

Sheffield - Rotherham Tram Train

Construction, Testing and Commissioning

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What is a Tram Train?

- A vehicle that operates as a Tram in the city and a Train on the Railway
- A seamless journey for passengers
- Better links to City Centres
 - Faster even though they are slower
- Uses Existing Infrastructure
 - Reduced costs compared to new build
- Reduced demand for local services at main stations
 - Free Capacity
- Shared infrastructure with heavy rail vehicles



UK Pilot Project

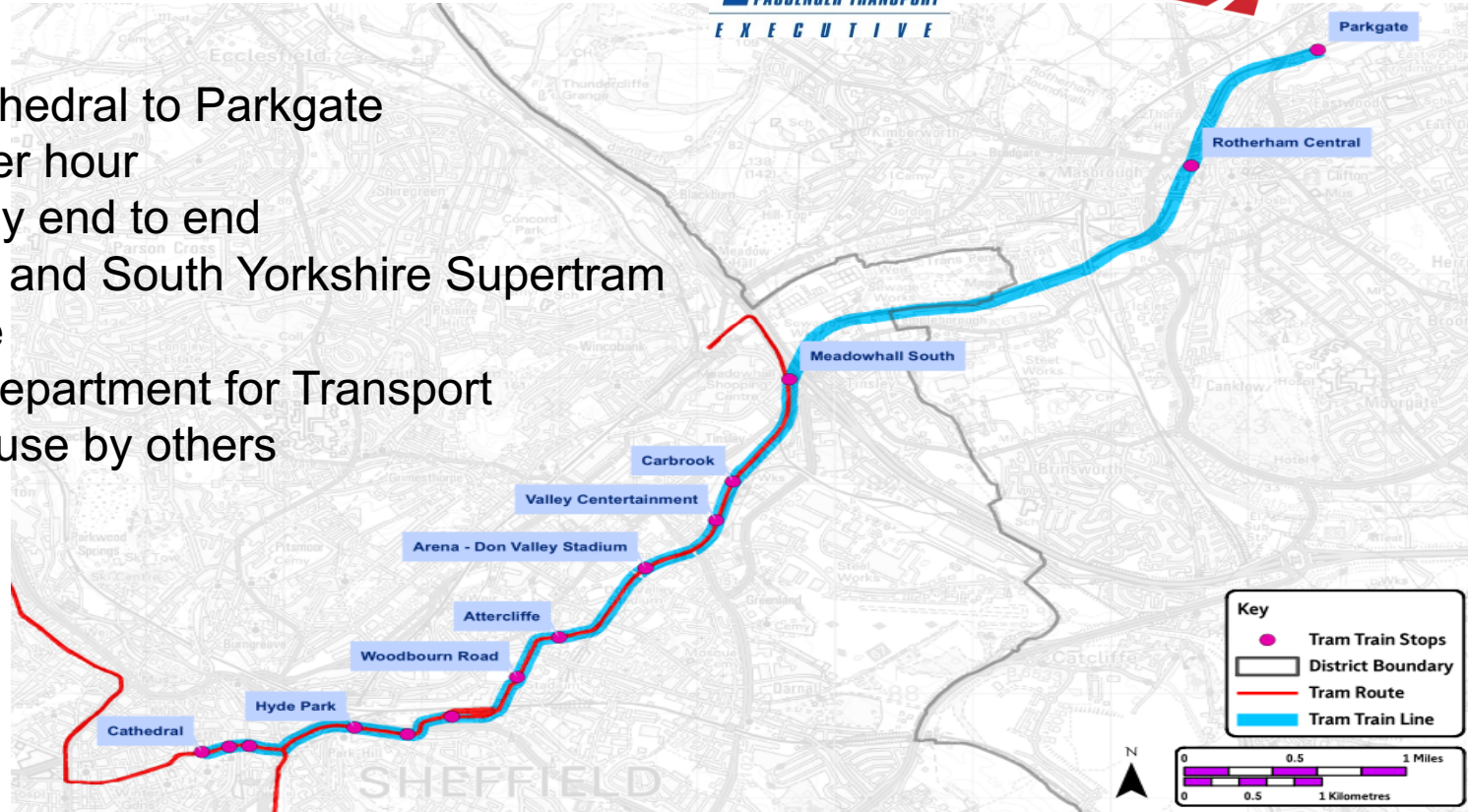
Department for
Transport

Stagecoach
SUPERTRAM

**SOUTH YORKSHIRE
PASSENGER TRANSPORT
EXECUTIVE**

Network Rail

- Sheffield Cathedral to Parkgate
- 3 Services per hour
- 26min journey end to end
- Network Rail and South Yorkshire Supertram infrastructure
- Funded by Department for Transport
- Learning for use by others



