National Asset Delivery
Technical Surveys and Testing

Works Information for 570135
M5, J23-24, MP194.10, Huntworth Viaduct Concrete Survey and Testing

CONTENTS AMENDMENT SHEET

Amend. No.	Revision No.	Amendments	Initials	Date
0	0	Original version issued with tender	ET	04/08/20

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LIST OF ANNEXES

1 DESCRIPTION OF THE WORKS

1.1 Project objectives

1.1.1 The principle objective of this project is carry out concrete inspection and testing to Huntworth Viaduct.

1.1.2 The specification that applies to the *works* is included in Section 6

1.2 Scope of works

1.2.1 The *works* to be provided under this contract are:

(1) Visual Concrete Inspection & hammer tap survey

(2) Concrete Testing – Half-cell Potential Measurements

(3) Concrete Testing – Cover Measurements

(4) Concrete Testing – Depth of Carbonation Measurements

(5) Concrete Testing – Concrete Resistivity Measurements

(6) Concrete Testing – Cement Content Analysis

(7) Concrete Testing – Chloride Ion Content Analysis

(8) Reinstatement of concrete test locations.

(9) The Contractor is to provide access equipment to access the underside of the viaduct for all inspection works.

1.3 Deliverables

1.3.1 The *Contractor* is required to produce the following deliverables:

(1) A factual report detailing the findings of the survey.

(2) Detailed and dimensioned drawings showing the results of all testing.

2 EXISTING INFORMATION

2.1.1 All relevant existing information including C2 stats searches can be found within the Pre-Construction Information (PCI) document.

2.1.2 Figures 1 to 18 show the location and type of testing and investigations required.

3 CONSTRAINTS ON HOW THE CONTRACTOR PROVIDES THE WORKS

3.1 General

3.1.1 The *Contractor* Provides the Works in such manner as to minimise the risk of damage or disturbance to or destruction of third party property.

3.1.2 The *Contractor* complies with the constraints and meets with the requirements outlined in Appendix 1.

3.1.3 The *Contractor* submits information detailing how the *Contractor* will provide the Works to the *Employer* prior to the *works* commencing. This information will include any lifting plans, risk assessments, method statements, the *Contractor's* staff training information and any other relevant Health and Safety requirements.

3.2 Working hours & site specific constraints

3.2.1 The Contractor's working hours for site works shall be between the hours of 08:00 and 18:00, Monday to Friday. The working hours will vary subject to weather conditions and the stated hours include the time for pedestrian or other non-motorised user management or traffic management to be to be set out and picked up.

3.2.2 All plant and equipment must be removed from site at the end of each shift.

3.2.3 Access to Spans 7 to 14 are via a canal swing bridge with an all-in weight limit of 16 tonnes. The same spans are also accessed via a level crossing. The Contractor will need to follow the latest safety information at the level crossing and these are as displayed on a Network Rail information board at the crossing location.

3.2.4 Access to the bearing shelf at the south abutment/Span 1 and north abutment/Span 17, is via a locked compound. The Contractor will need to request key access before entry.

3.2.5 Access to carry out the inspections shall be from beneath the deck only. Underbridge units based on the M5 will not be permitted. MEWP usage adjacent the Railway Line (Span 7) will be restricted to those capable of vertical up/down movement only. This prevents plant inadvertently entering the railway line envelope. See Figure 9 and Figure14.

3.2.6 A number of survey locations are on private land, therefore due consideration for the landowner should be considered. Highways England will arrange access.

3.2.7 The south abutment compound may still be being used as a storage area for traffic management vehicles and an associated cabin. Arrangements can be

made to have vehicles and plant within the compound moved. Cabins however will need to remain undisturbed. Any concrete not surveyed due to access restrictions shall be clearly marked on the inspection / defect drawings. It is acceptable to move the position of the 1m x 2m test areas to more accessible areas at Span 1. The expansion joint test area must be completed.

3.2.8 Other than the self-operated public crossing location, access onto Network Rail Land is not permitted. The Contractor may not work within 3m of the railway line.

3.2.9 Health, Safety and Environment & Risk Management

Health and Safety requirements

3.2.10 In Providing the Works the *Contractor* meets the requirements of Annex 2 of the supplementary constraints in relation to health and safety duties.

