Moving Overall Stability to Strength Limit State

Issues to be Considered

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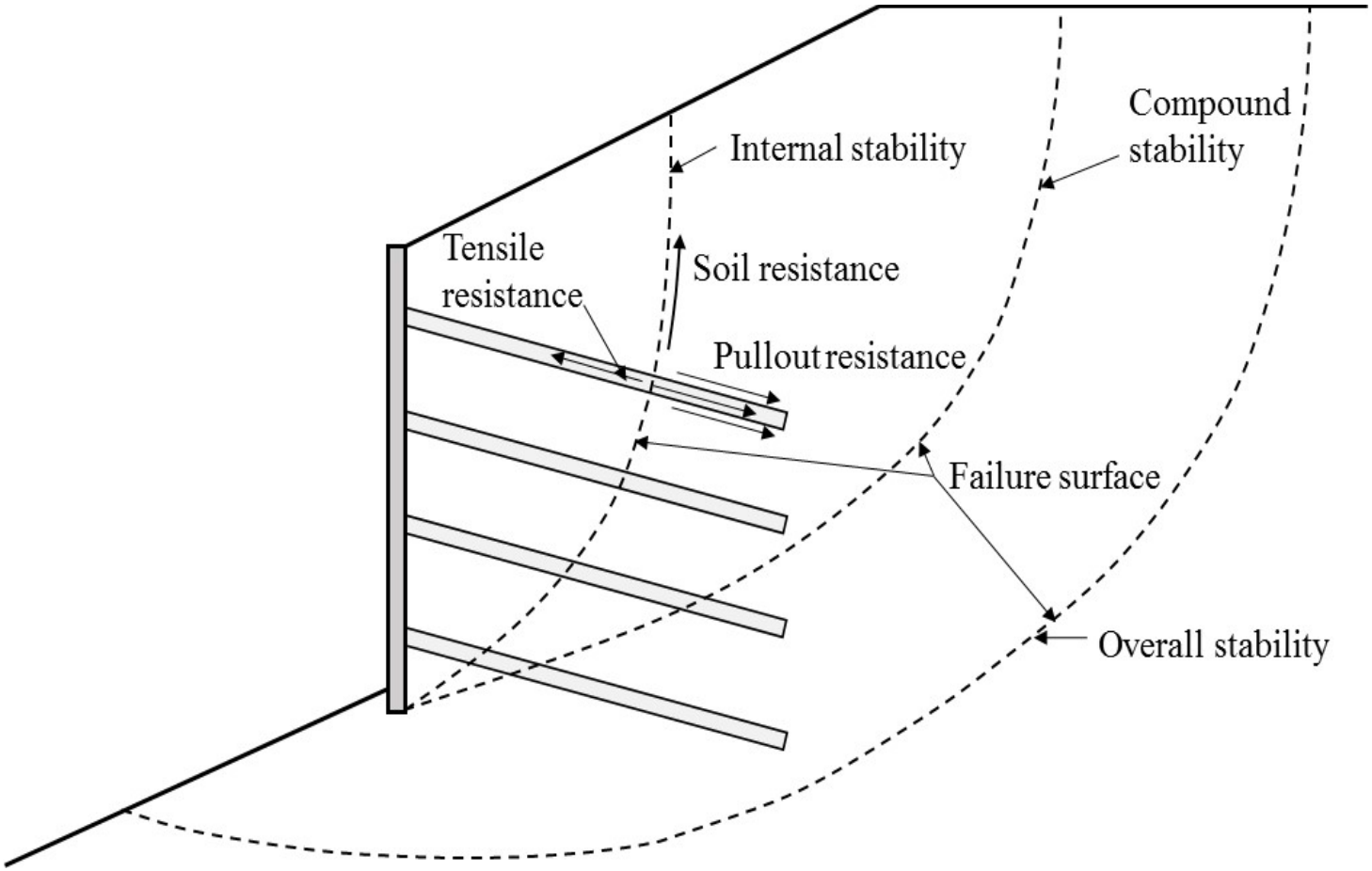
The Problem

- Overall stability is currently in Service Limit State
  - This was done almost 20 yrs ago – logic was that applying LRFD to slope stability very problematic
    - can't separate what is a load and what is a resistance, and
    - attempting to do so results in changes to the critical failure surface that are unrealistic
  - Temporary work around – put in Service Limit
  - Overall stability is a collapse, not deformation scenario
- For soil nail walls and MSE walls, internal stability must be evaluated in the Strength Limit State

The Problem

- Slope stability limit equilibrium techniques are:
  - Used for internal, compound, and overall stability for soil nail walls, and
  - Used for compound and overall stability for MSE walls
- Since especially for soil nail walls all three types of stability are evaluated in one continuous design process, having overall stability in the Service Limit state is problematic
- Overall stability is mentioned in a number of articles, but the changes needed in those articles are relatively minor

Illustration of the Different Types of slope Stability



Proposed Solution

- Move overall stability into the strength limit state
  - Consider FS output by slope stability design programs to be a load factor (i.e., γ_p = 1.3 to 1.5 depending on situation)
  - Use resistance factor for overall stability of 1.0 for soil failure
  - If add soil reinforcement, the reinforcement pullout and rupture limit states will likely have a resistance factor of less than 1.0 based on past practice
- This does not change the design outcome, but does simplify the design process
  - This change uses the FS as a LRFD load factor directly
  - Overall stability “resistance factor” is set equal to 1.0

T15 Next Steps

- Draft agenda item for this already completed
- Discuss and finalize draft at T15 mid-year meeting (October?)
- Submit as Subcommittee agenda item for Subcommittee consideration in 2018, with the soil nail wall agenda item

Comments and Questions