

## Capability Statement

Trilab is Australasia's leading independent supplier of specialised soil and rock mechanics testing, and calibration and instrumentation services to the Asia-Pacific mining, civil construction and infrastructure industries. Two full service laboratories are maintained in Brisbane and Perth.

Trilab's accreditations (or licences) comprise:

- ▶ **NATA:** Soil and rock construction materials testing (CMT) and calibration public testing laboratory corporate accreditation for both Perth and Brisbane laboratories [Accredited Laboratory No. 9926] performing tests to Australian and International Standards
- ▶ **Quarantine:** Australian Department of Agriculture, Fisheries and Forestry permits to import, store and destroy quarantine material in Brisbane and Perth which authorises Trilab to import soil and rock samples from all countries subject to certain conditions.
- ▶ **Radiation:** Queensland Health Department licence to accept, store and test radioactive rock core and soil samples.
- ▶ **Queensland Department of Transport and Main Roads:** Registered CMT supplier.
- ▶ **Membership:** Association of Geotechnical Testing Authorities (QLD), Australian Geomechanics Society.

### Summary of Testing Capabilities

- ▶ **Triaxial testing:** Over 30 frames; specimen diameters of 50mm, 63mm, 75mm, 86mm, 100 mm; all with automated data acquisition and pore pressure measurement; run concurrently; to a maximum confining pressure of 3,500 kPa.
- ▶ **Hoek-cell high pressure triaxial testing:** For specimen diameters of NX, HQ and PQ core; with automated data acquisition and a state of the art pressure control unit of up to 50MPa.
- ▶ **Consolidation testing:** Over 30 Oedometer units, and Extended Height testing; all with automated data acquisition.
- ▶ **Direct Shear testing:** Over 19 units; up to a 100 mm square box; capable of up to 2,500 kPa normal pressure; surface profiling; all with automated data acquisition.
- ▶ **Rock Strength testing, including UCS, modulus, P and S Wave (Sonic Velocity) testing and Direct Tensile testing:** 7 compression machines; 4 extensometers; strain gauge capability; 2 Sonic Velocity units, 1 Direct Tensile unit; 3 advanced end grinders.
- ▶ **Cerchar Abrasivity testing:** In accordance with ASTM International standards.
- ▶ **Permeability testing:** Over 20 falling-head units; over 15 constant-head units; over 10 dedicated Triaxial Permeability units.
- ▶ **Classification and index testing:** Including Particle Size Distribution (PSD), Hydrometer, Atterberg Limits, Shrink/Swell, Compaction, CBR and dispersion.
- ▶ **Aggregate Testing: In accordance with AS 1141 and local authority standards:** Including LA Abrasion, Aggregate Soundness, Wet/Dry Strength variation, Degradation Factor, etc.
- ▶ **On-site / off-site calibration:** Large range of engineering metrology equipment, including weighing, pressure and force measuring devices; testing machines, test sieves and ancillary testing equipment for CMT.

## Schedule of Services

### Triaxial Strength and Consolidation (Soils)

- ▶ QU - Unconfined Quick Undrained Compression Test - Up to 100mm.
- ▶ QU - Unconfined Quick Undrained Compression Test - Up to 100mm with Young's Modulus.
- ▶ UU - Confined, Unconsolidated, Undrained - 50mm to 100mm (single or multi stage).
- ▶ CU - Saturated, Consolidated, Undrained with Pore Water Pressure Measurement - 50mm, 63mm, 75mm, 86mm, 100mm (single or multi stage); 3,200 kPa Effective Cell Pressure.
- ▶ CU - Saturated, Consolidated, Undrained with Pore Water Pressure Measurement - extra strain (single or three stage).
- ▶ CD - Consolidated Drained with Pore Water Pressure Measurement - 50mm, 63mm, 75mm, 86mm, 100mm (single or multi stage); 3,200 kPa Effective Cell Pressure.
- ▶ Direct Shear on cohesive material / rock core (single or multi stages).
- ▶ Direct Shear on cohesionless material (single or multi stages).
- ▶ Oedometer - Up to eight stages (including Particle Density); additional stages upon request.
- ▶ Extended Height Oedometer / Consolidation / Settlement.

