

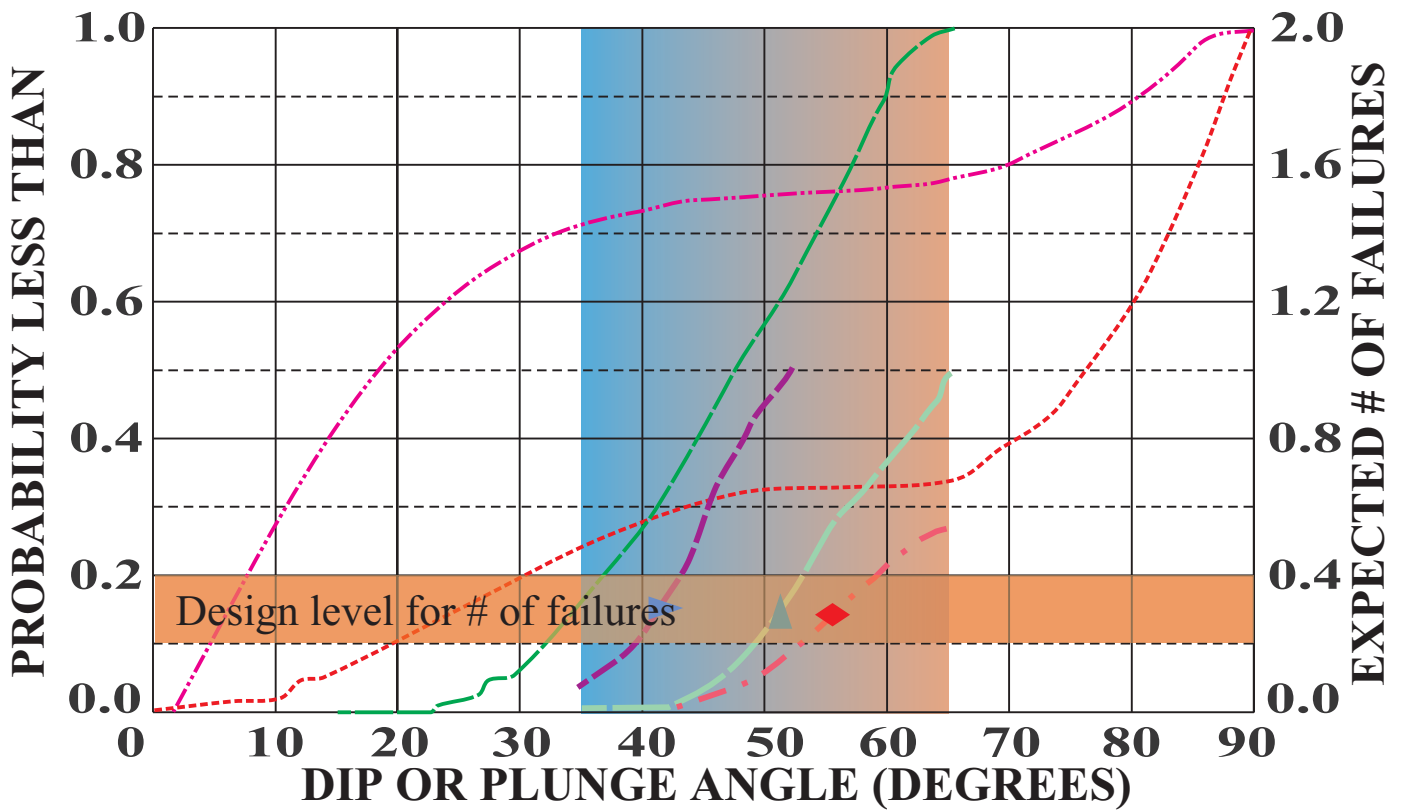
❖ INTERRAMP AND OVERALL SLOPE DESIGN

A catch bench/bench face angle combination can determine and interramp or overall slope angle. However, it may not necessarily do so. Interramp and overall slopes must be checked independently of the catch bench design.

Discontinuity analyses, similar to those utilized for the catch bench design can be used for interramp slope stability analyses. With techniques such as these, the expected number of interramp failures, and their associated volumes, can be calculated for any specific slope angle, orientation, and interramp height (Figure D1).

If geologic structure is not the controlling factor, and rock mass failure appears to dominate, statistical strength and failure models can be developed to address this situation as well (Figure D2).

Individual faults can be analyzed in terms of impact on specific walls. A probability of failure for any specific geometry can be calculated utilizing statistical shear strength distributions and variations of structure attitudes (Figure D3).

