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Aerial photograph by Evan Oldknow

TIDES OF INNOVATION: KELLER'S GEOTECHNICAL BRILLIANCE AT MUIZENBERG

By Roger Feldmann at Business Development: Keller Geotechnics SA

Along the tranquil shores of Muizenberg, Cape Town, 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 developer 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.

Like skilled navigators, the Keller 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 the apartment block.



(Above): The new soldier piles and capping beam integrating with the newly-bolstered existing retaining structure.

SAILING THE GEOTECHNICAL SEAS

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

A SYMPHONY OF TECHNIQUES: THE TIDES OF INNOVATION

Keller employed a plethora of geotechnical techniques to overcome these obstacles. To support the basement excavation, which was 3-5m deep, 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 robust 357mm ODEX-type piles in regions affected by stubborn boulders. This combination of perimeter piles was united by a capping beam, forming the backbone of the well-supported basement structure.

The existing old 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 included the piling for the new apartment



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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



(Above): Powerful rotary piling rigs were deployed to install the main piles to support the building, penetrating the underlying boulders.

750-900 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 typical axial loads.

CONQUERING BOULDER CHALLENGES: A TESTAMENT TO FLEXIBILITY

The site's underbelly rested 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

COVER STORY

site was 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 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, he was the driving force behind the innovative approach taken by Keller's in-house design team and the engineering team from Shelly Maritz Consulting.

A "TURNKEY" ENABLING WORKS PACKAGES

The project was another 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

(Right): One step at a time: careful planning and a logical construction sequence were essential.



the main contractor. Our turnkey package not only streamlined the construction process, but minimised potential delays and risks, showcasing our 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 allowed us to showcase our expertise and innovation.

Navigating the complexities of the Muizenberg landscape, Keller's flexible approach and diverse techniques have laid a solid foundation for the upmarket apartment development, while Oldknow's expertise was instrumental in charting this course to success. As we set sail for new horizons, Keller remains committed to excellence and innovation in transformative geotechnical engineering along South Africa's picturesque coastlines. ■

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Photos by Thomas Ferreira:
www.thomasfphotography.co.za

