



CONSTRUCTION OPPORTUNITIES

Connecting People to Business

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Underwater Connection

PROJECT FOCUS

SPOTLIGHT

The East – West underwater tunnel under construction in Kolkata will be first of its kind in India.

Kolkata was the first city in the country to have the underground Metro rail service. Now the City of Joy is all set to become the first in India to have the underwater metro rail tunnel connecting the east and west banks of the Hooghly.

Says **R. Anantakumar, EVP & BU Head**

– **Urban Transportation, Afcons Infrastructure**

“First thing that comes to mind is the sheer scale of projects being envisioned. The gap between concept and actual execution is shrinking rapidly. We have

incorporated world's latest and best practices in our design and implementation processes thereby delivering savings in time, cost and space. Our engineers have rapidly scaled up their skills to utilise the best practices with minimum gestation”

Factsheet:

AFCONS INFRASTRUCTURE, one of India's leading company in the infrastructure domain resumed construction of the twin tunnels of 2.9 kms each in September 2015. The project which started in April 2009 was stalled (for phase II between Sealdah and Howrah Maidan) in 2012 due to land acquisition and alignment issues. The tunnels are scheduled to be completed in 2020. The underwater tunnel will connect New Mahakaran Station on the Kolkata side with Howrah Station, and, finally the terminus at Howrah Maidan on the Howrah side. According to company sources the project is on schedule and expect to complete the underground Howrah Maidan Metro Station by 2019 and the underground Howrah Station by 2020. The Kolkata Metro Rail Corporation Ltd has appointed AECOM as their project management consultants and SYSTRA has

been appointed by Afcons.

KMRCL had carried out soil investigation work at the pre-tender stage for feasibility study. In addition to this, Afcons carried out soil investigation work near the entire tunnel alignment, deploying floating barges and pontoons in the river portion. The company also conducted extensive condition surveys of the buildings in proximity to the alignment before carrying out tunnelling.

Though the tunnel will not be constructed in any special manner that is different from the normal method of Metro tunnelling, certain criteria in the segmental lining have been adapted and as the scope of work involves tunnelling under water, certain additional operational precautions and checks are being implemented to prevent any untoward incident.

The Herrenknecht Tunnel Boring Machines (TBMs) used for the project are equipped with emergency seals in the articulation joints in the event of high pressure water inflow. The Tunnel Boring Machine (TBM) is expected to cover roughly 11 to 12 metres a day.

Benefits:

The underwater Metro tunnel will ease the heavy traffic substantially that chokes entry and exit from Howrah Station via the Howrah Bridge. This means that crossing the Hooghly river will be a breeze with the Metro service swiftly ferrying passengers between Howrah Maidan and Kolkata side.

Financing:

The underwater tunnel project cost was ₹937 cr when it was sanctioned in 2008-09. The project is partly funded by Japan International Cooperation Agency (JICA) and Ministry of Urban Development.

PROJECT FACTSHEET:

Name of the Project:

East – West Under Water Metro Tunnel

Location: Kolkata

Connects:

Howrah and Sealdah railway stations

Executioner:

AFCONS INFRASTRUCTURE

PMC:

From Client KMRCL side: AECOM

From Afcons' side: SYSTRA

Financers:

Japan International Cooperation Agency (JICA) and Ministry of Urban Development.

TBM Supplier:

Herrenknecht Tunnel Boring Machines

Total Length:

Twin Tunnels of 2.9 km each

Date of Commencement:

September 2015

Completion Timeline: 2020

The East – West underwater tunnel is a challenging and prestigious project undertaken by Afcons Infrastructure. Successful and timely completion will herald the company to a bigger league.

The company has recently bagged a Metro infrastructure construction project in Ahmedabad. The company has been awarded the job of designing and constructing underground stations and tunnel for Ahmedabad Metro Rail Project Phase-I. The project has been awarded by Metro-Link Express project for Gandhinagar and Ahmedabad (MEGA) Co. Ltd.

Apart from a twin-bored tunnel, Afcons will build two underground stations - Kankaria East and Kalupur Metro Station - including a portion of NATM and launching and receiving chambers of TBM for Ahmedabad Metro Rail Project Phase-I. ♦



Afcons will be the first Indian company to build underwater Metro



AFCONS INFRASTRUCTURE a SP Group company is set for a milestone by tunnelling underneath river Hooghly for the East-West Metro Project in Kolkata. AFCONS is among India's top infrastructure companies and has executed remarkable projects in India as well as in various parts of the world.

R. ANANTAKUMAR, EVP & BU HEAD – URBAN TRANSPORTATION, AFCONS INFRASTRUCTURE offered **CONSTRUCTION OPPORTUNITIES** a close view of India's first under water metro tunnel project being executed by his company.

Afcons is the first Indian company to build Metro infrastructure under water in Kolkata. What made you take up this unique challenge?

