

Geologic Considerations in Quarrying

Rock mass properties influence:

- **pit slope stability**
 - ▢ fracture set orientation and properties, and UCS, BTS, E , μ of intact rock
- **inpit mining methods**
 - ▢ cutting, ripping, breaking, drill & blast
- **drilling**
 - ▢ Drilling Rate Index (DRI), Abrasivity (VHNR), Cerchar Abrasivity Index (CAI), ...
- **blasting**
 - ▢ fracture set orientation and properties, anisotropy (I_a), porosity, density and dry sonic velocity of intact rock
- **crushing and screening**
 - ▢ Bond's Work Index (W_i), Abrasion Index (A_i), density, ...
- **aggregate quality**
 - ▢ cubicity (Flakiness Index), toughness, waste material percentage (typically fines with a high content of mica or other clay minerals)

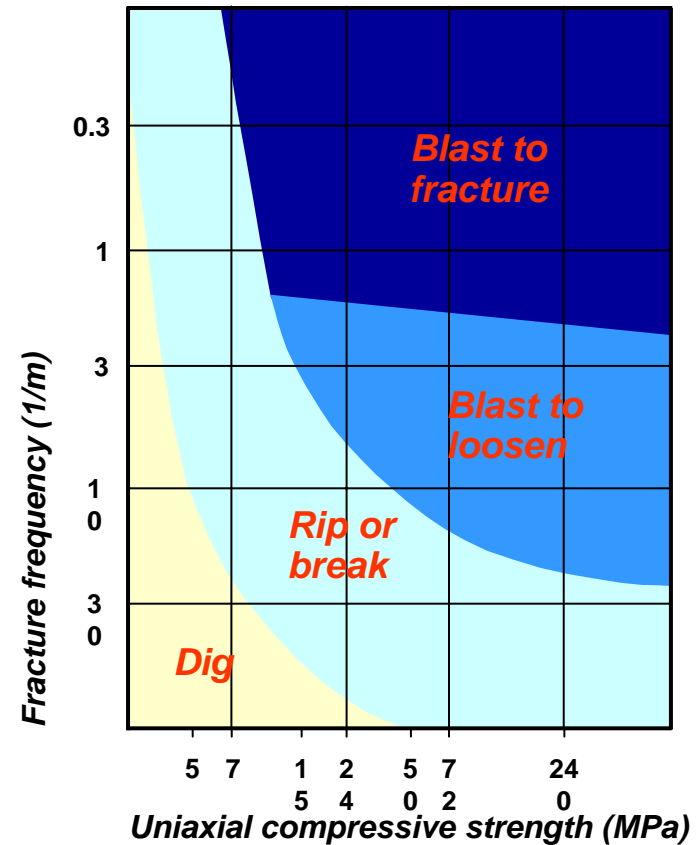


Inpit stockpiling
of waste

Geologic Considerations in Quarrying

Inpit mining methods

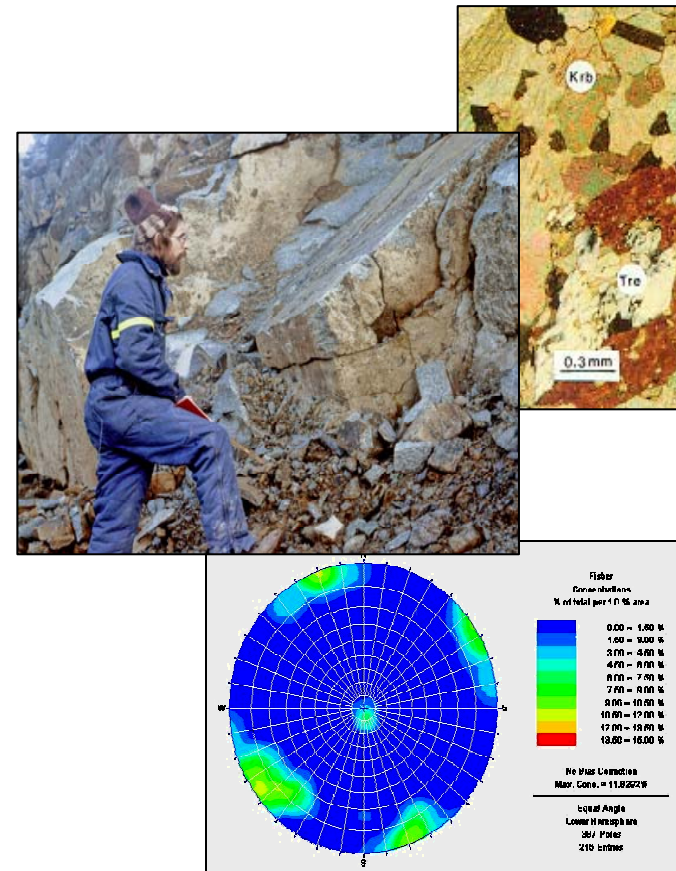
- *mechanical cutting with dragtools*
- *ripping with bulldozers*
- *breaking with hydraulic breakers*
- *fracture and loosen with drill & blast*



