

IMPROVING THE RAILWAY INFRASTRUCTURE OF A CAPITAL CITY



With thousands of commuters into the capital city every day, additional trains into London are a plus to help with the heavy traffic congestion.

As part of the Brighton Mainline Upgrade Programme, an additional six trains per hour will be made available during the morning peak. Along with this, the programme would also see four additional services into London with a further two additional trains in 2043. Performance will also be improved through the segregation of flows and contribute toward additional train paths on the route.

Topographical surveys are required for this complex and extremely busy piece of London's railway infrastructure. The programme provides the ideal time to upgrade to newer, faster and more efficient solutions for data capture.

Network Rail, the government entity in charge of the programme, turned to Atkins to perform the surveys.

A MAJOR UPGRADE

Established in 1938, Atkins is one of the world's most respected design, engineering and project management consultancies. Working closely with a wide range of clients from different sectors and regions across the public and private sectors and local and national governments, Atkins delivers long-term trusted partnerships to create a world where lives are enriched through the implementation of ideas.

Atkins Rail Division, based in Croydon, Surrey, United Kingdom, has been using Leica Geosystems surveying equipment for almost 20 years. The decision was made last year to replace the majority of the consultancy's trusted but aging fleet of Leica System 1100 and 1200 total stations and to add to the firm's existing GNSS, digital levelling and traversing equipment with the latest Leica Captivate solutions.

This major upgrade saw a broad spread of instruments:

- 1 Nova MS60 MultiStation
- 7 Viva TS161 Imaging total stations
- 4 Viva GS14 GNSS Smart Antenna
- 10 Captivate CS35 tablet computers
- 2 LS15 auto focus digital levels
- 8 full traverse kits

With the new portfolio, Atkins was ready to take on the important rail project.

SITE LIMITS AND CHALLENGES

To enable the additional programme paths toward London Victoria and London Bridge, there was a requirement to segregate flows at Windmill Bridge Junction. It would support performance improvement on the route through the segregation of key train flows, which currently transfer reactionary delays across the other adjacent lines and the wider South London network.

To **achieve additional train stopping capacity** at East Croydon, there was a requirement for additional platforms to be constructed. In addition to safely delivering a 12-car train operation between Selhurst and Gloucester Road Junction, infrastructure was required to **accommodate a 12-car train** on the Selhurst Spur.

As a result, feasibility options were developed to achieve these outputs. The options include:

- Grade separation of Windmill Bridge Junction,
- Extension of the Selhurst Spur
- Additional track between Windmill Bridge Junction and East Croydon
- Two additional platforms at East Croydon.

It was identified that work would be required at East Croydon station to safely deliver the required passenger access to new platforms and provide sufficient increased passenger capacity on the concourse.

"As with all railway topographical surveys, the limitations of site access and the nature of railway infrastructure constrains the way we conducted the survey," said Matevz Groboljsek, Atkins Track Team project manager. ***"This was especially true on a project area of this scale and considering the complex junction and train routing available through the section of the infrastructure."***





LEICA CAPTIVATE SOLUTIONS HELPING THE WORLD OF RAIL

With accuracy and reliability paramount in the rail environment, Atkins turned to Leica Geosystems' solutions and technology to avoid costly downtime during expensive and time restrictive track possession. The latest innovations available within the new Leica Captivate range proved invaluable in this situation.

The Leica Nova MS60 MultiStation, with its wide spread of functionality including the ability to scan up to 1,000 points per second, was used on the project. Combined with the imaging capability on all the total stations and the interoperability of these with both the Leica CS20 controller and CS35 tablet computer, this enabled Atkins to capture every necessary detail in the quickest and most effective way.

The same controllers and Captivate software were used with the GNSS Smart Antennae to establish control quickly and accurately using HxGN SmartNet correction service. Alongside the Captivate software, the latest Leica LS15 digital level with imaging and auto focus were used, allowing for **a faster, more accurate staff reading in harsh conditions**. The instruments were also used in conjunction with track trollies and alongside Leica Geosystems laser scanning solutions.

The provision of topographical survey data and selected point clouds for the project designers to use and develop created a rationalised railway infrastructure design that will increase capacity on an already packed section of South London's rail network. Ultimately this will declutter historical track alignments, making them suitable for rail expansion into 2020 and beyond.

The project and the data provided to it will lead to providing a better railway experience for the growing customer base and will be used to support economic growth of the surrounding areas.

PROVIDING TOPOGRAPHICAL SURVEYS TO LONDON'S RAILWAY INFRASTRUCTURE

For Atkins, Leica Geosystems solutions have brought many benefits to the project.

"By adopting Leica Captivate software technology, we can provide Network Rail with fast and accurate data realisation, avoid costly returns, and save them time and effort, whilst also reducing their risks," said Groboljsek. ***"By using a combination of Leica Geosystems solutions, data was collected safely, accurately, efficiently and, above all, within limited time during track access possessions. Reduction in time spent on the track reduced site-based risks and lessened risk of injury to Atkins personnel. Also, there was a reduced risk to Network Rail property and infrastructure."***

Primary and secondary control was established using the fast and accurate Leica Viva GS14 GNSS Smart Antenna, using both post processed and live RTK data from HxGN SmartNet. The service was also used to increase efficiency by assuring the quality of 3D GNSS data directly in the field.

With intuitive and understandable software in the field and in the office, Captivate allowed instant 3D visualisation of the survey data collected on the railway site, providing a detailed understanding of the project requirements.

The Leica ScanStation P40 laser scanner also offered a fast scan rate with less noise and clearer scans along with streamlined workflows from the field to office and back via easy automated processing with Leica Cyclone laser scanning software. This was then all quickly and easily communicated to all staff and to the client using Leica TruView.

The Brighton Mainline Upgrade Programme upon completion is one of the first where the topographical survey was used much earlier in the project lifecycle. Combined with Leica Captivate solutions, the rail project is delivered smoothly allowing for the design team and surveyors to proactively manage and transmit decisions based on immediate feedback.

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For more information, visit railways.hexagongeosystems.com



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