National Asset Delivery
Technical Surveys and Testing

Works Information for
A1 Priestgate Bridge Investigations

CONTENTS AMENDMENT SHEET

Amend. No.	Revision No.	Amendments	Initials	Date
0	0	Original version issued with tender	EK/CB	22/10/20
0	1	Amended version issued with tender	EK/CB	24/11/20

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LIST OF ANNEXES

1 DESCRIPTION OF THE WORKS

1.1 Project objectives

The first principle objective of this project is to undertake the following investigation, surveys and maintenance works to 2no. structures located on the Area 7 Strategic Road Network. Information on the structures can be found below:

Number	Asset Key	Structure Name
1)	**STR_5407**	East Markham Road
2)	**STR_5408**	Priest Gate

(1) East Markham Road is an overbridge that was constructed in 1967 and carries the local authority road *East Markham Road* over the A1 trunk road, just north of Tuxford. This structure is a 3-beam steel and RC beam construction, and is being tested due to its proximity to the *Priest Gate* structure.

(2) Priest Gate is an overbridge that was constructed in 1967 and carries the local C-class road *Priest Gate* over the A1 trunk road, north of Tuxford. This structure is a 3-beam steel and RC beam construction, and is being tested due to a heavy impact to the beams by a vehicle.

/A1//224.00// - East Markham Road

- Paint Testing works to report on the current condition on the steel beams' protective paintwork, and determine if any rectification works are required.

/A1//225.10// - Priest Gate

- 3D ‘point cloud’ LiDAR survey of the 3No. damaged steel Beams 1-3 of the southbound carriageway to identify the extent of steel deformation.
- Trial holes in the bridge verges thereby confirming the presence and location of Anglian Water main, BT telecommunication fibre cables and to identify an unknown duct indicated in as-built drawing 220021/GA/01 and locate any other existing services.
- Undertake localised concrete deck break out areas at the three locations above the 3no. damaged steel beams shown on drawing HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 to confirm the condition of concrete surrounding the shear studs and to investigate whether the welds connection of steel shear studs to the top flange have not been compromised by the bridge struck.
- Investigation for any hollow sounding area at the concrete deck around the top flange of the damaged beams and any possible cracks within the steel beams bottom flanges and/or web.

- Paint Testing works to report on the current condition on the steel beams' protective paintwork, and determine if any rectification works are required.

1.1.2 The specification that applies to the *works* is included in Section 1.2 – Scope of Works and Section 6.

1.2 Scope of works

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

1.2.1 3D Dimensional Point Cloud Survey:

(1) 3D 'point cloud' LiDAR survey, which will be undertaken at the 3No. damaged steel Beams 1-3 (numbered from north to south) of Priestgate bridge central suspended span to identify the extent of steel beams deformation.

1.2.2 Special Inspection, Trial holes & Shear Studs:

(1) Undertaking trial holes as shown on drawing HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 to confirm the presence and location of Anglian Water main, BT telecommunication fibre cables duct and identify an unknown duct presented in as-built drawing 220021/GA/01 and locate any other existing services. Trial holes to be completed in the north and south verges. The contractor shall make sure that suitable equipment/tools are provided to complete the excavations.

(2) Localised concrete break areas at three locations above the 3no. damaged steel beams will be undertaken to identify the condition of concrete surrounding the shear studs and confirm weld connections between the shear studs and the top flange. The localised concrete breakout areas are shown on drawing HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24.

(3) Hammer tapping the concrete deck slab soffit around the top flange of the damaged Beams 1-3 (numbered from north to south) to identify any hollow sounding areas.

(4) Investigate any possible cracks within the steel beams bottom flanges and/or web and on shear studs connection by using Liquid Penetrant Inspection (LPI) method. During LPI a low-surface-tension fluid penetrates into clean and dry surface-breaking flaws. Penetrant may be applied to the test component by dipping, spraying, or brushing. After adequate penetration time has been allowed, the excess penetrant is removed and a developer is applied to draw penetrant from flaws, making indications visible to the inspector. The inspection is carried out under ultraviolet or white light, depending on the type of penetrant used – fluorescent or nonfluorescent (visible). LPI to be carried out in accordance with BS EN ISO 3452.

