

Transport and Environment Committee

10:00 am, Thursday, 1 March 2018

North Bridge Refurbishment

Item number	7.7
Report number	
Executive/routine	Executive
Wards	11 – City Centre
Council Commitments	15 and 16

Executive Summary

The Grade A listed North Bridge structure carries the A7 over Market Street and Waverley Station and recent inspections have revealed the bridge to be in poor condition. The bridge must be repaired to address health and safety concerns and safeguard the long-term use of this vital link to Edinburgh's city centre. If the bridge is not repaired and it continues to deteriorate it may be necessary to place a weight restriction on the bridge.

A Steering Group has been formed to ensure good governance and a project management team has been assembled to develop this project.

The project is more challenging than most projects of this nature due to the difficulties in gaining access over the Waverley Railway Station and working on such an iconic historic structure. A suitably experienced contractor was appointed at an early stage to draw on their experience of working on such projects and to develop the design and construction methodology.

Having been invited to submit a tender, the contractor has provided a cost of £17.1m to undertake the core refurbishment work and the total project cost is estimated as £22.3m.

There is the opportunity to incorporate other additional enhancements within the project. The design for this public realm work is ongoing and the consultation will be completed in Summer 2018. The contractor will then provide a price for undertaking these potential additional works in Autumn 2018 for consideration.

North Bridge Refurbishment

1. Recommendations

- 1.1 It is recommended that the Transport and Environment Committee:
 - 1.1.1 approves the core scope of structural refurbishment work;
 - 1.1.2 notes that approval to appoint a contractor, to undertake the core scope of structural refurbishment work, would be the subject of a separate report to the Finance and Resources Committee;
 - 1.1.3 notes that if repair work is not undertaken that the bridge will continue to deteriorate and it may be necessary to impose a weight restriction that could impact its usage by public transport and freight traffic;
 - 1.1.4 notes that the netting which has been installed is temporary and that if the refurbishment work is not undertaken that it will need to be replaced with the replacement commencing in early 2021;
 - 1.1.5 notes that design work for potential additional enhancements is ongoing and that public consultation will be undertaken on these designs, during the summer of 2018;
 - 1.1.6 notes that final designs for potential enhancements, for which separate tendered prices will be obtained from the contractor, will be reported to the Transport and Environment Committee to decide whether or not these works are to be incorporated into the contract; and
 - 1.1.7 notes that there will be no obligation on the Council to progress potential additional enhancement works through the North Bridge Refurbishment contract.

2. Background

- 2.1 The Grade A listed North Bridge structure carries the A7 over Market Street and Waverley Station. Minimal maintenance work has been undertaken on the bridge since it was constructed.
- 2.2 Over the past three years there have been a number of incidents of loose material falling from the underside and façade of the bridge.

- 2.3 Council engineers arranged for an inspection to be undertaken and loose material to be removed. However, it became apparent that the bridge was in poor condition and arrangements were made to make the bridge safe by removing further material and installing netting to vulnerable areas.
- 2.4 Structural steelwork repairs were also undertaken to the areas of the bridge in the poorest condition.
- 2.5 The work undertaken to date has addressed the immediate health and safety issues.
- 2.6 On [5 October 2017](#) Transport and Environment Committee approved the outline scope of the proposed Central Edinburgh Transformation project, subject to further development to be taken forward through the leadership of the Central Edinburgh Development Working Group. This Central Edinburgh Transformation project seeks to make significant long-term improvements to the public realm of central Edinburgh. The North Bridge refurbishment project is one of a number of current and upcoming development projects which are aligned to the central Edinburgh transformation strategy.

3. Main report

History and Work to Date

- 3.1 The North Bridge was constructed in 1896 and little maintenance work has been undertaken on the bridge other than in 1933 when steelwork was replaced near road level and in 1990 when the topside of the bridge was waterproofed and the decorative façade was painted.
- 3.2 An inspection of the bridge was undertaken in September 2014 and this was done by abseil. Typical defects encountered were heavily corroded steelwork and friable concrete. Parts of the cast iron decorative façade were also heavily corroded and there was a high possibility of material becoming loose and falling.
- 3.3 Accordingly, a separate contract was awarded to remove loose material and to install netting to the more vulnerable areas to protect those below. There were two load bearing beams that were severely corroded and these were repaired. This work is complete and the bridge is now in a safe condition. It was necessary for the inspection and netting work to be undertaken by abseil due to the difficulties in gaining access over a live railway station.
- 3.4 Now that obvious loose material has been removed and the netting installed, this safeguards those below. The netting will require regular inspection and has an anticipated life of four years. It is also unsightly.
- 3.5 A Steering Group was put in place comprising of relevant senior Council staff Network Rail, and Waverley Station to provide good governance.

