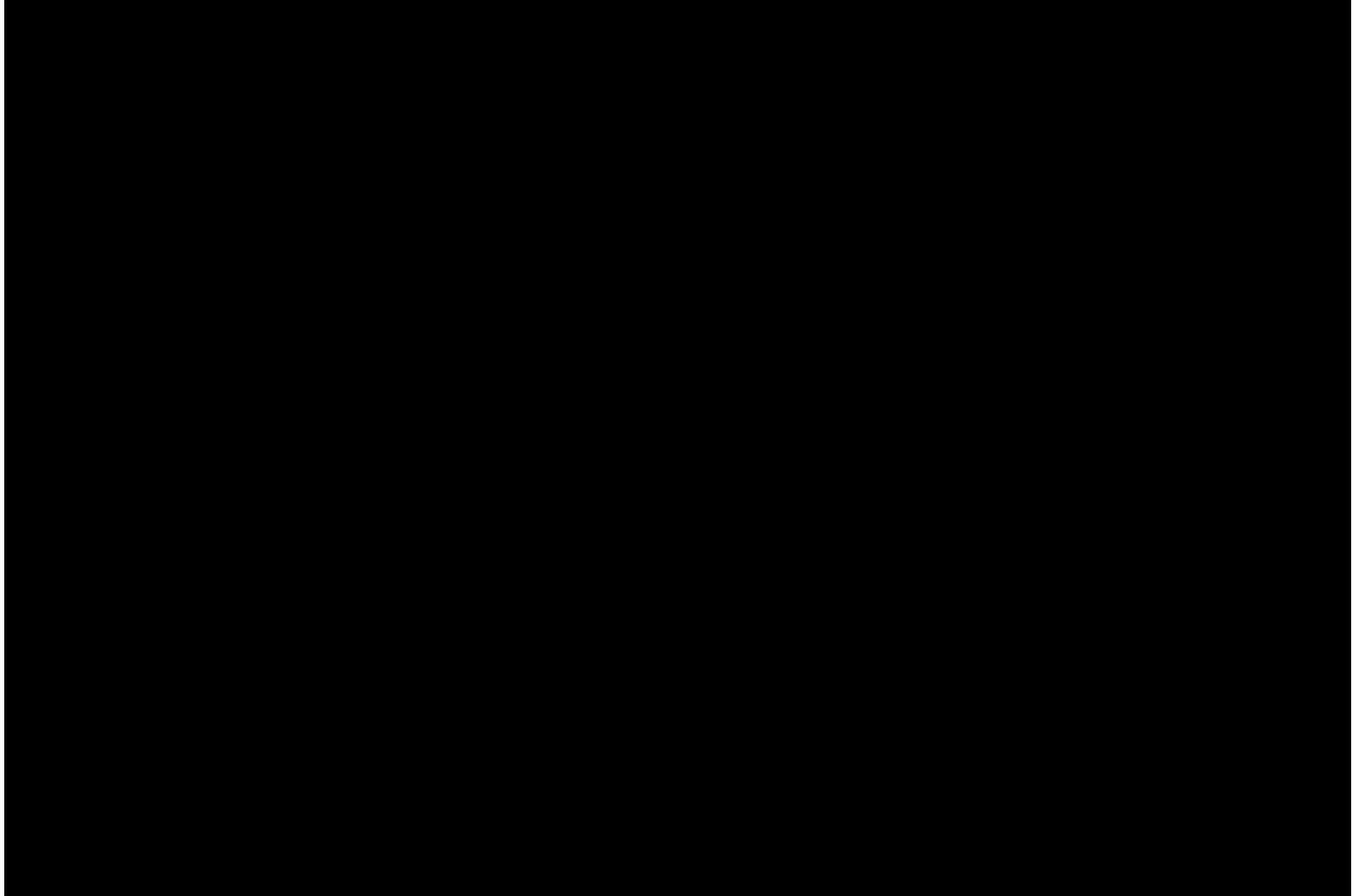


# Office Hazards



- Look at office spaces to see if large objects or even heavy binders could fall and injure you.
- Move heavy objects to a lower shelf.

# Emergency Preparedness Drill



# Prepare in Six Steps

## 2- Create a disaster plan


- Practice Drop, Cover and Hold on.
- Plan on how to respond after an earthquake
- Plan how to communicate and recover
- Practice, practice, practice!



# But what can I do?

- Have a plan! Know what to do!
  - Who ya gonna call?
  - Where will my family be and how will I reach them?
    - ✓ Children at school or activities
    - ✓ Plan for pets and livestock
    - ✓ Have an out-of-town emergency contact
  - How are you going to contact your family if phone service is not available?



