

## HXH/4a Contract Specification (Masonry Repair and Waterproofing Installation)

**Client name:** National Highways – Historical Railways Estate  
**Project name:** HRE Works Framework  
**Client reference:** HXH/4a  
**Document no:** 0451200  
**Revision no:** 03  
**Date:** May 2023  
**Project no:** B38380DE  
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**File name:** HXH 4a NEC ECC

### Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
02	May 2023	HXH/4a Contract Specification (Masonry Repair and Waterproofing Installation)	CD	JCW	BJ	NR

### Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments

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Name of Tenderer .....

## **HISTORICAL RAILWAYS ESTATE ON BEHALF OF THE DfT**

### **HRE WORKS FRAMEWORK HXH/4a 'WHEATLEY VIADUCT' CONTRACT FOR REMEDIAL REPAIRS AND WATERPROOFING**

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**VOLUME 1 – CONTRACT DATA**

## 1. BILL OF QUANTITIES

### Preamble

The Bills of Quantities have been prepared generally in accordance with, but not limited to, the rules of the Civil Engineering Standard Method of Measurement Third Edition, 1991 (CESMM3), modified and added to as described below.

The Contractor must price the bill in complete accordance with the drawings and the specification. All items required for construction are to be priced in the bill and as such the Contractor is deemed to have covered the cost of all items necessary for carrying out the works.

The cost or rate is to be entered against each item in the Bill of Quantities. The cost of items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

The whole cost of complying with the provisions of the Contract (including all the Contract documentation) shall be included in the items provided in the priced Bill of Quantities and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of Work.

The Contractor shall allow in his rates and prices for complying with any limitations and constraints on the use of the Site stated in or reasonably inferred from the Contract.

In particular, the Contractor shall include as Method Related Charges for reinstatement of any areas utilised for temporary spoil heaps, materials storage and his site accommodation area, to the approval of the Supervisor.

Quantities measured in the Bill of Quantities are estimates. The Contractor is responsible for ensuring his own quantities for work items whilst progressing the works.

### Departures from CESMM3 Measurement Rules

#### Class A: 3.1

The Contractor shall include for all accommodation and buildings required for the Works with this item description.

#### Class A: 3.2

The Contractor shall include for all Services required for the Works with this item description.

#### Class A: 3.3

The Contractor shall include for all Plant required for the Works with this item description.

### Additional Measurement Rules

Additional Measurement Rules for Class U: Brickwork, Blockwork and Masonry, are included overleaf and have been used for the attached Bills.