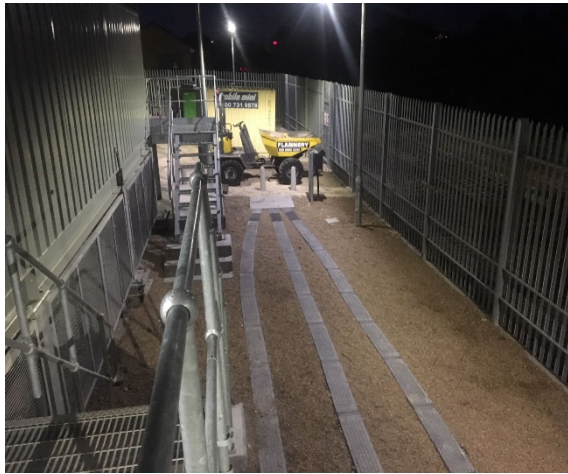
Infrastructure Changes – Supertram

- Signalling system
 - Points controller
 - Vehicle Identification system
- Guard Rails
- Rail replacement
- Depot Upgrade
 - Stabling
 - Cranes
 - Gantry
 - Training Rooms



Infrastructure Changes – Network Rail

- New link chord between SYSL and NWR
- 2No. track lowers
- 5No. new sets of S&C
- Circa 250 OLE structures
- 1No. bridge re-construction
- 3No. 650V power feed renewals
- 1No. 750V OLE feeder station
- 2No. low level stations



Infrastructure Changes – Tinsley Chord

- Connect the two systems together
- Transport and Works Act Order
- 25m and 80m curves
- Tramway signalling transition to NR signalling

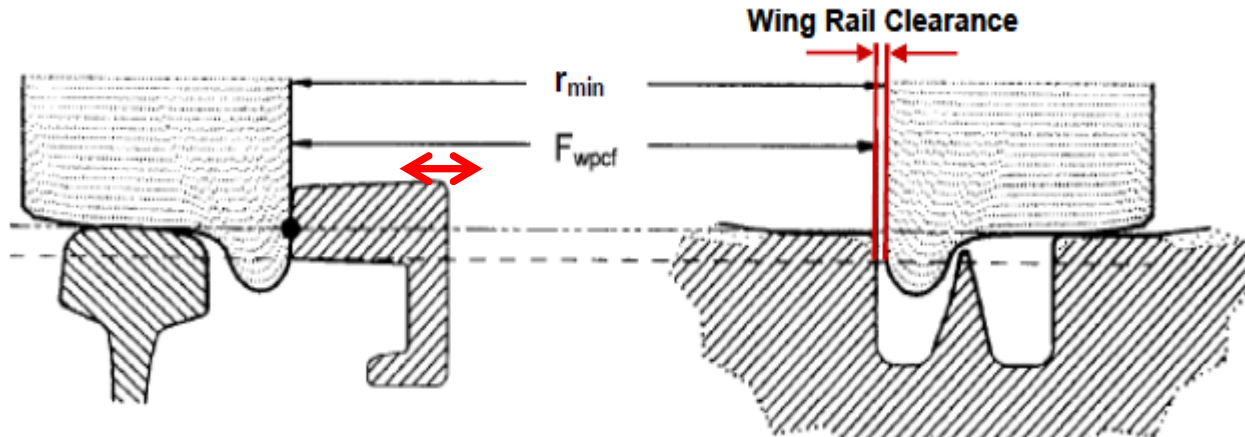


Stadler Citylink Tram Train

- Each vehicle can hold 234 persons
(88 seated & 2 Wheelchair Spaces)
- Dual Voltage - 750V DC and 25kV AC
- Maximum speed of 80km/h Tramway & 100km/h railway
- Air Conditioned
- CCTV and Passenger counting
- Railway Signalling and Safety Systems
- GSM-R and TPWS/AWS
- Tramway Control and Communication Systems
- Mode Switch



