Committees:	**Dates:**	
Planning and Transportation Committee Projects Sub Court of Common Council	30 October 2018 07 November 2018 06 December 2018	
Subject: Blackfriars Bridge Parapet Refurbishment and Bridge Re-Painting	**Gateway 3/4 Options Appraisal(Regular)**	**Public**
Report of: Director of the Built Environment **Report Author:** Thomas Creed		**For Decision**

Summary

Since the last Gateway, AECOM have produced a study, to identify the options for refurbishing the bridge, considering the access restrictions

- The four options considered are:
  - Do nothing.
  - Paint only.
  - Repair parapet.
  - Replace all balusters.
- Procurement Route:
  - The design work shall be carried out by our term consultant AECOM
  - The recommended option is over the OJEU tender limit and so a full OJEU tender process will need to take place for the works contract.
- Financial Summary:
  - Estimate Cost of Project : £8,570,000
  - Budget approved to date : £50,000
  - Spend to date : £30,532
  - Risk Budget (included in total estimate cost) : £1,055,000
- RAG Status: Amber due to access issues and unknown condition of painted cast iron elements.

Recommendations

It is recommended that:

- For Planning and Transportation and Projects Sub Committees
  - As the parapet has been shown to be of sufficient strength, the project proceeds with Option 3, a full refurbishment of Blackfriars Bridge with repair and replacement of the cast iron features as required; working around the current access restrictions.
- For Projects Sub Committee
  - AECOM (term consultant) are instructed to proceed with detailed design and prepare tender documents.
  - Despite the expected cost of the project now exceeding £5million; the project continues on the regular approval route and proceeds to Gateway 5 (expected October 2019). This is requested as options going forward are limited given the historic nature of the structure.

As the value fo the project is expected to be over £5m, Gateway 4b approval will be sought from Court of Common Council.

Options Appraisal Matrix

See attached.

Appendices

Appendix 1	PT 4 Procurement form
Appendix 2	AECOM Options Report
Appendix 3	Project Risk Register (recommended option)
Appendix 4	Note of the BHE Charity Trust Role
Appendix 5	Project Coversheet

Contact

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Options Appraisal Matrix

	Option 1	***Option 2***	***Option 3***	***Option 4***
1. Brief description	Do Nothing	Paint Only	Repair Parapet	Replace all Balusters
2. Scope and exclusions	The load testing of the parapets demonstrated that the structural condition of the parapets is satisfactory. With the numerous access restrictions to the site; carry out no further works until the access restrictions have lifted and/or there is an immediate structural concern.	Repaint of whole bridge; subject to access restrictions Metalwork patched and filled in a non-structural way. Continuous work to refurbish whole bridge; subject to approval of working methodology from all relevant stakeholders	Replacement of **some** of the baluster columns as required Repair of other cast iron elements as required Repaint of whole bridge; subject to access restrictions Continuous work to refurbish whole bridge; subject to approval of working methodology from all relevant stakeholders	**Full** reconstruction of parapet Repair of other cast iron elements as required Repaint of whole bridge; subject to access restrictions Continuous work to refurbish whole bridge; subject to approval of working methodology from all relevant stakeholders
Project Planning				
3. Programme and key dates	No work proposed until 2023 unless there is an immediate safety issue.	Site investigations – December 2018	Site investigations – December 2018	Site investigations – December 2018

	Option 1	*Option 2*	*Option 3*	*Option 4*
		Completion of design and tender documentation – Jan 2019 Tender Returns and evaluation – August/September 2019 Gateway 5 (Authority to Start Work) – October 2019 Estimated Completion – **September 2020**	Completion of design and tender documentation – Jan 2019 Tender Returns and evaluation – August/September 2019 Gateway 5 (Authority to Start Work) – October 2019 Estimated Completion – **October 2020**	Completion of design and tender documentation – Jan 2019 Tender Returns and evaluation – August/September 2019 Gateway 5 (Authority to Start Work) – October 2019 Estimated Completion – **April 2021**
4. Risk implications	Reduces project risk as access issues are minimised. Increases risk of structural degradation over time.	Does not improve the risk of structural degradation over time. Increases the risk of hidden defects in the metalwork, hidden by the cosmetic repairs	Reduces the risk of future defects occurring in the parapet. Further defects in the existing metalwork are likely to be exposed on site.	Significantly reduced risk that parapet defects will re-occur.
5. Benefits and disbenefits	Bridge structure may be at risk due to failure of protective coating Aesthetic of bridge will be besmirched for longer.	Aesthetics of the bridge will be improved quickly. Repairs are not likely to be long lasting and degradation is likely to be	Preserves the original cast iron parapet. Parapet has been shown to be of sufficient strength and therefore appropriate repair will minimise any	Increased cost compared to Option 2 but would increase useful life of bridge.

	Option 1	*Option 2*	*Option 3*	*Option 4*
		widespread when it occurs.	issues with the adjacent structure in comparison to Option 4.	Removed part of the original structure.
6. Stakeholders and consultees	Residents and business users	• Transport for London • Thames Tideway Tunnel Project • Port of London Authority • Metropolitan and City of London Police • Network Rail • Historic England • Residents and business users		
Resource Implications				
7. Total Estimated cost	Initially zero but may lead to further costs in the future due to the deterioration of the structure	Works: £5,750,000 Fees: £200,000 Risk: £1,055,000 Staff Costs: £80,000 **Total: £7,085000**	Works: £7,235,000 Fees: £200,000 Risk: £1,055,000 Staff Costs: £80,000 **Total: £8,570,000**	Works: £10,450,000 Fees: £280,000 Risk: £1,500,000 Staff Costs: £100,000 **Total: £12,330,000**
8. Funding strategy	Sums currently identified in Bridge House Estates 50year Bridge Repair & Maintenance Fund. The funding will be re-programmed to match the chosen option.			

	Option 1	*Option 2*	*Option 3*	*Option 4*
9. Estimated capital value/return	Supplementary Revenue Project			
10. Ongoing revenue implications	This option would increase maintenance requirements significantly as the structure deteriorates.	This option would not fully preserve the structure and further maintenance visits would be required as the paint system deteriorated.	Work would preserve the structure and minimise implications to ongoing maintenance	Maintenance requirements of the parapets would reduce as the metalwork is replaced
11. Investment appraisal	N/A			
12. Affordability	N/A			
13. Legal implications	The City of London Corporation, as trustee of Bridge House Estates, has a statutory duty under the Blackfriars Bridge Act 1863 to maintain and repair Blackfriars Bridge out of the rents and profits of the Bridge House Estates. As this structure has Grade II listed status, any alterations which affect its character as a building of special architectural or historic interest will require listed building consent. Consultation will be required with Transport for London who are Highway Authority for the bridge. A separate legal review was carried out to determine whether the City has an obligation to increase the height of the existing pedestrian parapets as they are lower than current design standards. It was concluded that as the British Standard for a pedestrian parapet is non-statutory guidance and not mandatory it does not place a legal requirement on the City to increase the height of the existing parapets to comply with the current Standard. Our consultants will carry out a technical risk assessment to confirm this conclusion.			

	Option 1	***Option 2***	***Option 3***	***Option 4***
	However, compliance with the recommendations of the AECOM report (including on-going monitoring, recording and evaluation of the state of the parapets) will reduce the risk of potential liability in relation to the current state of the parapets while preserving the original metalwork of the Grade II listed structure where possible. As trustee of Bridge House Estates, the City must act in the best interests of the charity, following principles of trustee decision-making developed by the courts. A summary of the City's role as trustee of Bridge House Estates is contained in Appendix 4.			
14. Corporate property implications	No impact			
15. Traffic implications	No impact	• Temporary closures of Blackfriars underpass required to install access scaffold • Site access and accommodation to be established from Blackfriars Bridge footway to maintain traffic flow (road and cycle lane) with temporary closures for site set-up		
16. Sustainability and energy implications	• Delaying work could reduce the expected useful life of the asset • Prolonging work would cause extended periods or disruption to road and river users. • No energy implications			
17. IS implications	N/A			
18. Equality Impact Assessment	No impact			
19. Recommendation	Not recommended	Not recommended	Recommended	Not recommended

	Option 1	*Option 2*	*Option 3*	*Option 4*
20. Next Gateway	N/A	Gateway 5 - Authority to Start Work	Gateway 5 - Authority to Start Work	Gateway 5 - Authority to Start Work
21. Resource requirements to reach next Gateway	N/A	Additional budget of: Consultant Fees: £50,000 Staff Fees: £20,000 **Total: £70,000**	Additional budget of: Consultant Fees: £50,000 Staff Fees: £20,000 **Total: £70,000**	Additional budget of: Consultant Fees: £80,000 Staff Fees: £30,000 **Total: £110,000**

Blackfriars Bridge Refurbishment

Parapet and Maintenance Painting Study

July 2018

Quality information

Prepared by	Checked by	Verified by	Approved by

Revision History

Revision	Revision date	Details	Authorized	Name	Position

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1. Introduction

Blackfriars Bridge was originally built in 1869 carries the A201 as well as a cycle superhighway over the River Thames. The bridge structure is owned by Bridge House Estates and managed by the City of London. The bridge is Grade 2 listed.

The recent General Inspection in January 2018 noted that the parapets are in a poor condition with a large proportion of the parapet balusters cracking in some places. In view of the apparent poor condition of the parapet a test was commissioned which found the parapet to be sufficiently strong for pedestrian loading and as a consequence of the layout of the bridge assessed as sufficient for likely traffic loading. A refurbishment of the existing parapet was decided upon as the most appropriate course of action.

The condition of the paint system is also starting to deteriorate significantly in recent years since the bridge's last maintenance painting circa 2000, particularly on the decorative fascia ribs. In the last painting contract the paint was removed back to bare metal hence it is considered that a top coat will be sufficient for the majority of the bridge.

This report will develop the maintenance planned for the bridge considering constraints from various stakeholders and estimate costs and durations for the works.

Figure 1. Blackfriars Bridge

2. Structural Information

Blackfriars Bridge is a five span, 285m (between abutment faces), steel and wrought iron rib arch structure that crosses the River Thames. The five spans are supported by abutments at the north and south ends and four intermediate piers. The piers and the south abutment are founded on London Clay and the north abutment is founded on Thames Ballast. All 'built-up' metallic sections in the structure are riveted together.

The original structure, which was completed in 1869, was 22.86m wide between parapets. The main structural elements were constructed of wrought iron (with some decorative cast iron elements). The structure, including piers, abutments and foundations, was widened in 1909 by 9.14m with the addition of new steel arches. At the north end of the bridge a new curved approach connecting the Victoria Embankment to the bridge was constructed that cantilevered from the north abutment. This curved approach has since been replaced by a largely self-supporting reinforced concrete structure.