FIRST DIVISION	SECOND DIVISION	THIRD DIVISION	MEASUREMENT RULES	DEFINITION RULES	COVERAGE RULES
11. Coring holes for anchor nr	1. Horizontally 2. Vertically 3. Inclined at 0°-15° to face 4. Inclined at 15°-30° to face	1x. Width: not exceeding 5mm 2x. Width: 5-9mm 3x. Width: 10-14mm 4x. Width: 15-19mm 5x. Width: 20-25mm 6x. Width: exceeding 25mm	Depth is calculated over face of reinstated core	Size of anchor stated	Includes cleaning and preparatory work for anchor Includes retaining core section for later use
12. Drilling holes for stitching bars nr	5. Inclined at 30°-45° to face 6. Inclined at 45°-60° to face 7. Inclined at 60°-75° to face 8. Inclined at 75°-90° to face	x: 1. Length / Depth: not exceeding 500mm 2. Length / Depth: 500mm-0.999m 3. Length / Depth: 1-1.499m 4. Length / Depth: 1.5-2m 5. Length / Depth: exceeding 2m		Size of bar stated	Includes cleaning and preparatory work for bar
13. Provide anchor/bar for installation nr	1. In cored holes 2. In prescribed locations			Size of anchor stated	Includes supply and delivery and installation of bar
14. Grouting anchor/bar in position	1. Materials t 2. Injections nr		Measurement of grout material excludes volume of inserted bar		
15. Cutting out areas of brickwork / masonry; and replacing m2	1. Brickwork vertical faces 2. Brickwork arch barrel	1. Thickness: not exceeding 0.5 bricks thick 2. Thickness: 0.5-1 bricks thick 3. Thickness: 1-1.5 bricks thick 4. Thickness: 1.5-2 bricks thick 5. Thickness: exceeding 2 bricks thick 6. Number of bricks nr		Vertical faces include wing walls which may be battered  Thickness of 1 brick is approx. 225mm.	Includes making good pointing around repair area Includes working to limitations of area removed at any time  For tunnel lining and arch barrels only: Includes tying to previous bricks with stainless steel safety ties at 450mm centres.
	3. Masonry vertical faces 4. Masonry arch barrel	1. Thickness: below 25mm 2. Thickness: 25-49mm 3. Thickness: 50-74mm 4. Thickness: 75-99mm 5. Thickness: 100-124mm 6. Thickness: 125-150mm 7. Thickness: exceeding 150mm			
16. Cleaning and mechanical remortaring of surfaces m2	1. Brickwork vertical faces 2. Brickwork arch barrel 3. Masonry vertical faces 4. Masonry arch barrel	1. Depth: not exceeding 25mm 2. Depth: 25-49mm 3. Depth: 50-74mm 4. Depth: 75-99mm 5. Depth: 100-124mm 6. Depth: 125-150mm 7. Depth: exceeding 150mm			Includes work to vertical faces and arch rings
17. Dressing back of spalled surfaces to remove flaking material m2					
18. Remortaring fractures					
19. Grouting fractures		1. Width: not exceeding 1mm m 2. Width: 1-1.9mm m 3. Width: 2-4.9mm m 4. Width: 5-9.9mm m 5. Width: 10-19.9mm m 6. Width: 20-50mm m 7. Width: exceeding 50mm m 8. Materials t 9. Injections nr	Fracture is measured over its length, Length remortared includes 0.5m either side of crack.		Includes work to vertical faces and arch rings
			Fracture is measured over its length; number of injections may then be determined by the Contractor to suit the method adopted.		Includes making good pointing around fracture

## Bill of Quantities

Refer to the excel spreadsheet "HXH/4a BoQ Rev02" which is enclosed with the Contract Documentation.

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Grand Total

£ \_\_\_\_\_

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## VOLUME 2 – SCOPE

## 1. SPECIFICATION

The Specification referred to in the Tender shall be the 'Specification for Highway Works', as Volume 1 of the Manual of Contract Documents for Highway Works, as modified and extended by the following:

- i. Appendix 0/1: National Highways Historical Railways Estate - specific Additional, Substitute and Cancelled Clauses Tables and Figures;
- ii. Appendix 0/2: Contract-specific minor alterations to existing Clauses Tables and Figures;
- iii. The numbered Appendices listed in Appendix 0/3;
- iv. Appendix 0/5; Special national alterations of the Overseeing Department of Scotland, Wales or Northern Ireland.

Appendix 0/4 contains a list of the drawings.

The relevant publication date of each page of the Specification for Highway Works is given in the Schedule of Pages and Relevant Publication Dates.

An Additional Clause as indicated by a suffix 'A' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. An Additional Clause as indicated by a suffix 'AR' in Appendix 0/1 is a Contract-specific alteration.

A Substitute Clause, as indicated by the suffix 'S' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. A cancelled Clause indicated by a suffix 'SR' in Appendix 0/1 is a Contract-specific alteration.

A Cancelled Clause as indicated by a suffix 'C' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. A cancelled Clause indicated by a suffix 'CR' in Appendix 0/1 is a Contract-specific alteration.

Insofar as any of the Numbered Appendices may conflict or be inconsistent with any provision of the Specification for Highway Works the Numbered Appendices shall always prevail. Additionally, Numbered Appendices 0/1 and 0/2 shall take precedence over Numbered Appendix 0/5.

Any reference in the Contract to a Clause number or Appendix shall be deemed to refer to the corresponding Substitute Clause number or Appendix listed in Appendix 0/1, 0/2 or 0/5.