Wheel/Rail Interface – The Challenge

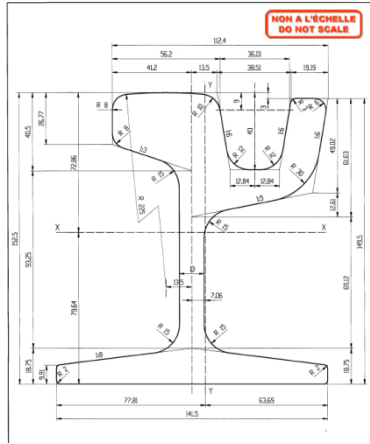


Flange Way Clearance:

- NR – **42mm**
- Supertram - **32mm**

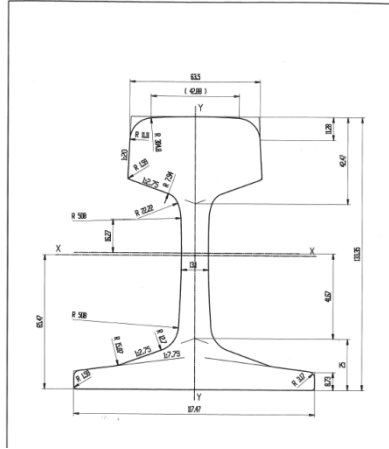


Wheel/Rail Interface – The Challenge



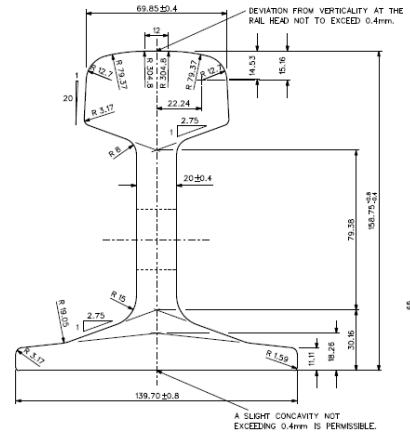
35G-TF,
55G1 & 55G2

Vertical



39E1 (BS80A)

1:40 & Vertical



56E1 (BS113A),
BR109 & BS110A

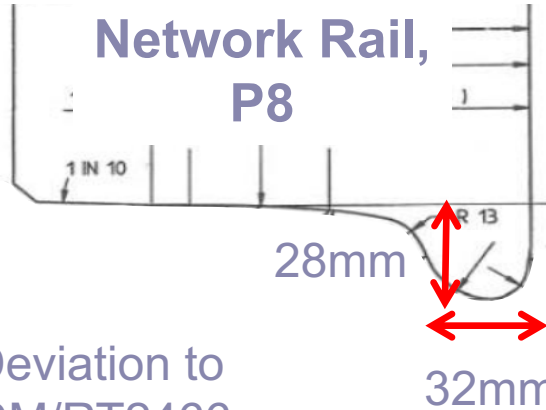
1:20



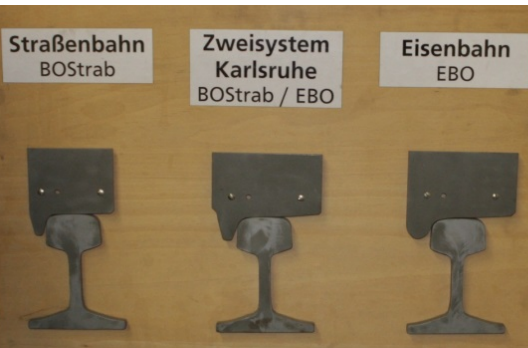
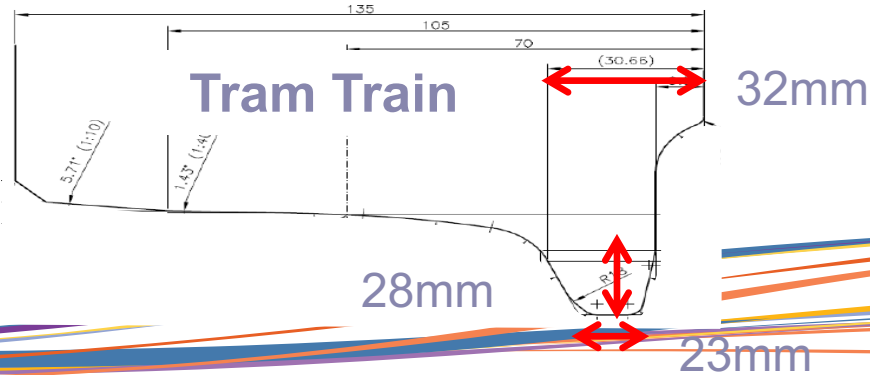
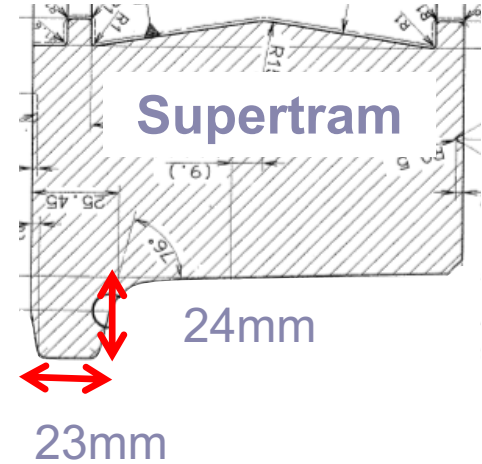
Tramway (embedded
and ballast)
and NR Switches