Geologic Considerations in Quarrying

Traditional testing of rock mass properties

- **atomic scale**
 - ▮ *chemical analysis and XRF for element and molecular content determination*
- **microscopic scale**
 - ▮ *thin section and XRD for mineral content*
- **macroscopic scale**
 - ▮ *laboratory testing of intact rock specimens:*
 - *strength properties, drillability, blastability, abrasivity, crushability, ...*
- **rock mass scale**
 - ▮ *representability of selected intact rock specimens for laboratory testing*
 - ▮ *mapping of rock mass discontinuities:*
 - *fracture set orientation and properties (strike, dip, frequency, aperture, ...)*



Geologic Considerations in Quarrying

In situ testing of rock mass properties

- *in-hole video surveys of shotholes*
- *sampling of cuttings for chemical analysis*
- *measurement-while-drilling or MWD basis for digital pit mapping*



OYO

Seeing is more than Believing

BPS No. 1, L2004-2, 15, 2004/03, 14:32:02

BIP-170

You may obtain a vast amount of information if you apply the BIP-170 to see and record the inside wall of borehole "as is".

"Seeing and Recording" the inside wall of borehole with orientated information of joints, beddings, cleavages, faults, fractures and all fabrics will revolutionarily improve the role of exploration boring.

Borehole television BIP-170 system makes it possible to obtain 360 degrees unrolled borehole wall image and store information in the computer memories; then necessary processing and analysis of the geological structures, rock fabrics, fracture distribution, and so forth can be easily carried out.

The BIP-170 system is a joint development of RAAX and OYO.

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Geologic Considerations in Quarrying

Practical rock sampling for drillability

Sample weight 10 -15 kg

Min. thickness 120 mm

Note

Rock samples should be typical for the drilling site with regard to:

- colour
- texture
- density

Additional info country

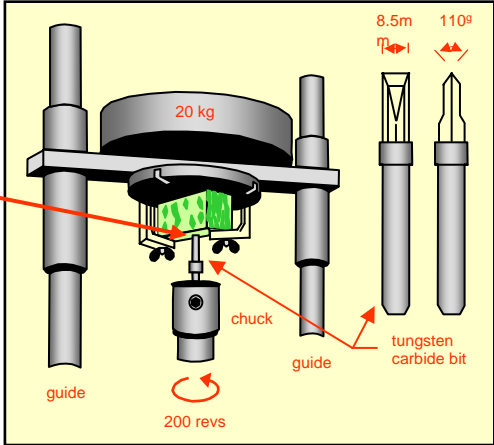
*Worksite, mine level, nearest town, province,
(Relevant drilling parameters and results)*



