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Civil Engineering

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**EXPLORING THE
CRITICAL STATE OF
TAILINGS DAMS**

**THE SECTOR
WEIGHS IN ON THE
2022 BUDGET**

**A GEOTECHNICAL
ENGINEERING
DATABASE FOR SA**



Successful Keller basement project supports new V&A development

Keller Geotechnics SA recently called on its experience to prevail over an array of challenges to deliver a 10 m deep three-level basement at the V&A Waterfront Parcel M site in Cape Town.



Installing soil nails



Installing the last rock bolts

The site is located in a prime location within the Cape Town Waterfront, off Dock Road, where Keller Geotechnics SA has completed a number of successful and challenging projects.

PROJECT SCOPE

Keller Geotechnics SA's project scope entailed the construction of a three-level basement with a depth up to 10 m, explains Contracts Manager Daryn Cloete.

The client and developer, V&A Waterfront Holdings, awarded the contract in July 2021 and the project was completed in December 2021.

The project included rock breaking, carting away and the construction of the lateral support works. The basement comprised 2 844 m² of lateral support and approximately 52 900 m³ of earthworks. A section of the basement wall was shared with the neighbouring property basement, requiring this existing wall be underpinned.

NOT WITHOUT CHALLENGES

Cloete explains that the sequence of the works, with removal and relocation of services, meant that plant was required at different periods of the contract as and when the programme dictated. Unknown live services running through the site meant the sequencing of works was changed frequently to quickly suit the relocation process and maintain continuity of works.

Below the clayey silt sand, which was approximately 1.5 m below ground level, was the Malmesbury bedrock, which turned out to be slightly weathered to unweathered hard to very hard rock. A total of 52 900 m³ of material, mostly hard rock, was removed from the site. Breaking the 70 MPa rock on site made it difficult to stick to earthworks production targets. Despite the numerous challenges, the six-month project – which commenced on 29 June 2021 – was completed on time and within budget.

A big factor contributing to the success of the project was the way in which the Keller



Hard rock and water challenges



Lateral support complete

team managed the constant challenges, while keeping their focus on the main task at hand, which was to create enough area for the subcontractor, Ross Demolition, to break and remove rock.

To prevail over these challenges, Cloete says, “we kept tackling the challenges as they arose and continued to push forward as a team. Due to great teamwork of the crew, led by Sandiso James, the contract was completed well within the stipulated timeframe. A big thanks to IGUAL Project Managers, RLB Pentad Quantity Surveyors and Sutherland Consulting Engineers, whose input and expertise contributed hugely to the success of this project.”

For more information

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Lateral support parallel to Dock Road

SOLUTIONS TO EVERY GEOTECHNICAL CHALLENGE

Keller provides solutions to a wide range of geotechnical challenges across the entire construction spectrum.

Improve bearing capacity

Transferring loads to deeper more competent layers through:

- Bearing capacity/settlement control: Soils often need treating to support the weight of a building or to withstand the loads imposed by a piece of infrastructure. This can mean improving the ground or putting in foundations to transfer the loads to deeper more competent layers.
- Liquefaction mitigation: Liquefaction is a common problem in earthquake-prone areas where soils lose strength due to the ground motion and behave like a viscous liquid, damaging overlying structures.
- Heavy foundations: Weak, compressible soils may require structural elements, specifically heavy foundations, that transfer loads through to underlying competent soils or rock.
- Heave control: When wet soils swell and can't expand downwards or sideways, the soil rises and exposes the upper surface. While displacement may be relatively small, ground heave can lead to serious structural damage.
- Re-levelling structures: The gradual downward movement of a building or structure can result in damage. Re-levelling techniques bring buildings back to their correct levels,

strengthening any weak ground under and around the foundations and avoiding any recurring sinking issues.

- Underpinning: Underpinning provides additional support to existing foundations that are unable to safely support existing or future loads.

Containment

It is often desirable to prevent the migration of contamination in the ground, or to prevent seepage from a dam or levee. Keller has a wide range of techniques that can be adapted to form an appropriate sealing or cut-off barrier.

Excavation support

During construction it is often necessary to form a stable excavation and ensure that any associated movement will not damage neighbouring structures or utilities. Keller offers flexible solutions to solve even highly complex excavation support problems for both temporary and permanent conditions.

Marine structures

Keller offers a full range of services for the marine construction market, including the design and construction of new ports, jetties and quays as well as the extension and restoration of existing structures. We also have solutions for tidal barriers and coastal protection schemes.

Remediation

Increasing land shortage is driving a need to use more brownfield and marginal land often requiring groundwater and soil remediation to reduce contaminants. Keller offers the optimal solution to make contaminated land suitable for re-use.

Seepage control

Major civil engineering schemes often involve working below the water table. Controlling or preventing water seepage is vital to allow construction to proceed. Keller has a range of techniques to deploy to provide effective cut-offs and to seal joints and fissures in the ground or below ground structures.

Stabilisation

Unstable ground can cause instability, both in temporary and permanent cases. Keller has a range of solutions that can be deployed to strengthen the soils.

Slope stabilisation

Slope stabilisation is often required to retain soil in natural, unstable, or man-made excavations. Keller draws on its extensive experience with the full range of techniques to provide optimal slope stabilisation solutions for various projects.