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ROAD INFRASTRUCTURE REPORT: A DEEP DIVE INTO SA'S ROADS – PART 2

THREADING A NEEDLE: LUMWANA MINING COMPANY CV3 CONVEYER REPAIRS

 **KELLER**



ON THE COVER

Along the tranquil shores of Muizenberg, a remarkable transformation is underway as a derelict old building yields to the promise of progress. Aptly named Wavescapes, this upmarket apartment development heralds a vibrant era, and Keller's flexible approach is paving the way for a solid foundation for the project. Keller's geotechnical experience takes centre stage, navigating the geotechnical complexities of this landmark project with flexibility and expertise.



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ON THE COVER

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▶ Keller is revolutionising the landscape of Muizenberg with unparalleled expertise on the Wavescapes project (Photo courtesy of Evan Oldknow)

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Tides of innovation: Keller's geotechnical brilliance at Muizenberg

Along the tranquil shores of Muizenberg, a remarkable transformation is underway as a derelict old building yields to the promise of progress. Aptly named Wavescapes, this upmarket apartment development heralds a vibrant era, thanks to the ingenuity of specialised property developers, Absolute Capital. As the tides of innovation rise, Keller's geotechnical experience takes centre stage, navigating the geotechnical complexities of this landmark project with flexibility and expertise.



Roger Feldmann
Business Development
Keller Geotechnics SA

At the heart of the Wavescapes project lies Keller's unwavering commitment to pushing the boundaries of geotechnical engineering. Like skilled navigators, the team embraced the challenges presented by the site's tricky geological history and the remnants of numerous previous developments while competing with groundwater intercepted by cutting into the steep mountainous terrain. Amidst the echoes of past structures surfacing during demolition, Keller's flexible approach came to the forefront, paving the way for a solid foundation for Wavescapes.

SAILING THE GEOTECHNICAL SEAS

The Wavescapes development presented a multifaceted challenge for our geotechnical engineers. The site's history had left it underlain by a complex layer of colluvial and talus boulders, overlying the Table Mountain group sandstone located between 7 m and 10 m below the original ground level. The phreatic surface was located at 0 m to 2 m below original ground level which makes the design and operations extremely challenging.

A SYMPHONY OF TECHNIQUES: THE TIDES OF INNOVATION

The title "tides of innovation" aptly encapsulates the plethora of geotechnical techniques Keller employed to overcome the obstacles encountered at Wavescapes. To support the basement excavation, which

Powerful rotary piling rigs were deployed to install the main piles to support the building, penetrating the underlying boulders



ranges from 3 m to 5 m in depth, a series of soldier piles was strategically installed along the site's perimeter, using a blend of traditional continuous flight auger piles in less challenging areas and the robust 357 mm ODEX type piles in regions affected by stubborn boulders. This combination of perimeter piles was united by a capping beam, forming the backbone of this well-supported basement structure.

The old existing retaining walls above the basement were bolstered with walers and grouted anchors to ensure overall slope stability during construction. The concept of incorporating the existing retaining wall systems was both practical and cost effective. In some areas, the natural ground was battered back and supported using traditional shotcrete and soil nail techniques.