Afcons has played a significant role in nation building by consistently delivering iconic and technologically challenging projects in India and abroad. It is the first Indian company to construct an underground Metro tunnel using top-down methodology without any foreign JV in New Delhi (Barakhamba Road Metro Station). Afcons is also the only company, in India, to qualify for Metro tunnel construction using TBMs on its own. It is constructing India's biggest

underground Metro station at Chennai as part of Chennai Metro project. The three-storey station will serve as an interchange, and, connect commuters with suburban and long-distance trains and bus services.

Afcons has consistently shown the gumption to tackle complex projects, and we're excited in playing a leading role in the East-West Metro Project in Kolkata. We are in the process of building an underwater tunnel below the bed of Hooghly River for the Kolkata Metro Rail Corporation Ltd (KMRCL). Afcons will be the first Indian company to build underwater Metro infrastructure facility.

How is building an underwater tunnel different from building an underground tunnel?

In general, underground tunnelling is a very challenging task but underwater tunnelling adds more complexities and risks. Due to working underwater, the risk of water ingress increases and impact due to geological surprises is also very high. Once the tunnelling starts under the river bed, it should not stop under any circumstance. In underwater tunnelling, bore has to be dug much deeper due to possibility of water inflow. This requires very high level of detailing, precision and preparation.

Please tell us about the extensive groundwork that was undertaken before the actual tunnelling work.

At the outset, we had to select suitable designs and technologies for the successful delivery of the project. The designing of this project was entrusted to specialised world-class design companies such as ATKINS, SYSTRA and Tunnelconsult. We chose Herrenknecht Tunnel Boring Machines (TBMs) for this project, based on their track record in manufacturing machines tailor-made for specific project requirements. Herrenknecht is also engaged in maintenance of the two TBMs deployed for the Kolkata Metro project. We are working together to ensure flawless delivery of the project, especially the under-the-river stretch.

KMRCL had carried out soil investigation work at the pre-tender stage for feasibility study. In addition to this, we carried out soil investigation work near the entire tunnel alignment, deploying floating barges and pontoons in the river portion. We have also conducted extensive condition surveys of the buildings in proximity to the alignment before carrying out tunnelling.

What have been the surprises that the geological survey of river bed has thrown so far?

There have been no surprises thrown so far with regards to the geological survey of the river bed. The tunnels will be constructed along the safest layer below the river bed. What are the eventualities that you are anticipating in your journey under the bed of river Hooghly? How have you equipped yourself to handle these situations?

We are not anticipating any surprises. However, we are well prepared and have taken all possible precautions and measures. We have a team of highly-experienced tunnel crew on board, should an entry into the cutting chamber be required under high hyperbaric pressures during river driver. In the remote possibility of river water ingress, the TBM is designed to shut down like a submarine, for safe evacuation.

Is the underwater Metro tunnel under the river Hooghly going to be modelled over similar projects in the world, like the Thames tunnel or Sydney Harbour?

Each underwater crossing has its own challenges and different geological features.

So, one cannot really model a crossing based on what has already been achieved. We have, however, looked for precautions taken and problems faced in different river crossings as well as projects that have been executed in extremely high water bearing conditions and applied this to our own geological situation that we will encounter.

Have any innovations been made as part of this project?

We have done a number of innovations and have improved upon numerous processes while planning the project.

Due to site constraints the TBM has to be driven through Howrah Station in advance. This is a delicate operation where the TBM can encounter difficulty in crossing the diaphragm walls. We designed a "Soft Eye" of styrofoam replacing M-40 concrete. This has worked extremely well. This is a first design of its kind attempted in India by our in-house design engineers.

At Afcons, we follow the culture of continuous improvement through innovation.



What took so long for India to come up with a project of this nature?

The experience of the existing Metro corridor in Kolkata and the success of the Delhi Metro network contributed to the sanctioning of the second phase of the Kolkata Metro that will have the underwater Metro tunnel. The tunnel, which runs underneath river Hooghly, is aimed at connecting Howrah and Sealdah railway stations, two of the busiest railway stations in the world.

This is a momentous feat in terms of Metro infrastructure. What have been the other



highlights in India's Metro infrastructure space before this?

First thing that comes to mind is the sheer scale of projects being envisioned. The gap between concept and actual execution is shrinking rapidly. We have incorporated world's latest and best practices in our design and implementation processes thereby delivering savings in time, cost and space.

Our engineers have rapidly scaled up their skills to utilise the best practices with minimum gestation.

Metro rail first arrived in India as early as 1984 with the north-south Kolkata Metro. But the rush for Metro infrastructure actually began after its success in Delhi. It was the first time in India that tunnels were constructed for Metro using TBMs. It changed the outlook and future of Metro construction in India. We expect a similar impact with the underwater tunnelling by Afcons.

Does Afcons have projects similar to this in the pipeline, given that you are making Metro infrastructure in several other cities in India?

We have recently been awarded the underground Metro projects in Ahmedabad. We have completed two underground projects in Chennai Metro. It is a matter of pride for us that Chennai Metro Rail Ltd (CMRL) chose us to takeover abandoned underground projects. This clearly demonstrates the confidence we enjoy from various clients in the country. ♦



Value ₹1,675 cr.

