Global Rail Construction

CASE STUDY

Feltham Resignalling GRIP 5-8 Phases 3 & 4 Rail Systems Package

LOCATION:	Feltham
CLIENT:	Atkins Global
DATE COMPLETED:	November 2021 - June 2023

Introduction

Global Rail Construction Limited (GRCL) has completed a multi-disciplinary GRIP 5-8 rail systems sub-contract encompassing Civil and Structural Engineering including temporary works, E&P and Signalling installation works, covering Phases 3 and 4 of the Feltham Resignalling Project. This project was on behalf of Principal Contractor (PC) Atkins Global for Network Rail's (NR) Southern region. GRCL is the UK arm of the worldwide Global Infrastructure Group and is a leading provider of design and build services to clients in the rail and transportation sector.

Global Rail Construction Limited's successful design, installation and handover of this contract supports the culmination and commissioning of these newly signalled areas in August 2023.

The full scope of the main contract has covered the re-control from the existing Feltham Area Signalling Centre (ASC) NX Panel system to the Basingstoke Rail Operations Centre (ROC) on a Resonate IECC Scalable system, and a signalling interlocking re-lock from the existing Staines and Windsor Route Relay Interlockings (RRI) to an appropriate configuration of Computer Based Interlockings (CBI) within the Atkins ElectroLogIXS system.

All existing lineside signalling infrastructure has been replaced with new equipment including all cabling, Location Case suites, AWS and TPWS, and existing AC track circuit train detection replaced by the Frauscher Advanced Counter (FAdC) Axle Counter system. 7No controlled Level Crossings have been renewed to interface with the new ElectroLogIXS lineside equipment with replacement of the booms, barrier machines, road traffic lights (RTLs), and changing from incandescent bulbs to white light LEDs.

New electrical Principal Supply Points (PSP) have been provided at Brentford, Feltham, and Wraysbury and a new Auxiliary Supply Point provided at Windsor. PSPs, ASPs, and Functional Supply Points (FSPs) has also been implemented as a Class II based system managed by the Camlin Signet Auto Reconfigurable system.

A new telecommunications fibre network has also been introduced to support the ElectroLogIXS Multi-Service Network (MSN) and the auto reconfigurable Signalling power system. Signal Post Telephones (SPT), LX LCU telephones, and emergency telephones have also been provided.

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The Feltham Resignalling project forms part of the Signalling Renewals/National Operating Strategy (NOS) scheme, which is intending to renew the life-expired signalling infrastructure in Feltham and Wokingham areas to the modern equivalent form.

The total scheme covers the renewal of 450+ Signalling Equivalent Units (SEUs) and the full geographical work-scope covers in excess of eighty miles of railway lines.

Challenges and solutions

Global Rail Construction Limited has delivered this sub-contract in accordance with all relevant Health, Safety and Environmental legislation, British Standards, European Standards, Manufacturer Instructions, Codes of Practice, Railway Group Standards, HSE's Health and Safety in Construction HSG150, Network Rail Company Standards and Network Rail's Life Saving Rules. The scope covers design, build and asset recoveries. The elements of work were as follows:

Lineside Signalling Installation covering:
All signals and indicators, covering main aspect signals, ground position light signals, subsidiary signal route indicators, banner repeater signals and off indicators. This specifically included as required:

- Installing heads onto structures
- Installing and recovering hoods
- Raising fold down structures
- Asset cabling works
- Aligning the signals in accordance with the sighting forms
- Connecting plug couped cables at location cases
- Installing prefixed plates onto both new structures and those being retained
- Installing cable containment tray works
- Installing Vortok clips and cleat cables to sleepers
- Making off and preparing free ended cables including crimping and beading

TPWS, AWS and Axel Counters (incl. PSR), specifically including as required:

- Installing all track assets
- Installing and recovering permanent AWS shields
- Asset cabling works
- AWS ramps
- Connecting plug coupled cables at the location case
- Installing cable containment tray works
- Installing TPWS Equipment boxes and connecting the earths
- Installing Vortok clips and cleat cables to sleepers
- Labelling of all assets

Track Circuits

- S&T Bonding
- Location case changes
- Running and termination of tail cables
- Installing EBI 2000 Trackside tuning units and pedestals
- Installing trackside Dis Boxes and pedestals
- Installing of Impedance Bonds/Advance plates and side leads
- Labelling of all assets

Signalling Location Cases and Marshall Boxes

- Installing on an existing foundation
- Connecting the earth, including the earth bus bar
- Running and terminating 110V cables between the signalling location and FSP
- Connecting/terminating cables (noting majority of cables are plug coupled)