- 3.6 It was apparent that to undertake repairs to the bridge would be challenging not only in terms of the scale of engineering works but also in gaining access and working over a live railway station. Accordingly, it was identified that the Council would need expert support in developing and undertaking a programme of works.

Support to the Council

- 3.7 Currie and Brown (C&B) are a project management and cost consultancy based in Edinburgh with experience of working in the city centre adjacent to Waverley Station. C&B was appointed in November 2016 to assist the Council in the management of this project. C&B was appointed through the Council's Construction Professional Services Framework Agreement.
- 3.8 C&B is represented on the Steering Group.
- 3.9 It was apparent that due to the challenges in gaining access it would be beneficial to involve a contractor at an early stage who has experience of working in a rail environment with a supply chain to draw expert advice from.
- 3.10 The main challenge is to erect scaffolding to the bridge during the very limited periods of time available from Network Rail to work over the railway station.
- 3.11 A major contractor with such experience was appointed in July 2017, solely for the pre-construction stage, to develop a solution for repairs to the bridge and ensure it is fit for the future without requiring major works for many years. The contractor is familiar with Network Rail's processes and procedures having built up a strong working relationship during recent works to replace the Waverley Station roof.
- 3.12 The contractor was appointed through the National Civil Engineering and Infrastructure lot of the Scape Group Framework Agreement (Framework) which is a pre-approved contract that the Council has access to. The contractor is the single supplier appointed to this lot of the Framework following an open procurement process, which included both quality and financial award criteria, in accordance with EU procurement regulations.
- 3.13 The Framework was competitively tendered in order to fix the staff costs, overheads and profit elements for every project called-off from the Framework. The initial work undertaken by the contractor is known as the Pre-Construction Stage.

Pre-Construction Stage

- 3.14 The work which has been undertaken by the contractor under the direction of the Council and C&B included further investigations to the bridge to help establish the extent, cause and cost of any work required. This includes how to undertake this work within the limited time offered by Network Rail and ensuring that all work can be undertaken in a safe manner. The solutions developed also allow for minimising disruption to road traffic.
- 3.15 To ensure that the bridge is fit for the future a structural assessment of the bridge's load carrying capacity was also undertaken and this included checks to ensure the bridge can accommodate any future extension for the tram.

- 3.16 The contractor appointed a firm of consulting engineers to support them in developing solutions and to undertake the necessary engineering design calculations.
- 3.17 Such is the complexity of the works it is a requirement that a separate firm of consultants was appointed to check the work.
- 3.18 Through this process a greater understanding of the condition of the structure has been obtained, allowing the scope of refurbishment work to be developed and costed in greater detail.

Scope of Refurbishment Work

- 3.19 Once the work is complete the bridge will be able to carry all normal traffic. This includes all vehicles up to a laden weight of 44 tonnes. For the avoidance of doubt this includes buses, trams and heavy goods vehicles. The bridge will also be capable of carrying vehicles up to a weight of 150 tonnes (eg large mobile cranes) under controlled conditions. For example, the bridge may need to be closed to other traffic to allow such a vehicle to cross.
- 3.20 The bulk of the work required is restricted to below the bridge. At road level, there will be the need to replace joints which run across the bridge at six locations, make improvements to drainage and place scaffolding on the footpath.
- 3.21 The core scope of the North Bridge Refurbishment project is included in [Appendix 1](#).

Opportunities for Additional Enhancements

- 3.22 There are further opportunities to incorporate additional improvements within the project, which would visibly enhance the public realm on the bridge and align with the overarching objectives of the Central Edinburgh Transformation Project. These opportunities are detailed in [Appendix 1](#) and, in particular, focus on improving the quality and experience of the public realm, prioritising access for pedestrians whilst also giving consideration to cyclists and public transport users.
- 3.23 Outline design work has commenced, and is ongoing, in relation to these opportunities. This includes traffic modelling of the potential improvements to the junction with Princes Street/Waterloo Place. The design proposals will take cognisance of other emerging city centre projects, and form part of a coordinated approach to the delivery of other planned improvements to Picardy Place junction and Leith Street, the Meadows to George Street Cycle Route, and the George Street and First New Town preliminary design project.

