EARTHQUAKE HAZARDS OF CLARK COUNTY

by

Mackey Smith
Department of Natural Resources
Division of Geology and Earth Resources

These maps show areas of unconsolidated sediments in brown, semi-consolidated sediment in white, and consolidated bedrock in pink. The purpose of this map is to show how each of these geologic units will react during a seismic event. This map is to be used for planning purposes only, and should not be considered valid for individual site evaluations.

Damage from earthquakes may result from a number of reasons, the more common of these are:

1. Tsumami - a giant sea wave produced by an earthquake.
2. Seiche - a periodic oscillation or sloshing in a large confined body of water.
3. faulting - breaking and offsetting of the ground surface during an earthquake.
4. ground shaking - actual shaking of the ground by transmission of earthquake energy waves.
5. Landslides - perceptible downward of masses of earth and rock.
6. Differential settlement - the uneven sinking of a structure due to inconsistancies in the material upon which it is built.

The amount of damage caused by an earthquake will depend on several factors:

1. epicenter location - damage will tend to be light if the quake is located in an area of little or no population; and will be heavier the closer the quake occurs to a zone of dense population.
2. Depth of focus - the depth at which an earthquake occurs limits the amounts of energy to reach the surface. Generally, of earthquakes having the same magnitude, a shallower focus quake will allow more energy to reach the surface than one whose focus is at a greater depth.
3. Magnitude - the total amount of energy released during an earthquake, usually expressed by the Richter Scale.
4. Duration of shaking.
5. Design of structures - depends upon building codes.
6. Material upon which structures are located.

While little can be done to control the magnitude or location of earthquakes, structures can be properly designed to withstand shaking and settlement. The map shows the distribution of geologic units in Clark County upon which structures currently exist, or may be built in the future.

The potential for earthquake damage from all six listed causes exists in Clark County, but probably would not be great from tsunami, seiche, or faulting. Earthquake damage would most likely occur from landsliding, shaking, and differential settlement.

Landslides are often triggered by earthquakes in areas that would otherwise remain stable. The potential for landslides caused by earthquakes is discussed under the Slope Stability of Clark County. Hillslopes which may be triggered into landslides by earthquakes are shown on the slope stability map.

Seismic Shaking is generally considered to be greater in unconsolidated sediments than on bedrock. The amount of shaking depends upon the thickness of unconsolidated sediments, the subsurface topography upon which the sediments were deposited, and the amount of saturation of the sediments by water. Quantitatively, the amount of shaking of a material is proportionate to the shear wave velocity of the material. Insufficient shear wave velocity data exists for Clark County, so the potential for seismic shaking cannot actually be calculated.

Differential settlement is the uneven settling of different parts of a structure by different rates of compression of subsurface material and liquifaction. Settlement can occur from the weight of the structure itself, but may be accelerated during an earthquake.

Unconsolidated sediments, shown in brown on the map, are the most susceptible to damage from differential settlement in Clark County. These areas are considered by many geologists to hold the highest potential for damage from seismic shaking also.

The most stable ground in the county is underlain by well consolidated bedrock. Damage from seismic shaking and differential settlement will usually be slight.

The distribution of semiconsolidated sediments is shown in white on the map. These materials are less saturated than the unconsolidated sediments of Clark County. Their behavior during an earthquake is variable between the extremes of unconsolidated sediments and well consolidated bedrock.

For planning purposes, the greatest potential earthquake hazard exists in areas of unconsolidated sediment. Investigation by an engineering geologist should preceed any significant modification of existing land use in these areas.

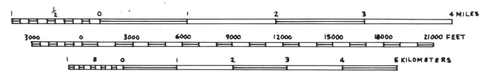
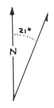
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND EARTH RESOURCES

EARTHQUAKE HAZARDS
CLARK COUNTY WASHINGTON
MACKEY SMITH
1975

OPEN FILE OF 75-12

EXPLANATION

1 — Unconsolidated sediments. Most susceptible to damage from differential settlement.

2 — Semiconsolidated sediments. Variable reaction to earthquake shaking.

3 — Bedrock. Damage from earthquake shaking and settlement slight.