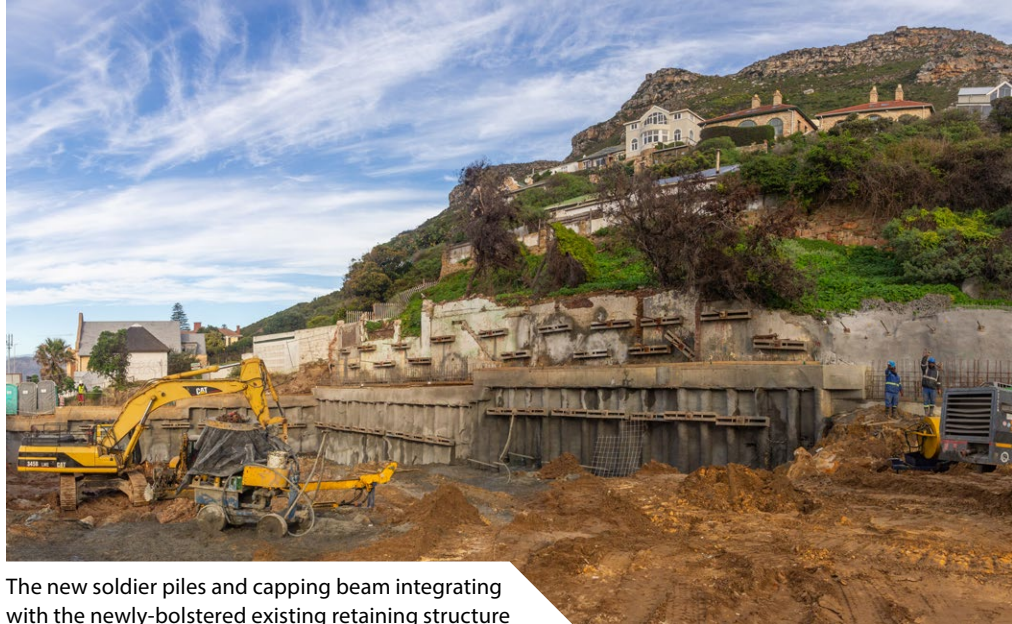
Keller's package also included the piling for the new apartment building within the excavation. These piles were installed from road level before excavation commenced, ensuring continuity and unrestricted access for the large piling equipment. The foundation piles, ranging from 750 mm to 900 mm, were installed using temporary cased bored piles, stubbornly woven through the boulders and firmly anchored into the sandstone below. The piles were concreted underwater using the tremie method, adding another specialist technique to the mix. With the shallow bedrock levels, the sockets had to be designed to resist seismic lateral loading and bending moments, in addition to the typical axial loads.

CONQUERING BOULDER CHALLENGES: A TESTAMENT TO FLEXIBILITY

The site's underbelly rests upon a colluvial and talus boulder layer, overlaying the steadfast sandstone of the Table Mountain group. Constructing in this type of geology, and working within the tight confines of this iconic site, presented a unique test of Keller's adaptability. The team deployed high-powered excavators, clearing gravel boulders wherever possible. Yet, like a seasoned captain changing course to navigate turbulent waters, Keller embraced the challenge posed by certain unyielding boulders with precision and expertise. The pile type often had to be tailored to penetrate these boulders and secure the piled foundations into the sandstone formation below, ultimately steering Wavescapes toward success.

JIM OLDKNOW: A BEACON OF LEADERSHIP

The success of the basement solution and construction methodology at Wavescapes owes much to the experience of Keller's Senior Contract Manager, Jim Oldknow. With an impressive 36-year track record in providing turnkey basement packages for challenging sites, Jim's expertise was the driving force behind the innovative approach taken at Wavescapes. Backed by Keller's in-house design team and the engineering team from Shelly Maritz Consulting, Jim's vision ensured that the project was equipped to tackle the complexities presented by the unpredictable saturated and boulder-laden terrain. His unparalleled experience served as the compass that guided the project to success, firmly etching his legacy into the foundations of Wavescapes.



The new soldier piles and capping beam integrating with the newly-bolstered existing retaining structure

A "TURNKEY" ENABLING WORKS PACKAGE

This project is yet another shining example of Keller's ability to produce a "turnkey" enabling or early works package, setting the site up for the main contractor to build the main structure. By taking charge of lateral support, piling, bulk excavation, and the strategic placement of foundations, we facilitated a seamless transition for the main contractor. Our turnkey package not only streamlined the construction process, but also minimised potential delays and risks, showcasing our unparalleled commitment to project efficiency and success.

PIONEERING GEOTECHNICAL BRILLIANCE

At Keller, we take immense pride in our recent involvement in the Wavescapes Project – a visionary development that aims to transform Muizenberg's urban landscape. Over the years, we have become synonymous with delivering exceptional geotechnical solutions, and Wavescapes presented us with a unique

challenge that allowed us to showcase our expertise and innovation.

In the wake of a remarkable transformation at Wavescapes, Keller's geotechnical brilliance shines as a guiding light. Navigating through the complexities of Muizenberg's landscape, Keller's flexible approach and diverse techniques have laid a solid foundation for the upmarket apartment development. Jim Oldknow's expertise has been instrumental in charting this course to success. As we set sail for new horizons, Keller remains committed to engineering excellence and innovation, propelling us forward as leaders in transformative geotechnical engineering along South Africa's picturesque coastlines.

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One step at a time: careful planning and logical construction sequence is essential

