Auxiliary Concept: Geotechnics

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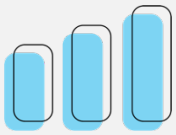
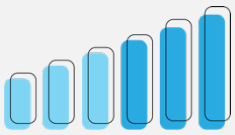
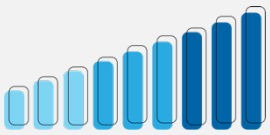
Engineering Literacy Dimension: Engineering Knowledge
Domain: Engineering Technical Applications
Overview: *Geotechnics* concerns the knowledge of the ways in which Earth's materials (i.e. rock and soil) behave under stresses and strains in order to determine how structures and products interact, or will interact, with their surrounding environments as well as how the Earth's materials can be used to mitigate, prevent, or solve problems. This concept is important to Engineering Literacy, as it enables one to design the foundations of structures, plan the excavation of build sites, select the route for roads and highways, minimize the negative impacts that structures have on the environment, and prevent the damages caused by natural hazards to make the Earth's surface more suitable for people and the development of communities.

Performance Goal for High School Learners
I can, when appropriate, draw upon the knowledge of Geotechnics content and practices, such as (a) *geological properties and classifications*, (b) *soil characteristics*, (c) *bearing capacity*, (d) *drainage systems*, (e) *foundations and retaining walls,* (f) *slope stability*, (g) *erosion control*, and (h) *geotechnical field tests and codes*, to analyze/model the behavior of Earth's materials, using the appropriate mathematical equations and conventions, in order to solve problems in a manner that is analytical, predictive, repeatable, and practical.

	 Basic	 Proficient	 Advanced
GEOLOGICAL PROPERTIES & CLASSIFICATIONS	I can describe the three major groups of rocks (igneous, sedimentary, and metamorphic).	I can explain the formation processes and features of different types of rocks.	I can analyze the geological properties of a given plot of land.
SOIL CHARACTERISTICS	I can identify the basic properties of soils (e.g. weight, porosity, void ratio, permeability, compressibility, shear strength, etc.).	I can classify a variety of soils in terms of their properties.	I can analyze the soil properties of a given plot of land.
BEARING CAPACITY	I can define bearing capacity, ultimate bearing capacity, and allowable bearing capacity.	I can explain the three modes of failure limiting bearing capacity (general shear failure, local shear failure, and punching shear failure).	I can analyze the gross allowable-load bearing capacity of a give plot of land.

Auxiliary Concept: Geotechnics Cont.

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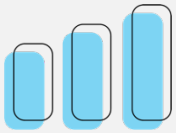
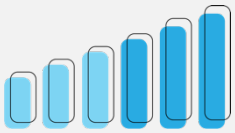
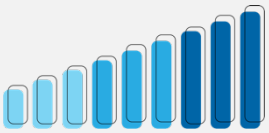
	 Basic	 Proficient	 Advanced
DRAINAGE SYSTEMS	I can identify different types of drainage patterns.	I can explain how each type of drainable patterns depends on the topography and geology of the land.	I can analyze the drainage patterns of a given plot of land.
FOUNDATIONS & RETAINING WALLS	I can describe the basic functions of foundations and retaining walls in an architectural structure.	I can explain different types of foundations (e.g. shallow and deep) and retaining walls (e.g. gravity, cantilevered, sheet piling, bored pile, anchored, etc.).	I can determine and justify which types of foundations and retaining walls are most appropriate for a given plot of land.
SLOPE STABILITY	I can describe how slope stability is determined and how it is related to a factor of safety.	I can explain the methods to analyze and improve stability of slopes.	I can analyze the slop stability of given plot of land.
EROSION CONTROL	I can describe the physical processes of erosion.	I can explain the factors affecting erosion rates.	I can analyze the erosion rate of a given plot of land.
GEOTECHNICAL FIELD TESTS AND CODES	I can describe field tests and coding that are relevant to the specific geotechnical situation.	I can select the appropriate field test and read the code in a geotechnical analysis.	I can plan and execute appropriate field test and report codes that will help inform design.