

FP2 Project: Effects of Partial Saturation on Liquefaction Triggering

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Research methodology:

Field data

- Approximately 30 sites have been investigated in Christchurch in a related project providing relevant data (V_p , V_s , CPT , ...)
- Links between partial saturation and geological/geomorphological features (i.e. swamp areas, organic layers) will be investigated; the degree of in-situ saturation will be estimated based on V_p data.

Lab testing

- Disturbed samples from two sites will be used targeting two soil types: (i) fine sands with less than 20% fines ($I_c = 1.8 - 2.1$); (ii) silty sands with FC = 20-60% and $I_c = 2.2 - 2.5$;
- Specimens will be re-constituted at in-situ densities and a series of liquefaction tests (dynamic) will be conducted for: (i) fully saturated specimens (which will provide the reference liquefaction resistance – LRC); (ii) partially saturated specimens at approx. $S_r = 80\%$, and (iii) $S_r = 60\%$. – In total 18 tests (or similar) will be needed for the above testing programme

Output

- LRCs for two soils and three degrees of saturation
- Quantification of effects on partial saturation for two soil types
- Conceptualization of methodology for estimating liquefaction resistance of partially saturated soils

Expected impacts:

- Quantification of partial saturation effects for Christchurch soils (builds on CBD Soils Project & Silty Soils Project) – short term
- Modification of liquefaction evaluation for effects of partial saturation (in conjunction with field testing procedures for estimation of saturation degree in-situ) – long term
In relation to crust thickness/effects on liquefaction manifestation/damage, and crust load on piles/foundations

Potential issues:

- Testing procedures for partially saturated soils (to be developed)

Anticipated timeline:

- Field interpretation (February – April)
- Development of testing procedures (February – April)
- LRCs of fine sand (May)
- LRCs of silty sand (June)
- Summary, interpretation, repeat tests (July – August)
- Reporting and papers (September)