

Infrastructure is a large part of the cost of new tramways or light rail systems. The LR55 track reduces the cost of tracks embedded in the highway by avoiding the need to relocate most under street services, and being quick and easy to install minimising the disruption to city life.

The LR55 track has been comprehensively tested by simulation, laboratory and field trials. A length of LR55 track was installed in the Sheffield Supertramway in March 1996, where it continues to give maintenance free service with over 300 LRVs per day, and 100 heavy road vehicles. It replaced a length of conventional track that failed after just one year.



The LR55 rail track system uses:

- (a) a top suspended rail, bonded into
- (b) precast concrete foundation troughs,
- (c) laid on a compacted type one highway base (CBR > 10%).
- (d) bonded into existing pavement with grouting



LR55 track in use

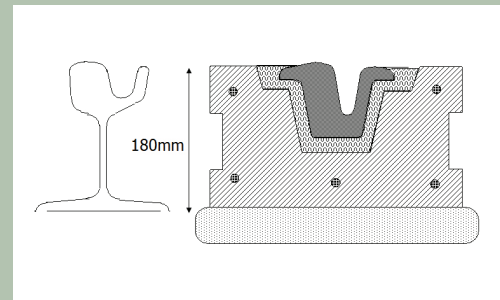


LR55 track in situ at Rotherham bus station

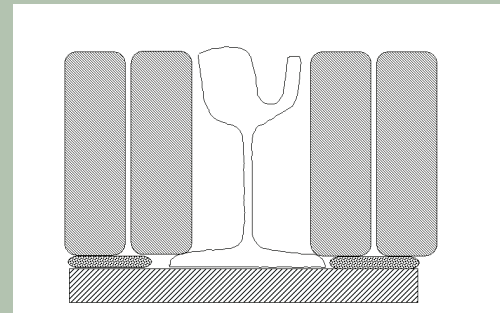


The track is installed in a two stage process, a pre cast concrete foundation trough, and low profile rail bonded with a grout which acts as a spring continuously supporting the rails. Other benefits include:

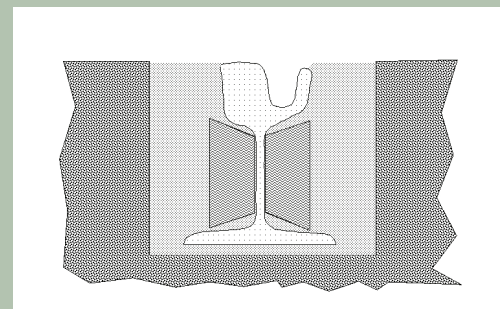
- Low pressure into the road pavement (<200MPa)
- Rapid installation, double track complete 100m per week with one gang
- Fully road traffic compliant
- Tested to carry mainline axles loads (up to 80 tonnes)
- Negligible stray currents (resistivity > 1000Ωkm)
- Less noise and vibration (<20Hz ~30dBA, >100Hz ~50dBA, nat. freq ~800Hz)
- Utility access during operating hours
- Designs for compatible switches and crossings
- Transition rails to all existing profiles
- No corrugation formation



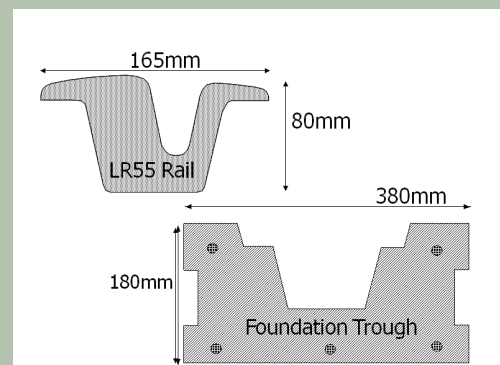
Comparison of Ri60 and LR55 track



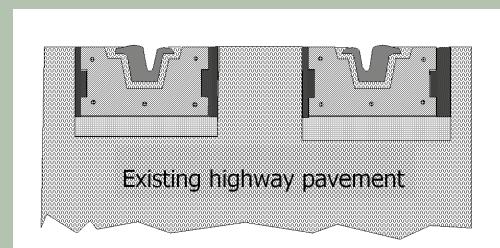
Ri60 general arrangement



Recent Ri60 installation



Elements of LR55 system



LR55 laid to gauge in highway pavement



A simplified design of overhead line (OHL) gives catenary performance, with an easier installation and lower costs. A trial section was installed in November 2004 at the Carnforth Railway Centre, where it gives maintenance free service and has survived some of the windiest weather experienced in England. This is designed for all pantographs, and with running speeds up to 150km/hr.

Extent of Electrification

- In EU, UK almost lowest % of track
- Energy source flexibility
- Lower pollution (modal switch)
- Lower operating costs
- Lower train maintenance costs
- Higher vehicle reliability

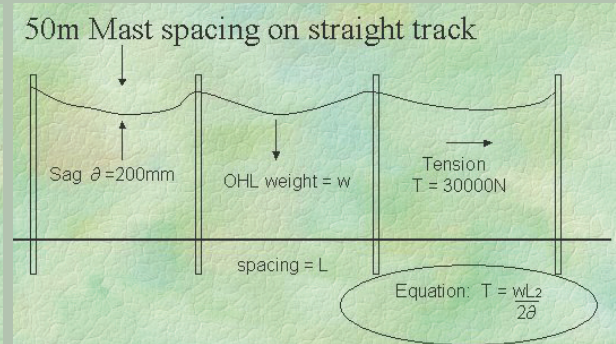
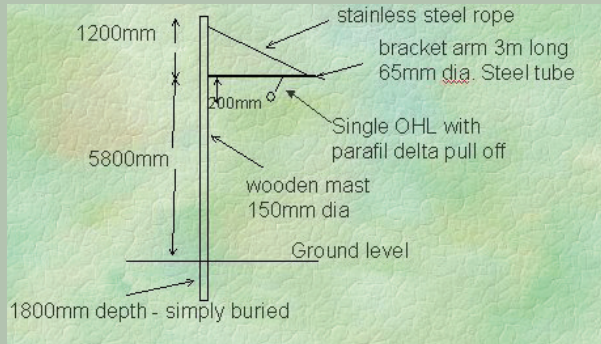


Functionality

- Electrical - power distribution with minimum losses from lower resistivity from larger cross section conductor
- Mechanical - can stand loadings from wind, weather, and pantographs
- Capital cost - reduction through fewer parts



OVERHEAD CATENARY LINE



Reducing costs

- Single OHL wire - but sags
- Larger diameter (14mm) (150sq.mm) - but higher unit weight
- Fewer support masts - larger sag or higher tension in OHL
- Simpler suspension system - no registration arms
- Different tensioning

Design and Installation

- Track curves min. radius 200m - mast spacing reduced to 30m
- 2 Over bridges - one direct suspension, other span wire
- OHL run out over whole length on temporary mast pulleys
- OHL tensioned and clipped up 300m at a time

Practicalities

- Weather - December 2004
- No exclusive track access
- Cherrypicker over parked rail vehicles
- Getting right alignment
- Using temporary ropes to lift and clip
- Total installation 40 man days
- Final clipping 3 man days
- Total costs £50k for 1200m

Conclusions

- OHL can be simplified
- OHL costs can be reduced
- Elastic supported single wire good for speeds to 150km/hr
- Low electric resistivity can be achieved
- Jan.2005 severe storms - no damage
- Could be used for branch lines
- Reduce cost of new light rail projects

