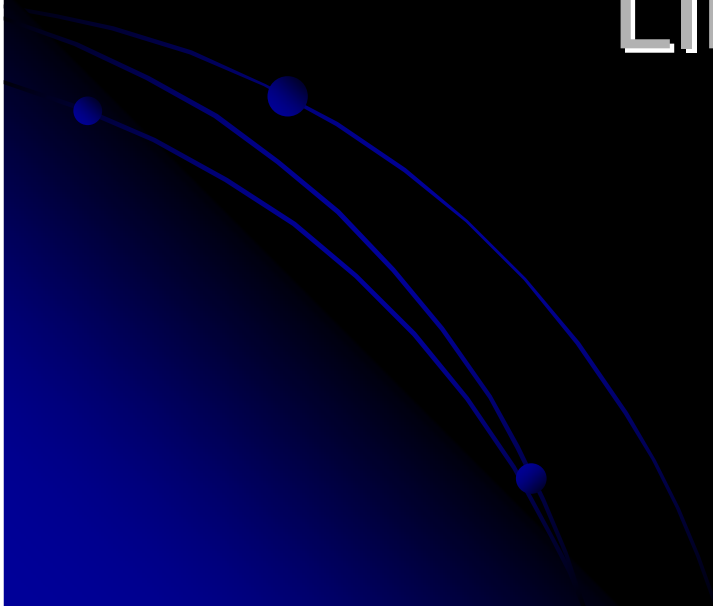
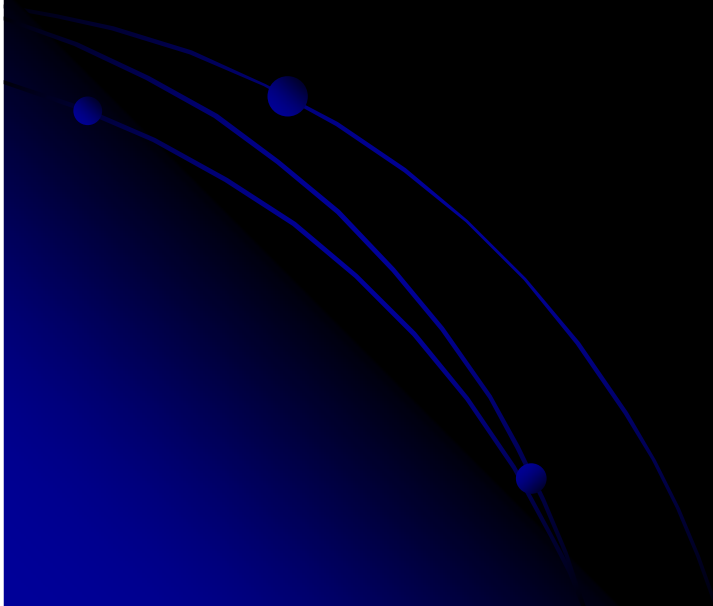


STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES



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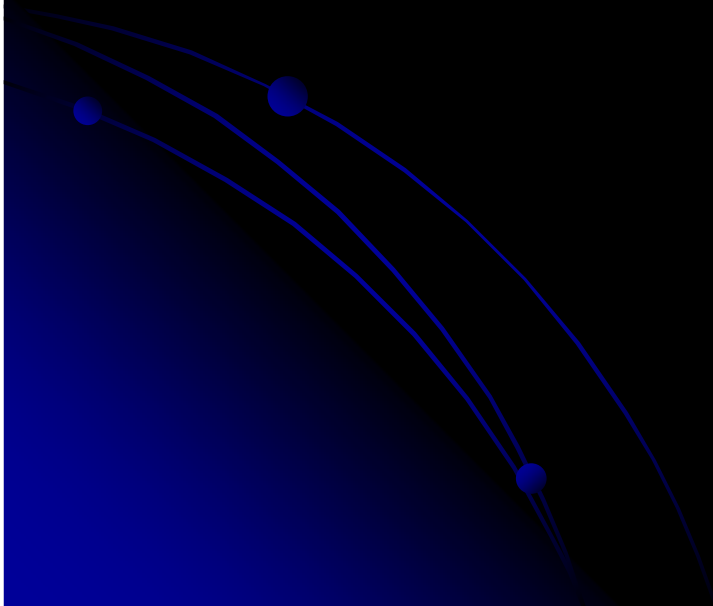
AS1726 'Geotechnical Site Investigations



STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

AS1726 'Geotechnical Site Investigations

"This investigation was carried out in general accordance with AS1726...."



STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

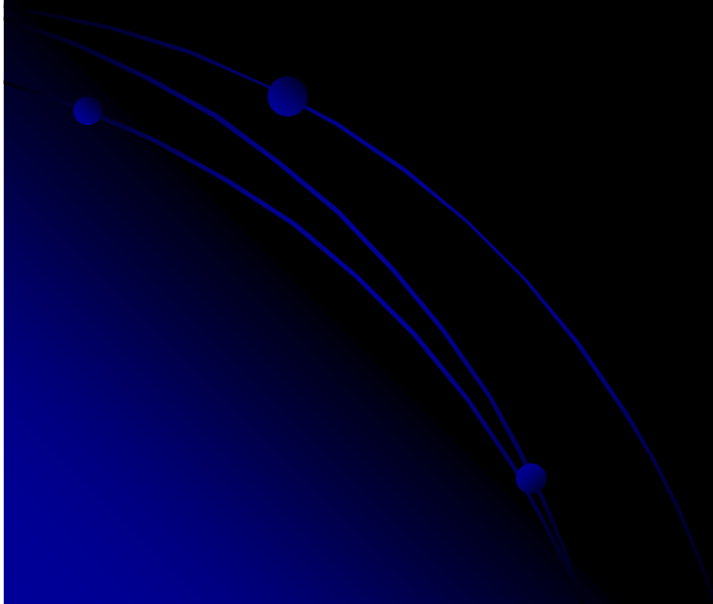
TABLE A8
STRENGTH OF ROCK MATERIAL

Term	Letter symbol	Point load index (MPa) $I_{p,50}$	Field guide to strength
Extremely low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties
Very low	VL	$>0.03 \leq 0.1$	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure
Low	L	$>0.1 \leq 0.3$	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling
Medium	M	$>0.3 \leq 1.0$	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty
High	H	$>1 \leq 3$	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer
Very high	VH	$>3 \leq 10$	Hand specimen breaks with pick after more than one blow; rock rings under hammer
Extremely high	EH	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer

STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

Rock strength commonly measured by 2 separate approaches:

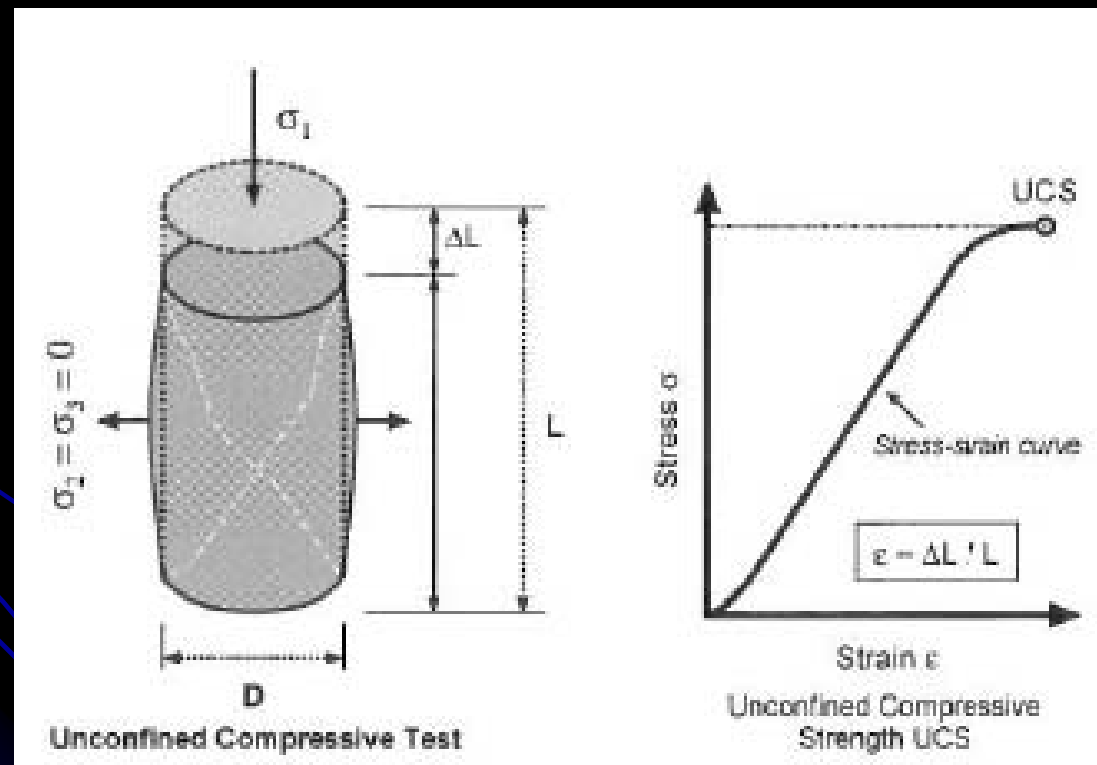
- **Direct Measurement** with Uniaxial Compressive Strength Test (UCS)
- **Indirect Measurement** for example with Point Load Index Test (PLI)



STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

- **Direct Measurement**

Uniaxial Compressive Strength (UCS) Test

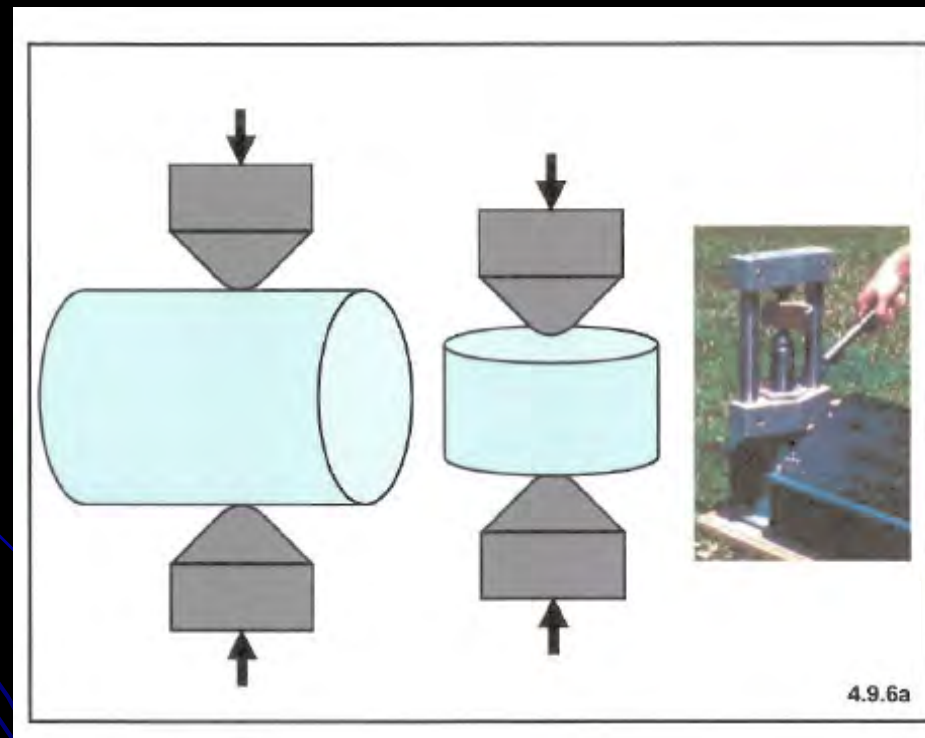


Ref: Thuro et al (2001)

STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

Indirect Measurement

The Point Load Test



STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

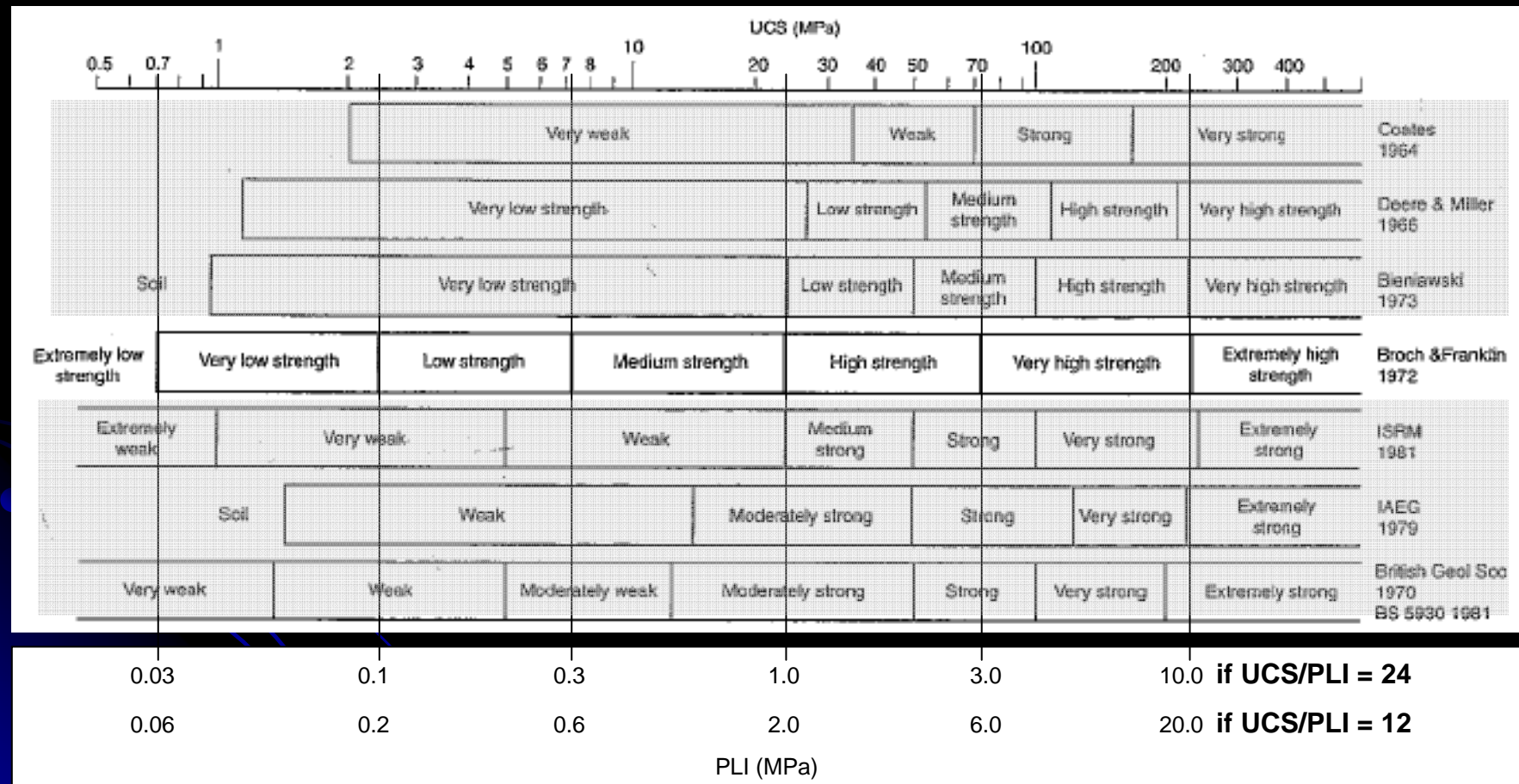
Point Load Index is proportional to shear strength, therefore:

$$UCS = C \times PLI$$

'Conventional' wisdom shows C to be of the order of 24



STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES



Ref: Hawkins (1998)

STRENGTH DESCRIPTION OF COASTAL & MARINE LIMESTONES

- Rock strength SHOULD be measured using UCS, but can't be because of AS sample length requirements ($L/D \geq 2.5$), need to use PLI
 - Many authorities caution against using PLI in 'very weak' rock ($UCS < 15\text{MPa}$)
 - With local carbonates, we have no choice, so we have to live with 'scatter' and we have to do a UCS/PLI correlation with every new site
 - Experience has shown that treatment of scatter, using linear regression, averaging and similar techniques, gives usable results for use in categorising and analysing rock masses
- 