(5) There are several STATS located in the working area including:

i. Anglian Water – Main – Live – North verge

ii. Western Power Distribution – Main – Live – Overground high voltage cables

iii. BT Telecommunications Fibre cable – South verge

iv. Unknown duct passing through south deck's verge

For details of Stats refer to drawing HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-21.

The contractor is to ensure a permit to dig system is operated and that the existing STATS are not affected by the trial holes.

(6) Contractor should arrange for Anglian Water and BT representatives to be on site when the trial holes are carried out using the dial before you dig system. A minimum 10 days' notice is required for this service to be arranged. Contractor to liaise with other "dial before you dig" services if deemed required.

(7) The Contractor is to ensure that all trial holes at deck's verges are filled with concrete ST3 or similar approved and verge surfacing to the existing level. Material shall be placed and compacted in accordance with manufacturer's instructions by the end of the works and before the TM is removed (if applicable).

(8) The Contractor is to ensure that all the localised concrete break out areas are reinstated with concrete of minimum structural concrete grade of 25N/mm^2, proprietary waterproofing material and surfacing up to the existing level of carriageway. Material shall be placed in accordance with manufacturer's instructions by the end of the works.

(9) The Contractor is to ensure that existing deck's reinforcement is not damaged during the localised concrete break out.

(10) The Contractor is to ensure that the damaged waterproofing material should be repaired with appropriate material compatible to the existing waterproofing material and that adequate overlaps are adhered as per manufacturer recommendation.

(11) PAK testing as detailed in section 6 – Specification for works.

1.2.3 Painting Test works:

(1) Carry out pre-specification paint surveys in accordance with standard CM 431 (Maintenance Painting of Steelwork), Section 3. The works are to include:

- Determine whether and to what extent maintenance painting of the protective coating is required;
- Determine the condition of the protective coating to a structure and categorise it in accordance with the categories of failure given in Appendix A;

- Determine pull-off adhesion and dry film thickness values of the protective coating;
- Determine the nature and composition of the protective coating, including whether it is convertible or non-convertible;
- Determine the presence of any toxic element content including lead, cadmium, chromium, arsenic, aluminium and zinc;
- Determine the resin type of the paint coats;
- Determine the types and levels of contaminants present on the surface of the protective coating including soluble salt;
- Establish the extent, intensity and methods of surface preparation that will be required to ensure the satisfactory performance of a maintenance paint system;
- Recommend a maintenance painting specification including a maintenance paint system specification;
- Recommend measures to deal with any health and safety risks and risks to the environment;
- Recommend measures to deal with waste including any hazardous waste;
- Gather the information necessary to develop an accurate bill of quantities for the maintenance painting works.

1.3 Deliverables

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

1.3.1 <u>3D Dimensional Point Cloud Survey:</u>

(1) The plan of 3no. damaged steel Beams 1-3 (numbered from north to south) deformed bottom flange located at central suspended span.

Sections to be produced (within a tolerance of 2-3mm) through the beam at regular 0.5m intervals, so that the deformation of beam's web and bottom flange can be identified.

The survey must also accurately relate the damage to the bearing stiffeners/stiffeners near the half joint positions. This can be achieved by taking measurement from diaphragms to bearing positions, half joints or ends of beams.

The survey must also include the bottom flanges of Beams 1-3 (numbered from north to south) to enable the strain-ratios incurred to be determined. ("Strain-ratio" is the ratio of the actual strain sustained to the strain at the point of yield).

The survey report should at least contain following information:

- Scanning and identification of damaged Beams 1-3 deformation.

- AutoCAD 2-D, AutoCAD 3-D and pdf format drawings.
- Cross-sections of the span.
- Longitudinal cross-section.
- East and west elevations.
- Location, depth, width and length measurements of any identified crack at steel beams cross section (flanges & web).