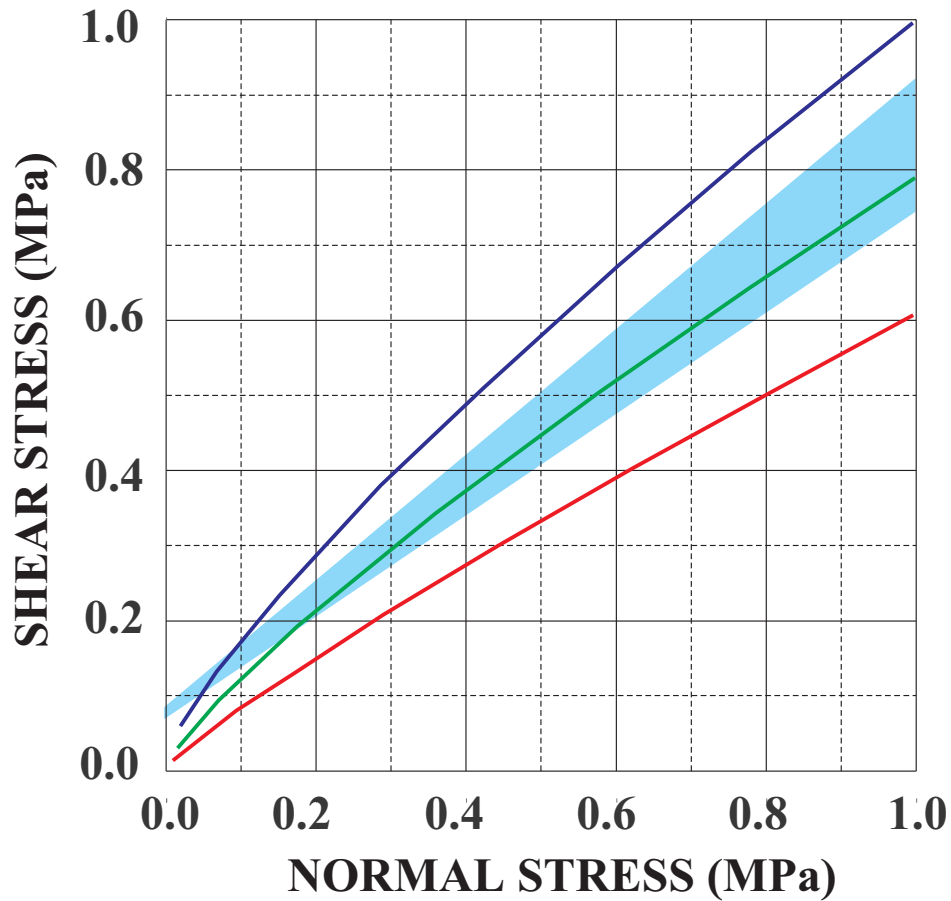


Calculated structure dip or plunge probabilities
 Face dip direction = 143 degrees
 Domain 4a, amphibolite schist

- Plane shear dip distribution
 - Wedge plunge angle distribution
 - Calculated step path dip distribution
- Estimated number of interramp slope failures
- . - . - . Best case
 - Expected case
 - Worst case