Wheel/Rail Interface – The Solution



Deviation to
GM/RT2466

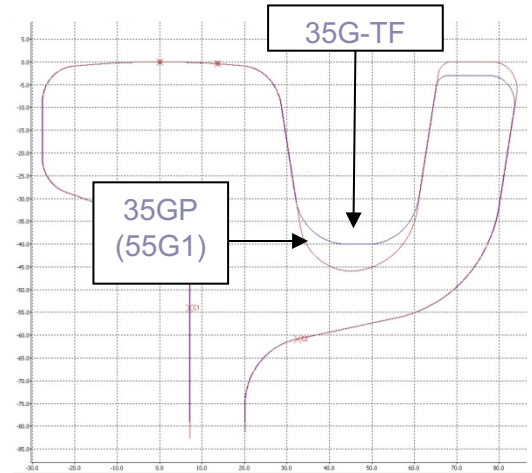


Wheel/Rail Interface – The Consequences

Network Rail Raised Check Rails

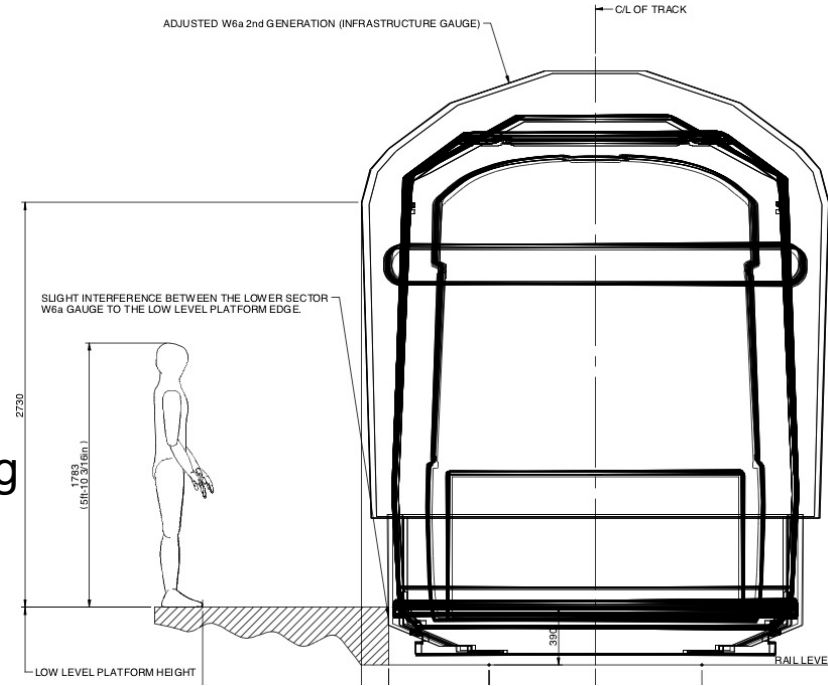


Supertram Rail Replacement, Guard Rails



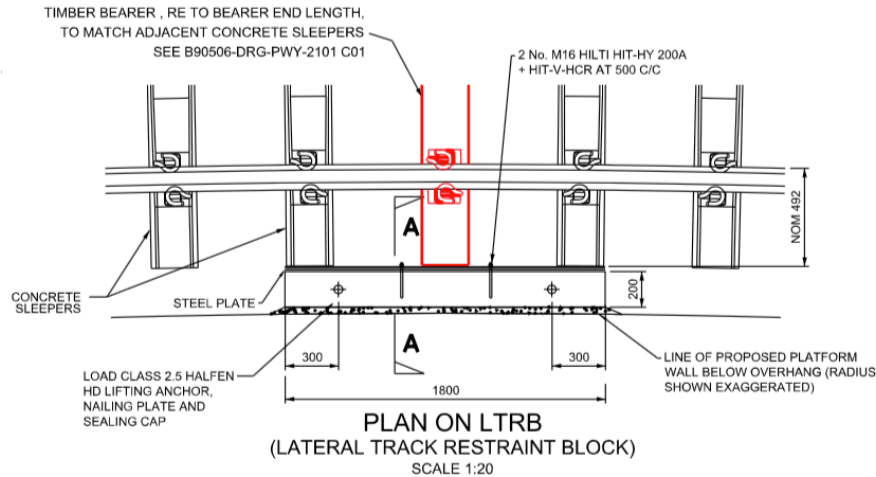
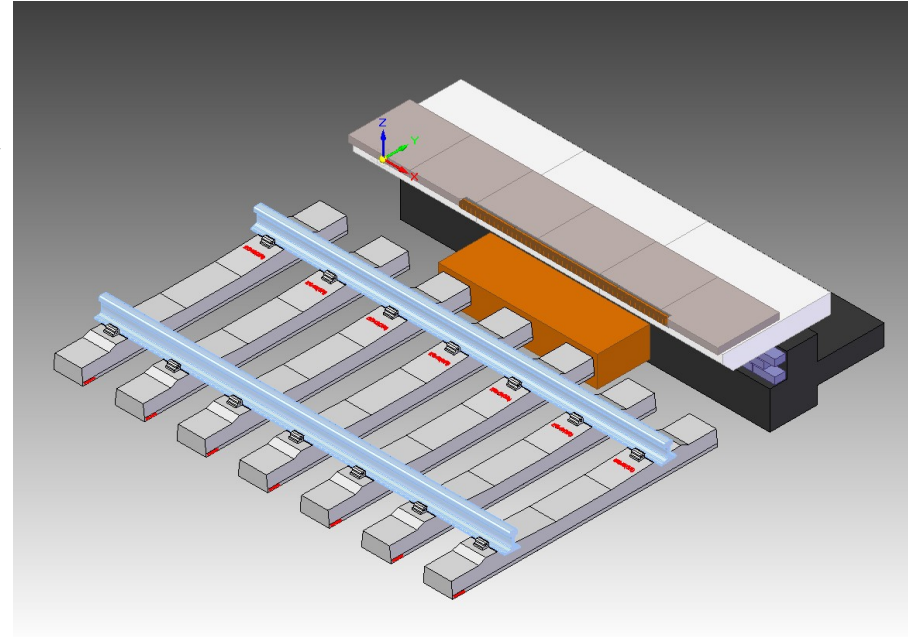
Platform Stepping – the problem

- Light rail horizontal stepping distance less than 75mm
 - Legal requirement (RVAR2010)
- Light rail stepping not compatible with W6A lower sector for ballasted track
- High track fixity needed to maintain stepping standards through low level platforms
- Track slab not preferred due to hard spot issues and tamping through the area



Platform Stepping – the solution

- Design for track fixity blocks
- Quick to install and allow for tamping
- Allows expansion of track longitudinally while maintaining gauge clearance



Feeder Station

- Feeder station is 750V DC but to NWR standards for N-1 for system failures
- 2 sets of transformer rectifiers in the feeder station
- Separate sections of the station allowing maintenance to be carried out with the station still operational
- Station elevated for flood protection
- Own low voltage sub-station
- SCADA system controlled by Network Rail York ECO
- All works constructed on existing Network Rail land