- 3.24 The final design proposals for potential additional enhancement works will be reported back to the Transport and Environment Committee to decide whether or not these works are to be incorporated into the contract for core works or left until a later date. It may be of benefit to progress with these works at this stage to take advantage of possible cost savings associated with having a contractor fully mobilised who will be familiar with working in this area. There will be no obligation on the Council to progress these works through the North Bridge Refurbishment contract.
- 3.25 It should be noted that at present funds have yet to be identified for these additional enhancements.

Timescales

- 3.26 Should approval to award a contract for the construction phase be obtained from the Finance and Resources Committee on 27 March 2018, the contractor would be formally appointed in April 2018.
- 3.27 The work would then commence on site in summer 2018 and be complete in Autumn 2020.
- 3.28 The duration of the construction period is heavily dictated by the availability of railway possessions. These are typically short overnight periods when trains do not run and electrified lines can be isolated to allow works to be safely carried out overhead. In this location the working time available within a possession is typically only two hours.
- 3.29 A programme for the work can be found in [Appendix 2](#).

Traffic Management

- 3.30 The core scope of works can be undertaken with only occasional off-peak, overnight or weekend lane closures anticipated.
- 3.31 As the contractor's scaffold design progresses it may prove necessary to impose a temporary weight restriction on the bridge. This would be to ensure that the bridge does not become overloaded during the construction period, when the weight of scaffolding has to be carried by the structure in addition to traffic loads. Any weight restriction required will be set at a level which does not restrict the use of the bridge by public transport.
- 3.32 Should the opportunity be taken to undertake footway widening and repaving works this will be undertaken in such a manner that two lanes of traffic, one in each direction, will remain open to traffic on North Bridge at all times.
- 3.33 While the temporary relocation of bus stops will be necessary in that case, the works will be phased in a manner which ensures that the number of stops closed at any one time is limited and which minimises the occurrence of buses queuing back into areas where the road is narrowed to two lanes.

4. Measures of success

- 4.1 The bridge has been made safe following the inspection in September 2014.
- 4.2 The success of the project will be measured against its delivery in a safe manner in accordance with the project specification, within budget and programme. This will be continuously monitored by C&B in accordance with good project management practices.
- 4.3 The contractor will be regularly monitored against 26 Key Performance Indicators (KPI's) which are pre-defined in the Framework. These include measures of performance against targets relating to health and safety, cost, programme, local spend and engagement of small and medium-sized enterprises (SMEs).

5. Financial impact

- 5.1 The cost of project management during the construction stage, payable to C&B, is estimated at £350k.
- 5.2 The cost associated with procuring this contract is estimated as £100,000, which includes a proportion of C&B costs to date as well as fees associated with using the Framework.
- 5.3 There is the potential for the cost to vary as the full extent of any defects and repair work is established. However, it is considered that the costs reported for the Core Works are sufficiently robust. Clearly the cost of some items of work can be fixed but there are other factors outside the contractor's control such as the availability of railway possessions and weather that could influence the outturn cost.

Core Works

- 5.4 The contractor, and his appointed consultant, have undertaken the outline design for the Core Work identified in [Appendix 1](#) during the pre-construction stage. Having been invited to do so through the Framework, the contractor has submitted a tender to undertake the Core Work for a price of £17.1m, under a Design and Build contract.
- 5.5 Including the cost of pre-construction stage works already undertaken, external project management services, internal staff costs, costs payable to Network Rail and allowances for third party compensation and risk, the total cost of the project is £22.3m.
- 5.6 This report outlines a capital investment of £22.3m. If fully funded by loans fund advances the overall loans charges associated with this over a 20 year period would be a principal repayment of £22.3m and interest of £14.517m, resulting in a total cost of £36.817m, based on a loans fund interest rate of 5.1%.

- 5.7 The current Capital Investment Programme 2018-2023 includes a budget provision of £12m for the refurbishment of North Budget. The report to Finance and Resources Committee of 8 February 2018 included officer recommendations for an additional budget provision of £10.3m for the project and was subject to approval at the Council budget meeting on 22 February 2018.
- 5.8 It should be noted that the Council's Capital Investment Programme is funded through a combination of General Capital Grant from the Scottish Government, developers and third-party contributions, capital receipts and borrowing. The borrowing required is carried out in line with the Council's approved Treasury Management Strategy, provided for on an overall programme basis rather than for individual capital projects. Following instruction from Members, notional loan charge estimates have been provided above on the assumption of borrowing in full for this capital project.
- 5.9 A contribution of £10k towards the restoration of the Kings Own Scottish Borderer's War Memorial on the bridge is expected from Edinburgh World Heritage Trust along with a contribution of £5k from the Kings Own Scottish Borderer's Association.

