ON THE COVER

The impressive Mafenya Reservoir, which forms part of the Mafenya pipeline, is nearing completion and will soon be supplying water to the Maseve Mine and its surrounding communities, situated approximately 35 km northwest of Rustenburg in the North West Province. Construction of the reservoir started in September 2015.

Construction of the Mafenya Reservoir northwest of Rustenburg – the purpose-made wall formwork kit from Doka was delivered on site; the photo shows the commencement of the erection process.

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Code of Ethics for SAICE Members

ON THE COVER

M&D Construction rises to the occasion

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M&D Construction rises to the occasion

OVERVIEW
The impressive Mafenya Reservoir, which forms part of the Mafenya pipeline, is nearing completion and will soon be supplying water to the Maseve Mine and its surrounding communities, situated approximately 35 km northwest of Rustenburg in the North West Province. The project was awarded in July 2015, and construction of the reservoir started in September 2015.

The R101 million project (a collaboration between PGM, Wesizwe Platinum and Magalies Water) entailed the construction of a post-tensioned, 50 Mℓ reservoir, designed as an eight-buttress post-tensioned tank which has an internal diameter of 68 m and a wall height of 15 m, with 36 precast columns supporting precast roof panels. The hybrid construction method (precast elements and in-situ concrete) facilitated the speed and quality of construction towards the efficient delivery of water infrastructure.

The design engineers and project managers are MWB Consulting Engineers and DRA respectively.

CHALLENGES AND UNIQUE FEATURES
At 15 m this reservoir is one of the highest in the country. Reservoirs are usually designed to be wider and shorter to better distribute the pressure of the water. This unusual design, which will cause a significant downward pressure on the floor of the reservoir when full, was necessitated by the very limited space available (the structural footprint is only 69.4 m in diameter).

The simultaneous in-situ construction of the walls, floor and hollow-core precast roof was particularly challenging, given the tight construction schedule and the space constraints at the various work fronts, which required careful site team scheduling. Despite the challenges, this parallel construction methodology resulted in a shortened construction period and a reduction in costs.

Unique to the design is a 5 Mℓ internal reservoir, which allows full access to the reservoir to conduct maintenance without inducing any ‘down time’.

Exceptional, consistent concrete strengths and quality were achieved through on-site batching, making use of local aggregate and sand with a CEMII Lafarge cement. This concrete was used to construct the reservoir floor and walls.

CONSTRUCTION PROCEDURE
Work on the reservoir was split into four quadrants to accommodate the tower crane, positioned in the centre of the structure. The crane has been used to lift formwork, and to facilitate with concrete pours and steel work. The walls of the first three quadrants were built ready to receive the precast roof, while the fourth segment will remain open until the roof has been placed on the other three. Then the foundation will be laid on the last quadrant, which will place the project at the 75% completion mark. The closing of the last quadrant is expected to take approximately four months, reaching the 95% completion mark, whereafter the crane will be removed and
the centre of the roof closed.

Introducing a precast reservoir roof, designed by Corestruc, reduced the construction time by seven to eight months.

UPDATE ON PROGRESS

The past few months were the most exciting, as the off-site and on-site work began to merge, resulting in rapid progress and a fast-changing landscape. The installation of the precast columns, beams and roof panels commenced as the construction of the external wall, the internal wall and the floor slabs was nearing completion. At the same time the post-tensioning team started their strand installation, to be ready for tensioning as soon as the last external wall panel has been completed and the required 30 MPa strength has been reached. The bandage and joint-sealing teams have also been busy with their preparation work, and have in fact already started with the sealing of the joints.

Before the reservoir can be filled with water the following tasks are nearing completion:

- The tower crane has been removed and the final roof panels are being installed.
- The tensioning of the tank and completion of the buttresses were completed at the end of September.
- The waterproofing of the roof is in progress.
- The waterproofing on the inside has been completed, and the ladders and covers have been installed.
- The finishing of the works is currently in progress.
- Once the water-tightness test has been passed, the tank will be filled with water, and then disinfected and tested.

INFO

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MURRAY AND DICKSON CONSTRUCTION

M&D Construction was established in 1983 as a purely building construction firm. The company has grown over the years to include many other construction and infrastructure-related disciplines, and now offers its clients a wide range of construction services:

- General building construction
- Civil engineering construction
- Pipe laying in the water, fuel and gas industries
- Earthworks and road construction
- Construction plant hire

The company is committed to delivering quality workmanship through pride and teamwork, producing customer satisfaction in a safe working environment.

M&D Construction is a Level 2 Black-owned B-BBEE company with CIDB ratings of 9GB PE, 9CE PE and 6ME PE. The company has offices in six provinces (Gauteng, KZN, Western Cape, Eastern Cape, Northern Cape, Limpopo and North West Province), with a total staff complement of approximately 1 000 permanent employees on-site and in head office.