

AL KHAWANEEJ SECOND SEWERAGE & DRAINAGE SYSTEM

CIRCULAR SHORING SYSTEM PROJECT

Project Name	Al Khawaneej Second Sewerage & Drainage System
Project Owner	Dubai Municipality, Government of Dubai
ESC Client	Arabtec Engineering Services (AES)
Consultant	Ch2m
Project Location	Al Khawaneej, Dubai, UAE
Product	Design, Supply, Installation and Extraction Of Circular Shoring System
Project Execution Period	December 2017–June 2018

INTRODUCTION

Dubai Municipality in the year 2017 allocated Dhs 7 billion in its annual budget for executing necessary infrastructure in the field of health and environment in the newly developed or developing regions of Dubai. Under this scheme, Dhs 300million were allocated to develop deep underground sewerage network in Al Khawaneej area of Dubai. The project was anticipated to be completed in the year 2018.

Horizontal directional drilling (HDD) was proposed for the construction of deep underground sewerage network. As part of the sewerage network, several Manholes were planned along the network. The manhole construction required excavations from 13m to 22m. To facilitate the deep excavations, ESC proposed Circular Shoring System.

SITE STRATIGRAPHY

The overburden soils at this project consisted of medium dense to dense silty sands to about 6m depth from the existing ground level. This is followed by extremely weak to weak, poorly cemented light brown Sandstone was encountered to the final explored depth. Ground water table was not found during the geotechnical exploration. The natural water level in the region is expected to be well below

30m depth. The stratigraphy at site i.e., presence of hard ground and no water table, is considered to be ideal for kingpost shoring system.

DESIGN CONCEPT - CIRCULAR SHORING SYSTEM

The Circular shoring system consisted of series of kingposts installed in a circular pattern. The pit diameter is designed to be 9m to provide enough space for manhole construction. 356x358x129kg/m Beams of Grade 275 are used as kingposts. Since the excavation depths ranged between 13m and 24m, these beams are fabricated to required additional lengths. Length of the kingposts ranged between 18m and 26m depending on the excavation depth.

The nature of excavations required multiple level walings. These walings are pre-fabricated at ESC yard to suit the pit diameters i.e., 9m. Each waling unit is divided into 3 arc segments connected with 3 connectors. To optimize the design requirements, 305x305x97kg/m beams are used for first level and 356x358x129kg/m beams are used for second level

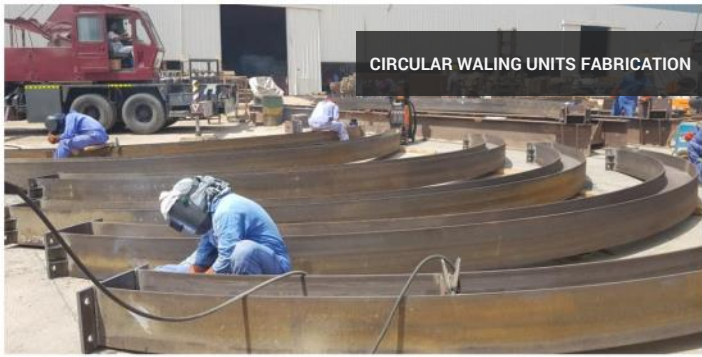
ESC SCOPE OF SUPPLY

CIRCULAR SHORING SYSTEM

ESC carried out the design, supply, installation, and extraction of circular shoring system for this project.



