Committee report

Subway "Checkrail Baseplate" System Design and Manufacture – award of contract

Committee Strategy and Programmes

Date of meeting 29 January 2016 **Date of report** 15 January 2016

Report by Assistant Chief Executive (Operations)

1. Object of report

To recommend the Committee approve the award of contract for the Subway Checkrail Baseplate System Design and Manufacture to Schwihag AG.

2. Background

2.1 Needs summary

A vital part of the Subway Operations is the infrastructure that the trains operate on, specifically the track system. As part of Subway's on-going maintenance and improvement of the rail infrastructure, there is a requirement to replace the near life expired checkrail system with that of a modern and more robust design.

The checkrail system comprises of the checkrail and supporting baseplate. The checkrail is a critical part of the track system, which is installed parallel to the running rail on tight curves to assist the trains to safely negotiate the radius of the track. There are currently 20 checkrail sites within the Subway tunnels with a total length of around 1220m. The nature of track design at these sites, result in high forces on the supporting componentry and high levels of wear on the checkrail.

The existing checkrail system design is constrained and does not allow any adjustment of the position of the checkrail to the running rail. As such, when the checkrail wears towards the maintenance limits, replacement is the only option. The existing checkrail baseplate design has the running rail and checkrail bolted together. As such any replacement of the checkrail also requires the running rail to be replaced, irrespective of condition. The checkrail/rail assembly is bespoke at each site and requires off site fabrication. Some of the sites are also of such a length and complexity that replacement in the current night time possessions is extremely challenging.

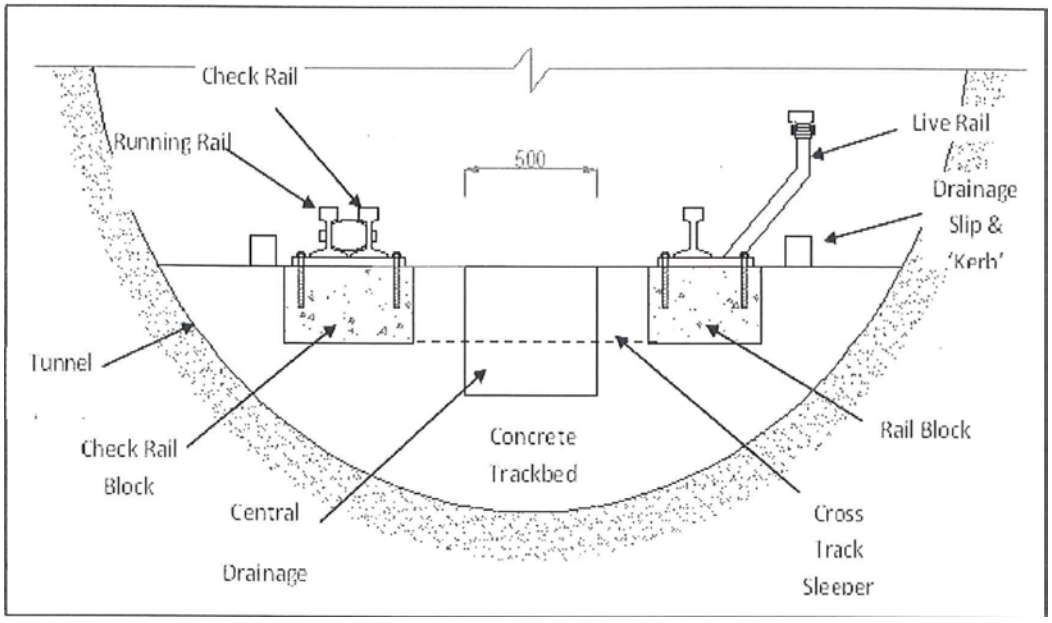
The existing checkrail baseplate is also not electrically insulated (significantly contributing to stray current issues) and creates difficulty in inspecting the rail foot for corrosion and deterioration.