3.2.11 When implemented, the *Contractor* shall comply with the requirements of Highways England's safety passport scheme and ensure that all of his employees, and any of his subcontractor's, are registered in accordance with the implementation of the scheme.

3.2.12 For details of the CDM duty holders, refer to the Pre-Construction Information document which is issued as part of this package of works.

3.2.13 Before commencing the construction phase of the *works*, the *Contractor* confirms to the *Employer* that adequate welfare facilities are in place. Where the facilities detailed in section 5 are not deemed adequate, the *Contractor* provides all necessary facilities to Provide the Works and to comply with the minimum requirements set out in HSE guidance document L153.

Environmental requirements

3.2.14 In Providing the Works the *Contractor* meets the requirements of Annex 2 of the supplementary constraints in relation to environmental duties.

Risk Management

3.2.15 The *Contractor* identifies, manages and mitigates risks in accordance with the principles of ISO31000.

3.2.16 The *Contractor* submits a risk register, which captures all risks associated with the delivery of the *works* including those identified by the *Employer*, with his tender and maintains it for the contract period.

4 REQUIREMENTS FOR THE PROGRAMME

4.1.1 The *Contractor* submits programme to the *Employer* with his tender.

4.1.2 The *Contractor* Provides the Works taking into account the following programme constraints:

(i) the *starting date* and *completion date* and any post site works, reporting and review period

(ii) The services and other things provided by *Employer* (see Section 5)

(iii) The Contractor shall submit results with 3 weeks of agreed completion of works on site.

(iv) Further constraints on the sequence and timing that work that is to be undertaken will be discussed after award.

4.1.3 The programme should be in the form of an activity and time related bar chart, produced as a result of a critical path analysis.

4.1.4 The programme should preferably be provided in either a PDF or MS Excel format and cover the full contract period including post site activities. Activities should be clearly defined and named and the programme should detail the following:

(i) the starting date, completion date & Contractor's planned completion

(ii) for each activity, the proposed resources (plant & labour) expected to deliver each activity should be shown on the programme

(iii) review periods for any reporting requirements

(iv) key dates for the Employer to provide 'services and other things'

(v) key dates for co-ordination with Others

(vi) Submission of reports and drawings following site works.

4.1.5 The *Contractor* updates the programme every week. The *Contractor* submits an updated programme to the *Employer* upon request.

5 SERVICES AND OTHER THINGS PROVIDED BY THE *EMPLOYER*

5.1.1 The following temporary traffic management will be provided by the *Employer* to allow the *Contractor* to Provide the Works:

(1) The Principal Contractor is responsible for Traffic Management on Marsh Lane and Dunwear Lane.

(2) The Principal Contractor will be responsible for the management of walkers/cyclists and vehicles within the survey areas. The extent and scope of this management need will vary depending on the extent of public access to an area. Traffic Management on the M5 is not permitted.

5.1.2 The other things that will be provided by the *Employer* are as follows:

(1) Welfare facilities will be provided by the Principal Contractor.

6 SPECIFICATION FOR THE WORKS

6.1.1 The Contractor shall undertake the works in accordance with this specification and Figures 1 to 19. Testing to be carried out and recorded in accordance with DMRB CS 462.

6.1.2 The testing shall be carried out by a testing organisation meeting the requirements of CS 462 5.27 and 5.27.1

6.1.3 The following deck areas require inspection and testing in the areas as listed below, these areas are;

- Span 17 (North Half, from Dunwear Lane to North Abutment)
- Span 14
- Span 8
- Span 2 (South Half)
- Span 1

6.1.4 Visual & Delamination Survey (survey of superficial defects, spalling, concrete delamination, cracking and water staining)

- Areas for visual survey are as identified on the accompanying figures as the **Survey Areas**.
- Defect drawings must be provided in a PDF format and based on a Computer Aided Drawing. These shall be in a pre-planned format and shall include for a clear key with regards the identification of different defects.
- Areas of elements shown on drawings but not inspected shall be clearly identified.
- Defects must be dimensioned where necessary and crack widths shall also be noted with width measurements being taken from the cracks widest point. Where a crack is significant in length, a number of width measurements may be necessary.
- Visual inspection shall be undertaken in accordance with CS 462 5.12, including but not exclusively the following;
    - Extent and condition of any exposed reinforcement
    - Extent and severity of cracking
    - Areas of seepage, presence of leachates and deposits and their chemical composition
    - Extent and location of any areas of permeable concrete
    - Soundness of surface – (through hammer tap survey)
    - Condition of joints and seals.