Each span consists of nine wrought iron arch ribs from the original structure and three steel ribs from the structure widening with the exception of the north end span (span 1). Span 1 has eight wrought iron arch ribs and four mild steel ribs. For spans 2-4 the widening process involved taking the original west face rib and moving it 9.14m. The three new steel ribs were then erected between the face rib and the remainder of the original structure. The face rib on span 1 was not able to be retained as it did not have the strength to carry the additional loads from the new curved approach span. A steel rib was erected in its place.

Arch Ribs

The flanges of the wrought iron main ribs comprise two plates 610mm wide with a total thickness of 38.1mm. The web plate varies in height and is 22.2mm thick. Pairs of 102x102x12.7mm angles connect the web plate to the top and bottom flanges.

The flanges of the newer steel ribs consist of two plates 610mm wide with a total thickness of 44.5mm. The web plate is similar to the wrought iron webs but the angle sections are 114x114x19mm thick.

All the ribs have 152x102x12.7mm T-section transverse stiffeners at approximately 1.676m centres.

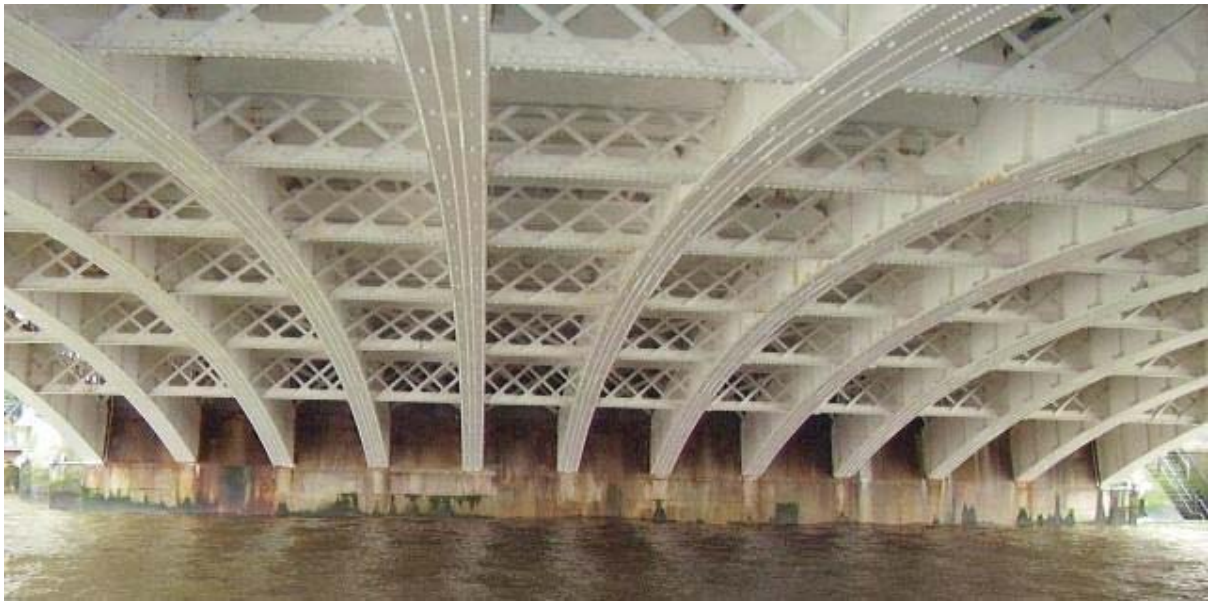

Figure 2. View of the underside of the bridge

Spandrels

On top of each end of the main arch ribs are lattice spandrels. The lattice spandrels on top of the outside girders are constructed in cast iron with the large stiffened C-section members comprising the individual struts. The internal steel and wrought iron spandrel struts are 127x76mm angle sections 7.9mm thick. The struts are inclined and spaced at approximately 0.95m centres.

The tops of the spandrel struts are riveted to the stem of the top chord T section which supports the deck structure. This is made up of a 508x9.5mm thick web plate, 203x12.7mm thick flange plate and two 101x101x12.7mm thick angle cleats.

Transverse Members

Transverse bracing members exist between the main ribs. The transverse bracing members are located approximately every third transverse web stiffener in the main ribs and are connected to the webs of the main ribs.

Transverse deck girders sit on top of the spandrel top chord or are connected directly to the web of the main arches in the centre of the spans. The girders are spaced at an average of 1m when on top of the spandrel top chord. Where the girders are riveted directly into the main arch ribs they generally occur at the same location as the transverse web stiffeners.

Figure 3. Braces between arch ribs

Parapets

The parapet is made up of hollow cast iron box rails that are supported on and bolted through hollow balusters. The balusters are set on a metal box plinth that is filled with concrete. Tie rods connect the rails to the concrete plinth through the hollow balusters. The parapet is approximately 1m high. The parapets are discontinuous across the piers, where there is an allowance for movement.

3. Recent Inspection Findings

Parapets

The recent inspection of Blackfriars Bridge found the parapets to generally be in poor condition.

Several cracks along the parapet were noted having propagated from the corners of the base of the balusters and this has caused section loss on the baluster in a number of locations. This deterioration is causing rust staining along the bridge which is highlighting the cracks and damage on some balusters. The vertical casting joints are separating in some instances and are showing signs of rusting. The balusters are also pitting in some locations along the bridge.

Several of the plates at the interface of the parapets and the piers are missing or displaced.

Figure 4. Example of large crack in the corner of baluster base that is required to be filled with epoxy filler.

Figure 5. Example of the rusting staining of the vertical casting joints

Figure 6. A missing plate connecting the parapet to the pier

Figure 7. An example of section loss at the base of the baluster

Underside

The outer cast iron spandrels are rusting in places and require full cleaning and painting. It can also be seen from the picture below that a number of the decorative castings that are attached at the node points of the lattice infill section are damaged or missing.

Figure 8. Rust staining and damage on spandrel rib

The condition of the paint throughout the soffit of the arches is quite good. It is believed that most of the paint is in good enough condition to be cleaned and over coated as opposed to being taken back to bare metal and 3 coats applied. It is likely that 5-10% of the soffit where rust is visible will need a full preparation and paint system.

Figure 9. Condition of structure on the underside

4. Parapet Load Test

In 2018 the City of London commissioned AECOM to arrange a test of the parapet to determine whether it was possible to retain the current parapet of if strengthening would be required. The test involved constructing a frame to apply a static horizontal load to a section of the parapet. The loads were applied at handrail level and baluster level

The test found that the parapet is satisfactory under ULS and SLS and so as a result does not need strengthening or replacing. However, it was recommended that the parapet be repainted and localised cracks be repaired to prolong the life of the parapet.

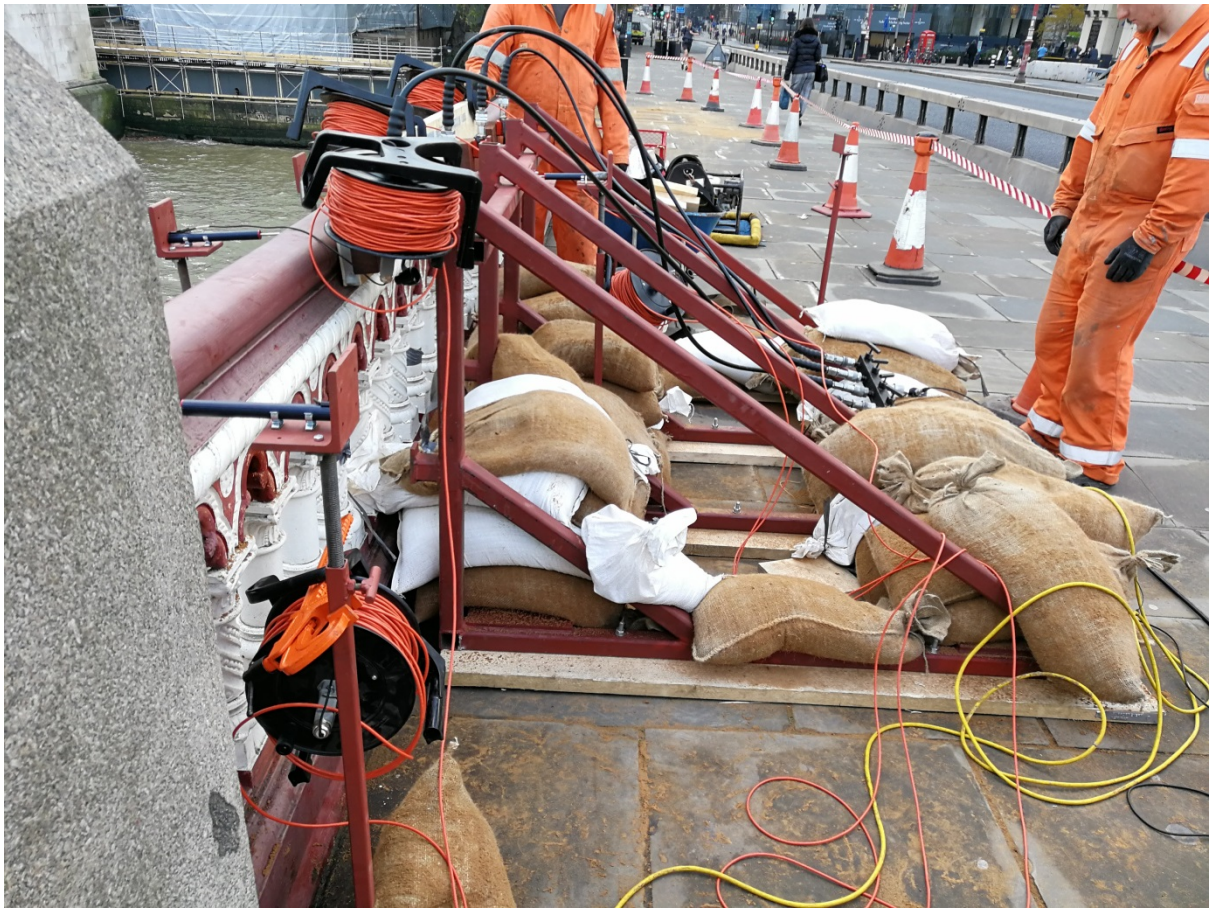

Figure 10. Parapet test

5. Parapet Repairs

In preparation for the Tideway works a new staircase was installed on the eastern side of span 1 recently. This involved the removal and repair of a section of the parapet. We have used knowledge gained of this work to inform our estimate of the works required to refurbish the parapet on the rest of the bridge, while it is appreciated there will be some economy of scale there is a limited number of specialist companies who will be able to carry out these works to the required standard.

