Case Study – Mass Mixing Retaining Wall Foundation

- Gabion wall required to retain approx. 4.2m at maximum height had failed owing to unforeseen (and under-investigated) very soft ground
- GDL were approached post failure for a solution and a soil mixed block was proposed as remedial measure
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Original proposal

5) BACKFILL TO GABION WALL:
The backfill for the Gabion wall is to be compacted Class 6N granular fill. This material is assumed to have the following characteristics: $\phi = 35$ degrees, $\gamma = 18$ kN/m$^3$ and $c' = 0$ kPa, compacted to a minimum of 95% maximum dry density in accordance with SFHW Series 600. The Contractor is responsible for the selection of these materials to ensure compliance with the geotechnical characteristics as shown on the relevant drawings and in the design documentation.

6) FOUNDATION FOR GABION WALL:
To achieve a suitable foundation for the Gabion baskets, excavation must take place down to the levels indicated on the drawing and allow for the placement and compaction of a minimum 150mm thickness of selected granular material (e.g., 6F2 with assumed properties of $\phi = 35$ degrees, $\gamma = 18$ kN/m$^3$ and $c' = 0$ kPa). The Scheme Engineer must confirm the suitability of the founding material. Assumed to be original, undisturbed firm-stiff sandy gravelly CLAY (Glacial Till), with a minimum allowable bearing capacity of 100kN/m$^2$ (to be confirmed by the Scheme Engineer). Any soft, loose or unsuitable material (such as made ground or alluvium) must be excavated down to firm-stiff sandy gravelly CLAY and replaced with compacted Class 6F2 granular fill.
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Aerial view c. 05/2016 – wall distortion visible from 04/2015
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Gross settlement indicative of a bearing capacity failure – a bearing capacity failure potentially exacerbates the potential for a slip owing to propagation of a failure plane and gross soil disturbance and loss of strength.
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Failed condition showing removed fill and gabion baskets. Propagated settlement profile visible along line of remaining baskets. Note poor quality fill remove from behind wall.
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Swale has been completely closed by the forward translation of the wall

Gross distortion and heave of the soil in front of the gabion basket has destroyed the swale

Very little back-rotation of the wall again indicates that this isn’t a rotational slip but rather a lateral translation probably brought on by initial bearing capacity failure
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From the survey information undertaken 08/2017, it looks like the wall has moved laterally by approx. 4.8m and vertically (settled) by approx. 700mm.
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- Pre-existing profile after backfill removed
- Proposed position / arrangement of gabion wall
- Current back of wall
- Mass mixed soil block of high strength and integrity
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Sampling indicated very soft (undrained shear strength ~5kN/m²), high plasticity clay
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Analyses show that the proposal is stable with adequate factor of safety > 1.5

Critical that the soil mix block gets into the underlying stiff material to provide stability.
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