Balfour Beatty Rail

NetworkRail

Investment Information

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What's happening?

Best Practice on *TLP KO2*

World's First Conductor Beam Air Gap Neutral Section

Canal Tunnels / St. Pancras

Overview:

The Balfour Beatty Rail design team have been working on a novel Overhead Line Equipment (OLE) Neutral Section constructed using conductor beam sections between the Canal Tunnels and St Pancras Low Level Station on the Thameslink project. Due to the out of phase electrical supply relationship between the Midland Main line and the East Coast Main Line, the different OLE systems need to be kept separated. The Conductor Beam Air Gap Neutral Section solution is a pioneering system that has never been used previously. As this is such an innovative solution this has drawn interest from the Crossrail Project team who recently visited our site to view the system as they are considering using it on their project. In total, 2Km of Conductor Beam has been installed on the N321/N306 Thameslink Project.

Overhead Conductor Beam Life Cycle Cost for the Metro Madrid (Due to the Conductor beam being relatively new in the UK, it was decided to use data from the Madrid Metro as it would be more reflective of a system installed in Canal Tunnels/St Pancras.	
Costs for Maintenance and Inspection:-	
Overhead Conductor Beam	1.335 £/km per year
Overhead Conductor Line (Catenary)	3.301 £/km per year

Overhead Conductor Line (Catenary) is 3 times more expensive than the Overhead Conductor Beam

Reliability (example for 2004-2005)	
Overhead Conductor Beam (150km)	No disruption
Overhead Conductor Line (150km)	56 hours at 15 disruptions Cost £260,000

Benefits:

- More robust electrical sectioning Air Gap between two sections of beam Improvement over traditional high maintenance section insulators
- Simpler design with fewer components
- Safer for train operation/ maintenance as beam system does not wear as much as a catenary system.
- Less maintenance less risk of staff injury
- System fire resistance is significantly greater than that of a catenary system
- Maintenance and inspection costs approximately 1/3 of that for a typical catenary system
- Condition inspections every 24 months
- Complete inspection every 10 years
- Less risk of something going wrong as not tensioned i.e. contact wire snapping
- Fewer possessions needed compared to a catenary system, contact wire and beam sections can be replaced easily if necessary.
- Less impact on commuters/ reputational risk as beam does not wear as much as cable
- Less material (i.e. no foundations, OLE tensioning equipment, cantilevers, catenary support system)
- Life expectancy of 60 years, significantly longer than a typical catenary system

Date: July 2015
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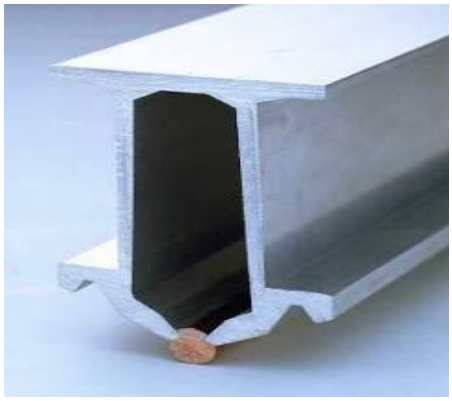
Challenges:

- As this is a world's first the on-site construction required on site design support to ensure the design was constructed to the tolerances specified.
- Product approval process



Meeting our objectives & targets:

This design development directly contributes to Network Rail's TLP Sustainability Strategy Objectives:

- **10b Validate that the infrastructure can support the programme PPM targets post construction** – reliability is estimated to save £3,292 per year.
- **18b Reduce waste during the design process** – longer life means less replacement of the infrastructure therefore less waste is going to be produced.
- **13a Identify opportunity for a whole-life costing study** – a WLC is going to be produced for this system.
- **17a Design structures to reduce future material use in maintenance & replacement** – there will be less material and fewer components which may need replacing