The survey will provide information that will help in determining the strain-ratios for the damaged beam. ("Strain-ratio" is the ratio of the actual strain sustained to the strain at the point of yield).

1.3.2 Trial holes & Shear Studs:

(1) The contractor is to confirm location of the water main, fibre cables (if found) and identify and locate the unknown and other existing services within the verge.

(2) The exact position of all buried services including:

i. Exact location of trial holes areas.
ii. Diameter.
iii. Colour.
iv. Number of services ducts.
v. Depth.
vi. Distance from parapet edge beam or other hard reference point.
vii. Photos (File to be named with location of taken photograph).
viii. Sketches.

(3) The exact position of all concrete shear studs in the concrete break out areas.

(4) Investigate the condition of concrete surrounding the shear studs. Any identified defects (concrete crack, area of loose concrete etc.) should be reported followed by evidence photos and measurements (depth, length, area etc.).

(5) Location and measured area of any hollow sounding area at concrete deck around the top flange of the damaged beams.

(6) Investigate the condition of welds connection between shear studs and top flange. Any identified defect (cracks on welds, deformation of shear studs etc.) should be reported followed by evidence photos and measurements (depth, length, area etc).

(7) Identify the extent and depths of any possible cracks occurred due to the impact to steel beams flanges and/or web.

(8) Type of material excavated (soil, stones, sub base, dry mix).

(9) The contractor is to take samples of the material covering the verges over the structure. A total of 2no. samples should be taken, 1no. from the south verge and 1no. from the north verge. Samples should be

PAK tested for the presence of Tar. If PAK test confirms positive, further samples should be taken for laboratory analysis.

1.3.3 Painting Test works:

(1) The contractor is to produce individual reports for the tested structures, covering the scope of the pre-specification survey. The reports shall include time stamped photographs of the tested areas.

(2) In providing recommendations for the maintenance painting specification, reference should be made to Series 5000 [Ref 2.N] and Series 5000 [Ref 3.N] for requirements and advice on methods of surface preparation and maintenance paint systems.

(3) In providing recommendations for the maintenance painting specification, the following should be identified, addressed and reported:

i. Any risk management measures that are likely to apply to the maintenance painting works to mitigate any health and safety risks, and risks to the environment.

ii. Any limitations and time constraints that are likely to apply during the maintenance painting works; for example restrictions on surface preparation methods or access to the structure.

(4) The reports may cover each main part of the structure separately.

(5) The reports shall include a Form HA/P1 (Maintenance) Paint System Sheet (see Series NG 5000 [Ref 3.N] Appendix 50/1) with the relevant sections of the form completed, providing initial recommendations for the maintenance painting works.

2 EXISTING INFORMATION

2.1.1 The Drawings listed below apply to this contract. Refer to the site information for details of existing site conditions including ground conditions, limitation on access, position of existing structures etc.

Drawing Number	Title
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-20	Location Plan
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-21	Statutory Undertakers Information
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-22	Existing General Arrangement
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24	Testing Locations
220021/GA/01	General Arrangement
BR/3137/1	Priest Gate General Arrangement
BR/3137/2	Priest Gate Details of Deck Steelwork
BR/3136/2	East Markham Road General Arrangement

2.1.2 **Expected depth of excavation**

The depth of the water main and telecommunication fibre cables duct at north and south bridge verges appear to be 130mm and 120mm respectively as presented in as-built drawing 220021/GA/01. The depth of the unknown duct presented at south verge in as-built drawing 220021/GA/01 appear to be 120mm.

The depth of the shear studs varies due to the thickness of carriageway surfacing and verges, approximately it is 101.6mm from the top of concrete deck as presented in as-built drawings BR/3137/1 & BR/3137/2.

2.1.3 **Anticipated Existing Services**

There are a number of STATS located in the working area including:

i. Anglian Water – Main – Live – North verge

ii. Western Power Distribution – Main – Live – Overground high voltage cables

iii. BT Telecommunications Fibre cable – South verge

For details of Stats refer to drawing HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-21.

