

Relevant material for the C24 webpages has been collected by Kendra J. Williams & Keith Olson, Engineering Geology students of Prof. Scott Burns at Portland State University (USA) in the framework of a students assignment. The following material has not yet been screened and commented nor approved by the C24 chair and membership.

## **Geologic Hazards, Who and What**

(This information is taken directly from Geologic Hazards – Association of Environmental & Engineering Geologists. <http://www.aegweb.org/i4a/pages/index.cfm?pageid=4038>)

### i. Landslides

Geologists identify active landslides and areas subject to slope instability so that they may be avoided or mitigated. Together, geologists and civil engineers develop and implement measures to improve the stability of slopes, repair existing landslides, and prevent damage from future landslides. Slope stability can be improved by removing material from the top of the slope, adding material or retaining structures to the base of the slope, and reducing the degree of saturation by improving drainage within the slope.

### ii. Earthquakes

Geologists work together with seismologists and engineers to study and understand earthquakes and the mechanisms that produce them. Geologists map the locations of faults, evaluate when and how often large earthquakes have occurred on the faults, and assess their probability of generating large earthquakes in the future. Also, geologists identify areas susceptible to geologic hazards associated with earthquakes, such as the presence of unconsolidated soil that can intensify shaking or be subject to liquefaction (described below).

### iii. Tsunamis

Geologists work together with seismologists and oceanographers to study and understand tsunamis and the geologic forces that trigger them. The results of these studies are critical for identifying areas susceptible to tsunami inundation and for developing effective warning systems.

### iv. Volcanoes

Volcanologists study and understand volcanoes and the mechanisms that produce them. They monitor seismic activity and gas emissions associated with volcanoes, and note any changes from the norm as possible precursors to eruptions. Engineering geologists evaluate hazards associated with different volcano types and their potential impact on humans, buildings and infrastructure. For example, shield volcanoes typically produce slow moving lava flows but not explosive eruptions. In contrast, composite volcanoes are known to produce explosive eruptions of gas and ash capable of traveling in the atmosphere extensive distances and lahars capable of moving debris great distances from the volcano.

### v. Land Subsidence

Geologists and engineers work together to develop computer models of areas undergoing subsidence and monitor fluid removal and subsidence

rates in those areas. To avoid damage to new development, geologists identify and study areas containing materials undergoing, or susceptible to, subsidence, then provide recommendations for minimizing or preventing future subsidence.

vi. Expansive Soils

Geologists work with geotechnical engineers to evaluate soil and rock prone to shrinking and swelling. These areas are mapped and denoted for their expansion potential. Expansive soil and rock be removed and replaced with non-expansive materials to provide a suitable foundation for new structures. Expansive materials can also be chemically treated, preloaded, or prewetted to decrease swell potential.

vii. Erosion

Geologists evaluate stream erosion and the site-specific factors that influence the type and rate of erosion. Maps, aerial photographs, and satellite images are often used to evaluate a stream's migration history and to assess hazards to nearby development from future erosion. In previously developed areas experiencing stream erosion, mitigation measures can be implemented to reduce the rate of erosion and protect nearby structures. For example, slope stabilization methods such as rip-rap (boulders), erosion-resistant vegetation, reduction of slope steepness, and retaining structures are used to project stream banks from erosion.

## **Licensure – United States**

viii. Engineers - List of licensing boards by state  
[http://www.ncees.org/Licensing\\_boards.php](http://www.ncees.org/Licensing_boards.php)

ix. Geologists – National Association of State Boards of Geology  
<http://www.asbog.org/>