Where a Clause is altered any original Table/Figure referred to in the Clause shall apply unless the Table/Figure is also altered. Where a Table/Figure is altered any reference in a Clause to the original Table/Figures shall apply to the altered Table/Figure.

Where a Clause in the Specification relates to work goods or materials which are not required for the Works it shall be deemed not to apply.

Any Appendix referred to in the Specification which is not used shall be deemed not to apply.

Where a Clause in the Specification is prefixed by an # this indicates that this particular Clause has a substitute National Alteration for one or more of the Overseeing Organisations of Scotland, Wales or Northern Ireland. Substitute or additional National clauses shall be used within countries to which they specifically apply, and they are deemed to replace corresponding Clauses in the main text of the Specification as appropriate. The substitute National clauses are located at the end of the relevant Series together with the additional National Clauses of the Overseeing Organisations.

Other than where references to the Overseeing Organisation are made in the context of the Overseeing Organisation granting statutory or type approvals, the roles and functions of the Overseeing Organisation shall be undertaken by †.

Where the Specification requires the provision of documentation to the Overseeing Organisation for statutory or type approval such documentation shall be provided to †.

If the Specification is used in conjunction with a Contract under which the Contractor is responsible for the design of any part of the Permanent Works, the delegation of the roles and functions of the Overseeing Organisation as stated in paragraph 12 above shall be amended as follows:

- (i) If any agreement, consent or approval required to be obtained from the Overseeing Organisation impacts on the health and safety of the general public, the environment or any property or equipment not owned or operated by the Contractor or the Design Build Finance and Operate concessionaire, such agreement, consent, approval shall be obtained from \*.
- (ii) Where the Specification provides for the Overseeing Organisation to require a test, waive the requirement for a test or alter testing frequency, the party to whom the Overseeing Organisation's roles and functions have been ascribed by paragraph 12 above shall exercise such decisions in accordance with the Secretary of State's requirements stated in the Contract \*\*.

† Engineer: Project Manager, Supervisor: Designer etc. as drawn from the Conditions of Contract.

\* Clients' Agent: Client's Representative: Department's Agent etc. as drawn from the Conditions of Contract.

\*\* Construction Requirements/Client's Requirements.

**SPECIFICATION FOR HIGHWAY WORKS SCHEDULE OF PAGES AND RELEVANT PUBLICATION DATES**

(10/22) **TABLE 0/1 SCHEDULE OF PAGES AND RELEVANT PUBLICATION DATES**

<b>Series/Appendix</b>	<b>Page Number</b>	<b>Publication Date</b>
000	1 to 3	May 2014
000	6 to 7F	February 2016
000	4 to 5	October 2022
100	2, W1F, N2 to N11F	May 2014
100	N1	December 2014
100	1, 3 to 30F	April 2022
200	1 to 3F	February 2016
300	1	May 2001
300	4	November 2002
300	2 to 3, 5 to 6F	May 2008
400	1, 9 to 11, 13, 17 to 20, 21, 23F	May 2017
400	2 to 8, 12, 14 to 16, 22	March 2020
500	1 to 2, 4 to 39F, N1 to N2F	February 2020
500	3	March 2020
600	1 to 68, 70 to 77F, S1 to S4F, W1 to W4F, N1 to N5F	February 2016
600	69	February 2017
700	1 to 5, 8 to 36F, N1 to N4	February 2016
700	6 to 7, N5 to N6F	October 2022
800	1 to 42F	November 2021
900	1 to 83F, S1 to S3F, W1 to W2F, N1F	July 2021
1000	3 to 33	January 2020
1000	1 to 2, 34 to 58F	November 2021
1100	1 to 16F	February 2021
1200	5	May 2001
1200	2 to 3, W1F	August 2003
1200	1, 14 to 16F	May 2004
1200	4, 9 to 11, 13	May 2005
1200	12	November 2006
1200	6 to 7, N1 to N4F	November 2007
1200	8	May 2008
1300	N2F	November 2003
1300	3 to 4	November 2004
1300	1, 5 to 10, 12F	November 2005
1300	2, 11 and N1	May 2006
1400	2, N1F	May 2001
1400	1, 3 to 9F	May 2006
1500	1 to 31F	February 2017
1600	1, 4 to 5, 9, 15, 17 to 18, 24 to 26, 29 to 31, 35, 38, 49F	March 1998
1600	2, 6 to 8, 10 to 14, 16, 19, 27 to 28, 32 to 34, 36 to 37, 39 to 42, 44 to 48	November 2003
1600	3, 20 to 23, 43	November 2005
1700	2, 4, 6 to 7, 19, 24 to 27, 30 to 34	December 2014
1700	1, 3, 5, 8 to 18, 20 to 23, 28 to 29, 35 to 39F	March 2020
1800	1	August 2014
1800	2 to 39F	April 2021
1900	1 to 35F, S1 to S2F	August 2014