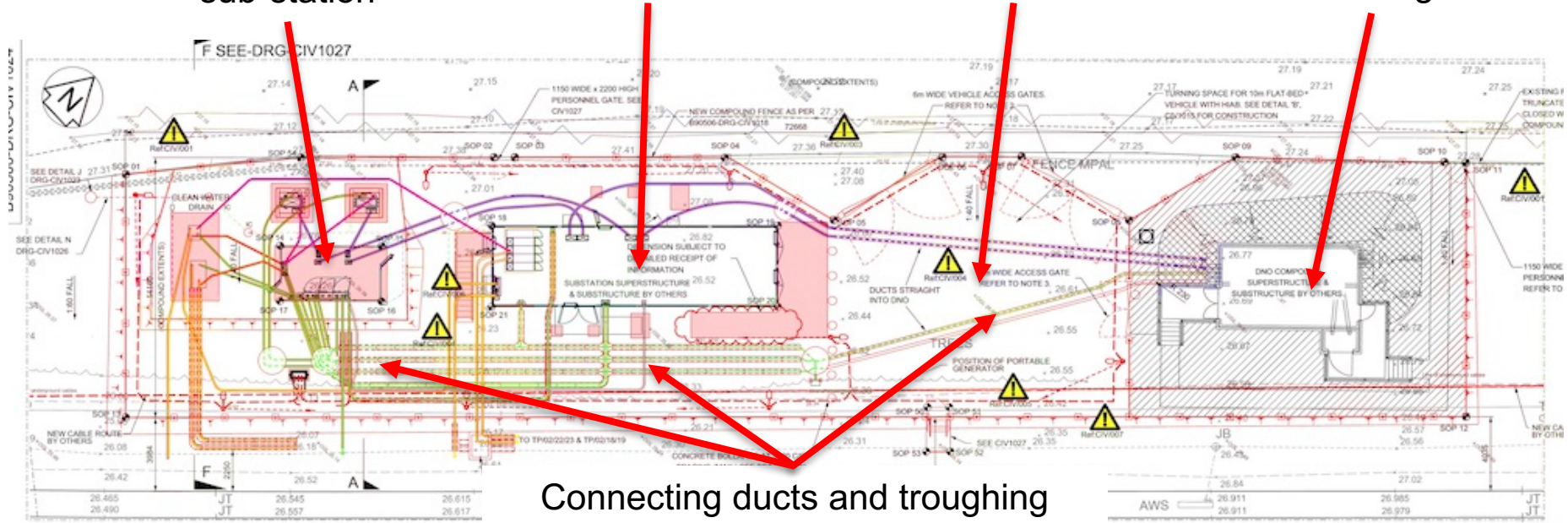
Feeder Station Layout

Low voltage
sub-station

Feeder station

Car Parking

DNO supply
housing



Feeder Station



Feeder Station



Overhead Line System

- Brand new Network Rail approved OLE system
- Based on the OLEMI Series 2 range
- The OLE is a 750V DC system
- Main change is no traction return for fault control
- Double insulation used as fault protection
- New standard design range and Green Book produced for the project
- Traction bonding designed specifically for the scheme