6.1.5 The attached figures include proposed locations for **Test Areas**, with the number of **Test Areas** listed below. In accordance with CS 462 5.20.1, the

Test Area locations may be adjusted to a position where there appears to be the greatest risk of reinforcement corrosion.

- Span 17 (7 No. 1mx2m, 1 No. 34.2mx 1m)
- Span 14 (6 No. 1mx2m)
- Span 8 (6 No. 1mx2m)
- Span 2/Span 1 (7 No. 1mx2m, 1 No. 34.2mx 1m)

6.1.6 Survey by instrument of electrical potential, moisture content, electrical resistivity;

- Areas for half-cell potential measurement shall be carried out on the **Test Areas** of the accompanying figures.
- The method for half-cell potential measurements shall be as described in ASTM C 876 and 5.31 of CS 462.
- Results of the half-cell potential survey shall be shown in a full colour tabulated format including a half-cell potential contour map that can be read in conjunction with the results from other aspects of the instructed testing works.
- Areas for electrical resistivity measurement shall be carried out on the **Test Areas** of the accompanying figures.
- The method for Resistivity measurement shall be in accordance with 5.36 of CS 462.
- Results of the resistivity measurements shall be expressed in kohm cm and shown in a colour-coded and tabulated format that can be read in conjunction with the results from other aspects of the instructed testing works.
- Moisture content shall be measured in accordance with 5.37 of CS 462.

6.1.7 Concrete Removal of Concrete Sampling for Testing and Laboratory testing of concrete samples.

Concrete sampling removal and testing works shall be undertaken by a suitable certified and UKAS Accredited contractor who has detailed and defined procedures to undertake such works and that is familiar with testing of Highways Structures and the general requirements as outlined below:

Laboratory testing works shall be undertaken by a suitably certified and UKAS Accredited testing house who has detailed and defined procedures to undertake such works.

6.1.8 Survey by instrument of levels or concrete cover

- Areas for cover measurement are as identified on the accompanying figures as **Test Areas**

- The method for cover measurements shall be undertaken using an electro-magnetic meter in accordance with the requirements of BS 1881: Part 204. And 5.35 of CS462
- Results of the cover meter survey shall be shown in a colour-coded and tabulated format that can be read in conjunction with the results from other aspects of the instructed testing works.

6.1.9 Depth of Carbonation Measurements

- There shall be 1 depth of carbonation sample per **Span** inspected within the attached figures.
- Results of the Carbonation survey shall be expressed in mm and shown in a colour-coded and tabulated format that can be read in conjunction with the results from other aspects of the instructed testing works.
- The depth of carbonation shall be carried out in accordance with 5.34 of CS 462.

6.1.10 Cement Content Analysis

- There shall be 2 Cement content samples per **Test Area** within the attached figures. Chloride samples be carried out in accordance with 5.27 of CS 462.
- Results shall be reported as kg/m3 and % by mass of concrete.
- Results of cement contents shall be presented in a tabulated format such that these can be read in conjunction with other laboratory chemical testing results
- The samples shall be tested in accordance with CS 462 5.40 and 5.41.

6.1.11 Chloride Ion Content Analysis

- There shall be 2 Chloride sample set per **Test Area** within the attached figures. Chloride samples be carried out in accordance with 5.27 of CS 462.
- Results shall be reported as % by mass of cement.
- Results of chloride ion contents shall be presented in a tabulated format such that these can be read in conjunction with other laboratory chemical testing results
- The samples shall be tested in accordance with CS 462 5.42 and 5.43.

6.1.12 General Reinstatement

- Where samples have been taken which has resulted in damage to the structure the concrete shall be reinstated.

- Repair material shall be Class R4 to BS EN 1504-3:2005.
- The repair material shall be cement based and installed in accordance with the manufacturer's instructions.

6.1.13 Deliverable

- A report detailing the findings of the concrete testing in accordance with CS 462 5.51 to 5.53.4
- A drawing for each span to be inspected, i.e. a minimum of 6 No. drawings.
- The drawings shall show the extent and results of all testing. The drawings shall be clear and include a key identifying results.

6.1.14 The Contractor is required to provide all necessary access equipment to carry out the inspection, e.g. Mobile Elevated Access Platforms.

7 APPENDIX 1 - FIGURES