- 



# But what can I do?

- Ask yourself am I prepared to live without the essentials?
  - ✓ Food
  - ✓ Water
  - ✓ Medicine
  - ✓ Toilet paper/ Tooth brush
  - ✓ Fill up the gas tank in your car frequently



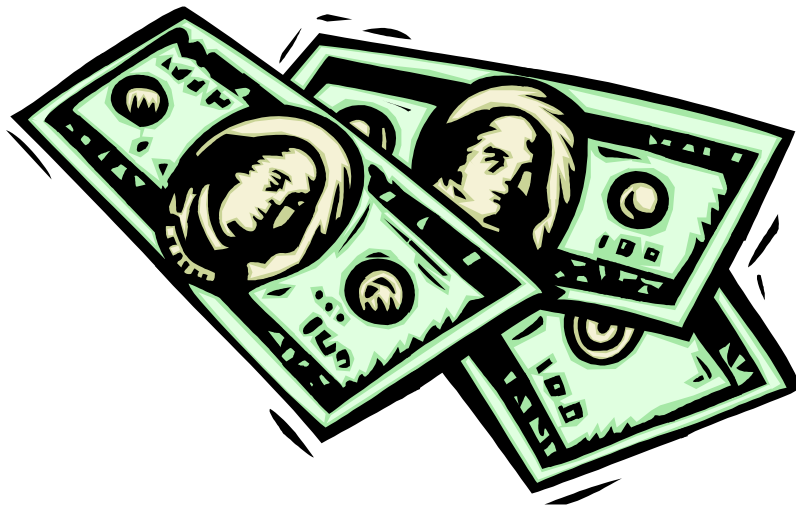
**How much toilet paper do you have in your house right now?**



# But what can I do?

- Have a plan! Know what to do!
  - How will I pay for things?
    - ✓ Have cash on hand
    - ✓ ATMs/Plastic cards will likely not work

**How much cash do you have on hand?**



# Prepare in Six Steps

## 3- Prepare disaster kits

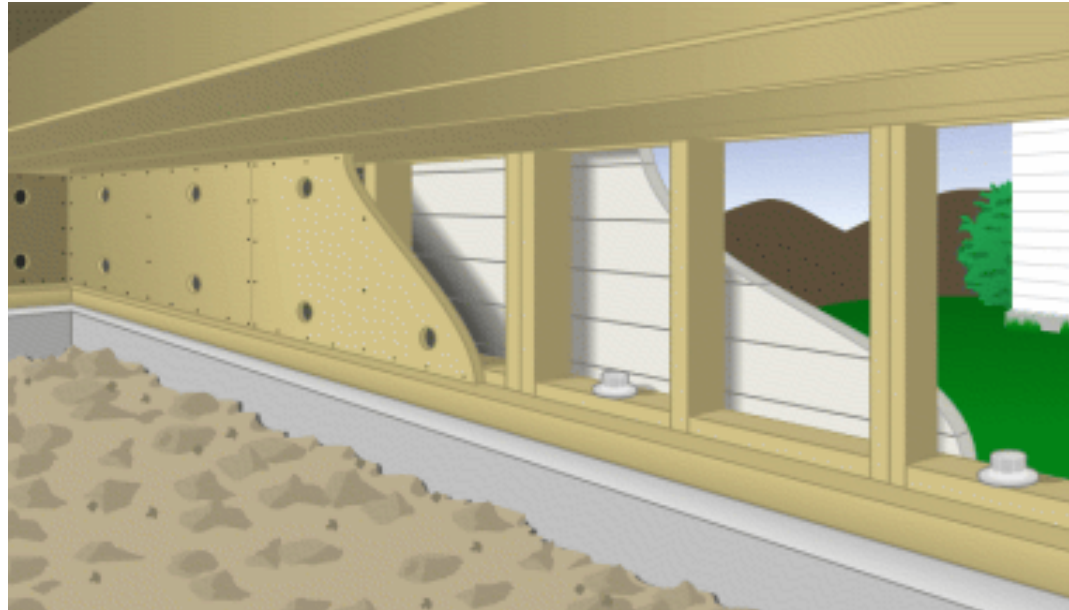
- Personal/Office
- Household
- Car



# Prepare in Six Steps

## 4- Identify and fix weaknesses

- Common building problems
  - Inadequate foundations
  - Unbraced cripple walls
  - Soft first stories
  - Unreinforced masonry





