Global Rail Construction

CASE STUDY

Greenwich SVC – Enclosure Design and Build

LOCATION:	Greenwich Generating Station
CLIENT:	Siemens
PROJECT VALUE:	£1.2m
DURATION:	Aug 2017 - October 2018

Introduction

Global Rail Construction Limited (GRCL) has successfully completed the Design and Build of a Static VAR Compensator (SVC) Enclosure at Greenwich Generating Station. Under Power Upgrades Package 5C, Siemens, as Principal Contractor, appointed GRCL to deliver the project, to house the new SVC within a disused turbine hall.

Access to the substation was via the Old Woolwich Road, which was challenging. An internal substation access road was used for all construction logistics and deliveries with minimum disruption caused to the local residents.

Whilst on site, GRCL were awarded a variation to provide further civils installation works associated with the extension to the existing 22kV Switch room located on the 1st Floor of the Sub-Station. These works included the demolition of the existing wall, strengthening of the floor using steel support and concrete screed, blockwork walls, self-levelling screed, door installation and plinth foundations.

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Scope of Works

The SVC was mounted at basement level at the North end of the hall. Asbestos containing materials were detected within the concrete that formed the existing raft slab. GRCL installed a 300mm thick unbonded reinforced concrete over slab below the footprint of the proposed housing. Around the perimeter of the housing there were four existing seven-metre-high mass concrete structures which would have originally been used to support equipment. However, it was subsequently identified that these structures contained asbestos, and therefore could not be incorporated into the structural design.

An investigation undertaken by London Underground found the existing basement floor had anomalies and therefore decided to construct a 300mm over slab.

Multiple site visits were carried out by Siemens RE, Siemens AG and GRCL to verify the cloud point data accuracy and accurately plot the feasible layout.

The housing was designed to be free standing on the 300mm concrete slab. This slab covered the 50mm screed on the basement floor which in turn covered and encapsulated the asbestos containing material.

The SVC housing was to be supported by the existing reinforced concrete 300mm floor slab. The housing comprises of four main areas namely the 'Reactor Yard', 'Converter Room', 'Control and Protection Room' and the 'Pump Skid Enclosure'. The walls were constructed from reinforced concrete and were approximately seven metres high with the exception of the 'Computer Room' which was approximately 4.6m high. All walls were 200mm deep, with the exception of the wall adjacent to the Reactor, which was 225mm. The roof construction was formed of precast concrete planks supported by steel beams. The steel beams were supported by the reinforced concrete walls. In-situ concrete structural topping was applied to the roof. Within the housing, the floor was typically raised by 500mm and achieved with lightweight concrete. Trenches were required in various locations within the 500mm floor depth. The 'Control and Protection Room' had a heavy duty raised floor (capable of supporting an imposed load of 10kN/m2) supported off from the 300mm slab. Exit from the housing via this room was via a new steel stairs and a steel platform.

Prior to construction, the 300mm slab was cleaned and inspected. Construction commenced with setting out of walls on the 300mm thick reinforced concrete slab and installation of the temporary works. The setting out was dictated by existing conditions (the existing concrete plinths) and the requirements of the equipment layout. This was followed by fixing of rebar and the concrete pour of the walls (the wet concrete is prevented from loading the plinths with a 12mm thick compressible board). This process was undertaken in five stages with a minimum seven days curing for each. Continuity around the corners of the walls is provided by 12mm diameter L bars (sets of 3) at 200mm centres.

Once the first lift of all walls had been undertaken and sufficiently cured the lightweight concrete floors and trench construction commenced. Glass fibre reinforcement dowels were provided between the walls and the 300mm thick slab for continuity. After the final concrete pour was sufficiently cured, the roof was constructed.

Steel beams (with a minimum bearing of 100mm) with concrete plank infills were installed and an in-situ structural topping was created. The in-situ topping was tied together with mesh reinforcement and dowels installed within the top wall, lapped with the mesh reinforcement. The existing overhead cranes were used to install the roof beams and precast planks. The planks were supported on the bottom flange and designed for torsion (and the moment induced on the wall due to the torsion was also taken into account in the wall design). The steelwork was then built into the walls. Three runway beams also were constructed over the Converter Room.

Finally, openings were created for the doors and a raised floor was then constructed.

Trenches were covered with a GRP grating and handrails were erected where required.

This sequencing allowed the M&E fit-out to follow on time, including the installation of the SVC equipment.

The project was delivered to meet all safety, budgetary and timeous requirements.