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Civils Structures On Track On Murray & Roberts N4 Upgrade Project

Work on the civils structures on the Murray & Roberts Infrastructure contract on the N4 toll road project is on track. The upgrade project involves increasing the carrying capacity of an 18 km section of the toll road from east of the Rockdale interchange to just west of the Arnot interchange. The contract was awarded by Trans African Concessions (TRAC)

Also under Murray & Roberts Infrastructure's scope of work are the construction of a new bridge, the extension of an existing bridge and the construction of six large *in situ* concrete culverts and associated drainage works.

The civils structures will be constructed using a high specification readymix concrete with a high cementitious content to ensure optimum durability. The readymix is being supplied from AfriSam's Middelburg readymix plant where the company installed a generator to ensure continuity of supply even under load shedding conditions.

Pierre van Vuuren, contracts manager at Murray & Roberts Infrastructure, who is responsible for civil works on the project, explains that consistency of supply was important and that the locality of the AfriSam plant as well as the competitive concrete solution offered meant that AfriSam was selected.

The readymix being supplied by AfriSam will create a more durable concrete with less likelihood of concrete deterioration and also allow more efficient use of labour as a result of the workability and easier placing and finishing. It also offers guaranteed early strength performance

In addition to being cost effective, AfriSam's enhanced durability mix designs meet all the durability specifications. AfriSam is considered one of the leaders in Durability Index testing in South Africa and the mix design underwent special durability tests at AfriSam's Centre of Product Excellence in Roodepoort. These tests included water sorptivity, chloride conductivity and oxygen permeability, all of which are designed to assess the working life of the structures being built with this concrete solution.

According to Mike McDonald, manager at AfriSam's Centre of Product Excellence, the AfriSam enhanced durability mixes are easier to place and generate less heat of hydration which prevents thermal cracking while reducing the CO2 footprint.

Van Vuuren says that the contract is particularly challenging as one of the culverts is being constructed at the entrance to the Middelburg Dam and portion of the new bridge over the Klein Olifants River is being constructed in an area where there is a constant flow of water.

Although the construction programme required that this culvert be constructed at the end of February, which theoretically marks the end of the major rainfall in the region, the catchment area had experienced a great deal of unseasonal rainfall and the water level in the dam was thus higher than anticipated.

To facilitate the construction of the culvert it was necessary to first build a large rock fill berm with a bentonite clay core on the northern or dam side of the culvert and then to dewater the area wherein the culvert was to be constructed. "The construction of the berm was exceptionally challenging for a number of reasons, but mostly as a result of the water level in the dam," van Vuuren says.

Excavating the trenches to facilitate the placement of the bentonite presented challenges, particularly with respect to dealing with the displaced water and this was done in a phased approach with trenches of 3 to 4 metres being excavated at a time.

Van Vuuren says that the section of the bridge being constructed in the middle of the river is being done using a system of girders and beams in place of traditional staging. "This is the most appropriate option as it is not possible to erect staging due to there not being a stable surface on the river bed," he explains.

"With all these challenges facing us, it was critical to develop a relationship with a supplier like AfriSam who could readily and reliably supply the 12 500 m³ of readymix concrete we require for use for the civil structures on the project," says van Vuuren.

CIVIL STRUCTURES ON N4 TRAC PIC 01 : Murray & Roberts Infrastructure's scope of work includes the construction of a new bridge and the extension of an existing bridge.

CIVIL STRUCTURES ON N4 TRAC PIC 02 : To facilitate the construction of the dam culvert it was necessary to firstly construct a large rock fill berm with a bentonite clay core on the northern or dam side of the culvert.

CIVIL STRUCTURES ON N4 TRAC PIC 03 : The entire bridge construction will require 2 000 m3 of concrete.

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