

Brief Description of Centrifuge Test CSP 5 by Wilson et al. (1997)

1. Soil Profile

The soil profile in the centrifuge test consisted of about 6 meter deep bay mud (soft clay) underlain by about 11.5 meter deep of Nevada sand with relative density of roughly 80%. Table 1 below presents the Torvane test results for the bay mud per depth (prototype scale).

Table 1. Shear strength of bay mud with depth (Torvane test results).

Depth (m)	S _u (kPa)
0.75	1.96
0.90	2.9
1.50	4.9
2.10	5.9
2.70	6.9
3.00	6.9
3.45	7.8
4.35	9.8
5.7	8.8

** The unit weight of the soft clay can be estimated to be roughly 18 kPa.*

The unit weight and the friction angle of the underlying dense Nevada sand were 20.0 kN/m³ and 40 degrees, respectively.

Pore fluid used for the centrifuge test was water and the water table was located at the soil surface. Typical permeability for bay mud has been reported to be roughly 2x10⁻⁹ m/s. To account for centrifuge test scaling factor, the permeability needs to be multiplied by 30. Therefore, the prototype permeability of bay mud is approximately **6x10⁻⁸ m/s**.

Per [Popsecu and Prevost \(1993\)](#), the permeability of saturated Nevada sand with D_r=80% is 3.7x10⁻⁵ m/s. As discussed earlier, the prototype permeability of the Nevada sand in this test would be 30 times larger, i.e., **k=1.11x10⁻³ m/s**.

2. Input ground Motion

The input ground motion had PGA of 0.3g (Event C) with total duration of 20 seconds. You can find the time history of the input acceleration in the spreadsheet "*Centrifuge Test _ CSP5_Event C_Measurements*".

Note:

Further information about the test is available here in this [link](#). Measurement at the free-field is of interest here so the records sufficiently far from the structural elements should be considered.