

CUSTOMER

Cross Rail/Laing O'Rourke

SECTOR

Rail

Crossrail Liverpool Street Station

Station Information &
Surveillance Systems
(SISS) and Building
Management System

LBFoster®



Nestled in one of the City's leading financial centres, surrounded by a continually evolving dense urban landscape, the design for Liverpool Street station makes the most of what little space is available to build a massive piece of infrastructure.

Stretching from Moorgate in the west to Broadgate in the east, the Elizabeth line ticket halls are connected by two mined platforms. Fully accessible ticket halls provide direct interchange with the Northern, Central, Metropolitan, Circle and Hammersmith & City lines, as well as National Rail services to Stansted and Southend airports.

L.B. Foster Telecoms fulfilled an essential role as a main supplier to Laing O'Rourke, carrying out Station Information & Surveillance Systems (SISS) and Building Management System works at Crossrail's Liverpool Street station.

L.B. Foster have routinely picked up on scope gap, and been asked to deliver these added works in addition to our contracted works:

"The complexity of the works at Crossrail's Liverpool Street station should not be underestimated. The team from L.B. Foster Telecoms used its considerable experience and expertise of working on similarly challenging installations to deliver the station's new SISS and BMS, tackling every part of the project with total professionalism and massive enthusiasm."

**Company representative
Laing O'Rourke**

Requirement

Laing O'Rourke is a privately owned, internationally focussed engineering enterprise with world-class capabilities spanning the entire client value chain. L.B.

Foster Telecoms, on behalf of principal contractor Laing O'Rourke, was selected to install the Station Information & Surveillance System (SISS) and BMS at the new Crossrail Liverpool Street station.

Specification

Installation of SISS including:

- > Public Address Voice Alarm (PAVA)
- > CCTV
- > Telephony/PHP
- > Customer Information Systems (CIS)
- > Telephony
- > SCADA
- > Radio:
 - > Trackside
 - > London Underground Limited
 - > Mobile phone
- > Driver Only Operated (DOO)
- > Optical Fibre Network (OFN)

Project Scope / Solution Overview

Public Address (PA)

L.B. Foster Telecoms completed the installation of PA/VA equipment throughout the public and non-public areas of Liverpool Street Station.

CCTV

The CCTV system acts as a deterrent against crime and vandalism, whilst providing real time video images to use for the purposes of security, operations and public reassurance.

The primary operation and management of the CCTV system is provided through the integration to the SMS and CMS Systems. We installed the CCTV system equipment including:

- > CCTV video cameras
- > Video encoders (to encode analogue images from lift cameras, and DOO cameras)
- > Public view monitors (with integral decoders) at the Gateline's.
- > Network Video Recorders and Storage Arrays (located in CERs)
- > Video Management System.

In addition, we also supplied and installed CIS systems and a complete IP telephony system. CCTV equipment is installed throughout the public and non public areas of Liverpool Street Station.#

Customer Information Systems (CIS)

We installed CIS at Liverpool Street Station showing Service Information Display (SID) in public areas including:

- > Broadgate Ticket Hall
- > Moorgate Ticket Hall
- > Ticket Hall levels.

SCADA/Cabinets

We installed contacts/serial/fibre optic patch panel/ copper patch panel to systems including but not limited to:

- > UPS systems
- > Tunnel Lights
- > Platform Screen Doors (PSDs)
- > Overhead Line Equipment (OHLE)
- > High Voltage Equipment
- > Non traction power
- > Low voltage equipment
- > Tunnel Drainage
- > BMS
- > Pumps
- > Fire Panel
- > DOO
- > Temperature monitoring
- > Monitored Doors
- > Lifts
- > Escalators
- > Switchable Signage.



Project Scope / Solution Overview cont.

Telephony/PHP

The new Telephony System is the collective name covering passenger help points, refuge help point, ruggedized and standard telephone devices. These are delivered as part of the Communication and Control System contract throughout the Crossrail Central Operation Section.

Radio

The PMR-RI system is the common arrangement for the propagation of PMR (GSM-R, LFEPA, ALU and LU Connect) and the PCR/ESN (GSM900/1800, UMTS2100, LTE800/1800/2600) signals across Liverpool Street station.

Coverage from GSM-R, ALU, LU Connect, LFEPA and Mobile Network

Operator/Emergency Service Network base stations (BTS) and fibre repeaters utilise the Private Mobile Radio Radiating Infrastructure (PMR-RI) for a RF over Fibre (RfOF) distribution. At Liverpool Street Station there are two PMR-RI infrastructures. The GSM-R and PCR system have a dedicated PMR-RI infrastructure. The second PMR-RI infrastructure extends the LU Connect Radio Services (Connect, ALU & LFEPA) from the LU area of Liverpool Street Station.

The RfOF is a common network consisting of fibre-optic primary distribution from optical master units to fibre repeaters located in CER 1 and CER 2. From the fibre repeaters a coaxial Distributed Antenna System (DAS) is utilised for the transmission of signals throughout Liverpool Street Station.

LU Connect Overview

Liverpool Street is a LU Interchange Station; part of the overall PMR-RI design criteria is to provide LU Connect with a dedicated PMR-RI throughout Liverpool Street Station. The solution delivers ALU, LU Connect Radio and LFEPA with the signal source supplied by LU Connect via a LU Connect RfOF infrastructure to the agreed demarcation. The agreed demarcation point is defined as the common port side of the diplexer which is connected to the output of the LU Connect supplied Repeaters within CER1 & CER2. The common port of the diplexer is then connected to the dedicated PMR-RI.