Figure 111. Parapet Repairs

Figure 12. Parapet Reconstruction

6. Stake Holders

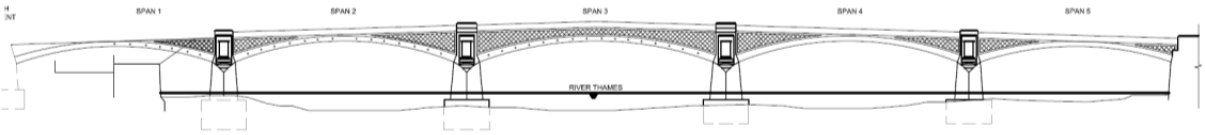

Figure13. Bridge Elevation

Due to the pivotal role played by Blackfriars bridge in the London transport system there are numerous stake holders to consider whose buy in is likely to be needed to refurbish the bridge.

In addition to the City of London, the relevant stakeholders are:

Transport for London (TfL) – These are the highway authority for both the bridge and the underpass which is under Span 1.

Port of London Authority (PLA) – The river authority who manage river traffic and are responsible for navigational safety for river users. The restriction of navigation beneath the bridge will need to gain their approval.

Network Rail (NR)– Owners of the adjacent bridge which is sufficiently close that any navigational restrictions on the road bridge needs to be replicated on the rail bridge.

Thames Tideway (TT)– The construction of a new sewer running beneath the Thames is happening over the next few years. A significant element of the works is centred around Blackfriars where there is a new foreshore being constructed. As a result of the project there is anticipated to be a significant increase in river traffic, and span 2 of Blackfriars Bridge is to be closed to river traffic for the duration of the construction.

Environment Agency (EA) - Any works over the River Thames where there is potential to affect the river requires the approval of the Environment Agency

7. Programme Constraints

In an ideal situation the painting of the bridge could be phased so that painters and scaffolders were able to work in a complimentary manner whereby access was readily available to all areas required by the painters and scaffolders were constantly occupied either installing or stripping scaffolding. This was achieved during the previous painting contract of Southwark and Tower Bridges by swapping work fronts between the two structures, enabling the scaffolders to prepare/strip one structure while the other was being painted. We do not have that possibility for this project.

Of the five spans of the bridge;

Span 1 is partly over water (although not a navigable span) and partly over road, namely the Blackfriars Underpass. It is also over a section of the embankment which for the next few years is being used as a site establishment for the Thames Tideway Project. To access the underside of this span agreement will need to be sought from TfL and Tideway. Part of the Tideway works will impact the painting of the spandrel because there is a new staircase due to be built alongside the bridge.

Span 2 is currently closed to river traffic for the safety of workers on the Tideway construction site.

Spans 3 and 4 are the main navigable spans.

Span 5 is not considered navigable by the PLA although small vessels can use it.

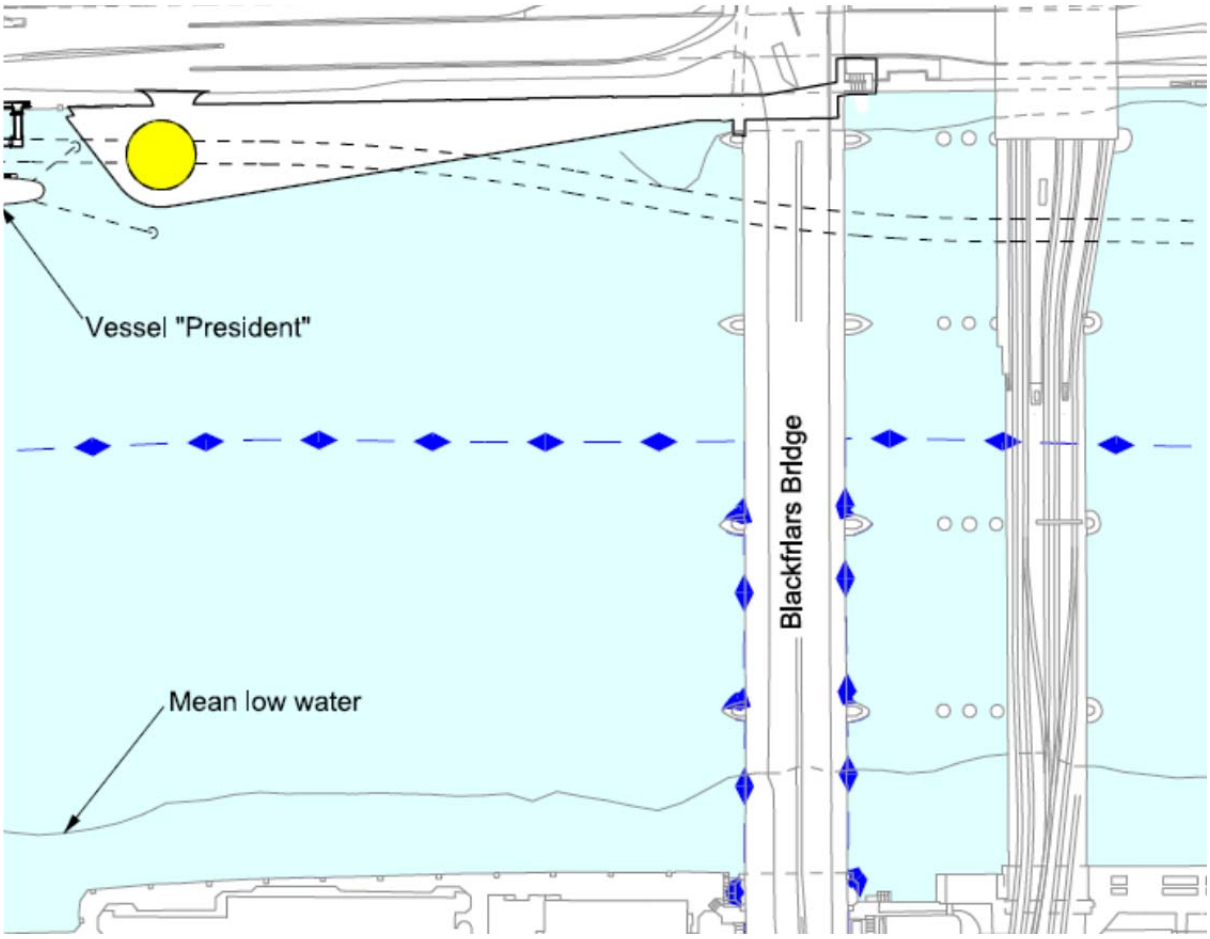

Figure 124. Plan of River bed Blackfriars Road and Rail Bridge

Any restriction to road traffic or alteration of the carriageway or footway will require approval from Transport for London (TfL) and any restriction to traffic on the River Thames would require the approval from The Port of London Authority (PLA) before going ahead.

PLA requires at least two of the arches to be open to traffic along the River Thames during the day. This creates a significant challenge because only 3 of the arches (arches 2, 3 and 4) are navigable to traffic along the Thames but arch 2 is currently blocked by Thames Tideway. PLA will allow river traffic to be restricted to a single span over night and at a cost of approximately £2000 an evening.

PLA have currently stated they will only allow work on the parapets of navigable arches at night, whether there is a crash deck in place or not, although in discussions there was an indication that working over an open span may be possible if a safe method could be demonstrated.

If this cannot be agreed with the PLA the current programme for the Tideway works at Blackfriars extends until April 2023.

8. Access and Site Establishment

A traditional scaffold that would be used for carrying out the painting and refurbishment of a bridge such as this is shown in Appendix B. However this would require the closure of a span to river traffic. This is a possibility to paint and refurbish Spans 2 and 5.

Span 1 would be best considered in sections. The section over the road could be scaffolded without causing significant disruption. The section over the Thames path could potentially be accessed using localised towers for the underside. The parapet and spandrel will be affected by the Tideway works and will need to be coordinated with the Tideway contractor.

In order to paint spans 3 and 4 during the next two years agreement will need to be reached with the PLA on a safe system of work over open river spans. This should be possible, it is regularly done over working railway lines, although it increases the cost of the works as the scaffold will need to be built at night while the span is closed to river traffic. The scaffold design will also need to be developed to not protrude (**non-protruding**)beneath the soffit of the arches. This will require the lowest parts of the span, typically the arch rib undersides) to be painted using roped access or underbridge unit because they will not be accessible from the scaffold.

It may be possible to agree with the PLA to extend the scaffolding below the soffit by 250-300mm in

With the northern foreshore occupied by the Tideway works there is very little land available for a Contractor to house their welfare units and store the necessary materials. To overcome this we would expect the Contractor to build an enclosure around one of the footways as shown in Figure 13 and house their welfare units and materials at the higher level.

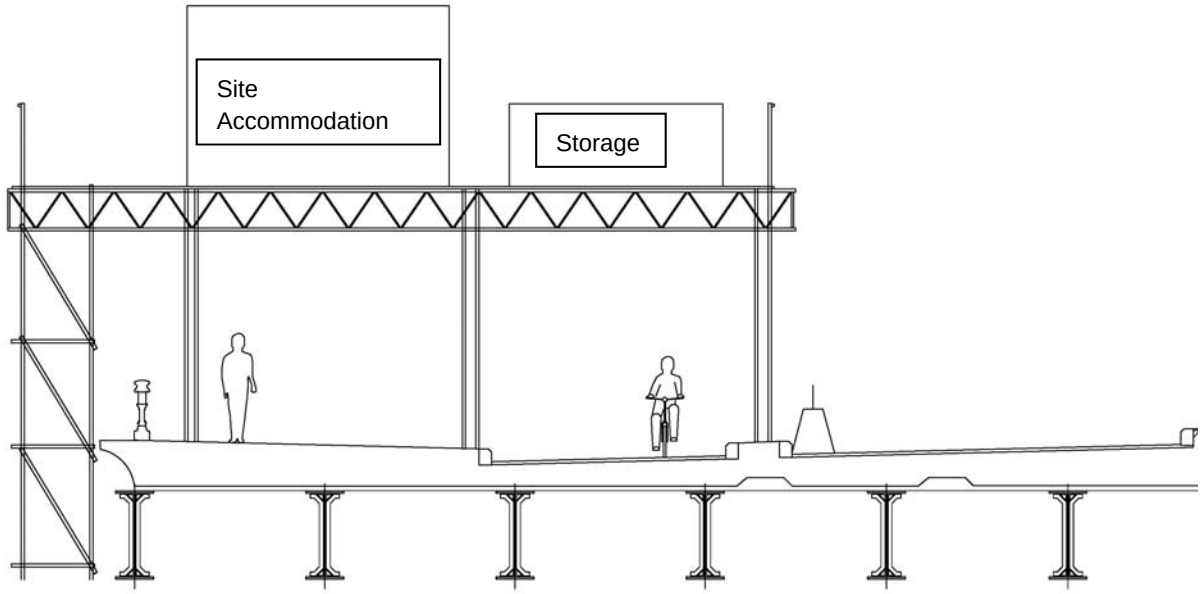

Figure 135. Possible high level office and store arrangement

The alternative option would be to moor a floating welfare setup in one of the closed spans, however the risks and costs associated with this option make the high level solution more attractive.

