'Top to Bottom' Construction - Arcapita Headquarters at Bahrain Bay

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Summary

Bahrain Bay is an artificial island construction project in the gulf near Manama in Bahrain, where the new Arcapita Bank Building defines one mayor urban axis of the new district to give the area enormous aesthetic identity and economic credibility. The 40m wide and 135m long composite structure is floating above concrete ground waves with six- storey cantilevers at both ends of length up to 25m into the sea.

To make this challenging structure work, optimized full- floor height steelwork trusses are integrated within the top HVAC floor in between concrete cores to form a bridge- like structure (span 64m) in between those cores as well as global cantilevers on both building ends from which all six floors are hung. Therefore, steelwork elements will be built 'away and downwards' from the core tops, creating a unique erection sequence which is best described as 'top to bottom' construction with special connection requirements (made in Western Europe by DONGES Stahlbau) as well as safety considerations during the design process.

Keywords: *floating building; erection top to bottom, long- span steel trusses; hung building cantilever; headquarter building*

1. Introduction

Given the unique building shape for the architectural design of the Arcapita Bank Headquarter office building (*Fig. 1*), a structural system needed to be developed, which allows the six- storey building to cantilever at its ends and also free- span in the central part, all above the ground floor entrance concrete 'wave' structure.

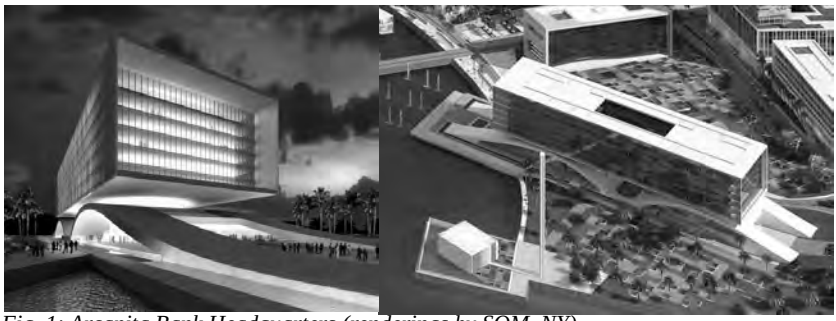

Fig. 1: Arcapita Bank Headquarters (renderings by SOM, NY)

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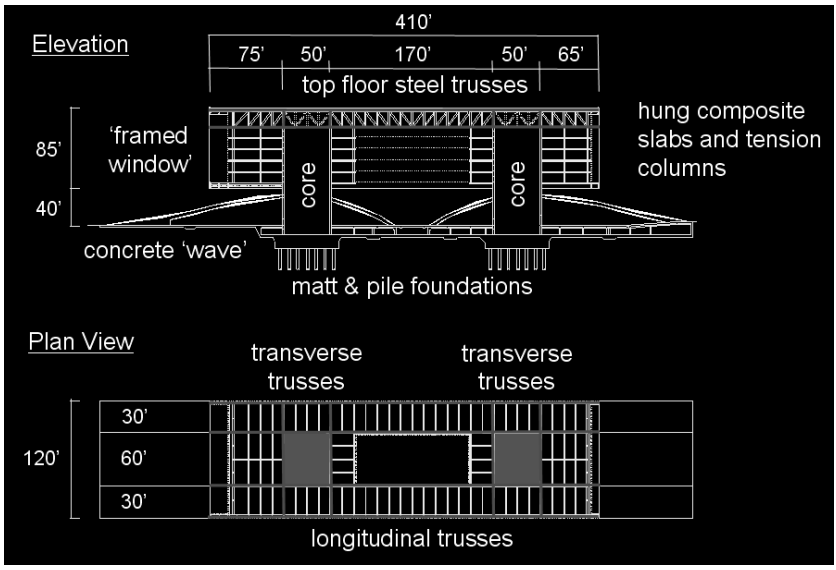

Fig. 2: dimensions and layout of structural system, elevation and plan view

2. Construction

Building erection is being achieved by the introduction of full storey- height steel trusses at the top of the building, which cantilever outwards and span in between two concrete cores (*Fig. 2*). The ground floor waves form the main entrance lobby which is column- free inside, such that outer façade mullions needed to be activated as integrated steel columns to support the wave on the outer façade lines. The building is currently under construction, applying a truly 'top to bottom'- erection sequence, which is innovative for office buildings and partially can be referred to as 'bridge construction': once the ground floor wave and concrete cores are built, pre- fabricated transverse and longitudinal trusses are lifted into place by crane in segments, spanning outwards and away from the cores. Then column connections and beams are detailed in a way that they can be lifted up and hung from those main top floor steel trusses, supporting metal decking and in- situ composite floor slabs (*Fig. 3*).

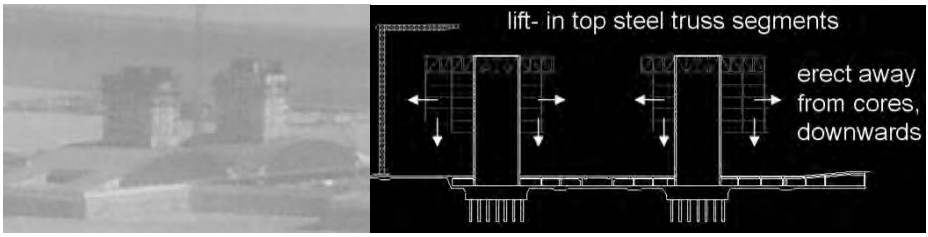

Fig. 3: concrete 'wave' and cores (left); 'top- to- bottom' erection sequence (right)

3. Conclusion

The presented erection sequence currently proofs to be successful on site. The building is scheduled for completion at the end of 2008 and will be the first of its kind in the Middle Eastern region.