Lineside and 6-foot Signage

- Constructing foundation
- Installing posts
- Installing signs
- Labelling and installation of signal identity plates

Level Crossings

- Installing lineside equipment housings (location cases)
- Connecting the plug coupled cables at each location case

Cabling

- Connecting plug coupled cables in the lineside enclosures
- Connecting/terminating cables to the side assets
- Running the cable that is connected to the asset (interconnect 1)
- Running and terminating cables between FSP and the signalling location
- De-lidding and re-lidding and cable protection for any works undertaken

Points

- Installing cables in readiness of changeover including crimping and beading
- Installing new point numbers
- Install points Marshalling boxes where required and connecting the earth

Buffer Stops

- Make off and prepare free ended cables including crimping and beading
- Terminate free ended cables in S&T side of the FSP

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E&P design, installation, test, and recovery works covering:

Substations

- Load monitoring
- Connection/modification to existing LVAC Signalling Power Changeover Panel
- Testing

DNO

- Connection of sub main/final circuit including testing of connection

PSPs/ASPs

- Connecting LV Sub main supplies and associated bonding
- Connecting signalling power final circuits
- Functional testing and short circuit verification of the Camlin protection systems
- Transporting and landing
- Terminating cables
- Setting to work PSP UPS and alarms
- Functional and witness testing of RCM systems and devices within PSP's

FSPs and Signalling Feeder

- Terminating feeder cables (PSP and FSPs)
- Functional testing and short circuit verification of the Camlin protection systems
- Jointing of feeder cables
- Route verification of 650V cable containment
- Setting to work Camlin Protection systems, FSP heaters and FSP lighting
- Testing and staged handover to Atkins signalling testers

Telecoms installation, test and recovery works covering:

- Fibre cable installation
- Copper cable installation
- Location case construction and installation
- Lineside telephone installation
- Fringe circuit installation

Challenges and Solutions

Plant planning and logistics

During the works GRCL provided all necessary plant including On Track Plant and equipment to complete its works excepting for recoveries via free issue trains. Careful planning was therefore required to meet the project timeframes. To support this, as part of a 'smart' mobilisation plan, GRCL advised the Principal Contractor team 54 weeks in advance (4 weeks from award of contract) of any requirement for free issue plant, including trains and Kirow Cranes.

GRCL also developed and operated a system and register for managing and controlling plant and equipment used on site, which was vital to the coordination, progression and timely completion of this contract.

Master planning and project controls

With possession opportunities limited to those in the works information and a number of critical milestones, works programming and project controls were also key to keeping the works on track.

Prior to commencement, the design and delivery teams prepared a detailed programme including materials deliveries.

They then subsequently issued a detailed four-week lookahead programme detailing daily work activities, working hours and site contacts on a weekly basis. This also included a 7-day look back and progress identifier. Items covered deconfliction planning, plant movements, track access, any storage requirements, welfare provisions, logistics and any other activities required from Atkins to co-ordinate the possessions and line blocks with Network Rail and any other 3rd party.

Management and coordination of Line Blockages, Track Possessions and Isolations

Prior to the works, GRCL had to identify, agree with the PC and book required possessions and isolations (taking account of possession availability advised in the Work Information). This included familiarisation with the PC's Engineering Access Planning process through which all Line Blockage and track possessions are obtained and managed.

As part of this, GRCL attended all relevant access planning and possession meetings (each week including preparing submissions for any Open Line Working as required.

GRCL also provided all necessary track safety staff, including PICs, SWL1/Controllers of Site Safety (COSSs), Protection Controllers (PCs), Site Wardens/Lookouts (SWs/LOs), Level Crossing Attendants (LXAs), Points and Ground Frame Operators (POs).

During the works, there were a number of interfacing projects and 3rd party contractors. GRCL fully co-operated in the planning and co-ordination of all shared worksites. The team worked collaboratively producing plans and maps of their worksite areas, including on track plant and trolley movements. These were issued well in advance of the works to enable proactive planning and best use of possession in support of passengers and to maximise operational use of the railway.

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Buried Services and HV Routes

Buried services and hidden cables were a concern throughout the contract, even though the PCL provided and the GRCL team carefully reviewed this information. GRCL undertook robust management throughout the works taking due cognisance, creating detailed action plans both prior to, and during the works to mitigate the risk of impacting buried services.

As part of this process, GRCL also arranged all necessary High Voltage (HV) cable route assessments and HV competent supervision as required to complete the works, covering material delivery over routes as well as construction work, and any necessary route protection and switch outs.