9. Refurbishment Options

We have presented below the options available to refurbish the bridge. As well as a 'Do Nothing' option we have considered a bare minimum in which the bridge is painted but the parapet is only repaired using filler and painted . For costing purposes we have assumed the entire bridge is painted with an estimated 5%of the surface area requiring preparation back to bare metal and the application of a full 3 coat system.

Our costs for the parapet refurbishment are based on the figures received from Newton Forge who carried out the repair to the section of the parapet repaired during the construction of the new stair case on the north east corner of the bridge. They removed and repaired/replaced a 12m section of the parapet at the north east corner.

The Preliminaries include site accommodation and supervision costs as well as costs such as a safety boat. The scaffolding costs are incorporated in the painting costs. The duration of the works, assuming scaffolding is carried out at night on spans 3 and 4 with day time painting, is anticipated as 12 months in total. It is assumed for this that where scaffolding repairs are included these can be carried out concurrently with the painting.

Figure 146. Current rust staining on the bridge

Once a casting specialist has been employed for the parapet it may be decided to extend the repairs to some of the other damaged cast iron elements such as those shown if Figure 16. A nominal sum has been included in the options wherein the parapet is being repaired for further unspecified repairs.

9.1 Option 1 – Do Nothing

This option is the cheapest option in the short term with no work required and would cause the least disturbance to the large number of tourists and commuters who use the bridge. The load test demonstrated the condition of the parapet is currently satisfactory structurally, however monitoring the deterioration of the parapets would need to take place to ensure safety. The recommended maintenance life of the paint system has been exceeded which can be seen in the rust staining appearing on the bridge This will continue to will worsen over time which will eventually impact the load capacity of the structure as well as impacting the aesthetics of this landmark bridge if it goes untreated.

Some form of refurbishment will be required in the future if it does not occur now, this could lead to a more expensive solution in the future.

We have not assigned a cost to this option because the monitoring of its deterioration will be part of routine inspections that occur currently on bridge.

Figure 157. Current rust staining on the bridge

9.2 Option 2 – Paint only

If the necessary repairs to the parapet only became apparent once the contract was let then the parapet would be patched in a non-structural way using fillers and painted over. This would leave the contract as a purely preparation and paint contract including providing access.

The downside of this approach is that the parapet paint system will start to break down in the areas where defects have been filled and it would be difficult to enforce any warranty on the paint system.

The cost estimate below is based on a conventional scaffold being possible on 3 spans and a non-protruding scaffold which would not restrict the passage of river craft being agreed on the two navigation spans. The scaffold would need to be installed at night during span closures.

Element	No. of Units	Cost Per Unit (£)	Total Cost (£)
Prelims			**1,000,000**
Repaint deck and parapet (standard scaffold)	3	**850,000**	**2,550,000**
Repaint deck and parapet (non-protruding scaffold)	2	**1,100,000**	**2,200,000**
		Total	**5.750,000**

9.3 Option 3 – Minimum repair parapet, continuous work

Due to Blackfriars Bridge's location and prominence it is important its appearance maintains a high level. As part of this option the major defects in the parapet will be repaired or replaced. This option includes completely replacing some of the balusters columns due to section loss or large cracks. As a Grade II structure the replaced baluster columns will need to replicate the original balusters. This option would also include the larger cracks being filled with an epoxy filler to prevent further corrosion and deterioration of the parapet. Before the cracks are filled, the cracks will be cleaned by being grit blasted. The connecting plates between the parapet and the piers will be replaced where cracked or missing. The longitudinal cracks in the mortar where the parapet meets the footway will be dug out and replaced. These works will be done before the bridge is repainted.

The parapet repairs do require panels (circa 4m long) to be disassembled to undertake the repairs which may influence the threshold at which a repair is carried out. Once a panel is apart a baluster which was considered suitable to be simply filled and repainted may be replaced because it is easily accessible, however the wholesale deconstruction of the parapet would be avoided.

In addition to patch repairs this option would address the issue of the rust staining of the majority of the baluster posts. Not only would it remove the staining from the parapet but it would prevent staining as the minor cracks causing staining of the parapet would be sealed by the paint. The pitting found on a number of the baluster posts would also be covered by the protective paint.

The bridge was last repainted in 2000 with some sections of the bridge repainted in 2002. The lifespan of a modern paint systems is typically 12-15 years and since the current system is at the end of this lifespan it is expected that it will begin to deteriorate further. The process of re-painting the parapet and deck involves removing the existing paint system by grit blasting before the reapplication of paint system.

Access to outer side of the parapet required for maintenance and repainting of the parapet will be achieved using a suspended scaffold arrangement and an enclosure to contain the dust and grit produced..

Element	No. of Units	Cost Per Unit (£)	Total Cost (£)
Prelims			**1,250,000**
Replace baluster post	23 panels	**45,000**	**1,035,000**
Fill gaps in parapet	20		
Repaint deck and parapet (standard scaffold)	3	**850,000**	**2,550,000**
Repaint deck and parapet (non-protruding scaffold)	2	**1,100,000**	**2,200,000**
Replace connecting plate	9	**10,000**	**90,000**
Replace parapet mortar base	400m	**20**	**10,000**
Sundry cast iron repairs			**100,000**
		Total	**7,235,000**

9.4 Option 4 – Replace all balusters, full repaint

This option proposes replacing all the balusters on the parapet as the current balusters have numerous cracks and defects. The top of the parapet is in a good condition apart from a few spots of rust where the paint has come off as the recent inspection shows. As a Grade II listed structure the balusters will need to be replaced with a replica of the balusters on the current parapet. Though this option is the most expensive it is likely it will provide economies in the future by minimising the amount of maintenance required and will provide a safer and more durable option. To reduce time spent painting the bridge on site the balusters could be painted off-site.

As shown in Appendix C the parapet can be detached in sections and the balusters replaced easily. The connecting plates between the parapet and the piers will be replaced where cracked and missing. The longitudinal cracks in the mortar where the parapet meets the footway will be dug out and replaced. These works will be done before the bridge is repainted.

A possible complication with this option would be whether it would be considered necessary to reintroduce a parapet that would comply with current standards as so much is being replaced. This would be extremely difficult to achieve without significant hidden reinforcement and would probably rule out this option.

Element	No. of Units	Cost Per Unit (£)	Total Cost (£)
Prelims			**1,500,000**
Replace all baluster posts	100	**40,000**	**4,000,000**
Repaint deck and parapet (standard scaffold)	3	**850,000**	**2,550,000**
Repaint deck and parapet (non-protruding scaffold)	2	**1,100,000**	**2,200,000**
Replace connecting plate	9	**10,000**	**90,000**
Replace parapet mortar base	400m	**20**	**10,000**
Sundry cast iron repairs			**100,000**
		Total	**10,450,000**

10. Recommendations

The option of doing nothing is not really a consideration given the bridge's location and significance to the City of London as well as its role as one of the main transport arteries for the City. The appearance of the bridge has already been the source of comments from significant figures in the City. It is very unfortunate that the painting of the structure coincides with the largest project undertaken on the Thames in living memory.

The option of carrying out painting of the parapets with simple superficial covering of the cracks is a short term solution to the appearance of the bridge however will not be economical in the longer term because the parapet condition will worsen in many situations and require repainting in less than the expected 15 years offered by a modern paint system.. When this is considered in tandem with the difficulties associated with working in central London and over the river this cannot present an appropriate solution.

Once accepting that repairs to the parapet are necessary then the choice is whether to carry out a focussed repair on the balusters, that are unlikely to last the 15 years or more, or whether to go for a wholesale replacement. Given the Grade II listed status of the structure there will be resistance from the planners to the replacement of any original fabric of the bridge that does not require replacement, and the replacement of sections as a precaution against future weathering is unlikely to gain approval even though the provision of access may make this an attractive option. We therefore recommend the option where only unmaintainable elements are replaced, Option 3.

The final cost estimate for this can be developed further once the various stakeholders and their access restrictions have been fully explored and agreed.

