



Phomolong Substation - Tembisa

Project Overview

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| Project & Location | - | Phomolong Substation, Tembisa |
| Product | - | Bosun Robust Block |
| Wall Area | - | 740m ² |
| Wall Height | - | 3m |
| Wall Angle | - | 80 Degrees |
| Engineer | - | Bosch Projects (Pty) Ltd |
| Contractor | - | Zizwe DSD (Pty) Ltd |
| Completion Date | - | July 2020 |



Located in a rural settlement within the Ekurhuleni municipality, the Phomolong Substation was a much-needed infrastructural upgrade for the surrounding communities.

The slope of the terrain and the scope of the project required numerous walls (mostly cut walls) throughout the development. As these cut walls needed to be constructed at the boundary edges of the site, there was limited space for conventional geogrid reinforcement. Due to these space constraints, a no-fines concrete was specified for the project.

No-fines concrete has readily been used in CBR wall designs where excavation space is severely limited, and has been found to be a viable economic solution for walls not exceeding 3m - depending on the availability of resources. The no-fines concrete backfill width varied from 300mm-600mm on this project. This was a considerable space saving factor when compared to using a geogrid reinforcement at a length of $0.7 \times H(\text{wall})$.

In addition to the tight space constraints behind the walls, underground water seepage was discovered from the neighbouring settlements during the initial excavation. The concern was to make sure this water would not affect the structural integrity of the outlined retaining walls. To overcome these concerns, the no-fines concrete would also need to provide adequate drainage once casted.



A no-fines concrete mix requires a specified mix-design - eliminating fine material sand from the mix, that once hardened, has a higher permeability than standard concrete mix-designs. For CBR walls this is an advantage because the no-fines concrete allows any water seepage to permeate through the concrete and can then be captured by weep holes situated at the base of the wall.

The design of walls therefore had to incorporate weep holes to ensure sufficient drainage. Certain sections of the wall were closely monitored once installed. Water draining from out the weep holes provided evidence that the no-fines concrete was draining the water sufficiently.

Wall details:

Mostly cut walls:

- Length - 450m long
- Average height - 1.65m
- Area - 740m²
- Configuration: Open (5.1 blocks/m²)
- No-fines concrete strength: 25Mpa
- No-fines concrete width: 300-600mm
- Loading considerations: Boundary wall (2.1m brick wall with foundation)

