Case Study

Project: Boiler Replacement Project
Location: Northumberland Park Depot
Client: Transport for London (TfL)
Date: January 2016 – July 2019

Introduction
Northumberland Park Depot (NPD) was brought into use in the late 1960's to stable and service London Underground's (LU) Victoria Line trains. NPD is the only depot currently serving the Victoria line. The hot water and heating system at the depot also dated back to the 1960's and consisted of three oil fired boilers, subsidiary pipework and heat emitting panels. Due to their age, the gas oil boilers failed and most elements of the old heating and hot water system were beyond feasible economic repair. Therefore, a new Boiler House was required to serve heating and hot water requirements of the train depot.

Quinn Infrastructure tendered for the works under an NEC Option A Contract and were successfully awarded the contract for the full Mechanical, Electrical and Power (MEP) design, install, commission and set to work of all the primary heating, hot water and associated plant systems at London Underground's NPD Depot.

An M&E Performance Specification and associated outline drawings were provided to Quinn Infrastructure in order to produce fully detailed design solutions for the MEP services to suit the operational and performance requirements of the Depot. The exact requirements for final loads were fully calculated by Quinn Infrastructure and their design team and agreed with LU. During the detailed design phase, Quinn Infrastructure undertook all necessary site surveys, stakeholder liaison and meetings with LU to progress the design ensuring that the requirements of the Performance Specification and LU were fully adhered to in readiness for the installation works.

As the existing Depot operates 24/7, 365 days per year, a temporary boiler and water heater enabling solution was created by Quinn Infrastructure for the existing boiler house, in order to maintain a continuous supply of heating and hot water. LU having already installed temporary boilers, agreed that these could be re-used by Quinn Infrastructure for these initial works. Quinn installed and

maintained the temporary boiler plant to cover the heating and hot water requirements of the depot for the duration of the project. Temporary lighting and power supplies were also installed.
Scaffolding was then installed for the high-level removal and installation works. Temporary works were co-ordinated and managed on site by qualified personnel.

Following asbestos surveys, it was confirmed that the boiler house walls, pipe insulations, flue insulations, boiler plant components, gaskets etc. contain asbestos. Quinn Infrastructure managed the asbestos removal works through a specialist contractor in a controlled environment. Following removal, the entire boiler house was stripped out and refurbished and 2No 30,000 litre redundant oil tanks were also demolished.

This carefully planned enabling work, allowed for the seamless replacement of the existing oil-fed summer and winter boilers with more energy efficient heat generators comprising of three high efficiency modular natural gas boilers operating on a duty, assist and standby arrangement together with two gas fired hot water service calorifiers and their ancillary plant, pumps, pressurisation units, and heat exchangers.

A natural gas main from a new meter house to the boiler house was also installed. This gas main fed the existing gatehouse, mess room, kitchen and spare connection to the examination and cleaning sheds. Following successful commissioning, Quinn Infrastructure managed the careful removal of the existing oil tanks and temporary plant through a specialist contractor.

The works were completed to meet TfL's requirements and in accordance with project programme and were successfully handed back into service in July 2019.

Contract Deliverables
Quinn Infrastructures entire MEP scope comprised the detailed design, installation, test and commissioning into service of the primary heating and hot water system plant to comply with LU's standards and requirements.

The existing oil-fed summer and winter boilers were replaced with more energy efficient heat generators comprising of three high efficiency modular natural gas boilers operating on a duty, assist and standby arrangement together with two gas fired hot water service calorifiers and their ancillary plant, pumps, pressurisation units, heat exchangers etc. A new natural gas main from the utilities meter house to the boiler house also feeding the existing mess room, kitchen, gatehouse and spare connection to the Examination and Cleaning Sheds was also provided. The scope also covered the removal of the existing oil tanks, oil distribution system, and all the redundant boilers, water heaters, pipework and electrics.

The full scope is detailed below:

1. New natural gas main to serve the Gatehouse, Mess room, Kitchen and new heating and hot water boilers with 25% spare capacity for future works, incorporated including meter base (civils), gas booster base (civils) and housings.

2. Decommission and remove all the redundant plant and equipment from the existing boiler house and oil tanks.

3. Installation of new lighting and electrics in line with LU standards and regulations.

4. Detailed design of the new gas fired boiler heating and gas fired hot water systems as a replacement to the existing oil-fired heating system.

5. Provision of Trend IQ3 controller and IQ4 control equipment including all electrical cabling (Utilising the existing BMS Head End).

6. Provide an automated water treatment for the hard water supply serving the boiler house systems hot water system.

7. New gas fired boilers to be arranged on a "duty, assist, standby arrangement" .

8. Oil supplies to be maintained to the existing and temporary boilers until they are no longer required. Enabling works to allow strip-out of existing plant and testing of the existing pipework circuits and maintain heating & hot water to Depot.

9. Electrical and BMS controls works for these Boiler and Hot water system replacement works.

10. Preparation of detailed design calculations for these works.

11. Preparation of Construction issue drawings and builders work drawings for these works.
12. Liaison with incoming natural gas provider on exact natural gas system flowrate and pressure requirements.
13. Testing and commissioning of all the MEP services within these works.
14. Provision of O&M documents, as-fitted drawings and Statutory Building Log Book.
15. Provide all information to LU for Building Regulation Compliances.
16. For the development of the Concept design stage through to detailed design and construction stages.
17. Allowance for operational hands-on teach-in to LU at Handover of all the MEP systems.
18. Allowance for all interfaces with LU existing systems eg Fire alarms, site BMS, refurbishment of boiler house and oil tank room etc.

Challenges and Solutions

Quinn Infrastructure's biggest challenge on this project was to ensure no disruption to the operational depot occured in relation to the heating and hot water - Northumberland Park Depot is a pivotal location on the TfL network.

Northumberland Park Depot is critical to the Victoria Line operations and therefore, required precise planning and close stakeholder engagement to ensure no disruption was experienced.

This was achieved by the onsite project interface and management team engaging with the TfL project management team and all end users, ensuring that train maintenance programmes were understood and any shutdowns of the heating and hot water systems were planned accordingly.