(10/22) **TABLE 0/1 SCHEDULE OF PAGES AND RELEVANT PUBLICATION DATES (Cond.)**

<b>Series/Appendix</b>	<b>Page Number</b>	<b>Publication Date</b>
2000	1, 3 to 4F	May 2001
2000	2	November 2004
2100	1 to 2F	February 2016
2300	1	March 1998
2300	2 to 3F	May 2001
2400	1, 4, 7F	May 2005
2400	2	May 2006
2400	3, 5 to 6	May 2008
2500	1	May 2001
2500	2, 8, 11F	November 2003
2500	10	November 2004
2500	6 to 7, 9	May 2005
2500	5	May 2006
2500	3 to 4	November 2006
2600	2 to 4	November 2003
2600	5	November 2004
2600	6	May 2005
2600	7	November 2006
2600	1, 8F	March 2020
3000	4 to 7, 10, 12 to 17, 19, 22 to 27F	May 2001
3000	20	November 2004
3000	2 to 3	May 2006
3000	8 to 9, 11, 18, 21	May 2008
5000	1, 4 to 19F, S1F	May 2005
5000	2 to 3	November 2008
5700	1 to 30F	February 2020
Appendix A	1 to 4F	May 2014
Appendix B	1 to 3F	May 2014
Appendix C	1 to 2F	May 2014
#Appendix D	1F	May 2014
Appendix D (NI)	N1F	May 2014
Appendix E	1F	May 2014
Appendix F	1 to 60F	October 2022
Appendix G	Not used	
Appendix H	1	May 2004
Appendix H	2	November 2005
Appendix H	3	November 2006
Appendix H	4 to 9F	November 2008

## APPENDIX 0/1: CONTRACT-SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT

### LIST OF ADDITIONAL CLAUSES

Clause No.	Title
137AR	Health and Safety File Information
202 AR	Vegetation Clearance Requirements
2470 AR	Definitions for Repairs to Brickwork and Masonry
2471 AR	Testing Requirements - Bricks
2472 AR	Existing Surface Condition
2473 AR	Grout
2474 AR	Mechanical Re-Mortaring
2475 AR	Curing of Grout and Mortar
2476 AR	Stitching and pinning bars and holes
2477 AR	Re-facing and patch repairs
2478 AR	Re-facing and patch repairs: general excluding arch rings
2480 AR	Patch repairs: method for minor repairs
2481 AR	Patch repairs: additional information for arch-barrels
2483 AR	Pinning of brickwork and masonry
2484 AR	Stitching of fractures: general
2485 AR	Stitching of longitudinal fractures
2486 AR	Cross stitching and grouting of brick arch rings for arch ring separation
2487 AR	Grouting of brickwork and masonry without stitching
2488 AR	Injection of Fractures
2489 AR	Re-Mortaring/Re-pointing
2490 AR	Drilling and Coring
2491 AR	Grouting Method
2492 AR	Cleaning of brickwork and masonry and superficial surface repairs
2495 AR	Mortar
2497 AR	Requirements for vegetation removal at structures
2607 AR	Painting of Bridge Numbers
2608 AR	Site Investigation Requirements if Cradle Access is Proposed

## **LIST OF ADDITIONAL CLAUSES, TABLES AND FIGURES**

Note: Clauses 137 AR to 2498 AR are copyright of Historical Railways Estate, used by Permission.

