

Sewage Treatment Plant

Client: Dubai Municipality
Contractor: Wade Adams
Location: Dubai, UAE
Products: Rapidclimb / Alform /

Case Study

The infrastructure and excavation works to prepare for construction of the massive phased Jebel Ali sewage treatment plant and pumping projects in Dubai, began early in 2007, with the contract for the development of a major pumping station awarded to the specialist drainage and sewage team of construction giant Wade Adams Middle East.

Aimed at servicing the whole of the Downtown Burj Khalifa area, which houses some of the largest and most impressive structures in Dubai, not least the worlds largest building the Burj Khalifa, the Dubai Municipality funded project at a cost in excess of Dhs1.56 billion will transform the way sewage is handled in the area. The solution involved taking multi storey construction and turning it literally on its head, with the construction of a vast concrete underground pumping station known as DS164 to contain and distribute waste through a link to the new and equally impressive Jebel Ali treatment works.

Wade Adams used high-rise formwork construction techniques to develop a much needed new underground sewage containment and treatment system for the expanding Downtown suburb of Dubai. The construction package for the DS164 project involves a pipeline link which finally finishes at Emirates Road via Al Khail Road and Umm Suqeim Road, discharging to a further pumping station DS161 that will forward sewage to the treatment plant along a predefined pipeline route.

In order to construct the underground highrise style pumping station, the Wade Adams engineering team worked with specialist formwork provider RMD Kwikform to design a safe and fast formwork solution, using its Rapidclimb system. This innovative approach to adopting the principles of highrise construction underground, led to the completion of the concrete work for the 22 metre deep, 700 cubic meter pumping station, ahead of schedule. The DS164 project including the pumping station were completed in April 2010, ahead of schedule. This was thanks to the work ethic of some 600 Wade Adams staff onsite, lead by construction manager, Ashraf Hanna and the use of RMD Kwikform's Rapidclimb formwork system.

Ashraf explains: "Even though this project will not been seen by residents and visitors to Dubai, it will certainly play an important role in ensuring they have all the amenities they would expect of a World class city. "Having developed a speciality in this sector, working on a number of drainage and sewage projects of this kind, but on a smaller scale, when we were tendering for the job, we knew that the success of the project would rely heavily upon achieving a high level of build quality. After all, the one thing you do do not need from a system

that is carrying sewage is leakage, or worst still system failure!

"So when looking at the overall design of the main 22 metre deep pumping station, we were very much focused on determining whether the formwork equipment and suggested solutions from suppliers could meet the pressures and tolerances exerted upon it by the self compacting concrete that we had to use.

"Although this was the core challenge, we also had to factor in the three key points that are relevant to any project, the programme time, cost and staff safety. Even before we were awarded the project in November 2007 we worked with RMD Kwikform engineers to develop a system that could meet these challenges, so that once we had secured the project we could move quickly to begin work."

Following a construction specification put together by design consultancy Khatib and Alami, the Wade Adams engineering team worked together with RMD Kwikform engineers to design a modular system based solution.

The important restrictions placed on the design related to its manoeuvrability, as the weight of the individual panel and Rapidclimb system sections, could not exceed the 2.5 tonne lifting capability of the sites 6 tonne tower crane.



Commenting on the design, RMD Kwikform's Key Account Manager said: "The great thing about Ashraf and his engineering team was their understanding of the challenges we faced. Being an experienced team meant that they had a clear focus on the practicality of working with a system on site. From a design perspective, unlike a high-rise project where you tend to have numerous cranes and plenty of room for supporting access systems, when you are working underground you have much more to contend with, not least the safety aspect of protecting workers from potential of falling debris.

"That is why in the main design we went for the Rapidclimb system as it is in this case a descending system that supports its own weight and can be moved simply from pour to pour using a crane. For this process due to the crane restrictions, the panels themselves that made up the system which uses RMD Kwikform standard formwork, was converted into a crane handled climbing system.

The system consisted of Alform aluminium secondary beams and Superslim Soldier primary beams in conjunction with our specialist Rapidclimb frames, with each panel 3.5m high by 6m wide to suit the customers pour sequence. From a practical perspective, once the panels are moved into place Rapidclimb can be anchored to the existing concrete construction using reusable high load Rapidclimb anchors. Mounted on a trolley the formwork panel can then easily be retracted from the form face to allow for cleaning and steel fixing to take place.

The beauty of the system is that the access platforms and formwork are lifted as one, increasing safety, whilst reducing the need for additional labour. "Because in this case we were descending, the platform design for second fixing was reversed and to increase safety we made the trailing platform wider in size to give staff an added reassurance, as working underground at height is probably even more daunting than being on top of a high rise building.

"From a quality and accuracy perspective, because we needed to achieve a very good finish for obvious reasons, that spillage was out of the question, we trained the team on how to take advantage of the system design layout. For example, due to the makeup of Rapidclimb, fine adjustments of the form face can be made during construction, to make sure accurate alignment of the face is achieved both vertically and laterally. Similarly the ratchet turnbuckle system used to retract the form from the wall makes it easy to strike the shutter from the concrete face and move to the next pour."

With the complete construction of the 22 metre deep pumping station requiring 20 pours, the speed of construction was achieved thanks in part to the simplicity of the formwork solution and the ability to second fix whilst the next pour was underway, with waterproof grout used to ensure that no leaks were possible.



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