

90 Grayston

Design & Construct a Lateral Support system for the basement excavation works of an office block in Sandton, South Africa



Project Facts

Owner

Redefine Properties

Client

Redefine Properties

Consultant

Sutherland Engineers

Quantity

- * 3 700m² Gunite & Anchors
- * 90 No. Soldier Piles
- * 24 No. Foundation Piles

Period of time

24th June to 24th September 2012

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The project required the design and construction of a lateral support system to the basement excavation works with 6 No. basement levels to a maximum depth of 18m below natural ground level. This site is underlain by Archean granites, typically found in the Sandton area of Johannesburg Granite Dome.

Based on the available information, the most viable solution proposed was the Anchored Soldier Pile Lateral Support System. The solution consisted of 600mm diameter straight shaft auger piles installed at 2.5m spacing with a minimum 1.5m toe in level below final excavation level with active strand anchors and 125mm thick reinforced gunite arch spanning the piles.

Designing the lateral support system was difficult due to the close proximity of the neighbouring buildings situated 3.4m and 4.5m away on the western and eastern boundaries of the site respectively, both having basement parking not accessible for the use of "dead-man" anchors.

The design proposal was to install a series of soil nails in the upper section of the retained soil wedge, which acted more as a soil improvement system rather than a lateral restraining system, followed by strand anchors below.



Product Description

3 770m² Lateral Support

Basement comprising of:

- J 90 No. Soldier Piles
- J 280 No. Strand Anchors
- J 150 No. Rock Bolts
- J 24 No. Foundation Piles
- J 50 500m³ to spoil
- J 6 750m³ Hard Rock Blasting

A few challenges were encountered during the construction phase of the project. Water from leaking services and neighbouring properties irrigation systems called for the urgent redesign of anchor components. Longer and higher capacity anchors were provided for the Northern face as well as accelerator additives for the gunite mix.

A rock outcrop was encountered at the location of the final access ramp position. This called for restricted blasting operations in order to protect surrounding properties while still adhering to programme constraints. On-site alternative solutions were applied resulting in an acceptable project completion date.