<b>Clause No.</b>	<b>Title and Written Text</b>
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<b>137 AR</b>	<b>Health and Safety File Information</b>
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The Contractor shall supply the following information to the Supervisor for incorporation into the Health and Safety File for the structure in compliance with the Construction (Design and Management) Regulations 2015.

- I. The Contract drawings will be supplied in electronic form on request, for the Contractor to modify in that format. The drawings can be supplied to the Contractor on compact disc or by E-mail as preferred.
- II. A list of all materials used on site and their suppliers.
- III. Email copied of each COSHH assessment, Health and Safety Data Sheet etc. as required for materials incorporated into the works.
- IV. Copies of all material test certificates called for under this contract specification.
- V. Details of any services encountered, including their exact alignments and depths.
- VI. Copies of site-specific health and safety information, requirements and control measures that might impact on, or have an influence on any future maintenance or repair activities, e.g., confined space entry permits, permissions and / or authorisations for road closures, etc.; issued by highway authorities, work at height permits, or similar documentation.

<b>202 AR</b>	<b>Vegetation Clearance Requirements</b>
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1. Due care shall be paid to wildlife in the vicinity of the Works. Special attention shall be paid in respect of the presence of bats, which are a protected species, and which are often found to roost in voids in masonry arch bridges. Any areas identified for repair, which are suspected to contain roosts of any nature shall be reported to the Supervisor.
2. Please refer to ecological constraints detailed in the ecology report for the site.
3. The following general site clearance requirements relate to features and areas identified within the site boundary on the Contract Drawings:
  - I. Existing soft landscaping areas - topsoil, shrubs, bushes and trees.

- II. Site clearance shall be limited to the removal and disposal of weeds, shrubs, bushes and saplings, sufficient to gain access for and comply with, the requirements of the works.
- III. Tree stumps and roots growing on the structure must not be wrenched out by machine since the roots are likely to have become established in open joints in the masonry. Roots must if necessary be severed from the stump and grubbed out by hand or hand-held machine. During stump removal operations, whether from trackbed or parapet, all non-essential personnel must remain clear of the operation and a banksman deployed at a safe distance below to provide early warning of masonry displacement that could lead to partial collapse. Personnel employed on and beneath the structure in a joint operation must be in contact by 2-way radio or other means, tested for reception prior to commencement of the operation.

#### **2470 AR      Definitions for Repairs to Brickwork and Masonry**

The following definitions shall apply:

Patch repairs shall mean the replacement of a portion of existing defective brickwork or masonry with new brickwork or masonry of similar construction such that all edges are bonded into the original brickwork or masonry.

Re-facing shall mean either the complete removal and subsequent replacement of a skin of brickwork or masonry,

Re-casing shall mean the addition of a skin of brickwork or masonry on to an existing brickwork or masonry "core".

Stitching shall mean the process of inserting and grouting steel bars into pre-drilled holes.

Pinning shall mean the securing of new brickwork or masonry to existing brickwork or masonry below or behind, using bars which are anchored using "adhesives" so that the existing and new brickwork or masonry is anchored to the bar. No voids or fractures are to be treated solely by pinning.

Grouting shall mean insertion of cementitious (or other) material into a structure through drilled holes to fill fractures and/or voids with suitable material to improve the structural performance.

Injection shall mean the insertion of cementitious (or other) material into a structure directly into the fracture.

Re-mortaring shall mean the raking out and mechanical re filling of brick joints.