FABRICATION OF CIRCULAR WALINGS



PAINTING OF CIRCULAR WALING



STACKING OF FABRICATED CIRCULAR WALING



LOADING & DELIVERY TO SITE



ON-SITE INSTALLATION

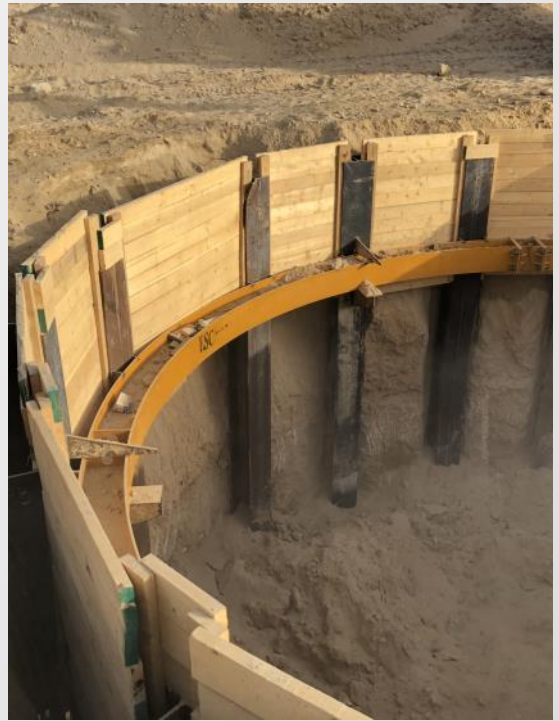
Due to the nature of ground conditions, pre drilling is carried out to facilitate the installation of kingposts. Prior to commencing the drilling process, each kingpost locations are surveyed and marked on the ground. Kingposts of desired length are then installed at the pre-drilled locations. Prior to carrying out the excavation works, ESC's QA/QC team ensured the alignment of kingposts, spacing between the kingposts and also the clear spacing required for manhole construction inside a 9m diameter pit.

Timber infill panels are installed between the kingposts simultaneously during the excavation in stages. These timber infill panels are installed up to the end of loose to medium dense overburden sand or to the top of the underlying Sandstone (bedrock).

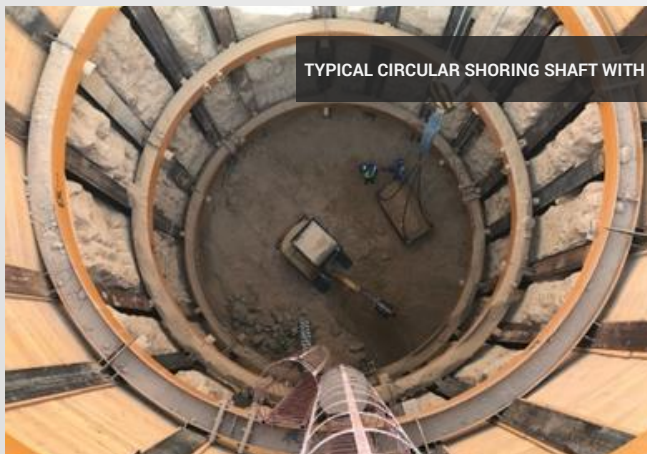
Pre-fabricated circular waling beams are then assembled on site next to the pit location and lowered using a mobile crane to the desired level as per the approved shoring design



ON-SITE INSTALLATION



ON-SITE INSTALLATION



ADVANTAGES - CIRCULAR SHORING SYSTEM

There are several advantages of a circular shoring system over conventional square or a rectangular shoring designs. Some of the main advantages are listed below:

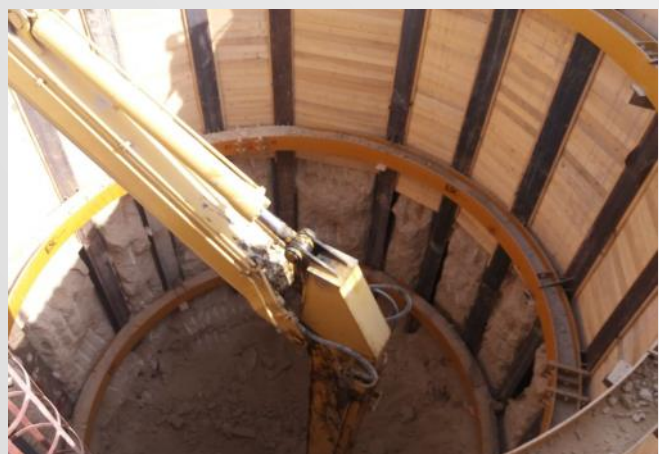
Due to the nature of stress development in circular shoring system (hoop stresses), the structural elements like kingposts and waling beams can be optimized to lighter sections which otherwise might require very heavy steel sections – particularly for deeper walings at 18m depth or below.

Circular walings can be easily fabricated at ESC's yard to suit the different pit diameters. These circular walings can be modified to suit different shaft diameters which can be used at many other project sites.

Since the shoring system comprises of steel elements (Beams), excavation can be commenced immediately without any waiting periods for curing

Several re-uses can be extracted within the same project or any potential future projects

Depending on the number of re-uses, there can be



ON-SITE INSTALLATION

