

Appendix V

RocLab Analysis

RocLab Rock Mass Analysis

The RocLab software was used to determine the shear strength parameters and the geomechanical properties of the rock mass according to the Geological Strength Index (GSI) method for jointed rocks. The software estimates rock mass strength parameters based on the generalised Hoek-Brown failure criterion.

In order to estimate the effective angle of friction and effective cohesion of the rock mass using RocLab the following information was required:

- Slope height (set to basalt thickness - approx. 15m)
- Unit rock weight (basalt set as 22 kN/m³)
- Weathering grade
- Joint spacing
- Rock Quality Designation value
- Point Load Index laboratory results
- Conversion of Point Load Index to uniaxial compressive strength (value of 15 selected for non-vesicular Newer Volcanics Basalt)
- Estimate of GSI value
- Estimate of Disturbance factor

A summary of the above RocLab input data, plots of GSI and explanations as to geotechnical parameter selection are provided over-page. It should also be remembered that the rock values selected have been based on rock core collected during drilling borehole I(3).

Labels	Point	I.D.	Depth (mbgl)	Weathering	Joint Spacing (mm)	RQD (%)	Is(50) - point Load Index (Mpa)	Rock Strength Symbol	Conversion Factor ¹	σ_{rc} (Mpa)	GSI ²	m_j	D ⁴	c' estimate (kPa)	ϕ' estimate
I(3)(depth=3m), VL	1	I(3)	3.05	EW-HW	300	????	0.06	VL	15	0.9	35	25	0.3	41	30.5
I(3)(depth=12m), VL	2	I(3)	11.7	EW-HW	450	0.37	0.09	VL	15	1.35	40	25	0.3	52	35.3
I(3)(depth=6m), L	3	I(3)	5.8	HW	200	0.60	0.11	L	15	1.65	30	25	0.3	48	33.2
I(3)(depth=9m), L	4	I(3)	9.1	HW	120	0.90	0.14	L	15	2.1	28	25	0.3	48	34.2
I(3)(depth=8m), VL	5	I(3)	8	HW	50	0.90	0.03	VL	15	0.45	25	25	0.3	25	22.5
I(3)(depth=17m), H	6	I(3)	17.2	MW-SW	140	0.43	2.41	H	15	36.15	35	25	0.3	163	57.0
I(3)(depth=18m), H	7	I(3)	17.65	MW-SW	200	0.43	2.83	H	15	42.45	40	25	0.3	199	59.5

1. Conversion factor of 15 used for PLI to UCS, based on lower bound value for non vesicular Newer Volcanics Basalt from Peck et al. (1992) Engineering Geology of Melbourne. The same author states that the conversion factor is unsuitable for the Older Volcanics.
2. The GSI has been based on joint spacing and weathering from the borehole logs. Each point is plotted on the GSI chart below.
3. The m_j has been based on standard basalt value for intact rock as defined by Hoek and Brown (1988).
4. The disturbance factor, D was defined by Hoek et al (2002). D=0 implies no disturbance, D=0.3 chosen to allow for some relaxation of rock face during to ongoing slips.
5. C' and ϕ' found using RocLab and a slope failure envelope with a slope height set to the thickness of the basalt = 15m (actual range 14-18m). Density of rock assumed to be 22 kN/m³