Additional Enhancements

- 5.10 Outline cost estimates have been prepared for the potential additional enhancements and are detailed in [Appendix 3](#).
- 5.11 On completion of the design for each of these opportunities, the contractor will provide separate, market tested tender prices for undertaking the work, for consideration.
- 5.12 These tendered prices for potential enhancements are anticipated in October 2018 following consultations and detailed design.
- 5.13 If it is elected to undertake any of these works they will be added to the contract and the works will run in parallel with the core works.

6. Risk, policy, compliance and governance impact

- 6.1 A risk register is in place for the project. This is regularly reviewed and updated in accordance with project management practices, with the most significant risks reported to the project Steering Group.
- 6.2 The unsightly temporary netting which is currently wrapping areas of the bridge has a remaining service life of four years and will require to be regularly inspected. Accordingly, if the Core Works are not undertaken in time it will be necessary to replace this temporary netting at an estimated cost of £1.5m.

- 6.3 If the bridge continues to deteriorate it may be necessary to remove more of the cast iron facade and install more robust netting. Indeed, if the bridge deteriorates to such a degree that it will be difficult to fix netting to the bridge this could result in repairs needing to be undertaken to allow netting to be fixed. This could significantly increase the cost of replacing netting to well in excess of £1.5m.
- 6.4 Calculations have shown the bridge, in its current condition, to be nearing the limit of its load carrying capacity. If the necessary work is not undertaken soon it may be necessary to impose a weight restriction on the bridge which could restrict its use by public transport and freight traffic.
- 6.5 Network Rail and Waverley Station are members of the project Steering Group which has allowed positive working relationships to be developed which should prove beneficial if issues arise. However, if Network Rail cancel or fail to make railway possessions available this could greatly decrease the productivity of the contractor and greatly increase the duration and cost of the project.
- 6.6 Any delays to the programme for the appointment of the contractor would increase the cost of the project as a result of inflation and a loss of efficiency in retaining key members of the contractor's staff who are already familiar with the project. In addition, the opportunities to take advantage of more efficient, pre-planned Network Rail possessions would be lost. A contingency has been allowed for this which will be drawn down as the project progresses.
- 6.7 It is inefficient and impractical to access all areas of the structure, to identify defects, until such time as a full scaffold system is in place. The appointment of the contractor at an early stage, supported by their design consultant and specialist suppliers, has ensured that consideration was given to buildability issues and enabled further information to be captured which should ensure a shorter construction period and reduced impacts during construction.
- 6.8 Clearly a project such as this is associated with a number of health and safety risks including working at height over an operational electrified railway. Throughout the pre-construction phase all parties have sought to identify health and safety risks and take steps to remove or reduce these as far as is practicable.
- 6.9 The health and safety risks identified are all known to, and capable of being managed by, a competent contractor who has significant experience of delivering projects of a similar nature, size and complexity.

7. Equalities impact

- 7.1 In line with good practice on construction sites, appropriate steps will be taken by the contractor to ensure that any temporary pedestrian diversions put in place do not unnecessarily disadvantage those with mobility issues.

- 7.2 The opportunity to widen footpaths on North Bridge pays due regard to the need to advance equality of opportunity (one of the three general duties of the Public-Sector Equality Duty) by meeting the needs of particular groups. This again relates to wheelchair users and people with prams or pushchairs who would particularly benefit from increased footpath width, especially where pinch points exist at bus stop locations.

8. Sustainability impact

- 8.1 The impacts of this report have been considered in relation to the three elements of the Climate Change (Scotland) Act 2009 Public Bodies Duties and the outcomes are summarised below.
- 8.2 The Key Performance Indicators defined in the Framework, which the contractor will be regularly monitored against, include targets for the amount of non-hazardous waste diverted from landfill and energy use during construction.
- 8.3 Restoring the structural integrity of the North Bridge will help achieve a sustainable Edinburgh by ensuring that this key route for public transport continues to be available for use, thus maintaining the current levels of social inclusion and equality of opportunity that are within the circle of influence of this project.

