



M4 Prince of Wales Bridge


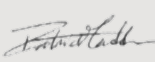
**Cable Stayed Bridge Scope for Resurfacing
(including Traffic Management, Concrete Repairs,
Waterproofing)**

SBIM-POW-TO824-SCO-001

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Document Control Sheet

REPORT TITLE:	M4 Prince of Wales Bridge
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1. Introduction

1.1. M4 Prince of Wales Bridge

As part of the Specialist Bridges Inspection and Maintenance (SBIM) contract, Amey have been appointed by their Client, National Highways, to undertake routine maintenance and inspection works on the M4 Prince of Wales Bridge (POWB).

The Prince of Wales bridge is a long span cable stayed bridge which carries the M4 motorway over the River Severn between England and Wales. The M4 motorway is a dual carriageway with three lanes and a hard shoulder in both directions.

The bridge was opened in 1996 and consists of three sections; a 25 span, 2103m long viaduct on the English side, a 24 span, 2077m long viaduct on the Welsh side and a 946.6m long cable stayed bridge in the centre.

The cable stayed bridge has carriageway width of 10.1m plus a 2.6m hard shoulder in each direction. Therefore, the total area of bituminous surfacing on the CSB is 24,044m².

1.2. Cable Stay Bridge Existing Surface Condition

The M4 Prince of Wales Bridge still maintains its existing surfacing from when it was laid in 1996 (Figure 1). The approach viaducts' surfacing has generally performed well, bar longstanding Lane 1 rutting in both directions. However, the Cable Stayed Bridge has in recent times suffered from regular potholes forming, particularly over winter months. Over the years maintenance remedials have included pothole repairs and larger patch repairs (where a number of defects have accumulated over a larger area). Often the waterproofing system has not been reinstated due to climate/time constraints.

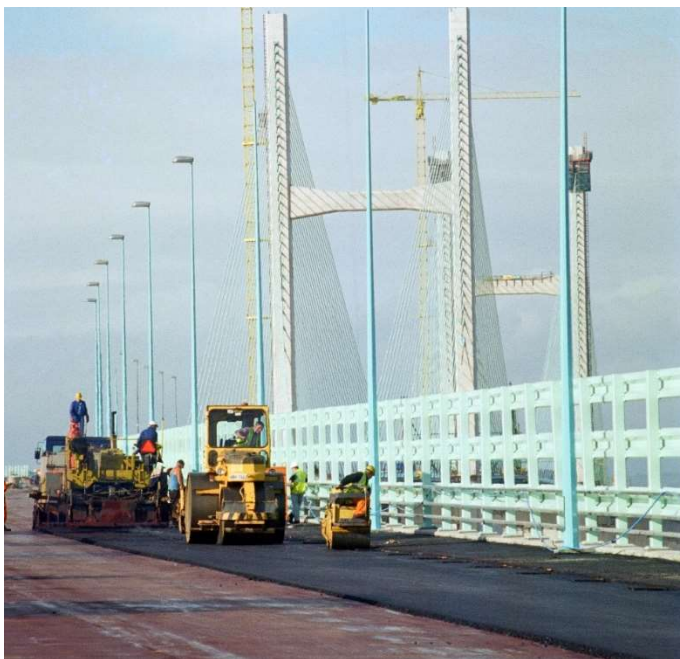


Figure 1: Approach Viaduct Surfacing 1996



Figure 2: Recent pothole forming on POWB CSB



Figure 3: Recent pothole forming on POWB CSB adjacent to patch repair

To ensure the long-term durability of the Cable Stayed Bridge surface and reduce the number of emergency road closures required over the winter periods to repair the potholes, National Highways are to undertake resurfacing works to the entirety of the Cable Stayed Bridge.