OLE system



Insulator in
castle

Insulator in
registration
arm

New OLE
3rd cable



OLE System - Installation

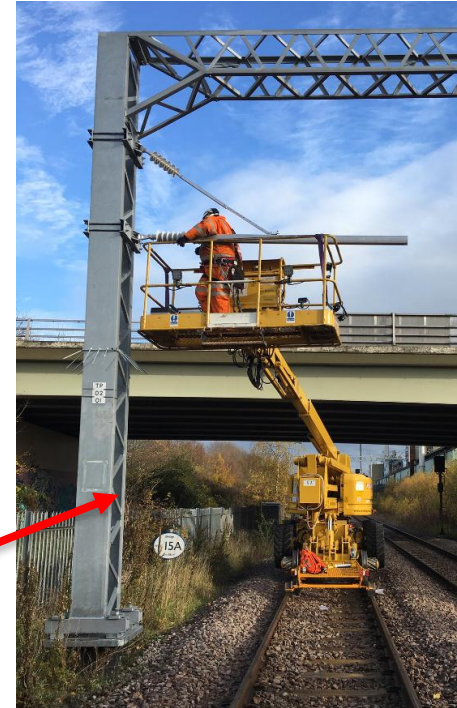


Contact and catenary
wire installed in
normal manner



New standard
slinging
arrangements
used for
steelwork

TTC
structures
used where
ever possible



Testing & Commissioning - NWR

2 staged commissioning of the Network Rail infrastructure

Stage 1 - Feeder station and overhead line

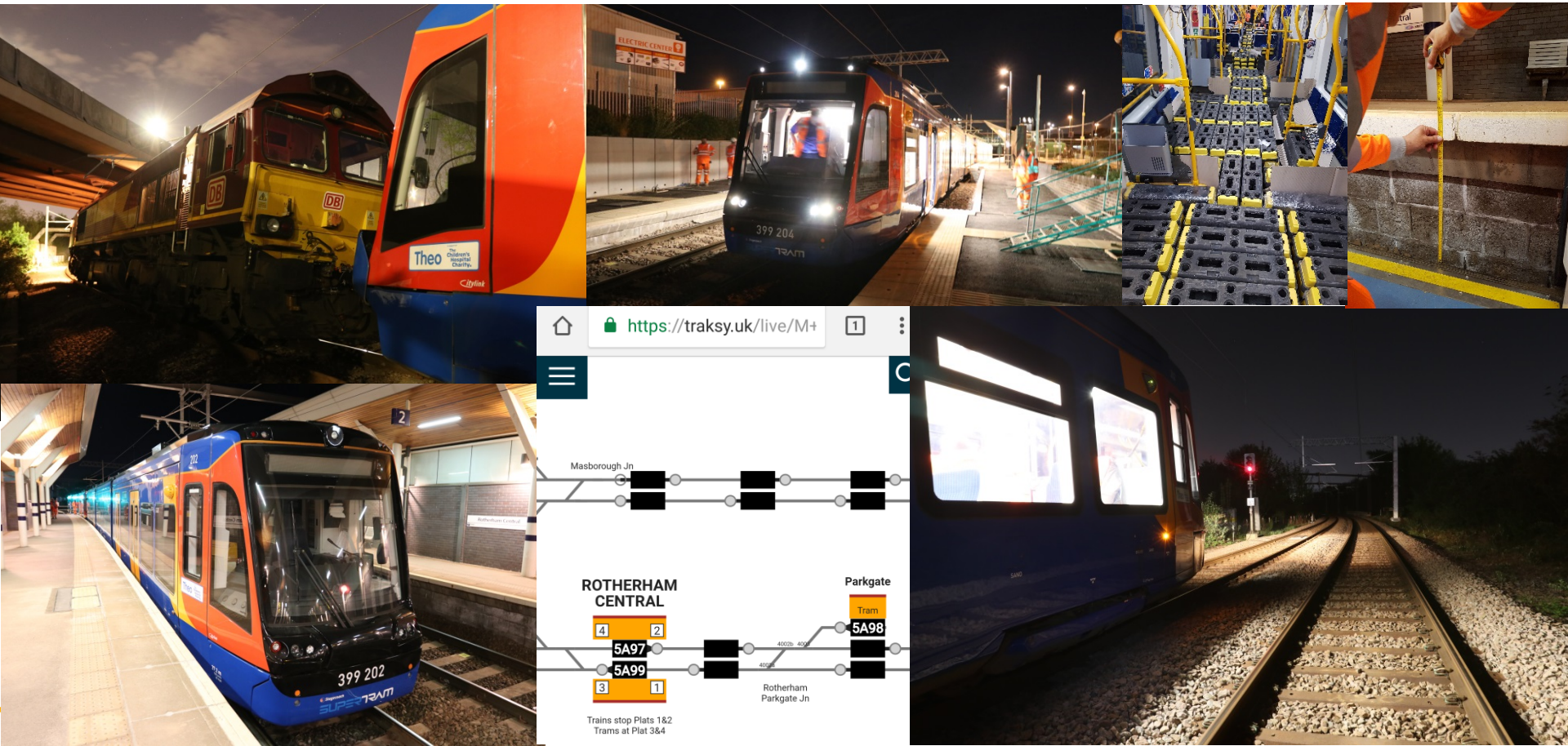
- 90No. individual site acceptance tests
- 138No. designs to be constructed and signed into use
- 7No. signalling commissioning stages

Stage 2 - October 2018 - Main Network Rail infrastructure

- Additional 29No. site acceptance tests
- 3No. signalling stage
- Additional 81No. designs to be constructed and signed into use



Testing and Commissioning - Vehicle



Tram Train Entry into service

Driver Training

16th July 2018 – September 2018

Ghost Running

September – October 2018

Start of Service

October 2018



Thank You for Listening

