Subway Long Welded Rail Delivery System Design and Manufacture – award of contract

Date of meeting 12 February 2016  Date of report 26 January 2016

Report by Assistant Chief Executive (Operations)

1. Object of report

To recommend the Partnership approve the award of contract for the Subway Long Welded Rail Delivery System Design and Manufacture to Brodie Engineering Ltd.

2. Background

2.1 Context

An integral 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 need to replace the existing equipment that carries the rails into the tunnels with a modern equivalent. This paper sets out the proposals for replacing the existing rail wagons with a long welded rail delivery system capable of taking much longer lengths of rail into the subway tunnels and thereby providing a more cost effective solution for rail handling in the subway.

SPT currently replace approximately 3km of rail per annum as part of the maintenance of the subway on an on-going and regular basis. The regular maintenance is currently being supplemented by an increased production rate of rail renewal in advance of the new rolling stock system being implemented, with approximately 50% of the rails being programme for replacement over the next two years.

2.2 Existing rail handling equipment (rail wagons)

The principal equipment used for rail transportation comprises two existing 20ft wagons coupled together and powered by two battery locomotives. The rail wagons are over 100 years old and were converted from the pre 1970’s rolling stock bodies during the last modernisation. They require continual on-going maintenance to keep them in service, are technically life expired and require replacement. In operation rails are lifted from stockpile up to waist height on the flat deck of the wagons, bringing further operational constraints and risks that are mitigated through considerable control measures deployed by SPT maintenance staff.
2.3 Limitations and opportunities for efficiencies

The total length of the two wagons (40ft) limits the maximum length of rail that can be delivered to the tunnels to 38ft, whereas the industry standard length of rail is 60ft/18.288m. The 38ft rails therefore require to be pre-drilled and temporarily joined together on site prior to welding utilising an aluminothermic welding process. Re-railing in this manner is inefficient and limits the technical quality and service life that the current and future subway operations demand, including:

- Creation of large volume of rail offcuts from the standard supply rail length
- High quantities of site thermic welds to join rails together
- High volumes of temporary joints required before welding
- Ride comfort impact from short rail lengths and aluminothermic welds

The wagons are hauled by two SPT battery locomotives working in tandem. The operation to load and offload rail requires the lifting of rail to waist height and a significant degree of manual intervention and skill to co-ordinate the movement of the locomotives and the lifting apparatus on the wagons. To accurately position the rail also requires SPT maintenance operatives to exercise considerable care and attention whilst the rail is raised/lowered into position. This risk, whilst managed through various control measures, has been considered in the specification of the new system of rail handling. In addition, by its nature, this approach limits efficiencies in deployment of staff due to significant manpower requirements to safely undertaken the current activities. The new system, therefore considers a more efficient way to undertake rail replacement.

Existing wagons decoupled – showing rail lifting crane

3. Aims and objectives

Taking account of the current limitations and modern approaches to rail handling and delivery, the overall aims and objectives of the long welded rail delivery system are to Design and Manufacture a specialist plant solution which will:

- Minimise the need for manual handling during loading/offloading
- Update and Improve the safety of Rail Delivery methodology to modern standards and best practice
• Have the capacity to handle standard 60ft lengths or greater (potentially up to 180ft)
• Increase the load capacity of rail per train/delivery
• Improve efficiency of rail drop/uplift
• Improving track quality through the reduction in welds
• Improving network availability and utilisation of limited possession access

The proposal to replace the existing rail wagons with a long welded rail delivery system has been planned as part of the subway on-going re-railing programme. The primary objective of which is to facilitate improvement in the track infrastructure prior to the introduction of new rolling stock. This investment is also to be undertaken in conjunction with previously authorised investments for rail fastenings, checkrail baseplates and rail welding. As a co-ordinated program these investments aim to reduce lifecycle costs, further minimise risks relating to rail handling and achieve production efficiencies.

4. Outline of proposals

4.1 Scope of works

The scope of work is to design, manufacture, test and commission a long welded rail delivery system that is compatible with the SPT infrastructure, locomotives and technical constraints. The scope includes the development of working methodology, staff training, and annual maintenance/testing.

4.2 Tender assessment process

Companies were invited to tender in accordance with the tender specification via the Public Contracts Scotland on 7 September 2015. Eight, notes of interest were made and 2 bids were received. Members should also note that prior to the tender process SPT undertook extensive market sounding with various specialists and found a very limited market for this piece of equipment that would fit within the constraints of the subway.

This tender was evaluated on the basis of the most economically advantageous tender (“MEAT”) taking into consideration the following factors with weightings noted as follows: Quality 60% & Price 40%.