2. Scope

The scope of works shall be split into 3 as follows:

- Scope 1 – Traffic Management Implementation and Maintenance
- Scope 2 – Concrete Testing/Repairs and Bridge Deck Waterproofing
- Scope 3 – Resurfacing of Cable Stayed Bridge

The governing specification shall be the Contract Specification Appendices (Ref. TO824-AMEY-HGN-SP-CB-0001), Specification for Highways works and their accompanying Notes for Guidance. See also scheme drawings referenced below:

- | | |
|---------------------------|---------------------------|
| • SBIM-POW-TO824-DWG-0001 | • SBIM-POW-TO824-DWG-0008 |
| • SBIM-POW-TO824-DWG-0002 | • SBIM-POW-TO824-DWG-0009 |
| • SBIM-POW-TO824-DWG-0003 | • SBIM-POW-TO824-DWG-0201 |
| • SBIM-POW-TO824-DWG-0004 | • SBIM-POW-TO824-DWG-0701 |
| • SBIM-POW-TO824-DWG-0005 | • SBIM-POW-TO824-DWG-0702 |
| • SBIM-POW-TO824-DWG-0006 | • SBIM-POW-TO824-DWG-1201 |
| • SBIM-POW-TO824-DWG-0007 | |

A tender may put submitted for Scope 1, Scope 2 or Scope 3. The contractor shall ensure that prices include the activity schedule items in Appendix A, B and C respectively.

2.1. Scope 1 - Traffic Management Implementation and Maintenance

The tenderer shall be responsible for designing, implementing, maintaining and removal of traffic management to enable resurfacing of the Cable Stayed Bridge. A stepped 70-->50, 50-->40mph speed limit shall be introduced in advance of the proposed cross-overs, with the 40mph speed limit enforced by way of average speed cameras on the Welsh/Gwent side of the bridge approach and English/Avon side approach. The proposed traffic management shall allow for two-running lanes in each direction at all times.

Cross-over locations are proposed between marker posts MP201/0 and MP200/9+20m (Gwent Side), and between marker posts MP195/7+80m and MP195/6+70m (Avon Side).

The traffic management will be into five phases as shown below and include both full and partial carriageway closures during operation:

- Phase 0 – Enabling Phase – Allowing construction of the required cross-overs
- Phase 1 – Westbound Hard shoulder & Lane 1 works
- Phase 2 – Westbound Lane 2 & 3 works
- Phase 3 – Eastbound Hard shoulder & Lane 1 works
- Phase 4 – Eastbound Lane 2 & 3 works
- Phase 5 – Reinstatement Phase – Allowing removal of the temporary cross-overs

Note that the tender shall include:

- Design of Traffic Management, temporary VRS and temporary lighting.
- Outline methodology for implementing the traffic management phase, ongoing maintenance and removal/reinstatement of temporary lining/studs.
- Provision for Welsh Language Act 1993 and ensure written signage is bi-lingual.
- Securing of trafficked gully covers and subsequent removal of securing method.
- Provision of a full-time breakdown recovery vehicle + Impact Protection Vehicle (1No. Eastbound and 1No. Westbound) – Location to be agreed.
- Lighting at cross-over locations (Design & Installation)
- VMS Provision (8 No) showing journey time – locations to be agreed.
- Reinstatement of permanent white lining, white rumble strips and road studs.
- Adjustments required to indicative programme for these works.
- Compliant Average Speed Camera speed enforcement system covering eastbound and westbound directions. Technical approval shall be required as per CG300 Category 1 for camera support column and temporary foundation (which will require an AIP).
- CCTV installations utilised for TM maintenance shall be installed and fed back to the Regional Control Centre (ROC)

2.2. Scope 2 - Concrete Testing/Repairs and Bridge Deck Waterproofing

The tenderer shall be responsible for:

1. Removal of final, up to 10mm, of asphalt and waterproofing. Note there is a requirement to expose sound waterproofing at the longitudinal edges of the proposed area for resurfacing to ensure a sound lap can be provided, part of the central reserve concrete shall require removal and reinstatement. Additionally, concrete surfacing in the central reserve will also require removal to expose the waterproofing. Allow for the preparation of the exposed concrete surface to receive waterproofing. The deck shall be suitably prepared for concrete inspection and testing, ensuring the deck is free of contaminants.
2. Concrete inspection and testing to exposed deck areas, to include:
 - Visual inspection of all exposed areas.
 - Hammer sounding survey of all exposed areas.
 - Concrete cover to all exposed areas.
 - Half-cell potential (3x10m grids), to be followed by chloride ion content testing and carbonation depth in the worst identified area – Refer to specification for scope.
 - Concrete resistivity testing – Refer to specification for scope.
 - Cement Content testing – Refer to specification for scope.
3. Concrete Repairs - Where spalling concrete, or less than 25mm cover is identified, or testing identifies a high risk of corrosion, the concrete shall be repaired/replaced, and cover reinstated by traditional methods to include removal of concrete to required depth behind reinforcement and application of concrete repair material to provide the required cover. Test performance of repair as required.
4. Waterproofing – Application of a compliant bridge deck waterproofing system. Test performance of waterproofing installation as required.

