Shear Zone

Renato Macciotta
School of Engineering Safety and Risk Management,
University of Alberta, Edmonton, AB, Canada

Definition

Zone of concentrated deformation within a rock or soil mass. The shear zone is characterized by the relative movement of rock wall segments (in rock masses) or soil particles with respect to each other. Usually associated with fully formed discontinuities, rock fragmentation, and soil softening.

Overview

Concentration of strains within a shear zone can lead to a ductile rearrangement of rock wall segments (or soil particles) within the zone, or to brittle behavior characterized by the formation of one major discontinuity and several secondary discontinuities. At large strains within rock masses, shear zones can be composed of rock fragments, crushed by the continuous deformation, and with varying soil content. Within soil masses, shear zones can be characterized by frequent fissures, and in some cases softening of the material (clays) and particle crushing (sands).

Shear zones can be observed at geologic scales such as in the vicinity of major discontinuities (i.e., faults), at engineering scales such as in landslide phenomena, and in laboratory scale (i.e., triaxial and shear testing). These zones are associated with degradation of engineering properties and different hydraulic conductivity when compared to the more competent strata (i.e., shear modulus, shear strength) (Gylland et al. 2013, Passchier and Trouw 2005).

Cross-References

- [Deformation](#)
- [Faults](#)
- [Hydraulic Conductivity](#)
- [Landslides](#)
- [Rock Laboratory Tests](#)
- [Shear Modulus](#)
- [Shear Strength](#)
- [Soil Laboratory Tests](#)

References

- Gylland AS, Rueslåtten H, Jostad HP, Nordal S (2013) Microstructural observations of shear zones in sensitive clay. *Eng Geol* 163:75–88
- Passchier CW, Trouw RAJ (2005) *Microtectonics*, 2nd edn. Springer, Berlin/Heidelberg