Appendix A Risk Register

Appendix B Scaffolding used for Southwark Bridge

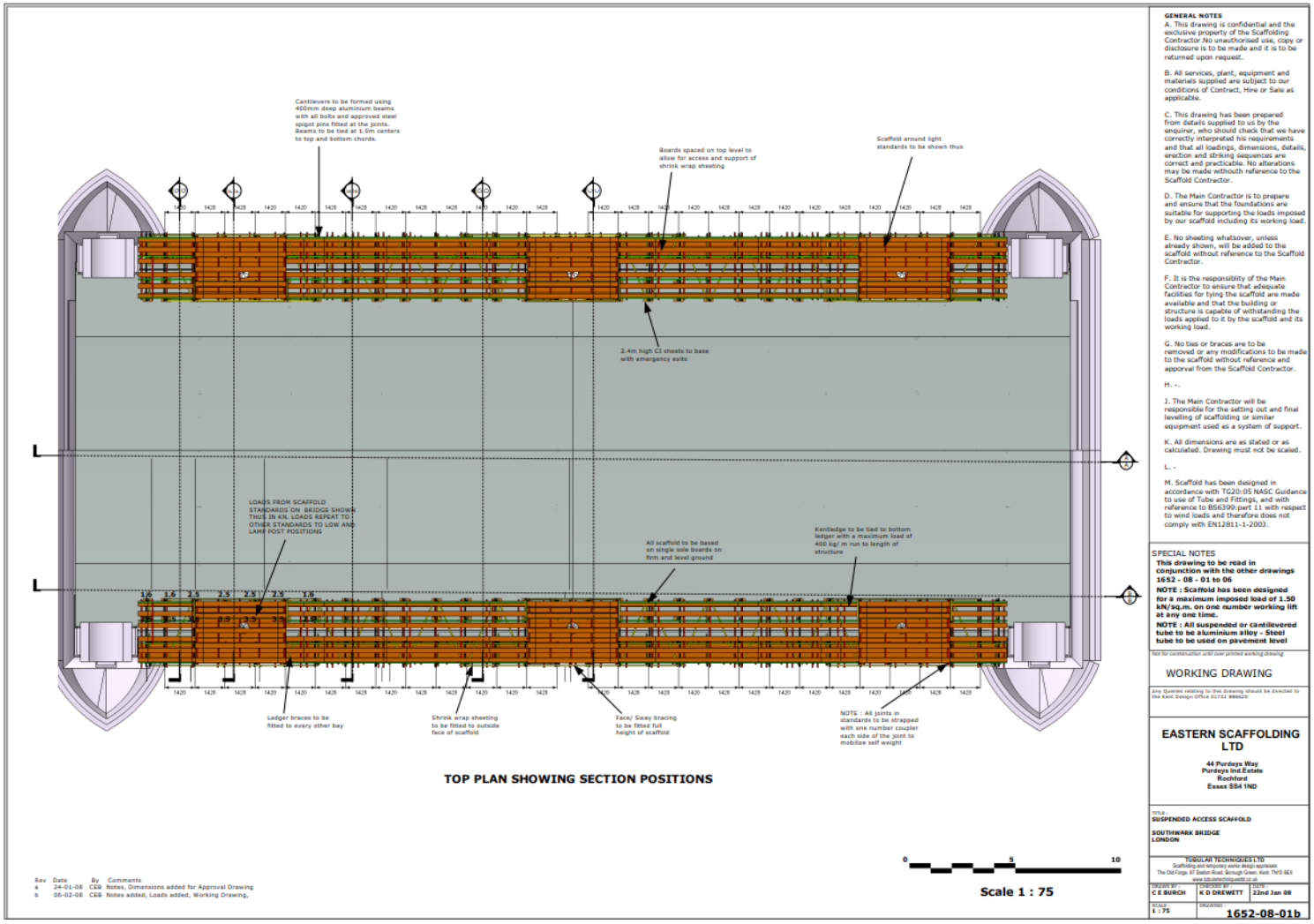

Figure 16. Scaffolding used on Southwark Bridge [1/6]

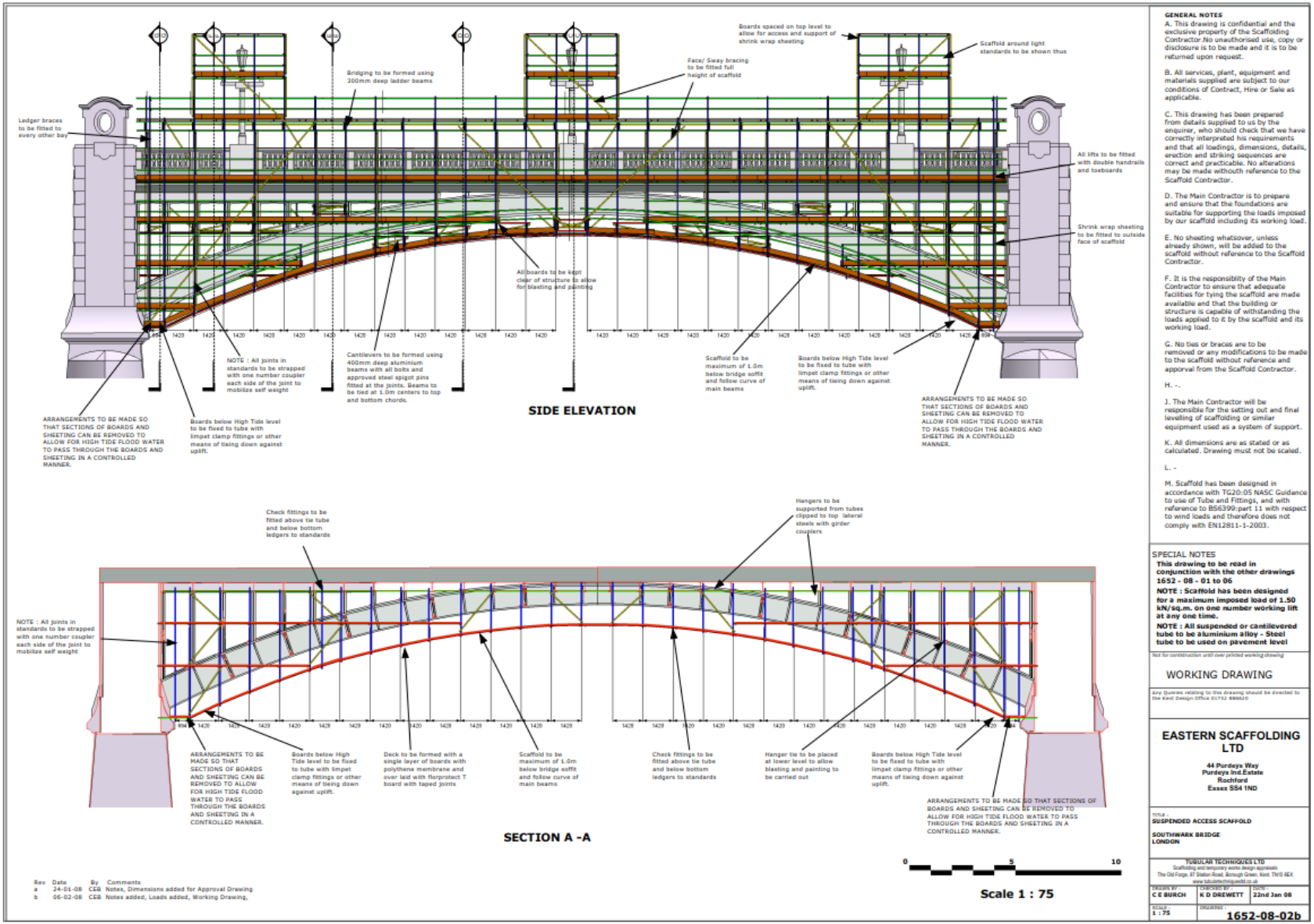

Figure 17. Scaffolding used on Southwark Bridge [2/6]

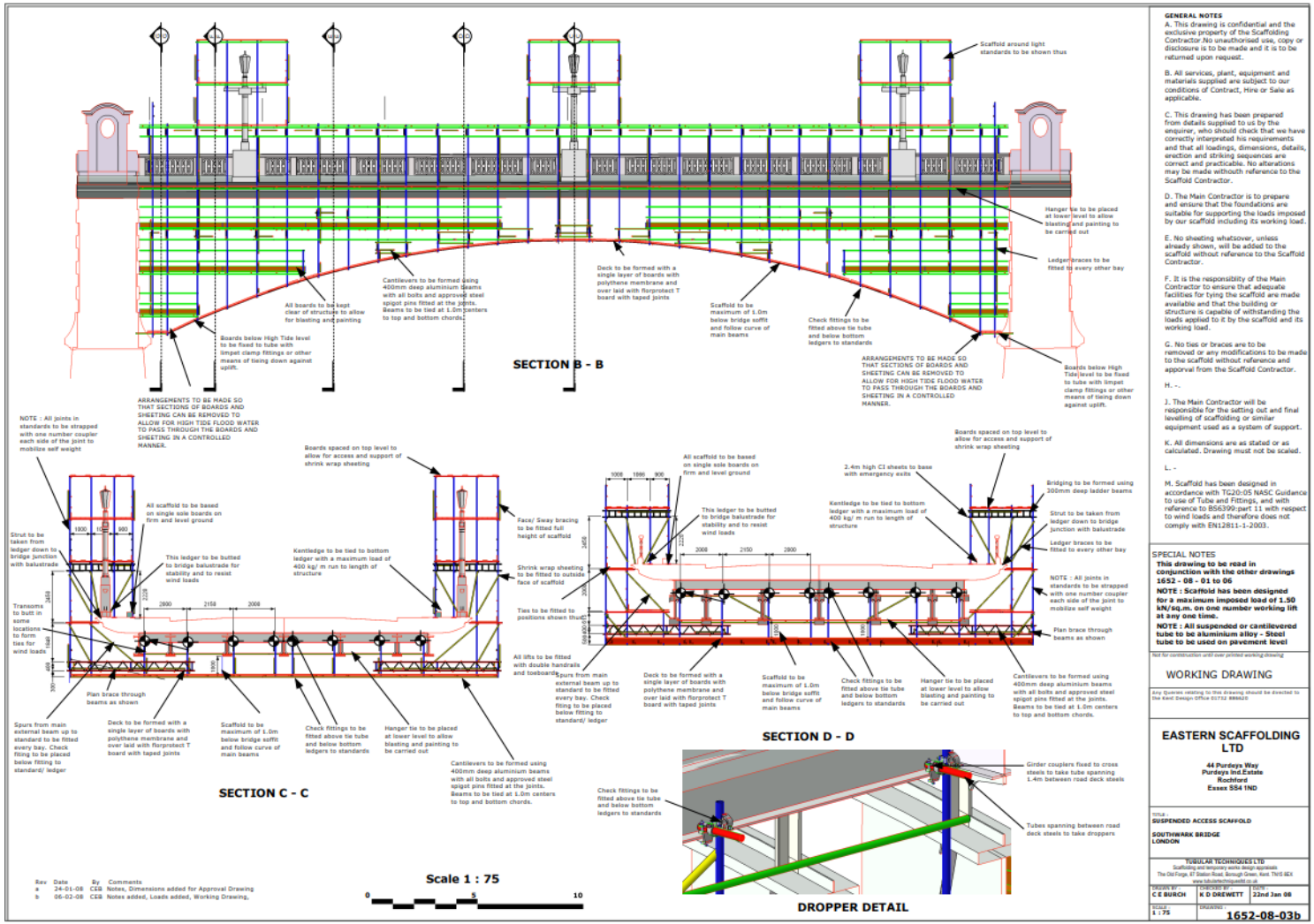

Figure 18. Scaffolding used on Southwark Bridge [3/6]