# Prepare in Six Steps

## 5- Protect yourself during earthquake

- Drop, Cover and Hold on



# Be a SMALL Target

## Body Position

- On knees
- Protecting neck/head
- Hold onto furniture
- Curl into a ball



## Face Position

- Turn away from windows
- Close eyes



**Notice Anything?**



# During the Shaking

## If Inside, Stay Inside

- Classroom
- Gymnasium
- Band Room

## If Outside, Stay Outside

Get away from buildings, trees, light poles, power lines, utilities





# In a Car or Bus

- Pull over to a safe location
- Stop & stay there
- Keep seat belt on
- After shaking stops, assess your situation



# Wheel Chair Bound

- Roll into area with structural protection
- Apply brakes
- Cover head and eyes to best of ability
- **Be Advised:** rescuers need to drop, cover, and hold on, too!



# 3 Common MISTAKES

- **DO NOT**  
run out of  
the building!

**Run**



- **DO NOT**  
get in a  
doorway!

**Doorway**



- **DO NOT**  
believe the  
triangle of life!

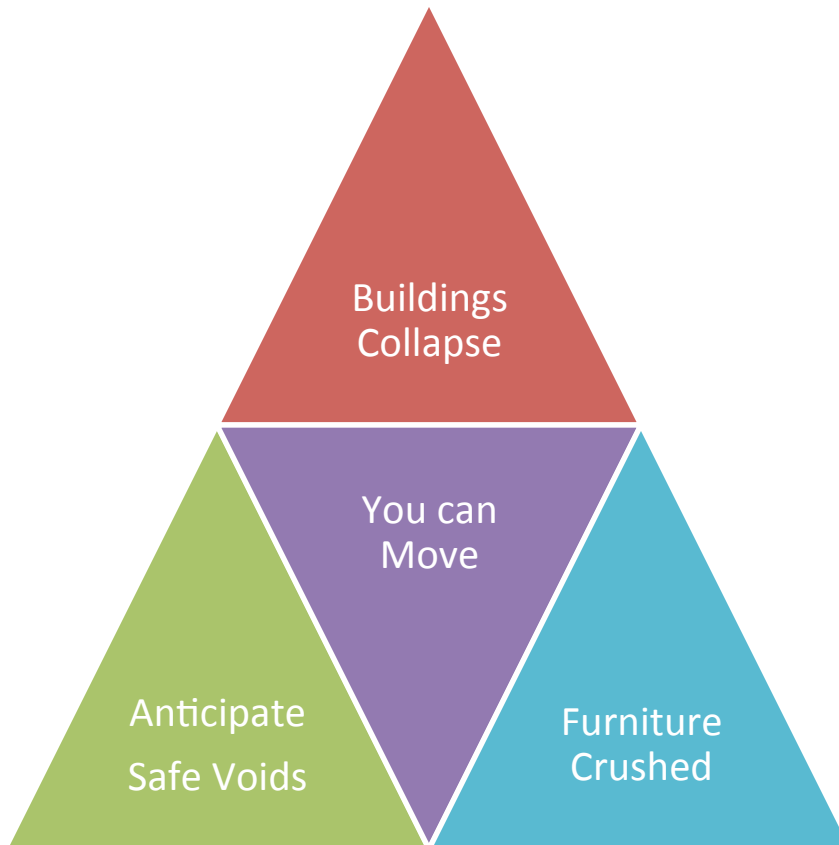
**Triangle  
of Life**



# The Triangle of Life MYTHS

MYTHS

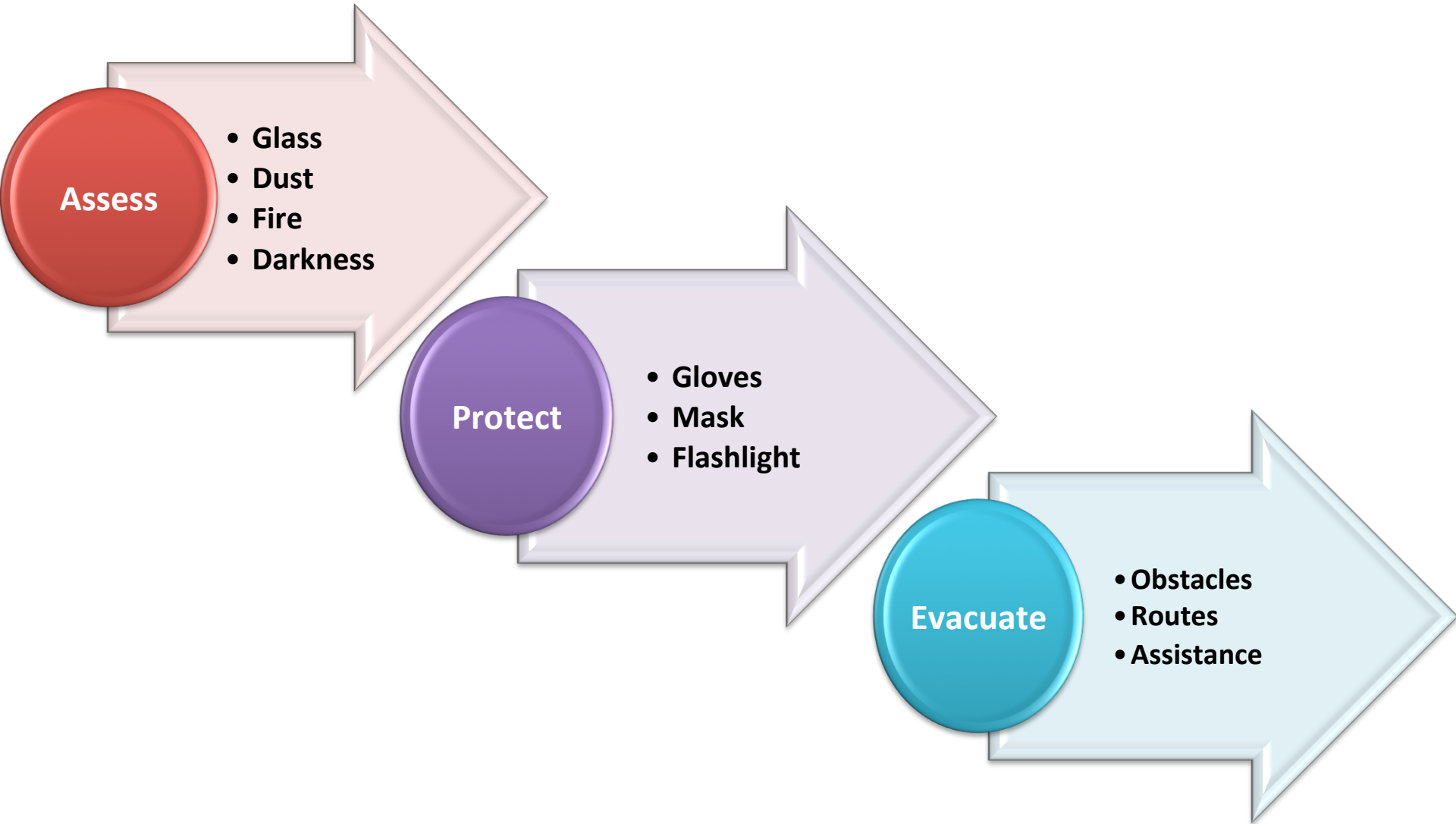
TRUTH



1. **Collapse:** Most buildings do not collapse
2. **Moving:** Strong shaking makes moving very difficult and dangerous