#### **2471 AR      Testing Requirements - Bricks**

1. Details of the Contractor's proposed testing regime shall be submitted for the agreement of the Supervisor
2. The following tests shall be included in the Contractor's proposed testing regime and undertaken in accordance with latest version of BS 3921: or BS EN 771 as appropriate:
  - i) Compressive strengths of bricks and mortar
  - ii) Water absorption of bricks
  - iii) Initial Suction rate
  - iv) These tests shall be used to select a suitable brick for the repair

**2472 AR Existing Surface Condition**

1. Where new brickwork is to be bonded to existing brickwork, the surface condition of the existing brickwork shall be controlled, as far as is reasonably practicable, so as to comply with the suction rate requirements of the bricks. Reduction of excessive suction rates may be achieved by wetting the existing brickwork with clean water. The existing brickwork shall not be soaked.
2. Unless instructed to do so, in writing, by the Supervisor, no repairs shall be carried out to brickwork which is subjected to running water or seepage which causes continuous wetting. Suitable damming, diversion or shielding is to be adopted.

**2473 AR Grout**

1. Grout other than for use with Cintec (or equivalent) anchors shall have a low heat of hydration and plastic shrinkage, high resistance to sulphate and other chemical attack and be capable of developing the performance specified when large volumes of water are present. The grout shall comply with the following performance specification at 5°C:
  - i) Minimum compressive strength of 5 N/mm<sup>2</sup> at three days, 7 N/mm<sup>2</sup> at seven days, and 11 N/mm<sup>2</sup> at 28 days.
  - ii) Maximum compressive strength at 28 days, compatible with the strength of the existing brickwork or masonry as determined by the contractor's tests.
  - iii) Initial set at 1-hour maximum, final set at seven hours maximum.
  - iv) Pourable consistency with flow channel figure not less than 380 mm
2. Admixtures may only be used with the prior written permission of the Supervisor. Admixtures including chlorides shall not be used

#### **2474 AR      Mechanical Re-Mortaring**

1. All pointing shall be undertaken by mechanical means except where the Supervisor clearly states that it is to be undertaken by other means.
2. Mortar for mechanical pointing shall be as clause 2495 AR.
3. All mortar is to be supplied in a colour to match the existing mortar of the structure.
4. In wet areas of tunnel-lining or masonry arch soffit repair, sodium silicate shall be introduced, when required, into the mortar flow at the applicator nozzle.
5. The optimum silica content in relation to its viscosity shall be as advised by the mechanical pointing mortar mix supplier to give an initial set suitable for the conditions at application.
6. The method of application should ensure that the mortar fully reaches the back of the joint.
7. Due care and attention shall be paid to the containment of removed mortar and protection of any watercourse during the re-mortaring process. Adequate precautions shall be taken to ensure that no waste material enters the watercourse or pollutes the land. Run-off containing pollutants into the surrounding soil will not be permitted.
8. Waste materials shall be disposed of off-site in accordance with all applicable legislation and the contractors waste management plan.

#### **2475 AR      Curing of Grout and Mortar**

1. Details of the hardening and curing characteristics of the proposed grout or mortar including details of the effects on temperature or other environmental and weather factors on the hardening and curing of the grout or mortar shall be submitted to the Supervisor.
2. During the hardening and curing of the grout or mortar, adequate precautions shall be taken to ensure that the temperature, environmental and weather factors do not cause any adverse effect on the performance of the grout or mortar. These factors shall be monitored and recorded so that an assessment can be made of the actual strength gain of the grout or mortar in situ.
3. Testing of samples of the grout or mortar, cured under identical conditions as the repair, shall be carried out to verify the setting, hardening and strength to be achieved on the resumption of dynamic loading.

4. Adequate precautions shall be taken to ensure that dynamic loading of the repair or element of the structure does not adversely affect the integrity of the completed repair.

**2476 AR      Stitching and pinning bars and holes**

1. Stitching and pinning bars shall be Class 1.4429, Grade 500 ribbed stainless steel round bar complying with BS 6744.or stainless steel SHS section (Cintec anchor or equivalent approved).
2. The bar and hole length shall be checked by the Contractor to ensure a minimum of 100 mm solid brickwork or masonry remains intact beyond the end of the hole.
3. Trial drilling of the existing brickwork or masonry shall be carried out to ascertain the overall thickness of the brickwork or masonry.
4. The dimension between the end of the bar and the front face of new brickwork or masonry, projected along the centreline of the hole, shall be 20 mm to 30 mm.
5. Unless shown otherwise on the Contract Drawings, the nominal bar diameter and drilled hole size shall be in accordance with Table 2476/1 as applicable to usage in brickwork and masonry.