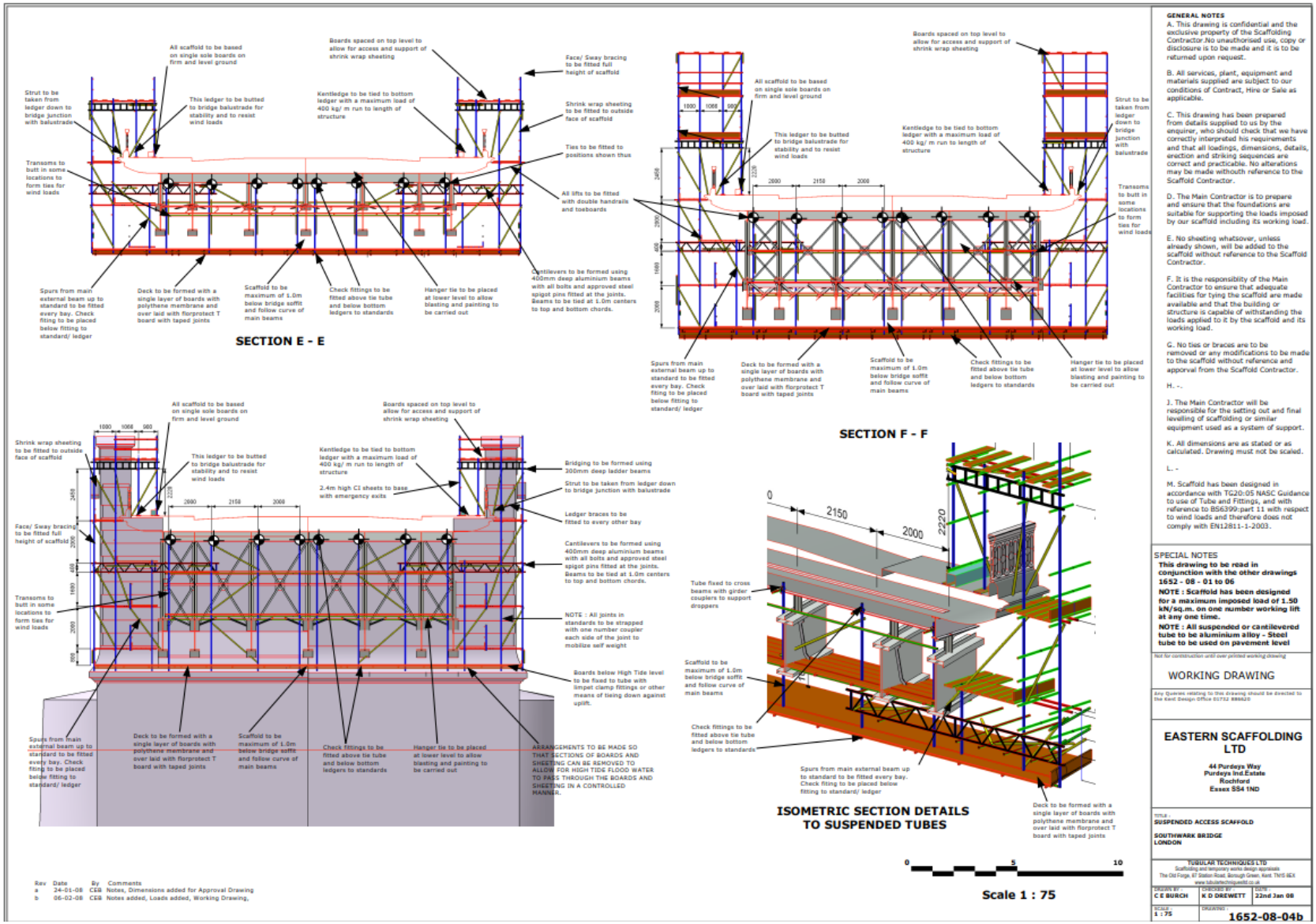

Figure 19. Scaffolding used on Southwark Bridge [4/6]

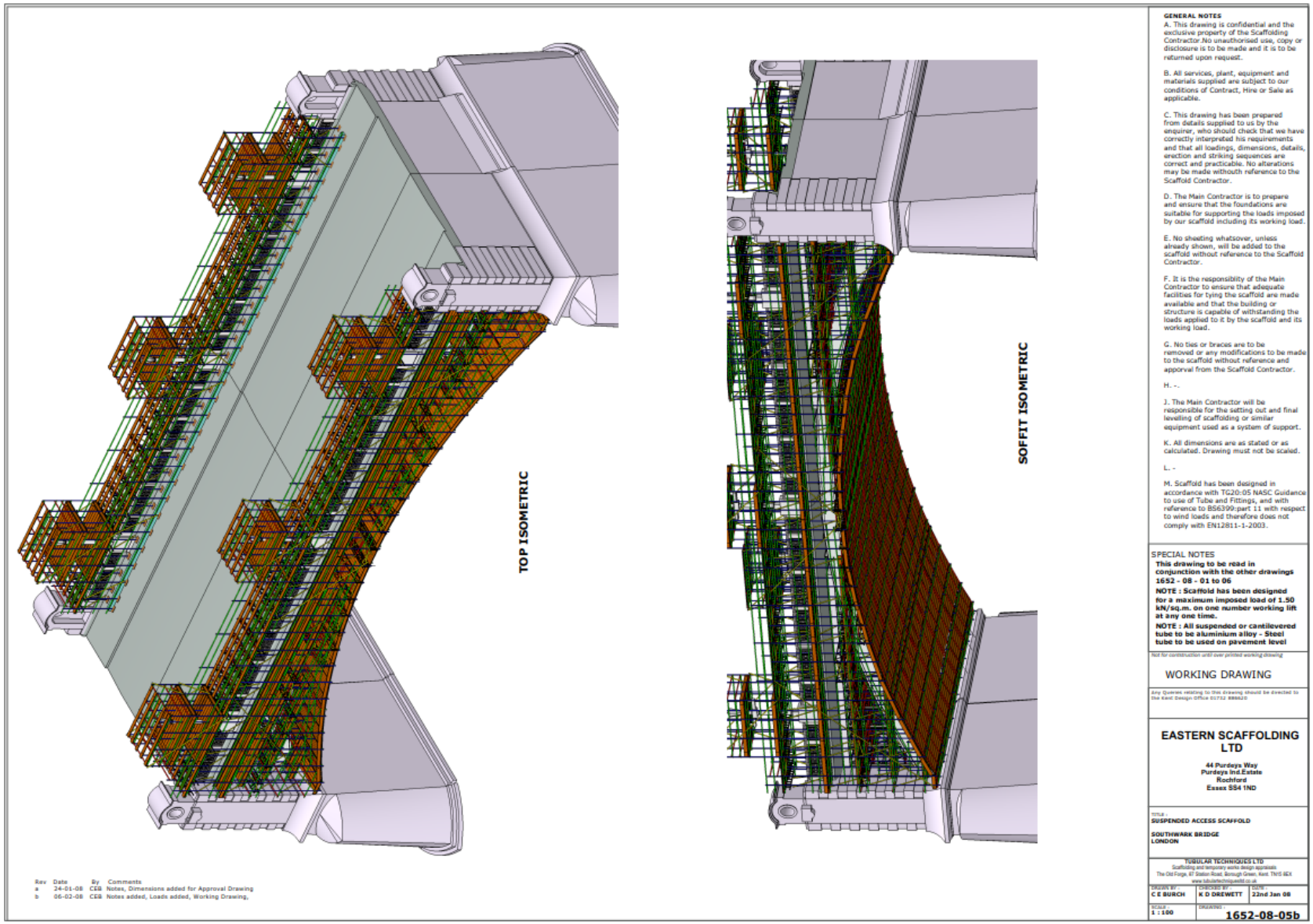

Figure 20. Scaffolding used on Southwark Bridge [5/6]

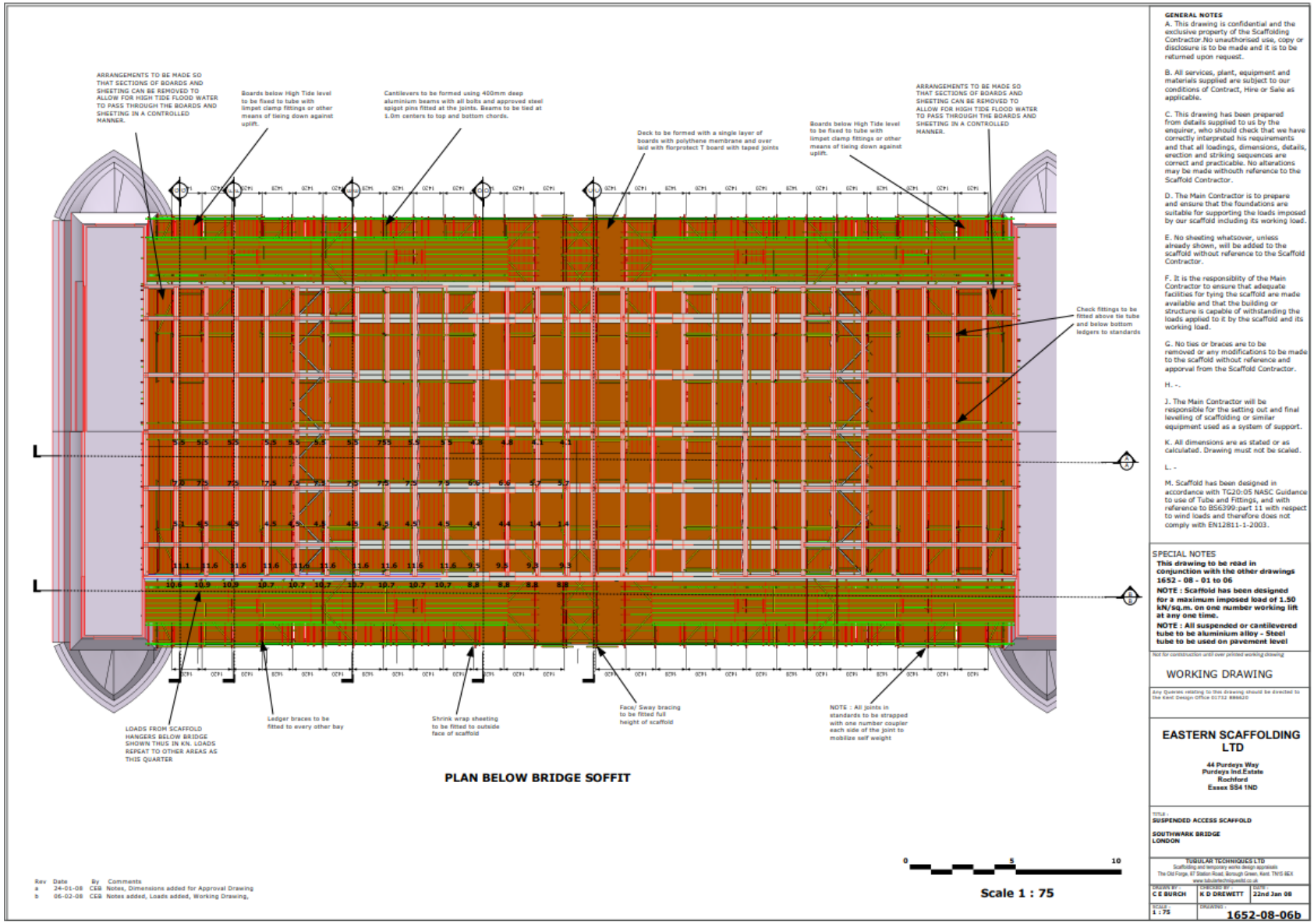

Figure 21. Scaffolding used on Southwark Bridge [6/6]