### Classification

- ▶ Visual Classification.
- ▶ Moisture Content.
- ▶ Atterberg Limits (including Linear Shrinkage).
- ▶ Percentage Fines.
- ▶ Particle Size Distribution - 4.75mm to 0.075mm, 75mm to 0.075mm.
- ▶ Particle Size Distribution with Hydrometer (including Particle Density).
- ▶ Shrink / Swell Index and Shrink / Swell Index with Swell Pressure (single stage).
- ▶ Apparent Particle Density (Specific Gravity).
- ▶ Unit Weight.

## Permeability

- ▶ Falling Head.
- ▶ Constant Head.
- ▶ Triaxial Constant Head.

## CBR and Compaction

- ▶ Maximum Dry Density - Standard or Modified.
- ▶ Soaked CBR.
- ▶ Soaked CBR (10 day soak).
- ▶ 4 Point CBR (Main Roads).
- ▶ Unsoaked CBR.
- ▶ Maximum/Minimum Dry Density.

## Dispersion and Chemical

- ▶ Percentage Dispersion (Double Hydrometer).
- ▶ Emerson Class Number.
- ▶ Pinhole Dispersion.
- ▶ pH / Conductivity / Salinity.
- ▶ pH Lime Demand (eight points).

## Aggregates

- ▶ Particle Size Distribution: Sieving Method.
- ▶ Wet / Dry Strength Variation.
- ▶ Los Angeles value.
- ▶ Flakiness Index.
- ▶ Degradation Factor.
- ▶ Crushed Particles.
- ▶ Average Least Dimension Direct measurement.
- ▶ Average Least Dimension - Calculation (nomograph).
- ▶ Aggregate Crushing Value.
- ▶ Materials finer than 75 Microns.

## Rock

- ▶ Point Load Index.
- ▶ UCS with photograph.
- ▶ UCS with Young's Modulus and Poisson's Ratio.
- ▶ Indirect Tensile Strength (Brazilian).
- ▶ Rock Porosity and Density.
- ▶ Slake Durability.
- ▶ Slaking and Dispersion Potentials.
- ▶ Hoek Triaxial (single or multi stages) (NX, HQ, PQ).
- ▶ Sonic Velocity (P and S Wave).
- ▶ Cerchar Abrasivity.
- ▶ Direct Tensile to ASTM International standards.

## Playing Field Material Assessment

- ▶ Water Holding Capacity.
- ▶ Saturated Hydraulic Conductivity.
- ▶ Porosity Computations.
- ▶ Compatibility Computations.

## Aggregates (Cont'd)

- ▶ Particle Shape by Proportional Calliper.
- ▶ Aggregate Soundness - Evaluation by exposure to sodium sulphate solution.
- ▶ Weak Particles.
- ▶ Clay and Fine Silt (settling method).
- ▶ Organic Impurities other than sugar.
- ▶ Particle Density and Water Absorption - Fine Aggregate.
- ▶ Particle Density and Water Absorption - Coarse Aggregate.
- ▶ Bulk Density of Aggregate (Unit Mass).
- ▶ Crushing - Core / Rock Spalls.
- ▶ Atterberg Limits - Cone Penetrometer.

## Calibration and Instrumentation Services

NATA calibration of:

- ▶ Dial Gauge to NATA Construction Materials Testing, and AS2103 - 1978 *Dial Gauges and Dial Test Indicators (Metric Series)* requirements.
- ▶ Electronic Balances.
- ▶ Load Cell / Proving Ring.
- ▶ Electronic and vernier callipers - Up to 300 mm.
- ▶ Extensometer.
- ▶ Concrete Testing Machine.
- ▶ Materials Testing Machine - Compression to 3MN or Tension to 100kN.
- ▶ Pressure Gauge / Transducer.
- ▶ Rubber hardness.
- ▶ Test Sieves.