The title of the presentation:

Soil compaction and its effects on the mechanical properties of compacted soil.

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Abstract:
In the typical conventional fill compaction, the dry density ρ_d and the water content w are controlled in relation to $(\rho_d)_{max}$ and w_{opt} determined by laboratory compaction tests using a representative sample at a certain compaction energy level CEL. Although CEL and actual soil type affect significantly the values of $(\rho_d)_{max}$ and w_{opt}, they change inevitably in a given earthwork project while CEL in the field may not match the value used in the laboratory compaction tests. Compaction control based on the stiffness of compacted soil in the field has such a drawback that the stiffness drops upon wetting more largely as the degree of saturation, S_r, of compacted soil becomes lower than the optimum degree of saturation $(S_r)_{opt}$ defined as S_r when $(\rho_d)_{max}$ is obtained for a given CEL. In comparison, the value of $(S_r)_{opt}$ and the $\rho_d/(\rho_d)_{max}$ vs. S_r - $(S_r)_{opt}$ relation of compacted soil are rather insensitive to variations in CEL and soil type. Besides, the following mechanical properties are controlled by ρ_d and "S_r at the end of compaction": 1) CBR of unsoaked and soaked compacted soil; 2) strength and stiffness in monotonic loading of unsaturated and saturated soil; 3) cyclic undrained strength of saturated soil; 4) hydraulic conductivity of saturated soil; are 5) volume decrease by collapse upon wetting of unsaturated soil. It is proposed to control not only w and ρ_d but also S_r so that S_r becomes $(S_r)_{opt}$ and ρ_d becomes large enough to ensue soil properties required in design. A field case in which an earth-dam was constructed following this new method is described.