Appendix C As built drawings

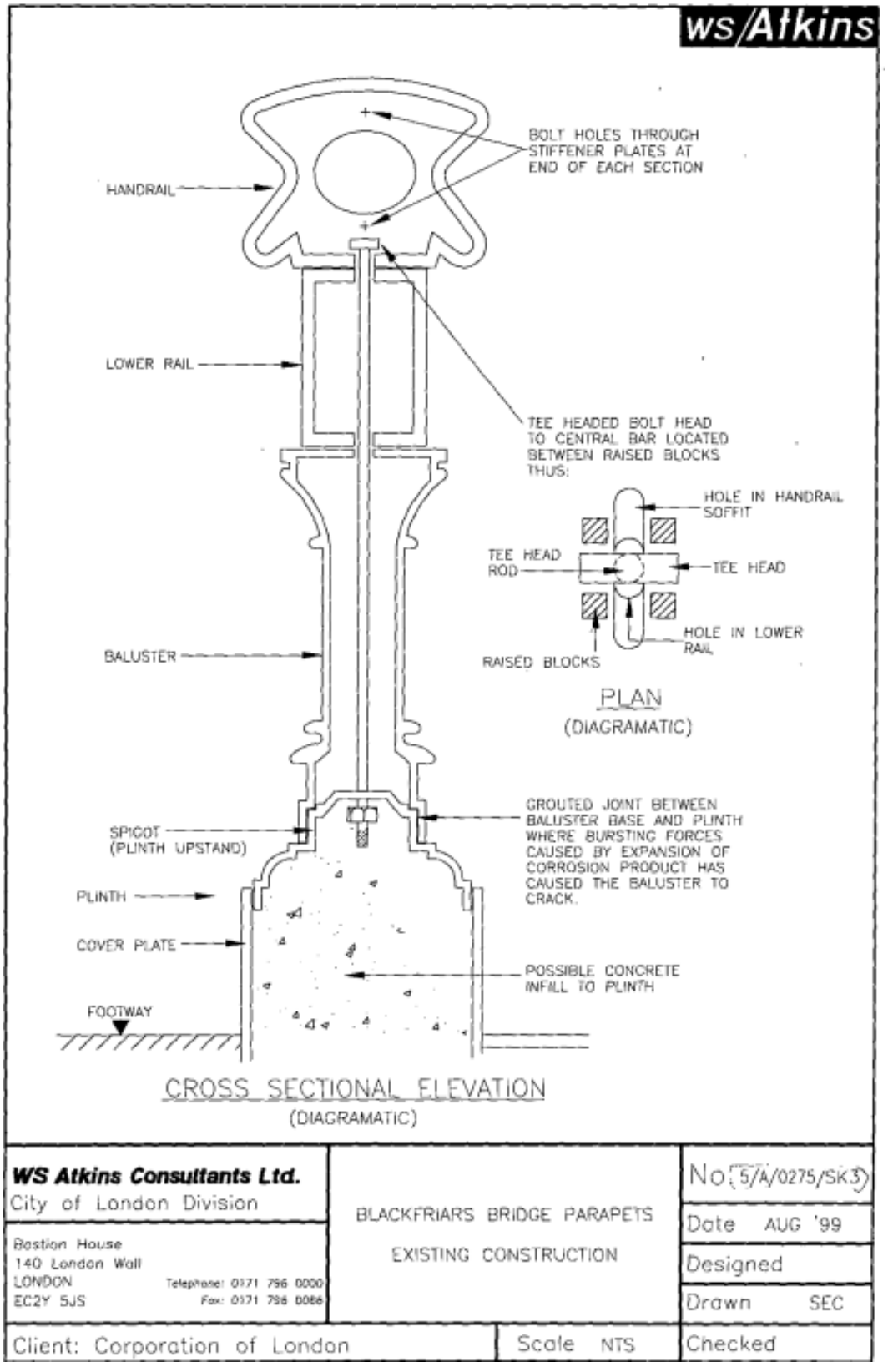

Figure 22. Cross section parapet

Appendix D Baluster Major Defects

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City of London: Projects Procedure Corporate Risks Register

Project Name: Blackfriars Bridge Refurbishment

Unique project identifier: 72800019

Overall risk rating	Amber
Costed risk carried	£4,045,000.00

General classification									Mitigation actions						Ownership & Action					
Risk ID	**Category**	**Description of the Risk**	**Risk Impact Description**	**Likelihood Classification**	**Impact Classification**	**Costed impact (£)**	**Risk score**	**Confidence in the estimation**	**Mitigating actions**	**Mitigation cost (£)**	**Likelihood Classification**	**Impact Classification**	**Costed impact after mitigation (£)**	**Mitigated Risk score**	**Date raised**	**Risk owner (Department/ External)**	**Risk owner (Officer/ External)**	**Action dependencies**	**Date Closed**	**Comment(s)**
ID Number (Officer discretion to how it is created)	*(1) Service Delivery/ Performance (2) Financial (3) Reputation (4) Legal/ Statutory (5) Safety/ Health (6) Objectives.*	*The Officers specific description of the risk to the project (and potentially to the Corporation as a whole).*	*if the risk is realised and becomes an issue needing to be resolved. This could describe a mix of time and milestone movement, Officer hours, change to scope, quality, reputation or financial cost.*	*Likelihood Classification the Officers judgment, previous experience or advice taken, of the risk occurring. On a 4 point scale from Rare to Likely.*	*of the risk should it be realised, measured on a 4-point scale from Minor to Extreme (using a Health and safety risk example below as a demonstration of how this may look)*	*the potential financial cost to resolve the risk in full should it occur. Estimated by the Officers judgment, from experience or advice taken. Some risks such as 'reputational damage' may be unquantifiable financially.*	*calculated from the grid using (E) and (F)*	*Not all risk estimations are comparable, some project elements may be more radical or novel with little basis for comparison within the Corporation. Officers have suggested noting this for Members and Senior Officers using a confidence mechanism, where risk owner give a confidence level in the risk item's description. (This would be expected to increase as the project progresses and investigations and surveys feed into the planning). Likewise the use of Quantity Surveyors early on in reviewing risk register elements should increase the confidence in the assessments made.*	*The actions or approach which could be taken to reduce or clarify the likelihood of a risk occurring or reduce/ change the severity of its impact should it occur. Mitigation could be to spend fees looking for asbestos or on early groundwork surveys, the results of which will further clarify the risks and could front-end particular actions in the project plan to prevent later expensive delays.*	*The cost of the risk mitigation works. Not all mitigation activities will have a cost associated with it.*	*Likelihood Classification the Officers judgment, previous experience or advice taken, of the risk occurring. On a 4 point scale from Rare to Likely.*	*of the risk should it be realised, measured on a 4-point scale from Minor to Extreme (using a Health and safety risk example below as a demonstration of how this may look)*	*The revised 'costed impact' of a risk if realised following the mitigation activities.*	*calculated from the grid using (E) and (F)*			*The stakeholder who would be responsible for the practical action to monitor and rectify the risk should it become an issue. In practice this is not always the project manager,*	*If there are any dependencies required to enable risk owner to take action*	*If action no longer relevant*	
R1	(1) Service Delivery/ Performance	Access issues leading to the inability to operate continuously	PLA constraints, including Tideway enforcement	Likely	Extreme	£250,000.00	32		Early discussion and sequencing of works. Phasing contract works	£0.00	Likely	Extreme	£250,000.00	32	**18/06/2018**	**DBE**				Increase in prelims and interruption of works
R2	(1) Service Delivery/ Performance	Access issues leading to the inability to operate continuously	Tideway	Likely	Serious	As above	8		Early discussion and sequencing of works. Phasing contract works	£0.00	Likely	Serious	As above	8	**18/06/2018**	**DBE**				Increase in prelims and interruption of works
R3	(1) Service Delivery/ Performance	Access issues leading to the inability to operate continuously	TfL	Possible	Serious	As above	6		Early discussion and sequencing of works. Phasing contract works	£0.00	Possible	Serious	As above	6	**18/06/2018**	**DBE**				Increase in prelims and interruption of works
R4	(1) Service Delivery/ Performance	Access issues leading to the inability to operate continuously	Illuminated River	Unlikely	Serious	As above	4		Early discussion and sequencing of works. Phasing contract works	£0.00	Unlikely	Serious	As above	4	**18/06/2018**	**DBE**				Increase in prelims and interruption of works
R5	(1) Service Delivery/ Performance	Access issues leading to the inability to operate continuously	Network Rail	Unlikely	Major	As above	8		Early engagement	£0.00	Rare	Major	As above	4	**18/06/2018**	**DBE**				Increase in prelims and interruption of works
R6	(1) Service Delivery/ Performance	No suitable Location of site compound	Cost and programme.	Likely	Serious	Cost included in estimate	8		discussions with contractor / City Surveyor	£0.00	Likely	Serious	£0.00	8	**18/06/2018**	**DBE**				The option to build a high level compound has been allowed for.
R7	(2) Financial	TfL charge lane rental	Cost and programme.	Possible	Serious	£120,000.00	6		Review Blackfriars Bridge Act	£0.00	Possible	Serious	£120,000.00	6	**18/06/2018**	**DBE**				£800 per day is current cost. Initial estimate based on 150 days.
R8	(1) Service Delivery/ Performance	Events	LMS, river events	Likely	Minor	£20,000.00	4		forward programming	£0.00	Possible	Minor	£0.00	3	**18/06/2018**	**DBE**				Possible additional prelims
R9	(1) Service Delivery/ Performance	HVM Barriers	Access, impact on works, removal and renewal.	Likely	Major	£10,000.00	16		liaison with MET police	£0.00	Likely	Major	£0.00	16	**18/06/2018**	**DBE**				High level compound reduces impact of these.
R10	(2) Financial	Extent of know cast iron defects	Cost and programme.	Possible	Serious	£250,000.00	6		increase level of survey, conservative allowance for repairs	£0.00	Possible	Minor	£125,000.00	3	**18/06/2018**	**DBE**				When panels are disassembled/blasted there could be further damage uncovered.
R11	(2) Financial	Unknown defects	Cost and programme.	Possible	Major	£200,000.00	12		Inspection information	£0.00	Possible	Major	£50,000.00	12	**18/06/2018**	**DBE**				Regular inspections have been undertaken. Many defects decorative rather than necessary
R12	(1) Service Delivery/ Performance	Finding a suitable contractor for competetive tender	cost and Value for money	Possible	Serious	£0.00	6		Early discussion. Phasing contract works and procurement strategy	£0.00	Possible	Minor	£0.00	3	**18/06/2018**	**DBE**				OJEU process likely to be necessary
R13	(1) Service Delivery/ Performance	EU Tender	programme	Possible	Major	£25,000.00	12		procurement strategy. Accurate estimating	£0.00	Possible	Major	£25,000.00	12	**18/06/2018**	**DBE**				OJEU process likely to be necessary, greater cost for tendering
R14	(4) Legal/ Statutory	Not gaining Third Party Approvals	LBC and others	Unlikely	Major	£10,000.00	8		early engagement with approving bodies	£0.00	Rare	Major	£5,000.00	4	**18/06/2018**	**DBE**				
R15	(5) Safety/ Health	site security/trespass	open site.	Possible	Serious	£10,000.00	6		ECI. Early drafting of Construction phase plan	£0.00	Possible	Minor	£10,000.00	3	**18/06/2018**	**Contractor**				
R16	(5) Safety/ Health	Terrorism	could provide new access opportunities for terrorists	Unlikely	Extreme	Included above	16		ensure existing mitigation is maintained. Liaison with police forces.	£0.00	Unlikely	Extreme	£0.00	16	**18/06/2018**	**DBE**				
R17	(5) Safety/ Health	Asbestos / other contaminents found	H&S, cost and programme	Rare	Major	£250,000.00	4		increase level of survey.	£0.00	Rare	Major	£15,000.00	4	**18/06/2018**	**DBE**				Bridge has been taken back to bare metal previously . No record of harmful materials still present. Asbestos survey could be carried out in advance
R18	(4) Legal/ Statutory	AECOM contract finishing	project programme goes beyond current AECOM commission	Likely	Serious	£50,000.00	8		review appointment / extend contract.	£0.00	Rare	Minor	£0.00	1	**18/06/2018**	**DBE**				
R19	(5) Safety/ Health	Utility strike	H&S, cost and programme	Unlikely	Major	£150,000.00	8		increase level of survey. Specifications	£0.00	Rare	Major	£20,000.00	4	**18/06/2018**	**Contractor**				Contractor made aware of services and to CAT scan before any excavations.
R20	(5) Safety/ Health	Failure of Temporary Works	H&S, cost and programme	Unlikely	Major	£100,000.00	8		selection of appropriate contractors. Quality based tender process	£0.00	Rare	Major	£10,000.00	4	**18/06/2018**	**Contractor**				
R21	(3) Reputation	Quality of workmanship	reputation, disruption, cost. Future maintenance issues	Likely	Major	£250,000.00	16		selection of appropriate contractors. Quality based tender process. Supervision and testing	£0.00	Rare	Serious	£25,000.00	2	**18/06/2018**	**Contractor**				Rigorous selection of Contractor
R22	(3) Reputation	Reputational damage	delays in doing the works, rust staining after works complete	Likely	Serious	£0.00	8		appropriate PR, liaison strategy.	£0.00	Likely	Minor	£0.00	4	**18/06/2018**	**DBE**				