Visual survey's, CAT and Genny scans prior to any ground disturbance works, were also undertaken and recorded before any works were carried out. GRCL implemented a strict Permit to Dig operating procedure for all excavation and ground disturbance work in accordance with Network Rails 'Working safely in the Vicinity of Buried Services' Standard, which, included the preparation and issue of 'Buried Service information Packs', along with Permit to Dig documentation, for all construction and delivery teams.

Track Support Zone Monitoring

GRCL were also responsible for providing the necessary assessment, track monitoring plans, track inspections and track monitoring - where works impacted the Track Support Zone.

The team undertook detailed surveying, inspecting, monitoring, and reporting via a competent and certificated Track Handback Engineer in accordance with NR/L2/TRK/001/A01 (inspection and handover of the line following engineering works).

In doing so, GRCL's Track Handback Engineer was able to complete the necessary final checks of all such disturbance works and complete the handback paperwork in accordance with the relevant Network Rail Infrastructure Conformance Certificates process.

Quality Assurance

The application of a robust Quality Assurance system conforming to the requirements of BS EN ISO 9001 and to define the control and acceptance criteria for the works was vital.

GRCL put in place a process for assuring quality through surveillance inspections. This included providing at the start of the works a 'Quality and Monitoring Programme' to support the Atkins production of a project wide integrated version in accordance with NR/PR/SPC/IQC0002[22].

This system included preparation and submission quality inspections forms covering the works (for each of the constructed elements).

During the works, GRCL were also subject to random inspections and checks from the PC team. As a result of the robust processes and application of quality systems, GRCL passed these with flying colours.

To further support best practice, GRCL delivered:

- An assurance tracker identifying all the elements to be constructed
- Certificates of Conformity for all materials
- A Handover Certificate, for each element, confirming the element has been constructed and is ready for handover to the Contractors Tester in Charge

Environmental Management

During the works, GRCL were responsible for minimising disturbance, nuisance and pollution arising from its site operations, this included compliance with the PC's Environmental and Social Management Plan/Precautionary Method of Working and the requirements of NR's Environmental and Sustainability Strategy including the use of the RSSB's Carbon Rail Tool. As well as detailing the risks and controls of environmental/ecological hazards within the Work Package Plan (WPP) and relevant Task Briefing (TBS), GRCL also appointed an Ecological Representative to be responsible for ensuring that the measures outlined in Environmental and Social Management Plan/PMW were implemented and providing appropriate information within the TBS for each team member at the start of any shift on site.

Measures considered included: Noise; Vibration; Air Quality - Dust/Smoke; Light pollution; Geology/soils – contamination; Water quality/drainage/pollution control; Accidental spill control; Energy and resources (transport, materials, fuel etc.); Waste – storage, segregation, testing, re- use, recycling, disposal; SSSI's; Special Areas of Conservation; Conservation Areas; Archaeological sites; Heritage Sites; Protected species and habitats; TPOs; Birds/Bird Nesting; Reptiles and Amphibians; Invasive Plant Species; Badgers and other Mammals; and Bats.

Timely Handover

Timely handover was crucial when aiming to meet a key commissioning date. GRCL successfully supported successful handover of their sub-contract works by:

- Attending dilapidation surveys and completing form NR/L2/MTC/089/AMP010
- Providing the following information to for each asset installed
  - Signalling Form 005s for the signal heads
  - Material conformity certificates
  - Electrical installation/testing certificates
  - Telecoms Testing certificates
  - Handover to Test (HOTT) documentation
- Attending taking over walkouts, agreeing, recording, and actioning as applicable, the items to be included within form NR/L2/MTC/089/AMP016

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Benefits

Having a railway design and build team, including dedicated project and site management across the full rail systems package scope, familiarity with the scheme, having delivered several previous phases and having delivered time pressurised resignalling schemes across Network Rail infrastructure, allowed Global Rail Construction Limited to provide the necessary turnkey solution and complete the project to meet their client's requirements.

Railway resignalling projects are time-critical, with crucial milestones to be met, so experience is a key factor in achieving success, So, having an in-house team of design engineers, project managers and installers, enabled integrated solutions to be quickly and effectively formed – providing programme and cost surety.

Stakeholder Management was key over a large geographical area. GRCL's Project, Construction and Possession Management staff provided the client and any interested outside party with relevant information. This was crucial when so many sites were running concurrently, to maintain necessary communication and progress – putting the passenger first.

The collaborative effect of Global Rail Construction also extended to its own workforce and those of its sub-contractors. This co-operation gave GRCL the flexibility to increase resource when needed and create a logistics plan for 'right first time' delivery of materials and plant to keep the workforce fully occupied.

Fostering this 'one team' spirit throughout allowed GRCL to ensure that both environmental considerations were managed, and safety and quality were never compromised.