Quality was given a higher rating as it was necessary to ensure that the tenderers had sufficient demonstrable experience in developing and delivering specialist rail plant solutions. The quality criterion was further split as per the following table.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weighted</th>
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<tbody>
<tr>
<td>Technical Requirements and Solution</td>
<td>2</td>
</tr>
<tr>
<td>Proposed Methodology and Management</td>
<td>2</td>
</tr>
<tr>
<td>Experience of Similar Projects</td>
<td>1</td>
</tr>
<tr>
<td>Quality Assurance</td>
<td>1</td>
</tr>
<tr>
<td>Risk Register</td>
<td>1</td>
</tr>
<tr>
<td>Proposed Programme of Works</td>
<td>2</td>
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</tbody>
</table>
The summary of the cost and quality scoring is as noted below:

<table>
<thead>
<tr>
<th>Name</th>
<th>Quality Score</th>
<th>Pricing Score</th>
<th>Final Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adj 60%</td>
<td>Actual Cost</td>
<td>Adj 40%</td>
<td>Total Score</td>
</tr>
<tr>
<td>Brodie</td>
<td>60</td>
<td>£981,856*</td>
<td>25.67</td>
<td>85.67</td>
</tr>
<tr>
<td>Bance</td>
<td>36.25</td>
<td>£629,985.00</td>
<td>40</td>
<td>76.25</td>
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*In addition to the tender cost, further options were provided to cover an extended warranty period (5 years) and the potential for the equipment to extend to 180ft length.*

When assessed against the tender award criteria, Brodie Engineering Ltd was deemed to have had a significantly better quality submission. Whilst complying with the minimum requirements, Bance submission lacked significant details and also the potential of significant risk to the eventual outturn cost. Key strengths in Brodie Engineering Ltd’s submission, reflected in their quality score included:

- Design development for their tender submission had extended beyond outline design stage, proving concept and buildability and hence reducing uncertainty and risk
- Robust and detailed working methodology based on SPT constraints
- Flexibility of system for adaption to other uses also expandable to take additional capacity
- Demonstrable experience in delivering under similar constraints with other clients

4.3 Outline of preferred new rail handling system

The proposed long welded rail transportation system comprises of a series of articulated trolley units linked by demountable walkways. The long welded rail train is powered either end by existing SPT battery locomotives. In addition to supporting the rail the trolleys house the electro-hydraulic hoists and clamps that lift and hold the rail in position. The principle of the design concept keeps the rail as close to the ground as possible while also removing the need for the work force to be near the trackbed as the rail is lifted/lowered. For the transportation of rails of up to 120ft (two 60ft rails) in length the system requires seven rail trolleys and two auxiliary link trolleys that form the connections to the locos and contain the batteries for powering the hoists and the system lighting. Rail is either lifted or lowered by starting at the middle trolley and working outwards in both directions. The braking and power systems will be fully compatible with and interlinked to the SPT battery loco’s. Outline sketches will be provided at the meeting for information.

4.4 Value assessment

The long welded rail system along with all the many technical benefits reduces overall rail delivery and uplift costs in the following ways:

- Reducing the number of expensive aluminothermic welds
• Increases the payload of rail per delivery - reducing the number of deliveries
• Reduces time of the uplift and delivery cycle – increasing the number of deliveries possible per shift
• Provides the opportunity for manpower efficiencies

When considered on both an assumed annual re-railing program and a periodic cycle of more significant re-rail, over a 40 year lifecycle the comparative costs for option 1; like for like replacement of existing wagons against option 2; replacement with the new long welded rail transportation system are as follows:

<table>
<thead>
<tr>
<th></th>
<th>40 year period</th>
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<tr>
<td>Option 1 (like for like)</td>
<td>£28.4m</td>
</tr>
<tr>
<td>Option 2 (Long welded rail)</td>
<td>£15m</td>
</tr>
</tbody>
</table>

On the basis of the above, the expected cost saving of option 2 over the 40 year lifecycle is considerable (£13.4M), with a payback on the capital cost of less than 2 years.

In the short term, when considered against the both the annual and current major re-railing requirements to be delivered in the first year of the equipment being available (2017) the estimated cost saving in adopting the new system is £1.1M.

The value assessment therefore clearly demonstrates the strong business case for investment in a new rail handling system for the subway.

5. Conclusions

The tender assessment for a new rail handling system has concluded that the submission by Brodie Engineering Ltd represents the most economically advantageous proposal.

As this is a highly innovative solution it is proposed that the commercial risk shall be managed by phasing the payments dependent upon successful completion of each stage.

6. Partnership action

The Partnership is recommended to

• approve the award of contract for the subway Long Welded Rail Delivery System Design and Manufacture to Brodie engineering Ltd comprising up to the original tender amount of £981,856 plus an allowance of £202,800 for extended 5 year warranty and extended equipment length to handle up to 180ft rails lengths; and
• note that the final contract amount will be subject to design development and an additional amount of contingency has been allowed within the overall project budget to allow for finalisation of the detailed design and the risks relating to such a bespoke piece of equipment.
7. Consequences

Policy consequences
None Identified.

Legal consequences
Form of contract to be concluded as well as a VEAT (Voluntary Ex Ante Transparency) notice to be issued (in OJEU, identifying that the tender value was above the OJEU threshold).

Financial consequences
The forecast costs of the LWR equipment are included in the proposed 16/17 capital budget.

Personnel consequences
None Identified.

Equalities consequences
None Identified.

Risk consequences
Design development impact on costs included within the overall budget.

For further information, please contact Charles Hoskins, Senior Director on 0141 333 3285.