

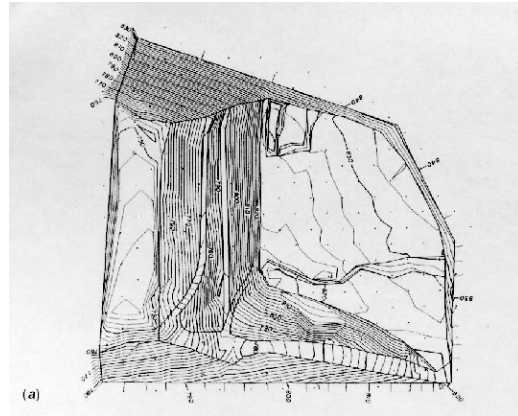
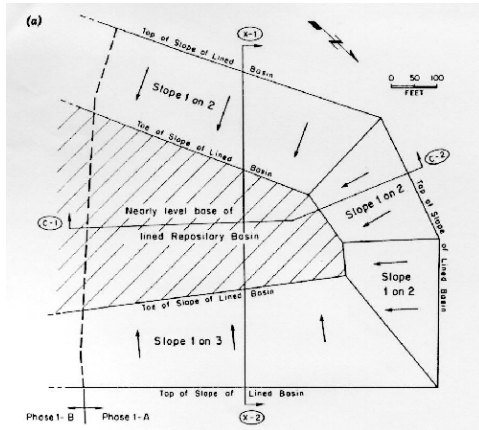


TSLOPE3

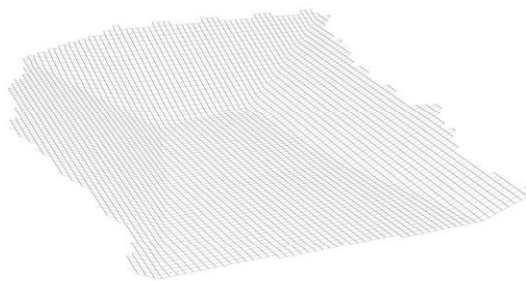
KETTLEMAN HILLS LANDFILL EXAMPLE

The Kettleman Hills landfill is a waste repository in California. In March 1988 a slope failure occurred that resulted in lateral displacement of the surface of the waste of up to 35 ft and vertical settlement of up to 14 ft. The maximum fill height at the time of failure was 90 ft (Seed et al 1990). The failure developed by sliding along interfaces within the composite geo-synthetic clay liner beneath the waste fill.

This TSLOPE3 analysis of the failure has been based on the geometry illustrated in Seed's (1990) paper.



TECHBASE, a geological GIS software package, was used for generating the modelled surfaces and imported as ASCII (XYZ) gridded points into TSLOPE3

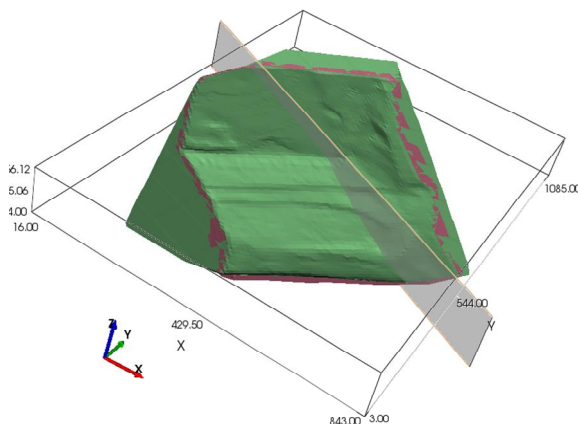


Base of landfill



Landfill surface prior to failure

The surfaces were imported to TSLOPE3 as a 'cloud of points'.



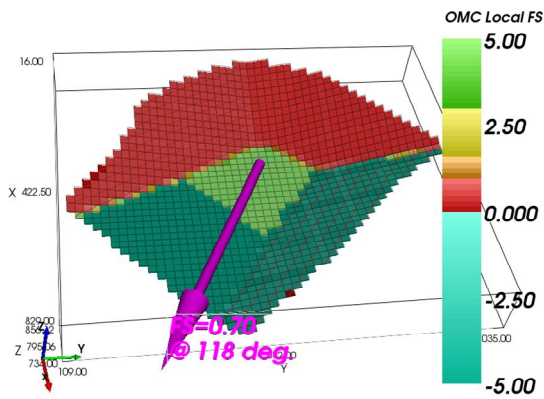
TSLOPE3 top surface showing the edges of the base of the landfill and one of the 2D cross sections



To estimate 'Factors of Safety' the default material properties were adopted. Two slope cases were analysed: one without a phreatic surface and one with a wet zone. The friction angle was varied and tested at 5° and 8°.



Mohr-Colomb	Cohesion	0	0
	Friction angle	5°	8°

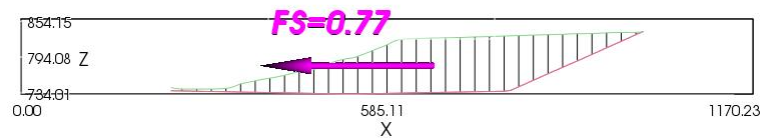
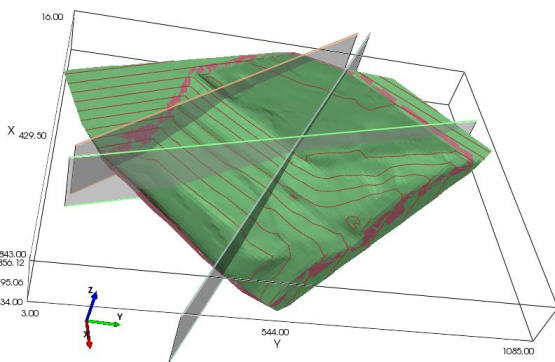


Non phreatic $\Phi = 5$ degrees

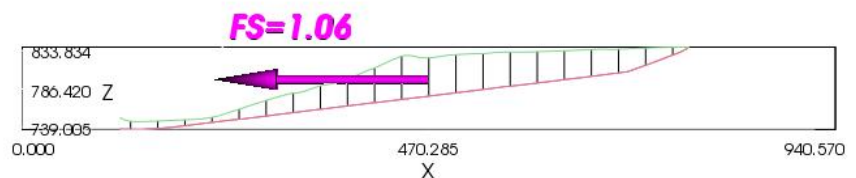
RESULTS—Factors of Safety

3D Cases	FoS	Direction
Dry - 5°	0.70	118
Dry - 8°	1.13	118

2D Cases	FoS	Direction
XS 1 (dry) 5°	0.77	118
XS 1 (dry) 8°	1.24	118
XS 2 (dry) 5°	0.95	162
XS 2 (dry) 8°	1.52	162
XS 3 (dry) 8°	1.06	139



XS 1 2D analysis— non- phreatic $\Phi = 5$



XS 3 2D analysis— phreatic $\Phi = 8$