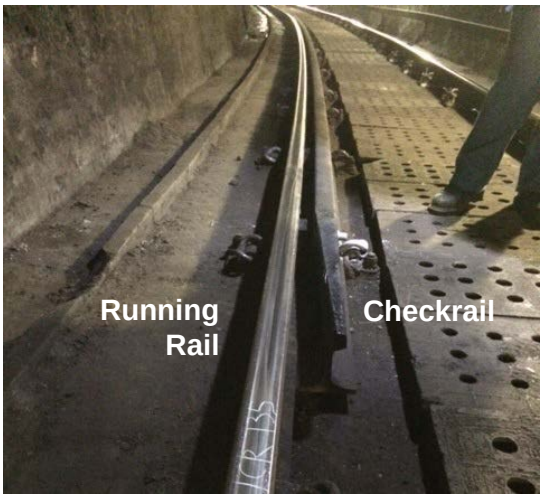
2.2 Existing design configuration and constraints

The existing checkrail system used on the Subway track comprises of two full sections of 39E1 rails in parallel to one another and secured with checkrail blocks onto a bespoke baseplate. The checkrail system has a fixed flangeway with no adjustment.

The track system has a central drainage channel within the concrete trackbed which only provides a limited concrete area for the baseplates that holds down the track infrastructure.

The limited space available restricts the use of standard railway design checkrail baseplates within the Subway tunnels without the need for extensive civil engineering modification of the mass concrete trackbed. The checkrail track system layout is illustrated in the figure and photographs below.





Photographs of existing checkrail sites

2.3 Aims and objectives

The overall aims and objectives of the checkrail baseplate system are to Design and Manufacture a bespoke checkrail baseplate which will:

- Fit within the restricted footprint available on the Subway tunnels trackbed
- Increase checkrail asset life by allowing adjustment between the running rail
- Allow the checkrail and running rail to be replaced independently
- Allow the checkrail at some sites to be extended/modified to better suit the track geometry design
- Improve rail foot visibility for inspection
- Provide electrical isolation
- Be maintainable within standard nightshift possession
- Contributes significantly towards SPT's drive to limit rail break risk
- Contributes towards ride quality improvements and customer experience

The proposal to replace the checkrail systems has been planned as part of the system re-railing programme to facilitate improvement in the track infrastructure prior to the introduction of new Rolling Stock. The checkrail, as with the running rail will then be installed by the Subway infrastructure team.

3. Outline of proposals

3.1 Scope of works

The design of the checkrail system has to consider and make recommendation on the stiffness transition onto the existing system from the new baseplate and fixing design. Given that it is anticipated that the new checkrail system stiffness will differ from that of the existing system, there will also be a requirement to modify/change the associated plain line baseplate design (running rail associated with the checkrail) to ensure a consistent approach on the stiffness of the track and achieve the identified aims and objectives.

The scope of work is to design and manufacture checkrail baseplate and companion plain line baseplate assemblies including the baseplate, baseplate pad, anchor fixings and rail pad that suits the physical constraints of the tunnel system and general track design parameters. The scope will also include the methodology for installation and maintenance.

The design of the checkrail and plain line baseplates will include testing to meet SPT's specifications.

3.2 Tender assessment process

Companies were invited to tender in accordance with the tender specification via the Public Contracts Scotland on 24 September 2015. Eleven notes of interest were made although on 9 November 2015 no bids were received.

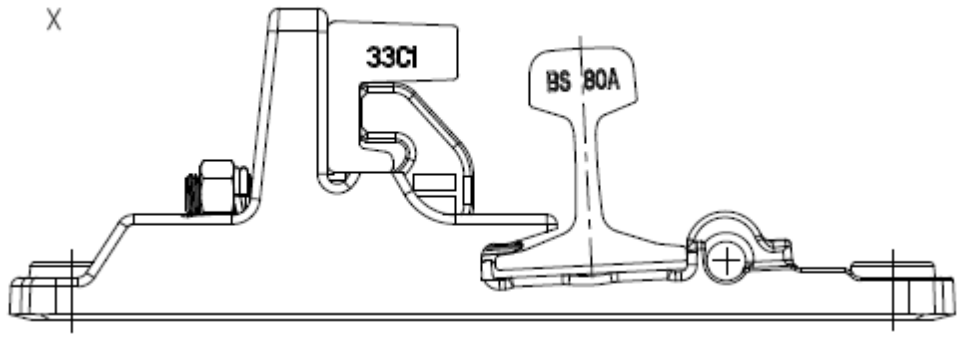
Feedback from those who noted interest but declined to bid was either not being able to supply the product or the need to undertake a bespoke design but with only a limited run requirement for manufacture not being cost effective.

