BS 2010/002

BENEFIT STATEMENT

Case Analysis

MARKET SECTOR

Mining Industry

APPLICATION

Thick Lift Compaction

PROJECT PHASE

Design Phase

maximizing the use of on-site materials, eliminating the need to import alternative material

PROJECT and GEOLOGICAL REVIEW

This design project refers to the haul road design of a new Uranium mine located near Swakopmund, on the west coast of Namibia.

The project is the largest in-situ and highest grade granite-hosted uranium deposit in Namibia and currently the fifth largest uranium-only deposit in the world.

The area is a semi-arid region with an extremely dry sandy material (desert-like) of very poor quality.

DESIGN REVIEW and ALTERNATIVE PROPOSAL

The original Haul Road design included the following:

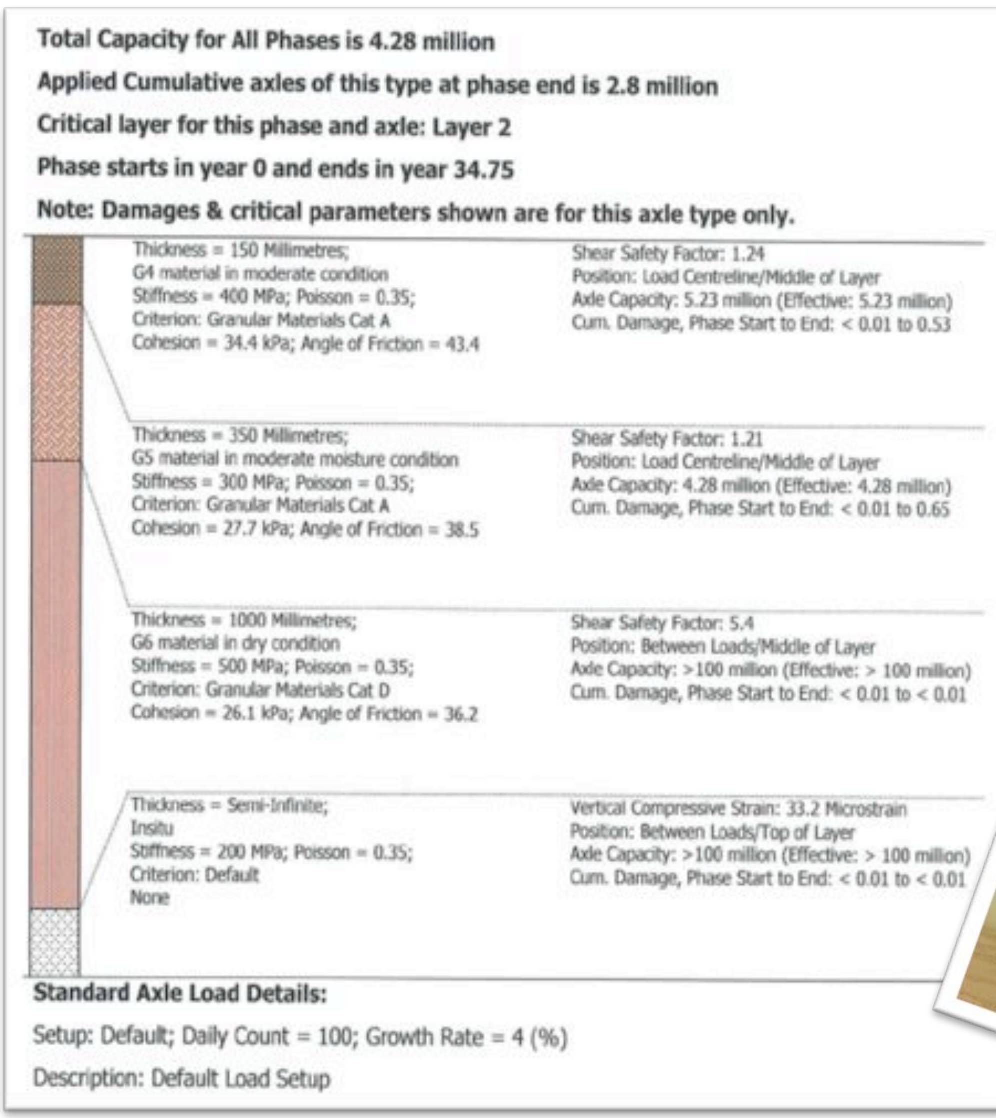
- 1000mm layer of rockfill directly on top of "untreated" in-situ material (G6 equivalent used in the analysis).
- 350mm of a granular material predominantly characterized by rock (G5 equivalent used in the analysis).
- 150mm wearing course (G4 equivalent used in the analysis).

The problem associated with the design was the fact that the rock/granular material was not available on site and would have to be hauled in from a quarry quite a distance away. In addition to the unavailable site material, crushing facilities would be required to control the particle size required for the construction of the layerworks conventionally.

The use of impact compaction would offer great advantages in the construction of the original design in that, with thicker layerworks, minimal crushing would be required, reducing the construction phase of the haul road whilst offering a stronger longer life platform.

With G5 being widely available on site, the benefits of utilising impact compaction using available materials and thick lift compaction became apparent, as depicted in the revised design. Substituting the multiple "granular/rockfill" layers with two single G5 layers, each being 750mm thick, not only saved on material hauling and crushing and pavement construction but also resulting in a longer life pavement when compared under standard axle loading criteria.

ORIGINAL DESIGN ANALYSIS



ALTERNATIVE DESIGN ANALYSIS

Total Capacity for All Phases is > 100 million

Applied Cumulative axles of this type at phase end is 2.8 million

Critical layer for this phase and axle: Layer 1

Phase starts in year 0 and ends in year 34.75

Note: Damages & critical parameters shown are for this axle type only.

Thickness = 1500 Millimetres;
GS material in moderate moisture condition
Stiffness = 300 MPa; Poisson = 0.35;
Criterion: Granular Materials Cat A
Cohesion = 27.7 kPa; Angle of Friction = 38.5

Shear Safety Factor: 3.8
Position: Between Loads/Middle of Layer
Axle Capacity: >100 million (Effective: > 100 million)
Cum. Damage, Phase Start to End: < 0.01 to < 0.01

Thickness = Semi-Infinite;
Insitu
Stiffness = 200 MPa; Poisson = 0.35;
Criterion: Default
None

Vertical Compressive Strain: 37.5 Microstrain
Position: Between Loads/Top of Layer
Axle Capacity: >100 million (Effective: > 100 million)
Cum. Damage, Phase Start to End: < 0.01 to < 0.01

Standard Axle Load Details:

Setup: Default; Daily Count = 100; Growth Rate = 4 (%)

Description: Default Load Setup

SAVE UP TO 50% OF ORIGINAL EXPECTED COST.

SUMMARY

- Eliminating the need to haul and crush imported material.
- Superior subgrade strength.
- Longer life pavement.
- Construction time savings.
- Substantial cost savings.