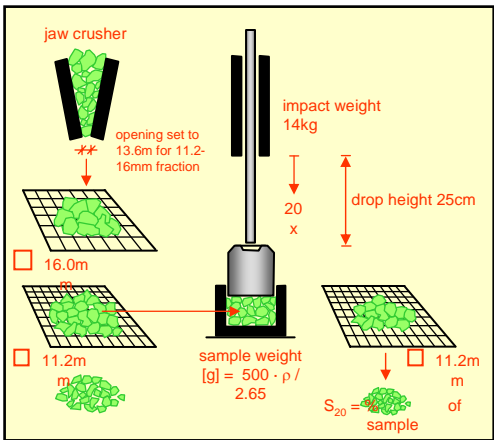
Geologic Considerations in Quarrying

Drilling Rate Index, DRI

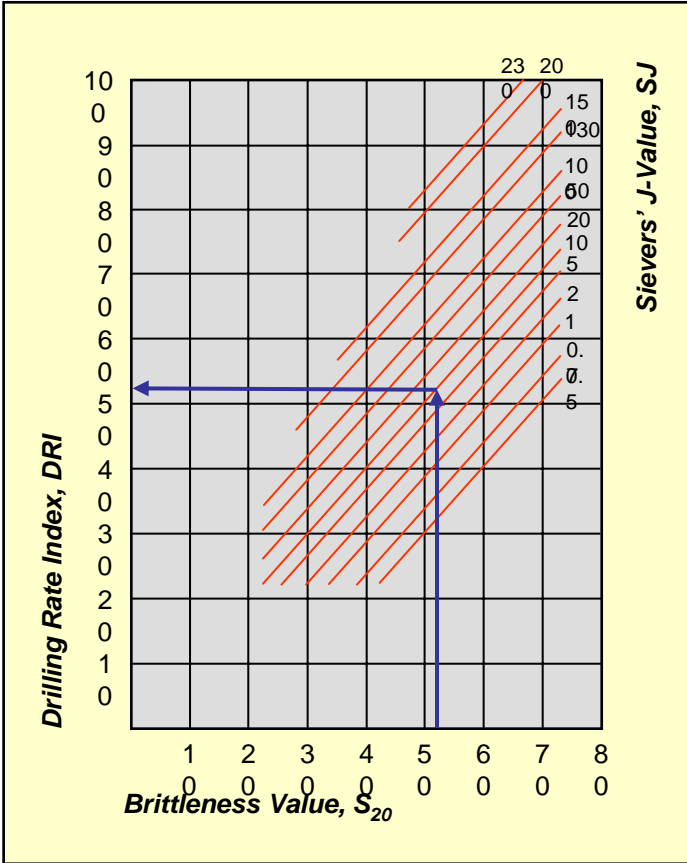
Rock surface hardness, SJ



Rock toughness, S_{20}



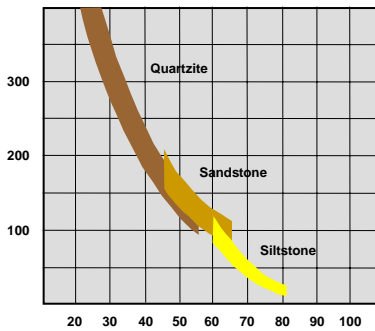
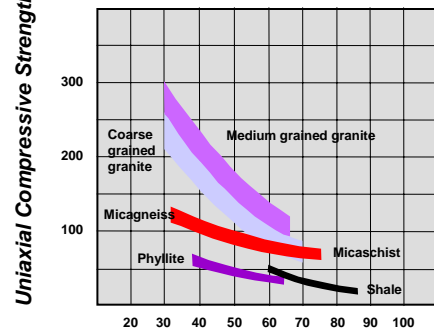
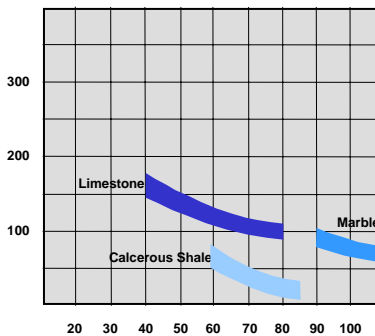
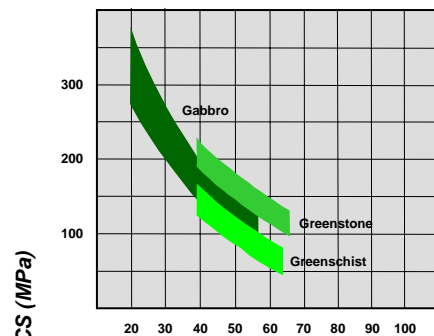
Rock drillability, DRI



Geologic Considerations in Quarrying

DRI drillability test result evaluation

- **Drilling Rate Index versus UCS**
- **detect weathered samples (SJ/VHNR chart)**



Drilling Rate Index, DRI