9. Consultation and engagement

- 9.1 Given the location of the bridge, Network Rail and Waverley Station are key project stakeholders and they have been fully engaged as members of the project Steering Group.
- 9.2 Consultation has also taken place with the Balmoral, Scotsman and Carlton Hilton hotels, plus building managers at Waverley Gate, regarding the structural refurbishment works, some of which will involve noisy construction operations.
- 9.3 Initial consultation with the above stakeholders, Spokes, Living Streets, Bus Operators, and the Edinburgh Access Panel will be undertaken in relation to the junction improvement works and opportunities for additional enhancements to the public realm. As part of the design process these proposals will be issued for public consultation in Summer 2018 and the feedback will be used to inform the final design prior to seeking prices from the contractor in Autumn 2018.

10. Background reading/external references

- 10.1 A Sustainable Lighting Strategy for Edinburgh - http://www.edinburgh.gov.uk/downloads/file/876/sustainable_lighting_strategy_for_edinburgh

10.2 Scape Group Framework Agreement -

<http://www.scapegroup.co.uk/services/procure/frameworks/civil-engineering-infrastructure>

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11. Appendices

Appendix 1 Scope of Works

Appendix 2 Programme

Appendix 3 Cost Estimates for Potential Enhancements

Scope of Works

Core Works

- Structural steelwork repairs and strengthening.
- Grit blasting and repainting of the structural steelwork.
- Repairs to the cast iron façades.
- Grit blasting and repainting of the cast iron façades.
- Repairs to the concrete deck soffit.
- Improvements to the structural drainage systems.
- Replacement of expansion joints.
- Restoration of, and repairs to, the Kings Own Scottish Borderers War Memorial (located on the east plinth of the bridge's south pier).
- Installation of permanent platforms to improve access provisions for future inspection and minor maintenance.
- All temporary scaffolding required to access the structure.

Potential Enhancements

- The current footpaths over the bridge are narrow at bus stops. Accordingly, the footpaths could be widened by approximately 700mm to improve conditions for pedestrians whilst maintaining dedicated bus lanes in the carriageway.
- Replacing existing kerbs and paving, in accordance with Old Town/New Town heritage requirements and resurfacing of carriageway from High Street to Princes Street.
- Decluttering of footways.
- Renewing bus shelters and street furniture.
- Installation of heritage style bollards on each footway as a deterrent to vehicle encroachment.
- Installation of feature architectural lighting to the façades of the bridge, in accordance with the Council's Sustainable Lighting Strategy.
- Major improvements to the North Bridge/Princes Street/Waterloo Place junction to enhance provision for pedestrians and cyclists, subject to design development and consultations.

Programme

NORTH BRIDGE REFURBISHMENT CONSTRUCTION PHASE PROGRAMME																																							
	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20			
CONTRACT AWARD FOR CORE STRUCTURAL WORK							◆																																
CORE STRUCTURAL WORK CONSTRUCTION PHASE																																							
POTENTIAL ADDITIONAL ENHANCEMENTS																																							
Instruction to explore additional enhancements	◆																																						
PUBLIC REALM/STREETScape ON NORTH BRIDGE																																							
Outline Design Development																																							
Consultation process																																							
Detailed Design and Traffic Order																																							
Pricing																																							
CEC Approval																																							
Construction Phase																																							
PRINCES ST JUNCTION IMPROVEMENTS																																							
Outline Design Development																																							
Traffic Modelling																																							
Consultation process																																							
Detailed Design																																							
Traffic Order																																							
Pricing																																							
CEC Approval																																							
Construction Phase																																							
ARCHITECTURAL LIGHTING																																							
Outline Design Development																																							
Consultation Process																																							
Detailed Design																																							
Planning/Listed Building Consent																																							
Pricing																																							
CEC Approval																																							
Construction Phase																																							

* Note – the programme shown for potential additional enhancements is subject to design development and the availability of funding

Cost Estimates for Potential Enhancements

Potential Additional Enhancement	Outline Cost Estimate
Footpath widening and repaving from High St to Princes St, including replacement of the bridge deck waterproofing and renewal of bus stops and street furniture.	£2.9m
Hostile vehicle deterrent bollards along footpaths should these be deemed appropriate following a cross-department review, with heritage style shrouds.	£1.7m
Princes St/North Bridge/Waterloo Place Junction Improvements	£2.7m
Feature architectural lighting to the bridge	£0.5m
Total	£7.8m

Note – the above estimates are subject to the completion of detailed design, public consultation and obtaining market tested prices for the works, as discussed in the main body of the report. In the meantime the above cost estimates contain a risk contingency of 10%.