DESIGN OPTIMIZATION OF EAST LONDON FORESHORE PROTECTION DURING CONSTRUCTION

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BACKGROUND

Transnet Group Capital (TGC) was appointed by Transnet National Ports Authority (TNPA) to manage construction of a revetment at East London Foreshore in East London, South Africa. The revetment construction was initiated to halt a 40 m regression of the reclaimed land between the grain elevator and the sea. This area accommodates the access road to the terminus yard as well as the rail lines that serve the grain elevator.

DESCRIPTION OF THE STRUCTURE

The structure comprises of approximately 902 m rock armoured, 1:2 sloping revetment with horizontal crest and toe berm. The prescribed armour and toe rock ranges between two layers of 6 t and 10 t rock, while the standard heavy grading two layers of 0.3 t to 1.0 t was also prescribed as the underlayer.

CHALLENGES

Challenges emanated from the following:

- The size of armour rock
- The physical nature of the quarry
- The experience of the contractor

RESOLUTIONS

Since the start of construction the contractor was faced with a number of challenges which had a significant impact on the planned completion date. After exploring various options to increase the yield at the quarry, there was very little success. The contractor proposed that the current design based on the design criteria is altered. The new design maintained the status quo but reduced the mean weight of the armour from 8 t to 5.5 t. The reduction in mean armour weight was tested in a 2 dimensional (2D) flume, at the Council for Scientific and Industrial Research (CSIR) and proved to be stable. Despite the re-evaluation of the armour rock, sourcing the prescribed rock sizes remained a challenge.
In order to rescue the project, a workable solution had to be determined based on the following assessments:

- Site observations
- Quarry visits
- Desktop study

For the reviewed design, a double layer of 3.5 t mean weight armour rock was recommended while the status quo remained based on the less onerous design conditions; and the structure with above mentioned specifications was also tested in the 2D flume and proved to be stable. Implementation of the new design, ensured that the work schedule can be reduced by 7 months.

Figure 1: East London Foreshore Revetment during construction

REFERENCES

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