



Ipswich Road switch house and transformer enclosure

## DESCRIPTION OF WORKS

This project consisted of the design and build construction of 2 No switch houses and transformer enclosures (Substations Mike and November) to be utilised for the newly constructed data centre for China Mobile. The design of the switch house and transformer enclosure consisted of the construction of a concrete raft foundation with full oil retention bund for the transformer and cable entries through the switch house, in-situ concrete bund walls encapsulating steel columns for the superstructure, Steel framed structure, 4 Hr rated precast concrete brick panels and associated works.

For this project PTC were involved from early engagement to facilitate an effective design and build project, enabling a collaborative approach to the construction of the required works. PTC engaged with SEC proposing new techniques to construct the switch houses and transformer enclosures in a cost and time efficient manner. This included the proposal for the use of Precast concrete brick cladding that can be manufactured off-site and lifted into place with the benefits of factory standard quality control measures, time required on-site minimised and the reduced risk of operatives working at height to produce a brick facing among other advantages.

The works to construct the new switch houses included;

- Excavation raft foundations/bund slab
- Installation of Steel Frame
- In-situ concrete bund wall and transformer base construction using shuttering panel for quality and efficient construction with duct entries
- Lifting and Installing of 4-hour fire rated precast concrete panels with brick skin fixed to the steel frame
- Installation of metsec internal skin with plywood, firewall and insulation to the internal of the walls, dividing walls and exposed steel in the switch house providing support the installation of relay and LV equipment.
- Installation of equipment support structures.
- Installation of GRP grating to the oil retaining bund.
- Installation of Kingspan multi-deck roofing with C30 concrete cover
- Installation of a louvered wall to the transformer enclosure with the louvers extending over the brick panels.
- Installation of surface water drainage

CASE STUDY DATE: 14/05/2019

## PROJECT DETAILS

CLIENT: Southern Electric Contracting

LOCATION: Ipswich Road, Slough, SL1 4EP

START DATE: 13/08/2018

COMPLETION DATE: 21/01/2019

VALUE: £1,074,966

CONTRACT: NEC3 (Design & Build)



Lifting PCC Brick Clad Panel

## KEY ASPECTS

- Design
- Oil Retaining Bund Construction
- Steel Superstructure
- Lifting Operations
- PCC Brick Cladding
- GRP Installation
- Transformer Enclosure

## CHALLENGES & SOLUTIONS

During the construction of the Switch Houses and Transformer Bunds at Ipswich Road in slough, PTC encountered several challenges which we overcame to deliver the project to a successful finish. These include;

- Brownfield Site (Existing Structure) – During the excavation of Substation Mike, we encountered an underground bunker / bomb shelter that was not identified on any existing records of the site, therefore PTC rectified to allow the continuation of the construction.
- Neighbouring Contractors – Throughout the works the construction of the data centre, for which these substations will be serving, was undergoing construction by Kier. PTC ensured that we kept a good working relationship with all adjacent contractors to our site and CDM.
- Space Constraints – Due to the construction of the data centre, there was a limited amount of space available. PTC engaged with Kier and the client to ensure that works progressed for both parties efficiently.
- New Concept – This project encountered challenges relating to the introduction of a new method of constructing a substation. To overcome the challenges PTC ensured that extensive forward planning took place and every element of the design was carried out in great detail in conjunction with the designers, Cluttons LLP.
- Panel Lifting – due to the size of the panels, PTC ensured that the lifting operations were fully planned and coordinated with the adjacent work to ensure we had enough space and safety measure in place to perform successful, safe lifts in conjunction with precast panel supplier and contractor, Sterling Services Ltd.

## OUTCOMES

The successful completion of the project produced some significant outcomes as a proof of concept. These outcomes include the reduction in construction time due to;

- Installation using the panelling system was equivalent to 24720 bricks for each substation in 2 days which would equate to 8 weeks through traditional brickwork methods which includes the elimination of scaffolding per substation
- Installation using the panelling system was equivalent to 4500 blocks per substation in 4 days as opposed to 3 weeks per substation.
- This system based on the 2 substations took 12 working days instead of the traditional method of 22 weeks saving approximately 19 weeks on site.
- For this project the traditional build time would have been 43 weeks + 8 weeks design and investigation, however the actual build time with this system was 18 weeks + 6 weeks design and investigation.

The success of this project also included a significant risk reduction and other outcomes for the construction of a substation including;

- Reducing man hour on site dramatically limiting human exposure to site risks and risk of human error. Total reduction of 746 working man days
- Eliminate all scaffolding, reducing the risks of falls from height and falling objects.
- Reduced preliminary and management costs
- All manufacturing carried out off site in a controlled environment, ensuring a robust quality and safety-controlled environment
- The reduction in transport from 1 car and 3 vans for 485 trips to site and 18 deliveries to 1 car and 3 vans for totalling 48 trips and 9 deliveries. This is a saving of 446 trips to site. This excludes visits from senior managers and surveyors.



Panel Fixing



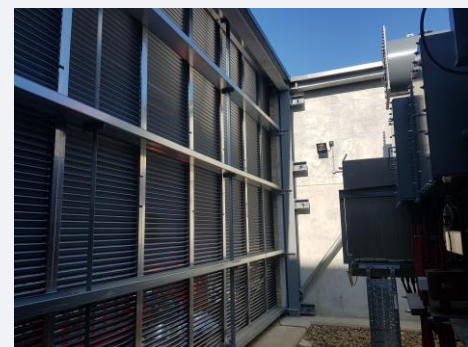
PCC Brick Cladding Panel



In-Situ Bund, Superstructure and internal PCC Panels



Panel Fixing



Inside Completed Transformer Enclosure