R23	(5) Safety/ Health	Bridge strike	increased risk due to decreased headroom	Possible	Major	£1,000,000.00	12		navigation controls and signage.	£0.00	Rare	Major	£100,000.00	4	18/06/2018	DBE				Scaffold to be kept close to (or above) bridge soffit line.
R24	(1) Service Delivery/ Performance	Continuity of contractor	caused by the potential phase works / contract	Possible	Major	£500,000.00	12		procurement strategy. Accurate estimating	£0.00	Possible	Serious	£200,000.00	6	18/06/2018	DBE				Knowledge of availability of spans at tender stage
R25	(1) Service Delivery/ Performance	Procurement strategy	reputational, cost and programme	Possible	Major	£250,000.00	12		flexibility in procurement approach i.e. not fixed price	£0.00	Possible	Serious	£50,000.00	6	18/06/2018	DBE				
R26	(1) Service Delivery/ Performance	Continuity of personnel and supply	uncertainty of programme and phasing	Likely	Major	£50,000.00	16		procurement strategy. Buying materials upfront	£0.00	Possible	Serious	£0.00	6	18/06/2018	DBE				
R27	(4) Legal/ Statutory	Contractor dispute	cost reputation	Likely	Serious	£500,000.00	8		correct contractor selection and contract type. Good management of the contract	£0.00	Possible	Serious	£50,000.00	6	18/06/2018	DBE				Can be further mitigated by Performance Bond
R28	(4) Legal/ Statutory	Consultant dispute	cost reputation	Possible	Serious	£50,000.00	6		continued engagement with AECOM	£0.00	Unlikely	Minor	£0.00	2	18/06/2018	DBE				
						£0.00				£0.00			£0.00							
						£4,045,000.00				**£0.00**			**£1,055,000.00**							

Appendix 4 - Summary of a Charity Trustee's role - Bridge House Estates (1035628)

The City of London Corporation (the City) is the sole trustee of the charity, Bridge House Estates (the Charity). The City acts by the Court of Common Council and its committees to which functions of the charity have been delegated. All Members of the Court collectively perform that role to discharge the City's duties and exercise its powers as trustee. Each Member by virtue of their membership of the Court (and its relevant committees and sub-committees) has a duty to support the City to discharge its duties and in the exercise of its powers as trustee by faithfully acting in accordance with the terms of reference of the relevant committee or sub-committee, and the City's corporate governance framework. (Officers may also act under delegated authority).

All charity trustees must always act in the best interests of their charity and manage any conflicts of interest or loyalty accordingly. When Members of the Court (at the Court itself or across committees) are dealing with business associated with the Charity, they must ensure that the best interests of the Charity are paramount.

The City, as trustee of Bridge House Estates, has the following main duties:

1. To ensure the charity is carrying out its purposes for the public benefit.
2. To comply with the charity's governing documents and the law.
3. To act in the charity's best interests.
4. To manage the charity's resources responsibly.
5. To act with reasonable care and skill.
6. To ensure the charity is accountable.

The courts have developed principles of trustee decision-making which trustees should be able to show that they have followed. These are that in making decisions about their charity, trustees must:

1. act within their powers (i.e. consistent with the charity's objects and powers;
2. act in good faith, and only in the interests of the charity;
3. make sure they are sufficiently informed, taking any advice they need;
4. take account of all relevant factors;
5. ignore any irrelevant ones;
6. manage conflicts of interest;
7. make decisions that are within the range of decisions that a reasonable trustee body could make in the circumstances.

While the City is acting in its general corporate capacity as trustee of Bridge House Estates, the Charity Commission's guidance for local authorities acting as a charity trustee is helpful in providing clarification where an organisation, such as the City in this case, must balance its competing duties and interests (available on the Charity Commission's website at https://www.gov.uk/government/publications/local-authorities-as-charity-trustees; as is the Charity Commission's Conflicts of Interest Guidance, CC29 (also available on their website at: https://www.gov.uk/government/publications/conflicts-of-interest-a-guide-for-charity-trustees-cc29).

The report presented to Court of Common Council on 16 January 2014 entitled "The role of the City of London Corporation as Trustee of the Bridge House Estates" clarifies the distinct functions and responsibilities of Committees that conduct business relating to the Charity as they existed at the time.

22 May 2017
Comptroller & City Solicitor's Department

Project Coversheet

[1] Ownership

Unique Project Identifier: 72800019 **Report Date:30/10/2019**
Core Project Name: Blackfriars Bridge Parapet Refurbishment and Bridge Re-Painting
Programme Affiliation (if applicable): N/A
Project Manager: Thomas Creed
Next Gateway to be passed: Gateway 5 (regular) or Gateway 4c (Complex), depending on Member decision

[2] Project Brief

Project Mission statement: The project will repaint Blackfriars Bridge, including the gilding of embellishments where appropriate. This will significantly improve the aesthetics of the structure and protect its fabric.

The project will also repair the parapets to prevent future water ingress and protect the structure.

Definition of need: If the project is not progressed, the appearance of the bridge will further deteriorate and ultimately, the lifespan of the structure will be significantly reduced.

Reputational risk as the City would be seen to be failing to meet its obligations under the Blackfriars Bridge Act 1863 and the Corporation of London (Bridges) Act 1911 to maintain and repair the bridge.

Key measures of success:

1) Project to control water ingress in the structure.
2) Project to be completed within the budget allocated in the Bridge House Estates 50-year plan
3) Project to repaint the bridge, including the gilding of embellishments where appropriate; to protect the structure and improve it aesthetically.

[3] Highlights

Finance:
Total anticipated cost to deliver [£]: £7m to £12m
Total potential project liability (cost) [£]: £7m-£12m + risk (£4m)
Total anticipated on-going commitment post-delivery [£]: No Change
Programme Affiliation [£]: N/A

[A] Budget Approved to Date*	[B] New Financial Requests	[C] New Budget Total (Post approval)
£50,000	**£70,000**	£120,000
[D] Previous Total Estimated Cost of Project	**[E] New Total Estimated Cost of Project**	**[F] Variance in Total Estimated Cost of Project (since last report)**
£5,000,000	£8,570,000	£3,570,000
[G] Spend to Date	**[H] Anticipated future budget requests**	

£30,532	£8,450,000

Headline Financial changes:

Since 'Project Proposal' (G2) report: ▲£3,570,000 *Increase owing to better understanding of the full implications of the access restrictions, particularly because of the Tideway Tunnel works site. The increase in cost now means that the works must be procured through a full EU tender process.*
Since 'Options Appraisal and Design' (G3-4) report: N/A
Since 'Authority to start Work' (G5) report: N/A

Project Status:
Overall RAG rating: Amber
Previous RAG rating: Amber

[4] Member Decisions and Delegated Authority

N/A

[5] Narrative and change

Date and type of last report:
Gateway 1 / 2 March 2018

Key headline updates and change since last report.
Advice has been sought form specialist contractors and liaison with key stakeholders has led to a better understanding of the access issues faced.

Headline Scope/Design changes, reasons why, impact of change:

Since 'Project Proposal' (G2) report: No change in scope
Since 'Options Appraisal and Design' (G3-4 report): N/A
Since 'Authority to Start Work' (G5) report: N/A

Timetable and Milestones:
Expected timeframe for the project delivery: 2-3 years
Milestones:

1) Tender Returns August / September 2019
2) Gateway 5 – October 2019
3) Estimated Completion on Site October 2020

Are we on track for this stage of the project against the plan/major milestones? Y
Are we on track for completing the project against the expected timeframe for project delivery? Y

Risks and Issues
Top 3 risks:

Risk description	Access issues – PLA / Tideway constraints
Risk description	HVM Barriers (uncertainty due to temporary nature)
Risk description	Terrorism – Creating new access points to the bridge

See 'risk register template' for full explanation.

Top 3 issues realised

Issue Description	Impact and action taken	*Realised Cost*
Access Issues	Restrictions have required different access solutions, leading to higher project costs and extended procurement timeframes	No costs realised to date (see above for budget variance)

Has this project generated public or media impact and response which the City of London has needed to manage or is managing?

Not to date but this may be necessary at a later date.