The contractor is to ensure a permit to dig system is operated and that the existing STATS are not affected by the trial holes.

2.1.4 **Tar**

As part of the works, samples material covering the verges over the structure should be taken, and PAK tested. If this test shows positive, further samples shall be taken for laboratory analysis. 2no. samples to be tested (1no. south verge, 1no. north verge). The area where the sample is taken should be reinstated with a suitable material approved by Highways England. Please note that additional samples shall be taken if different types of material are identified across the verges during the survey works.

2.1.5 The Drawings listed below apply to this contract. Refer to the site information for details of existing site conditions including ground conditions, limitation on access, position of existing structures etc.

Drawing Number	**Title**
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-20	Location Plan
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-21	Statutory Undertakers Information
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-22	Existing General Arrangement
HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24	Testing Locations
220021/GA/01	General Arrangement
BR/3137/1	General Arrangement
BR/3137/2	Details of Deck Steelwork

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 from the A1 shall be during night time hours between 21:00 and 06:00 the following morning for each shift. Booking information shall be provided to the Traffic Management contractor. Daytime working with unrestricted hours will be possible for above deck works.

3.2.2 Traffic management will be arranged by the *Employer*.

- Priestgate Road is under full closure since the struck incident.
- Traffic management on A1 will consist of night time lane closures only between 21:00 and 06:00 the following morning.

3.2.3 For works undertaken from underneath, the *Traffic Management Contractor* will act as *Principal Contractor*

3.2.4 For works undertaken above deck no Traffic Management is required, the *Contractor* will need to take on *Principal Contractor* duties.

3.2.5 The *Contractor* is to ensure that no vehicles or heavy construction plant is loaded on the damaged steel beams of the suspended span.

3.2.6 The *Contractor* to ensure that existing deck's reinforcement is not damaged during the localised concrete break out works.

3.2.7 All the *Contractors* to ensure that all personnel and works are undertaken in safe distance from the overhead high voltage cables located adjacent to the north elevation of the bridge.

3.2.8 When working above deck, the Contractor must ensure the work site is appropriately barriered off to prevent pedestrian encroachment.

3.3 Health, Safety and Environment & Risk Management

Health and Safety requirements

3.3.1 In Providing the Works all the *Contractors* meet the requirements of Annex 2 of the supplementary constraints relation to health and safety duties.

3.3.2 All the *Contractors* shall comply with the requirements of Highways England's safety passport scheme and ensure that all of their employees, and any of their subcontractor's, are registered in accordance with the implementation of the scheme. Details on the scheme can be found here: http://www.highwayssafetyhub.com/safety-passport.html

3.3.3 For details of the CDM duty holders, refer to the pre-construction information which is included as part of the TST package.

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

Environmental requirements

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

Risk Management

3.3.6 All the *Contractors* identify, manage and mitigate risks in accordance with the principles of ISO31000.

3.3.7 All the *Contractors* submit 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 All the *Contractors* submit programme to the *Employer* with his tender.

4.1.2 All the *Contractors* Provide 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)

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*, the *completion date*, and the *Contractor's* planned completion.

(ii) Start of consultation with Anglian Water and BT.

(iii) For each activity associated with the project; proposed resources (plant and labour requirements) expected in order to deliver each activity to be shown on the programme.

(iv) Duration of works.

(v) Adjacent site activities.

(vi) Review periods for any reporting requirements.

(vii) Key dates for the *Employer* to provide services and other items.

(viii) When information will be provided back to Highways England.

(ix) Key dates for co-ordination.

4.1.5 The *Contractor* updates the programme every 4 weeks. 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:

- Lane closures are to be provided for the works on the A1.

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

(1) When working from the A1, the Traffic Management Contractor arranged by the Client will provide welfare facilities for use by the *Contractor*.

