

# SS Construções pioneers top-down methodology

## and use of Kelly Bar system in Mozambique

Source: Luis Gaspar, SS Construções (Moç) Lda alternate director

*The Anadarko Phase 2 construction project comprised of the design and construction of a seven-storey building in central Maputo, Mozambique. The client required the building to be completed in a twelve-month programme, which required strategic thinking to overcome some of the challenges presented to the project team.*

These challenges included Mozambique's restrictive land laws; the proximity of the site to other buildings in the area (which meant that noise needed to be kept to a minimum and working hours were restricted to daylight hours); and the substantial scope of work that needed to be completed within a short timeframe of just twelve months.

"All land in Mozambique is state owned and leased from the government for a fifty-year period," explains Luis Gaspar, SS Construções (Moç) Lda alternate director. "The traditional method of using soil anchors, which would normally be placed on neighbouring land, would have resulted in delays as we sought permission from each affected neighbour – who would most likely consult their own engineers before granting us permission to proceed. This would have taken much more time than we had available."

SS Construções and its piling subcontractors evaluated several potential proposals which would enable it to remain on schedule while also minimising the impact on neighbouring properties. "This resulted in our employing an ingenious 'top-down' construction system, a methodology that would result in substantial saving on time – and a first for Mozambique," says Gaspar. The top-down system at the Anardarko Phase 2 project consists of a perimeter of sixteen-

metre-deep concrete piles on three sides of the structure. The steep incline at the back of the building meant that no concrete piles were required there.

The final structure makes use of lateral support walls of bored piles in reinforced concrete and these piles must be braced in order to support the soil. To decrease construction time, SS Construções' engineers employed a concrete slab band at -2 level. This slab allowed contractors to continue building upwards while downward excavations were still underway, dramatically reducing construction time and the impact on neighbouring land.

"The piling itself was also a challenge, and a standard gear phase was used on the perimeter, whereas the Kelly Bar system was employed for the remaining piles," says Gaspar. "This is a first in Maputo, and a unique accomplishment for SS Construções." The only minor drawback to implementing the top-down approach was that the basement parking structure needed to be redesigned – the parking spaces needed to be adjusted to cater for concrete piles that were 200mm wider on each side.

Despite the short production timeframe and the use of new techniques, there were no safety incidents, and the project was completed on time. The top-down system has the potential to change the way that buildings are constructed in Maputo, especially for projects that have strict time considerations. "This methodology is equivalent in price to other techniques, however, drastically cuts down on building time," says Gaspar. "We are extremely excited at the potential this approach has, and are already implementing it on another one of our projects."

#### Captions:

1. The front façade of the Anadarko building, as viewed from the main road.
2. A rear view of the Anardarko building showing the parking levels and office floors.





## Top-down construction methodology adopted for multipurpose building in Maputo

Source: Luis Gaspar, SS Construções (Moç) Lda alternate director

*SS Construções (Moç) Lda is currently constructing a multipurpose building for its client EMEM in Maputo, Mozambique. The project includes the construction of three underground parking levels, six floors of office space and ten floors of apartments, with two high-spec apartments per floor.*

*The project commenced in September 2018 and is scheduled to be completed in March 2020.*

### Top down system

The soils were contained through the installation of piles on all four sides of the building. In order to keep the piles from moving due the pressure of the soils, a top down system was used – this methodology was also implemented in order to cause as little disruption as possible within the congested neighbourhood. The building's piles were cast from the ground floor level and steel beams were left in the columns to support the slab cast.

“The resounding success of implementing the top-down system at our Anadarko project means that we are able to implement this system here with great confidence,” says Luis Gaspar, SS Construções (Moç) Lda alternate director. Furthermore, the fact that this approach means that the contract does not need to encroach on neighbouring properties also allows SS Construções to start with the construction work at the outset. In April 2019 the piling and pile caps had been completed, and the construction team started casting the slabs on the -1 and -3 levels.

Both the interior and the exterior of the building will be completed by SS Construções, and most of the finishes are being imported from Europe. “The EMEM building, in particular the apartments, will be finished to a high quality and to the superior finishes required by our client,” says Gaspar. “There are many apartments available in Maputo and EMEM would like this building to be set apart from what is currently on offer in the city – we aim to play our part in achieving this for them.”

### Caption:

The first slab being poured at the EMEM Building, with the piles visible at minus-three level.