Table 3 (b). Estimate of Geologic Strength Index (Hoek et al., 1998)

2	9 1	==4							
From the descriconditions of the Box in this char Geological Stre Do not attempt of GSI from 36 that GSI = 38. If the Hoek-Browl rock masses w	structure and surface erock mass, pick an appropriate t. Estimate the average value of the ength Index (GSI) from the contours to be too precise. Quoting a range to 42 is more realistic than stating it is also important to recognize that n criterion should only be applied to here the size of individual blocks is d with the size of the excavation ation.	SURFACE CONDITIONS	VERY GOOD Very rough, fresh unweathered surfaces	GOOD Rough, slightly weathered, Iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with Compact coatings or fillings of angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings		
STRUCTURE			DECREASING SURFACE QUALITY						
u v	BLOCKY - very well interlocked indisturbed rock mass consisting of cubical blocks formed by three orthogonal discontinuity sets		80 70						
d n	/ERY BLOCKY - interlocked, partially disturbed rock mass with multifaceted angular blocks formed by our or more discontinuity sets	OCKING OF ROCK PIECES		50					
	BLOCKY/DISTURBED - folded and/or faulted with angular blocks formed by many intersecting discontinuity sets	  G  INTERLOCKING  O			/*°/	30			
	DISINTEGRATED – poorly interlocked, heavily broken rock mass with a mixture of angular and rounded rock pieces	 C DECREASING INTERL					20 //		
	FOLIATED/LAMINATED/SHEARED — Thinly laminated or foliated, and tectonically sheared weak rocks. Closely spaced schistosity prevails over any other discontinuity set, resulting in complete lack of blockiness	8	N/A	N/A			5		

m & s Values for disturbed :	rock masses	m & s Va	lues for und	listurbed ro	ck masses
Empirical failure criterion $\sigma_1 = \sigma_3 + \sqrt{m\sigma_c\sigma_3 + s\sigma_c^2}$ $\sigma_1 = \text{major principal stress}$ $\sigma_3 = \text{minor principal stress}$ $\sigma_c = \text{uniaxial compressive}$ $\text{strength of intact}$ $\text{rock, and}$ $m, s = \text{empirical constants.}$	CARBONATE ROCKS WITH WELL DEVELOPED CRYSTAL CLEAVAGE dolomite, limestons and marble	LITHIFIED ARGILLACEOUS ROCKS mudstons, siltstons, shale and slate (normal to cleavage)	ARENACEOUS ROCKS WITH STRONG CRYSTALS AND POORLY DEVELOPED CRYSTAL CLEAVAGE sændstone ænd quærtsite	FINE CRAINED POLYMINERALLIC ICNEOUS CRYSTALLINE ROCKS andesite, dolerite, diabase and rhyolite	COARSE GRAINED POLYMINERALLIC IGNEOUS AND METAMORPHIC CRYSTALLINE ROCKS amphibolite, gabbro, gneiss, granite, norite and quarts-diorite
INTACT ROCK SAMPLES  Laboratory size specimens free from joints  RMR rating 100	m = 7.0 $m = 1.0$ $m = 7.0$	m = 10.0 $m = 10.0$ $m = 10.0$	m = 15.0 m = 1.0 m = 15.0	m = 17.0 $s = 1.0$ $m = 27.0$	m = 25.0 $m = 1.0$ $m = 25.0$
Q rating 500  VERY GOOD QUALITY ROCK MASS  Tightly interlocking undisturbed rock with unweathered joints at 1 to 3m.  RMR rating 85  Q rating 100	s = 1.0 m = 2.38 s = 0.008 m = 4.10 s = 0.188	<b>s</b> = 1.0 <b>n</b> = 3.40 <b>s</b> = 0.008 <i>m</i> = 5.85 <b>s</b> = 0.189	s = 1.0 = 5.10 s = 0.008 m = 8.78 s = 0.189	s = 1.0 $m = 5.78$ $s = 0.008$ $m = 9.95$ $s = 0.189$	s = 1.0 m = 8.50 s = 0.008 m = 14.63 s = 0.188
GOOD QUALITY ROCK MASS Fresh to slightly weathered rock, slightly disturbed with joints at 1 to 3m.  RMR rating 65 O rating 10	m = 2.010	m = 0.820 $s = 0.0003$ $m = 2.870$	m = 1.230 s = 0.0003 m = 4.310	m = 4.880	m = 2.050 s = 0.0000 m = 7.180
FAIR QUALITY ROCK MASS Several sets of moderately weathered joints spaced at 0.3 to 1m.  RMR rating 44 Q rating 1	s = 0.020 $a = 0.126$ $s = 0.0001$ $m = 0.945$ $s = 0.002$	m = 0.020 $m = 0.180$ $m = 0.0001$ $m = 1.380$ $m = 0.002$	s = 0.020 $m = 0.270$ $s = 0.0001$ $m = 2.030$ $s = 0.002$	m = 0.020 $m = 0.310$ $m = 0.0001$ $m = 2.300$ $m = 0.002$	s = 0.020 $m = 0.450$ $s = 0.000$ $m = 3.380$ $s = 0.002$
POOR QUALITY ROCK MASS  Fumerous weathered joints at 30 to 500mm with some gouge.  Clean compacted waste rock.  RMR rating 23  Q rating 0.1	= - 0.028 =-0.00003 m = 0.448 s = 0.0002	= 0.040 =-0.000003 = 0.640 = 0.0002	m = 0.060 m = 0.960 m = 0.0002	m = 1.088	m = 0.100 $s=0.00000$ $m = 1.600$ $s = 0.000$
WERY POOR QUALITY ROCK MASS  Themerous heavily weathered joints spaced < 50mm with gouge. Waste rock with fines.  RMR rating 3 Q rating 0.01	m = 0.007 m = 0.217 m=0.0002	m = 0.010 s=.0000001 m = 0.310 s=0.00002	m = 0.015 s=.0000001 m = 0.465 s=0.00002	m = 0.017 s=.0000001 m = 0.527 s=0.00002	m = 0.025 s=.000000 m = 0.775 s=0.00002