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The Role of Clay Mineralogy in Classical Soil Mechanics

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Classical soil mechanics has historically been based primarily upon a phenomenological, continuum mechanics approach to soil behavior. At the same time, other approaches to studying soil behavior have also impacted the procedures for solving practical engineering problems. For example, studies on clay mineralogy and physico-chemical properties have been superimposed on the continuum mechanics formulations to provide information on *why* soils behave in a certain manner.

Clay mineralogy and physico-chemical properties have impacted classical soil mechanics in two primary areas. The first area relates to the description of the stress state variables of a soil. The osmotic potential in clayey soils becomes part of the description of the stress state for both saturated and unsaturated soils. The second area relates to the description of the soil properties which form part of the constitutive description of soil behavior. The variation in soil properties are often correlated to clay mineralogy, the adsorbed cations and the chemistry of the pore fluid. As such, clay mineralogy and physico-chemical properties play an important but secondary role in solving geotechnical engineering problems.