Table 2476/1 For Brickwork and Masonry		
Usage	Nominal bar diameter	Nominal hole diameter
Cross pinning of new facing or patch repairs	12	16
Stitching *	16 20	20 25
Cross stitching of brick arch rings	16	20

\* Diameter of bar dependent on position and size of fracture. Note that the use of solid bar may not be applicable where a proprietary grout-retaining sock is used.

**2477 AR      Re-facing and patch repairs**

1. The maximum area of defective brickwork or masonry removed at any one time shall be 1.0 m<sup>2</sup> or be agreed with the Supervisor and shall take account of the following factors:
  - i) Whether the element supports static or dynamic loading.

- ii) The condition of the brickwork or masonry to be removed and surrounding brickwork or masonry.
  - iii) The thickness of the remaining brickwork or masonry.
  - iv) Temporary Works used to relieve the element of load.
  - v) The time available for removal of dynamic and/or dead load, the amount of work which may be completed during the time available and the strength of the repair when traffic is planned to be re-introduced.
  - vi) The location and effectiveness of any repair.
2. At all times the structure shall be capable of carrying the loads intended unless measures are taken to reduce the loading.
  3. Unless shown otherwise on the Contract Drawing, the maximum area of defective brickwork to be removed at any one time shall be 1.0 m<sup>2</sup> by a half brick thick unless agreed by the Supervisor. The height of the repair is to be limited to 2.5M. maximum
  4. Each skin shall be bonded back to the existing skin using stainless steel safety ties, Type 2. The safety may be fixed using mortar or a resin anchoring material.
  5. The depth of defective brickwork (excluding arch rings which have defined courses) to be removed from vertical or sloping faces should be sufficient to accommodate the depth of repair specified plus 10mm to 20mm allowance for mortar or grout infill. A small area is to be broken out initially to investigate the condition of the backing brickwork.
  6. When large areas can be safely removed, abrasive wheels may be used to cut vertical slots into the brick face to be removed, aiding brick removal. The tools must be fitted with a device to limit the depth of cut to that required. A plan showing the area to be cut out, the depth of and orientation of cut is to be provided and approved by the Supervisor in advance of the works.
  7. Headers shall only be replaced where a key to the next course is required, or when agreed by the Supervisor. Care shall be taken to minimise disturbance to adjoining brickwork.
  8. Details of the areas of brickwork or masonry to be removed at any one time, including supporting calculations and details of any Temporary Works shall be included in the detailed method statement for the repair. Pinning around the periphery of areas to be repaired to secure surrounding areas may be required before breaking out commences. Alternatively, temporary works may be used to support any potentially unstable brickwork.

9. New facing or patch repairs to brickwork and removal of surrounding existing brickwork shall not be carried out until pinning or stitching and grouting operations have been completed.
10. New brickwork to patch repairs shall be bonded into existing brickwork, the bond to match existing. The bonding may either be block bonding or toothed bonding.
11. Mortar joints to patch repairs to arch rings shall be struck flush. Mortar joints to other patch repairs shall be struck flush and finished to give a 'bucket handle' or struck and weathered joint as applicable to match the existing finish.
12. Parts of the structure where loose, spalled or damaged brickwork have been identified and are to be replaced must be the subject of a joint inspection between the Supervisor and the Contractor to determine the necessity, type and scope of temporary works. No personnel will be allowed beneath such areas until the inspection has been made and measures implemented to provide temporary support as appropriate.

