

# Cementation

## SKANSKA

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# Chorleywood to Rickmansworth Embankment Stabilisation

### Client

Metronet Rail  
SSL

### Designers

Mott MacDonald

### Scope of Works

715m of embankment  
stabilisation



Cementation Skanska's innovative, customer focused solutions have successfully rejuvenated an ageing earth structure between Chorleywood and Rickmansworth Stations on the Metropolitan Line for Metronet who, in partnership with London Underground is upgrading two thirds of the Tube. The works were completed on programme and to budget providing a safe structure for the running of trains for the next 120 years.

The single sourced, negotiated contract with Metronet involved the design and construction of stabilisation measures to the 11.6m high southbound embankments over a length of 715m. Cementation Skanska has a team dedicated to working within the rail environment and has successfully stabilised over 50 embankments/cuttings in the last 10 years on a design and construct basis for both the London Underground and Network Rail systems. Chorleywood however is the first embankment stabilisation contract for

Metronet under the Public Private Partnership (PPP).

The embankment was originally constructed by the Metropolitan Railway and was opened on the 8th July 1889. The embankment comprised of Track Ballast and Ash over Embankment Fill Chalk constructed over a thin layer of Glacial Deposits underlain by the upper chalk.

The Metropolitan Line at this location which provides track assets for both the Metropolitan Line and the Chiltern Line, required regular maintenance by Metronet to maintain the safe running of trains due to ongoing settlement of the crest of the embankment. Prior to the award of the contract Metronet installed temporary support works.

The contract required the line to remain open throughout the construction of the works, and

for the solution to have minimal maintenance. Cementation Skanska designed the works in partnership with Mott MacDonald.

Cementation Skanska and Metronet jointly negotiated access to two of the embankments across third party land and with the Highways Agency for the main access directly under the M25 motorway.



In order to maintain mature trees along the embankment the works were designed to allow construction from a temporary scaffold platform. Prior to the erection of the scaffold platform the existing temporary propped retaining system required redesigning to enable the existing propped retaining system to be replaced with an anchored retaining system. The anchors were installed from smaller platforms, which were assembled at discrete locations along the slopes of the embankment.

From the scaffold platform temporary cuts were made into the crest of the embankment, the cuts were supported using a combination of anchored and cantilever retaining systems. In order to protect the railway a speed restriction was applied when the excavation for the temporary works commenced. The temporary works were monitored on a daily basis to ensure that the stability of the track was not compromised.

The scaffolding platform also enabled vertical and inclined bored piles to be constructed with LUL approved plant. Each pile was constructed through the chalk fill pinning potential slip planes. Pile cages were installed in small sections to enable all piling works to be carried out during normal traffic hours.

Although used on a variety of London Underground and Network Rail projects, additional plant was designed and manufactured by Cementation Skanska to enable the patented CemRailBeam® system to be placed from the scaffold platform. The CemRailBeam® is a unique

reinforced capping beam system designed to overcome safety, quality and production difficulties on traditional embankment piling work. It involves factory-made precast shuttering units assembled on site over the piles, combined with reinforcement and concrete to form a continuous trackside retaining wall.

Cementation Skanska's Operations Team Leader said 'The CemRailBeam® system delivered factory controlled finish to the stabilisation works' in addition he added 'Chorleywood has seen the longest and tallest sections of CemRailBeam® placed from scaffolding platforms using specially designed plant – this enabled the stabilisation works to be completed in a fast track method and reduced the overall programme period by six weeks compared with a conventional cast in-situ solution.'

On completion of the capping beam works, engineering fill material was placed behind the capping beam to support the crest of the railway and to provide safe walking routes for railway personnel.

The final interface between the track and the stabilisation works involved placing additional track ballast during engineering hours from engineering trains.

On removal of the scaffold platform, the slopes were locally re-graded and replanted.

"This contract was both technically and logistically challenging but the team approach helped to deliver a safe, effective solution to the Client," commented Cementation Skanska's Rail Area Manager

During the project, Cementation Skanska introduced 'Incident and Injury Free' working where the ethos is zero tolerance. The team at Chorleywood recorded over 20,000 man-hours worked without a reportable incident.

The works were also programmed to enable the temporary speed restriction to be lifted two weeks ahead of programme providing benefits to both LUL and the Chiltern Line railway.

The Metronet Earth Structures Manager Simon Welsh, said 'throughout the project the site team have performed in a very professional manner and as demonstrated by the accident book, have operated an extremely safe site. All of this has been completed on programme and achieved with a minimum of disruption to both the operation of the railway and the lives of the local residents.'