Schwihag AG contacted SPT immediately prior to the tender deadline stating that they were unable to submit a bid due to time constraints and did not request an extension to the deadline. They did however intimate that they had an existing product that could be modified to suit our requirements.

As no tenders were received, dialogue was then opened directly with Schwihag AG.

Given the critical requirement to change the checkrail baseplate to a design that would avoid extensive civil engineering costs and risk to the trackbed structure, SPT invited Schwihag to discuss their proposal.

Schwihag AG proposed using their conventional design of a boltless checkrail baseplate modified to accommodate the requirements of SPT specifications and physical constraints. An illustration of their conventional design is shown below.



Conventional Design of Schwihag Boltless checkrail baseplate

The main modifications proposed to the Schwihag's standard baseplate are for the plate to be shortened in length and for the holding down bolt holes on the plate to be repositioned such that the design can fit in the available space on the existing concrete trackbed.

This, once fully designed, should be able to be installed without the need to undertake any significant civil modifications on the trackbed and hence reduce engineering risk to the tunnel invert structure and additional costs. It will provide the adjustability between and fixing independence from the running rail as this is inherent in the conventional design. The plate will also be electrically isolated and provide improvement in inspection and maintenance as required.

Based on an indicative quantity of 1000 of each baseplate type, Schwihag AG has quoted £300,000 for the design, testing and manufacturing of the baseplates.

The lead time from order placement to receiving the designs and manufacture of both types of baseplate is estimated to be 5 months.

3.3 Value assessment

The existing checkrail baseplate has a theoretical design life of 30 years.

The existing checkrail requires to be changed out on average every 6 years. The existing design of the checkrail baseplate results in both the checkrail and running rail to be replaced once the limit has been reached. Over the lifespan of the baseplates there would be a need to replace the checkrail and the companion running rail 5 times.

Considering the replacement materials for checkrail and running rail and the associated labour cost to prep, deliver, install and remove redundant rail, the cost of this replacement activity over the baseplate lifespan is estimated at approximately £1,700,000.

The new checkrail baseplate will allow for the flange-way to be adjusted which will extend the life of the checkrail and will also allow for the checkrail and running rail to be replaced independently. The new baseplate design will also allow a less expensive type of rail (compared to the running rail) to be used for the checkrail replacements.

It is currently estimated that the checkrail life would double to approximately 12 years as the checkrails would be able to be adjusted rather than replaced when the flangeway gap reaches the maintenance limit. The ability for adjustment and the segregation from the checkrail would extend the companion running rail life to be in the region of approximately 20 years.

The checkrail would therefore be required to be changed out twice and the running rail once over the baseplate design life. With this reduced replacement frequency, the material and labour costs would drop to approximately £600,000, resulting in a whole life saving in the region of £1.1m.

4. Conclusions

The outline proposal and quote provided by Schwihag AG was considered to be acceptable and meets the stated specification. From assessment of the whole life benefits and savings alone from re-railing it is also considered to be economically advantageous to SPT. In the absence of tender response from the market, it is also the only solution currently available to SPT and as such is recommended as representing best value and the preferred approach.

5. Further Information

Given that supplier requires to undertake detailed design in order to confirm the materials and supply cost and, depending on the final design, quantities may vary from existing baseplate provision at the checkrail sites, the quote provided by Schwihag is provisional and will require confirmation upon completion of design. An allowance for risk and contingency is therefore included in the overall project budget. Effective management of the design phase will be in place to ensure that the contract requirements are delivered efficiently and within the approved budget.

6. Committee action

The Committee is recommended to award the contract for the checkrail (and companion plain line) system design and manufacture to Schwihag AG with a contract value of £300,000 (excl. VAT).

7. Consequences

Policy consequences	*None identified.*
Legal consequences	*The award of the contract is to be made as a bespoke SPT contract.*
Financial consequences	*Estimates for the forecast cost are included 2015/2016 and draft 2016- 2017 Subway budgets.*
Personnel consequences	*None identified.*
Equalities consequences	*None identified.*
Risk consequences	*As this commission requires design to confirm final supply and manufacture costs a risk & contingency allowance has been included within budget.*

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