Note that the tender shall include:

- Details of the proprietary waterproofing system proposed. Note: the system shall not require an additional protective layers (APL) and shall be compatible with the proposed surfacing material.
- Limiting of concrete repair areas to ensure temporary stability.
- Outline methodology for undertaking the scope listed under this section.
- Adjustments required to indicative programme for these works.
- Removal of water and debris from hydro demolition off site – no discharge to watercourse permitted.

2.3. Scope 3 - Resurfacing of Cable Stayed Bridge

The tenderer shall be responsible for:

1. Undertaking a topographical survey of the existing cable stay bridge deck surfacing.
2. Removal of the existing surfacing to within 5 to 10mm to concrete deck over the required area.
3. Laying of PMB HRA surface/regulating courses as required by specification.
4. Testing as required

Note that the tender shall include:

- Outline methodology for undertaking the scope listed under this section.
- Measures to minimise risk of damage to the concrete deck and newly laid waterproofing. The contractor is to manage the varying existing surface thickness and ensure the deck is not damaged.
- Adjustments required to indicative programme for these works.

2.4. Other items for inclusion for each scope

- The attendance in person of two suitable representatives at a meeting in Bristol for half a day
- Attendance for 1 person each week of the tenderer's programme for 1 hour for an update meeting on MS Teams
- Attendance for 2 suitable representatives for 2 hours for each month of the construction programme
- Anything necessary to achieve legislative compliance (CDM requirements etc.)
- The submission of weekly progress and programme updates
- Copies of factual reports on all testing. Where specifically required by the works specification, preparation of interpretative reports or technical notes to comment on test results.
- Identification and management of Project risks
- Value engineering proposals

If required, tender visits to site can be arranged.

3. Compound Area, Temporary Accommodation

The contractor shall allow for accommodation and welfare facilities for its own staff which may be positioned either at the Prince of Wales Bridge Maintenance Unit "Visitor Centre" area to the south of the bridge on the Avon side OR under M4 Junction 22 Pilning Interchange. Temporary hoarding shall be provided by Amey where required. Welfare vans shall be allowed for by the contractor for its own staff within agreed traffic management areas on the approach viaducts.

4. Project Roles, Responsibilities and Restrictions

Amey shall act as both the Principal Designer and Principal Contractor for the works. Amey will also assume the role of Temporary Works Co-ordinator.

5. Programme

An indicative programme of works has been provided (TO -824 - CI 31 Construction Programme dated 08/04/2024). The contractor shall provide a schedule of any amendments it requires to complete its scope, including that of any deliverables not included, reasonable float needed, critical paths, time risk allowance or potential for late start or early finish.

The programme shall comply with NEC contract requirements.

Appendix A: Traffic Management Activity Schedule

Prince of Wales Cable-Stayed Bridge Resurfacing Scope 1

Contractor:

Tender Submission Date:

Signature:

Preliminaries	
	£
Main Works	
TM Design (inc Risk Assessment and Method Statement) for Phases 0 to 5	£
Provision of Average Speed Camera speed enforcement system and maintenance	£
Phase 0 – Enabling Phase - Construction	£
Phase 0 – Enabling Phase - Maintenance	£
Phase 0>1 – Westbound Hard Shoulder & Lane 1 works - Construction	£
Phase 1 – Westbound Hard Shoulder & Lane 1 works - Maintenance	£
Phase 1>2 – Westbound Lane 2 & 3 works - Construction	£
Phase 2 – Westbound Lane 2 & 3 works - Maintenance	£
Phase 2>3 – Eastbound Hard Shoulder & Lane 1 works - Construction	£
Phase 3 – Eastbound Hard Shoulder & Lane 1 - Maintenance	£
Phase 3>4 – Eastbound Lane 2 & 3 works - Construction	£
Phase 4 – Eastbound Lane 2 & 3 works - Maintenance	£
Phase 4>5 – Reinstatement Phase - Construction	£
Phase 5 – Reinstatement Phase - Maintenance	£
TM Removal and reinstatement of permanent white lining, white rumble strips and road studs	£

Appendix B: Concrete Repairs and Waterproofing Activity Schedule

Prince of Wales Cable-Stayed Bridge Resurfacing Scope 2

Contractor:

Tender Submission Date:

Signature:

Preliminaries	
	£
Main Works	
Phase 1	
Phase 1 Waterproofing removal (inc Removal of final up to 10mm blacktop and waterproofing).	£
Phase 1 Inspection blast after waterproofing removed and prior to any concrete testing	£
Phase 1 Concrete inspection and testing to all exposed deck areas – Visual, tap hammer and cover only	£
Phase 1 Concrete inspection and testing to exposed deck areas as required by specification – Half-cell, chloride ion content, concrete resistivity, and cement content only.	£
Phase 1 Concrete Repair (inc Robot Hydrodem & Concrete Reinstatement) - Allow 5% of total exposed surface area.	£
Phase 1 Deck preparation to receive waterproofing	£
Phase 1 Waterproofing	£
Phase 2	
Phase 2 Waterproofing removal (inc Removal of final up to 10mm blacktop and waterproofing).	£
Phase 2 Inspection blast after waterproofing removed and prior to any concrete testing	£
Phase 2 Concrete inspection and testing to all exposed deck areas – Visual, tap hammer and cover only	£
Phase 2 Concrete inspection and testing to exposed deck areas as required by specification – Half-cell, chloride ion content, concrete resistivity, and cement content only.	£
Phase 2 Concrete Repair (inc Robot Hydrodem & Concrete Reinstatement) - Allow 5% of total exposed surface area.	£

Phase 2 Deck preparation to receive waterproofing	£
Phase 2 Waterproofing	£
Phase 3	
Phase 3 Waterproofing removal (inc Removal of final up to 10mm blacktop and waterproofing).	£
Phase 3 Inspection blast after waterproofing removed and prior to any concrete testing	£
Phase 3 Concrete inspection and testing to all exposed deck areas – Visual, tap hammer and cover only	£
Phase 3 Concrete inspection and testing to exposed deck areas as required by specification – Half-cell, chloride ion content, concrete resistivity, and cement content only.	£
Phase 3 Concrete Repair (inc Robot Hydrodem & Concrete Reinstatement) - Allow 5% of total exposed surface area.	£
Phase 3 Deck preparation to receive waterproofing	£
Phase 3 Waterproofing	£
Phase 4	
Phase 4 Waterproofing removal (inc Removal of final up to 10mm blacktop and waterproofing).	£
Phase 4 Inspection blast after waterproofing removed and prior to any concrete testing	£
Phase 4 Concrete inspection and testing to all exposed deck areas – Visual, tap hammer and cover only	£
Phase 4 Concrete inspection and testing to exposed deck areas as required by specification – Half-cell, chloride ion content, concrete resistivity, and cement content only.	£
Phase 4 Concrete Repair (inc Robot Hydrodem & Concrete Reinstatement) - Allow 5% of total exposed surface area.	£
Phase 4 Deck preparation to receive waterproofing	£
Phase 4 Waterproofing	£

Appendix C: Resurfacing Activity Schedule

Prince of Wales Cable-Stayed Bridge Resurfacing Scope 3

Contractor:

Tender Submission Date:

Signature:

Preliminaries	
Set up compound within the Prince of Wales compound	£
Remove site compound	£
Main Works	
Phase 1 (2 lanes)	
Topo survey of surfacing and trial holes to confirm depth within TM area	£
Phase 1 surfacing removal (to within 5-10mm of concrete deck)	£
Phase 1 Regulating layers (average 30mm depth)	£
Phase 1 surfacing laying	£
Phase 2 (2 lanes)	
Topo survey of surfacing and trial holes to confirm depth within TM area	£
Phase 2 surfacing removal (to within 5-10mm of concrete deck)	£
Phase 2 Regulating layers (average 30mm depth)	£
Phase 2 surfacing laying	£
Phase 3 (2 lanes)	
Topo survey of surfacing and trial holes to confirm depth within TM area	£
Phase 3 surfacing removal (to within 5-10mm of concrete deck)	£
Phase 3 Regulating layers (average 30mm depth)	£
Phase 3 surfacing laying	£
Phase 4 (2 lanes)	
Topo survey of surfacing and trial holes to confirm depth within TM area	£
Phase 4 surfacing removal (to within 5-10mm of concrete deck)	£
Phase 4 Regulating layers (average 30mm depth)	£
Phase 4 surfacing laying	£