The LU Connect services dedicated PMR-RI replicate the Crossrail PMR-RI

design with respect to fibre repeater, passive components and antenna locations. L.B. Foster Telecoms completed this installation.

Driver Only Operated (DOO)

Our team completed the installation of the DOO to provide pictures from platform-based analogue cameras installed along the platform edge. These are then transmitted to the train via a DOO Leaky Feeder cable transmission system.

The video input feeds from cameras monitoring the platform-train interface (PTI) are connected to the DOO cabinet. Processing equipment located in the DOO cabinets crop, scale and combine the video feeds into two video channels, which are then transmitted via the DOO Leaky Feeder transmission system to the train allowing the train driver a continuous view of the entire PTI.

OFN (Optical Fibre Network)

The Optical Fibre Network is a Dark Fibre system that provides transparent fibre optic communications between the locations within the Crossrail Central Section. The use of splice boxes and patch panels gives the end users a fully transparent point to point link between the end points.

The only exception to this is the link from Pudding Mill Lane to the Route Control Centre (RCC) at Romford which makes use of the Network Rail fibre. Due to the limited number of fibre cores available, the use of Coarse Wave Division Multiplexing (CWDM) technologies is necessary to provide sufficient links to the RCC.

The OFN covers all Public and Back of House areas within the Crossrail Liverpool Street station across the following levels:

- > Moorgate Shaft – Level +1
- > Moorgate Shaft – Street Level
- > Moorgate Shaft – Level -1 to -6
- > Broadgate Basement – Level -2
- > Bloomfield Box – Level +1
- > Bloomfield Box – Street Level
- > Bloomfield Box – Level -1 to -6

L.B.Foster Telecoms completed this installation



Our Solution

A comprehensive design review was undertaken, checking the project documentation for accuracy, constructability, and completeness. During the design review and throughout the project, we actively sought opportunities to value engineer elements of the project and to highlight and raise these through the appropriate channels.

Our project management team engaged with Laing O'Rourke to ensure that the correct processes were implemented throughout the project. We managed the project efficiently through the whole project life cycle, from mobilising the project management team, through construction, to the testing phases to handover to the client.

Efficient project delivery relies on maintaining the systems in place to manage the project delivery process. Our Quality Management System (QMS) is certified to the requirements of BS EN ISO 9001 and projects are managed in compliance with the established QMS. The QMS is additionally implemented on projects in accordance with the specific requirements of the client QMS, together with the requirements of industry standards such as LU's QUENSH.

We deployed a dedicated team of appropriately qualified and experienced personnel who have overseen the development of the project at all stages. We installed SISS and BMS works including CMS, cabling, asset installation, test and commissioning of the SISS and BMS, in close collaboration with the main contractor, designers, sub-contractors and other stakeholders to ensure the efficient delivery of all aspects of the project.

Our team adhered closely to project Health & Safety rules and standards at all the time. Project Assurance Plan, Project Quality Plan, Work Package Plans, Installation and Test Plans for each phase, Testing Specifications and Plans, procurement plans were produced and checked on a regular basis.

Our team ensured all mandatory documentation was in place required for permission to commence the construction. All Inspection & Test Plans for all the systems were developed and agreed/approved with Client before commencing the construction. All installation check sheets, test sheets procedures, hold points, witness points, Inspection points were agreed with Clients (LOR) under and as a part of ITPs..

All off-site installation and test procedures are agreed with Clients at least two weeks prior to the inspection invitation. Clients are invited for all applicable factory acceptance tests. On successful completion of FATs, the system/assets/equipment have been shipped on site with Client's consent. FAT reports/ITP deliverables are produced and handed over to the Clients as part of project deliverables.

During the construction phase, all approved design drawings, specifications, schedules, schematics were provided to the construction team and regularly updated as and when received by the Principal Designer/ Designer. Any changes during the construction /testing/commissioning phases are captured on red line drawings and/or on non-conformance reports (NCR) or on any project agreed format. We carry out Internal inspections and all snags/defects are captured on internal snagging register.

Our project team progressively updated the project assurance documentation i.e. red line drawings, ITP deliverables etc as soon as install/testing/commissioning activities were done on site and ensuring to keep them ready all the time for Client's review when asked.

Testing is implemented through the project Testing Specifications and Plans and the Inspection and Test Plan (ITP) documents.

L.B. Foster ensured progressive assurance is set for the construction/red line drawings. Any construction changes during installation/testing/commissioning phases were notified to the client and captured on the red line drawings progressively. NCRs were raised where applicable and necessary.

Each of the Telecoms systems required separate project assurance controls, processes and documentation to ensure that each system was appropriately managed through to completion.



What they said

"Prestige infrastructure projects such as Crossrail attract interest from all over, so the eyes of the world are upon you. That's why it is so important that the entire supply chain is made up of wholly competent suppliers. The team at L.B. Foster Telecoms performed over and above the call of duty and delivered a fantastic all round job."

Company representative
Laing O'Rourke

L.B. Foster
Telecoms

1 Fieldings Road
Cheshunt
EN8 9TL

t +44 (0) 199 262 2385
e sales@lbfooster.co.uk

lbfooster.eu