L&T AND AFCON BAG CONTRACT FROM MEGA

L&T and Afcon bag ₹1,675-crore order from Ahmedabad Metro MEGA, which also awarded additional work worth ₹1,400 crore involving constructing different overhead sections of the metro rail project. This is the costliest civil work to be undertaken in the first phase of the ₹10,700-crore metro rail project. L&T will be constructing 4.38-km of the underground section between Kalupur and Shahpur, while Afcons will construct 2.45-km portion between Apparel Park and Kalupur, according to Metro-Link Express for Gandhinagar and Ahmedabad (MEGA) Company Ltd.

Value ₹500 cr.

L&T'S ELECTRICAL & AUTOMATION UNIT BAGS ORDER FOR DOHA METRO

L&T's electrical and automation unit has bagged an order worth ₹500 crore from Qatar Rail Company (QRAIL) for Phase 1 of Doha Metro. The order will be executed by L&T Electrical & Automation FZE (LTEAFZE), the competency centre for L&T Electrical & Automation's automation business in UAE. The order entails supply, installation, testing, integration, commissioning and maintenance for five years for 37 stations.

Value ₹202 cr.

PENNAR INDUSTRIES BAGS ORDERS

Pennar Industries Ltd today said it has bagged orders worth ₹202 crore from various players including JSW Steel, Tata Power, GE Power and Thermax. It also received an order for CRF (cold roll formed) sections from BEML. Also received orders for module mounting structures from Tata Power, Waaree Energies, Adani Power and Greenko, among others. Pennar has also bagged orders for collecting electrodes from GE Power and Thermax in addition to the ones received from JSW Steel in its engineering services division. It has entered into defense products and received its first order from Ordnance Factory.

Value \$3.3 billion

HYUNDAI ENGINEERING BAGS ORDER FROM AHDAF

Hyundai Engineering signed a deal with AHDAF, a subsidiary of the National Iranian Oil Company (NIOC), and the agreement covers the construction of the second phase of Iran South Pars 12. The deal is worth at 3.098 billion euros and it is the largest in amount to date that domestic construction companies have won in Iran. The second phase project is to build a petrochemical plant at South Pars Gas Field in Tonbak, a region about 1,100 kilometers south of the Iranian capital city of Tehran.

Value ₹30 cr.

NILA INFRASTRUCTURE BAGS PROJECTS

Ahmedabad-based Nila Infrastructures Ltd has bagged two key projects worth ₹30 cr from the Gujarat State Road Transport Corporation to construct Bus Terminal Facilities (BTF). In a move to improve the urban transport infrastructure, the Amreli BT facility has been awarded individually to Nila Infrastructures Ltd, while the Modasa BT facility has been awarded to it in consortium with Vyapti Infra build Pvt. Ltd, where Nila holds a share of 34 per cent. The projects entail creating an iconic structure and design fortified with modern facilities that integrate commercial facilities on Design, Build, Finance, Operate and Transfer (DBFOT) basis.

CONTRACTS AWARDED

Value ₹250 cr.

NBCC (INDIA) BAGS ORDER FROM MAURITIUS GOVERNMENT

NBCC (India) has signed a ₹250 crore agreement with the Mauritius government and Landscape (Mauritius) for construction of new Supreme Court building on a PMC basis in Mauritius. The project completion period is 24 months.

Value ₹222 cr.

A2Z INFRA ENGINEERING BAGS CONTRACTS

A2Z Infra Engineering has won three contracts worth over ₹222 crore from Chhattisgarh State Power Distribution Company Ltd. The three contracts aggregate a value of is ₹222,57,18,684. The contract is for execution of works for supply of material and erection of lines and substations under IPDS (Integrated Power Development Scheme) at Durg, Raipur and Bilaspur region in Chhattisgarh, it said.

Value ₹2720 cr.

PNC INFRATECH WINS ROAD CONTRACT FROM NHAI

PNC Infratech has bagged two NHAI's highway projects worth ₹2,720 crore in Uttar Pradesh and Madhya Pradesh. One of the projects pertain to four-laning of 75 km Jhansi-Khajuraho section of NH 75/76 (package I) in the states of Uttar Pradesh (UP) and Madhya Pradesh (MP) under NHDP III for ₹1,410 crore. The other project is four-laning Jhansi-Khajuraho section of NH 75/76 (Package II) from km 76.30 to km 161.70 km for ₹1,310 crore.

Value ₹45.6 cr.

RPP INFRA PROJECTS LTD BAGS ORDER

RPP Infra Projects Limited has bagged orders from Karnataka Slum Development Board (KSDB) worth ₹456 Million for Construction of 795 Ground Floor Dwelling units including infrastructure at 1 selected slums of Krishnaraja Area in Mysore city under PMAY-HFA Scheme. The project is to be completed within 24 months.