FIGURE D1



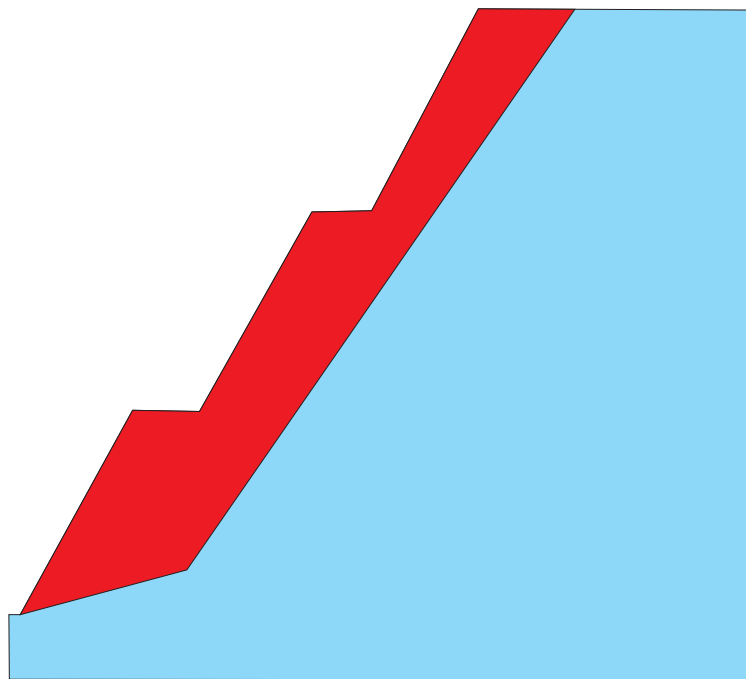
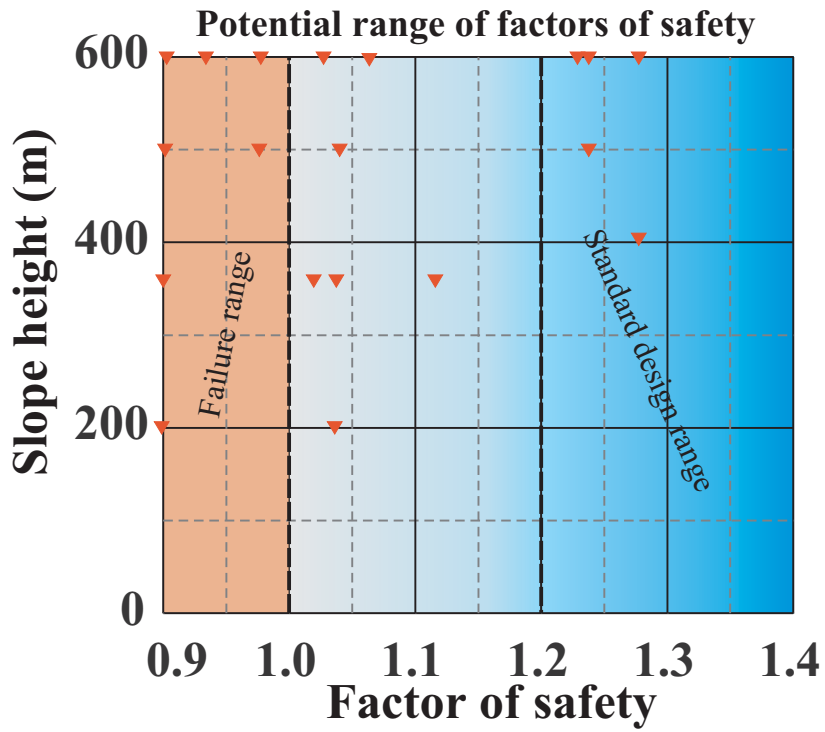


— Upper strength bound equivalent material model
— Mean strength equivalent material model
— Lower strength bound equivalent material model
 Robertson/Olsen RMR strength assessment for pit slopes
 RMR range 35-40; friction angle = 40 degrees; cohesion = 86kPa
 RMR range 25-30; friction angle = 34 degrees; cohesion = 69kPa
 (values from Island Copper Mine, B.C., Canada. See text for derivation of design RMR values for methodology)

Applicable strength range		Equivalent material rock strength									
		20% rock		25% rock		35% rock		40% rock		50% rock	
from (MPa)	to (MPa)	friction angle	cohesion (kPa)	friction angle	cohesion (kPa)	friction angle	cohesion (kPa)	friction angle	cohesion (kPa)	friction angle	cohesion (kPa)
0	0.1	36.8	10.1	38.4	15.0	46.0	21.5	48.5	32.1	53.0	38.9
0.1	0.2	33.4	19.1	34.8	23.9	41.3	38.0	44.5	48.8	48.2	63.2
0.2	0.3	31.7	27.6	33.5	34.5	39.2	51.5	42.0	66.2	46.1	79.9
0.3	0.4	30.7	35.1	32.3	42.4	37.6	65.9	40.0	84.8	44.0	102.5
0.4	0.5	30.0	41.9	31.4	51.0	36.6	77.0	38.6	101.7	43.7	106.0
0.5	0.6	29.6	47.2	30.7	59.0	35.6	89.5	37.7	115.0	41.5	139.3
0.6	0.7	29.2	53.3	30.2	66.6	34.9	101.2	37.0	127.6	40.5	157.7
0.7	0.8	28.8	59.0	29.8	73.8	34.3	112.3	36.2	142.0	39.7	175.2
0.8	0.9	28.5	64.5	29.4	80.6	33.8	122.9	35.5	158.0	39.0	192.0
0.9	1	28.2	71.5	29.0	88.3	33.3	134.8	34.8	173.3	38.5	205.5

**ROCK MASS STRENGTH - PROBABILISTIC STRENGTH MODEL
FIGURE D2**





Analysis conducted for specified strengths. This could have been conducted in closed form for a distributional probability of failure. A rock mass probability of failure could have been calculated for a distributed failure mode utilizing the strength distribution as given in Figure D2.

OVERALL SLOPE STABILITY W/DEFINED SURFACES

FIGURE D3