3. **Voids:** The direction of shaking and unique structural aspects of the building make this impossible.
4. **Furniture:** People DO survive under furniture or other shelters.



# After the Earthquake



# Prepare in Six Steps

## 6- Evacuate if necessary

- Know if you are in a Tsunami Hazard Zone
- Do not wait for an official warning
- Check for injuries
- Check for damage if you do not have to evacuate



# But what can I do?

- Have a plan! Know what to do!
- Do I live, work or visit in a tsunami hazard zone?
  - ✓ Know your evacuation route and PRACTICE!
  - ✓ Know where you will evacuate to.
  - ✓ If you are in a safe area, stay there!
  - ✓ There will be no official warning.



The Great  
Washington  
**Shake  
Out**



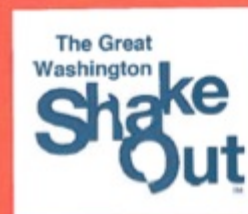
# What IS The Great Washington ShakeOut???

**Shake  
Out.**  
**Don't  
Freak  
Out.**



The Great  
Washington  
**Shake  
Out**

Register at [ShakeOut.org/washington](http://ShakeOut.org/washington)



**OCTOBER 16, 2014**

**@ 10:16 a.m.**

*Earthquake Drill*



*Tsunami Siren Test*



Registration/Information: [www.shakeout.org/washington](http://www.shakeout.org/washington)



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Washington

Shake  
Out™