6 SPECIFICATION FOR THE WORKS

6.1.1 3D Dimensional Point Cloud Survey:

The Contractor shall undertake the works in accordance with the specification of works detailed in Section 1.3.1

6.1.2 Trial holes & Shear Studs:

6.1.2.1 The *Contractor* shall undertake the works in accordance with: MCHW Volume 5, Section 3, Part 4, Chapter 6 'Contract Documents for specialist activities – Ground Investigation – Specification – Pits and Trenches.

6.1.2.2 Trial Pits - The report should show the following information:

- The dates and location of where the trial pits were taken;
- The depth of existing Statutory Services below carriageway level or from a suitable 'hard' reference.
- Comment on the weather conditions;
- Trial pit photographic records should include one or more faces and the spoil heap; all photographs should include a suitable and legible reference board. Artificial or flash lighting is normally required and photographs to be time stamped as well;
- Trial pits are to be hand dug to avoid striking statutory services.
- These trial pits are to confirm the location the existing water main, telecommunication fibre cable duct and the unknown duct as well as the depths of the existing STATS, as well as their relative location to one another.
- Measurements are to include depth from ground level and the offset of each element as well as measurements from a 'hard' point e.g. parapet edge beam etc. diameter, colour, pipe material, presence of concrete surround, number of pipes, description of excavated material.
- *Contractor* to produce a survey report to clarify the findings of the trial holes, including suitable cross section drawings/sketches to reference for the design and construction.

6.1.2.3 Concrete break out areas to identify the condition of concrete surrounding the shear studs and condition of weld connections between shear studs and the top flange shall be undertaken using the following methodology:

1. Remove the carriageway surfacing;
2. Carry out the concrete break out areas to the deck to the specified depth.

6.1.2.4 Trial pit areas reinstatement:

All trial holes at deck's verges are to be reinstated with concrete ST3 or similar approved matching the existing, up to the top level of surfacing course (i.e. top of verge surfacing level). Material shall be placed and compacted in accordance with manufacturer's instructions.

6.1.2.5 Concrete break out areas reinstatement:
All concrete break out areas at deck's carriageway are to be reinstated with structural concrete of minimum concrete grade of 25N/mm^2 or similar approved and surfacing up to the level of carriageway. Material shall be placed and compacted in accordance with manufacturer's instructions.

6.1.2.6 Requirements for reinstatement of waterproofing

- Sampling of existing waterproofing material to be carried out minimising the damage to the existing waterproofing system.
- The existing waterproofing is stated in as-built drawing BR/3137/1 as 1 layer of Ruberoid copper lined bituminous sheeting or similar approved protected by ½" fine cold asphalt under carriageway.
- The damaged waterproofing areas are to be repaired using a compatible waterproofing repair material. Waterproofing repair material to be applied in accordance with manufacturer's instructions, ensuring minimum required overlap with the existing waterproofing system is achieved in accordance with those instructions.

6.1.2.7 Tar Testing

- The contractor is to take samples of the material covering the verges over the structure. A total of 2no. samples should be taken, 1no. from north verge and 1no. from south verge. Samples should be PAK tested for the presence of Tar. If PAK test confirms positive, further samples should be taken for laboratory analysis.

Location of samples

Sample ID/Trial Pit	Lab testing	Location Grid Reference Approximate – use to closest trial holes.	Depth	Exposed area
TP1	**WM3**	**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**348mm**	**500mm length x 1860mm wide**
TP2	**WM3**	**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**348mm**	**500mm length x 1860mm wide**
TP3	**WM3**	**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**348mm**	**500mm length x 1800mm wide**

TP4		**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**348mm**	**500mm length x 1800mm wide**
BOA1		**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**542mm**	**1000mm length x 305mm width**
BOA2		**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**429mm**	**1000mm length x 305mm width**
BOA3		**see drawing (HE601911-KIER-SGN-A1-225.1MP-DR-CB-0100-24 TESTING LOCATIONS)**	**475mm**	**1000mm length x 305mm width**

6.1.3 Painting Test works:

The *Contractor* shall undertake the works in accordance with CM 431 (Maintenance Painting of Steelwork). The full requirements are detailed in Section 1.2.3 of this document.