**2478 AR      Re-facing and patch repairs: general excluding arch rings**

1. New brickwork for patch repairs or facing shall be built up in lifts which do not damage new laid mortar beds or preclude the installation and inspection of the grout infill between the existing and the new brickwork. The maximum single lift of new brickwork shall be 1.0 metre per shift.
2. If grouting is used to fill the void the gap between the existing or exposed brickwork and the new face shall be filled in lifts not exceeding three courses of brickwork. Subsequent grout filling shall only proceed after the previous filling has attained an initial set. Grout filling shall not progress until the brickwork mortar has achieved an adequate strength.
3. If mortar filling of the gap is adopted the gap is to be solidly filled as work progresses. The back faces of bricks are to be mortared before placing and pushed against the existing brick face to ensure solid and complete filling.
4. Each skin shall be bonded back to the existing skin using stainless steel safety ties.
5. Vertical Half brick thick re - facing must not carry any element of live loading.

**2480 AR      Patch repairs: method for minor repairs**

1. Following removal of existing facing:

- i) New facing brickwork built. The front face of new brickwork or masonry shall be flush with remaining face brickwork or masonry.
  - ii) The gap between the back of the new brickwork and front face of the existing brick core: shall be between 10mm and 20mm (with the exception of patch repairs to arch barrels) and shall be filled with cementitious grout or solidly filled with cement mortar as work proceeds.
  - iii) Areas of new brickwork or masonry greater than 0.5 m<sup>2</sup> shall be pinned back to the existing structure, once the mortar has gained adequate strength.
  - iv) Each skin shall be bonded back to the existing skin using stainless steel safety ties.
  - v) Vertical half-brick re-facing must not carry any element of live loading.
2. Details of the proposed area to be refaced, pinning pattern, hole and bar lengths and diameters, bar shape and material, hole inclination, grouting method and void filling shall be included in the detailed method statement.

**2481 AR Patch repairs: additional information for arch-barrels**

- 1. Details of staging, centring or peripheral pinning required to support or secure the brickwork or masonry repairs being undertaken shall be included in the detailed method statement.
- 2. Defective brickwork shall be carefully broken out from the first arch ring only. Any calcium deposits on the second arch ring shall be cleaned off. The second arch ring shall be inspected by the Contractor and where the removal of the first ring reveals that the condition of the second ring requires additional repairs or re-mortaring, the extent and nature of any additional repairs necessary to the second or subsequent arch rings shall be determined and agreed with the Supervisor.
- 3. Each arch ring shall be bonded back to the previous ring using stainless steel safety ties as per patch repairs to tunnels detailed below.
- 4. For patch repairs to tunnels, the repair shall be tied to the third ring of brickwork using Type 2 stainless steel safety ties every third course at horizontal centres of 500 mm ± 100 mm, with alternative rows staggered equally. The ties shall be grouted into 25 mm diameter drilled holes using the same mortar as for the brickwork repair.
- 5. Brickwork shall be built up to the finished profile. Details of the method of support for new brickwork shall be submitted for the agreement of the Supervisor. Bricks shall be well bedded on mortar between the intrados of the adjacent ring and the new brickwork.

6. The method of installing and supporting the final course of bricks shall be included in the detailed method statement.
7. **Where brickwork to the edges of arch rings are to be repaired, the new brickwork must be either block or toothed bonded into the existing.**
8. Areas of new brickwork or masonry greater than 0.5 m<sup>2</sup> shall be pinned back to the existing structure, once the mortar has gained adequate strength.
9. All temporary works shall be removed, and the surface made good following completion of the works.

**2483 AR      Pinning of brickwork and masonry**

1. Holes for pinning shall be diamond cored. Rotary percussive drilling is not permitted.
2. The proposed pattern of coring shall be detailed on the drawings, in accordance with the following principles:
  - i) Pinning shall only be carried out when mortar has cured sufficiently for damage not to occur.
  - ii) Pinning bars shall be installed at a rate of 5 bars/m<sup>2</sup> in a staggered pattern. Where irregular areas, or areas between 0.5 and 1.0 sq. m are to be secured, the number and position of the securing pins are to be agreed with the Supervisor.
  - iii) The pattern of coring shall form two square grids, offset from each other by half the grid pitch in both orthogonal directions. The grid pitch shall depend on the condition and thickness of the underlying brickwork and masonry and shall be such that effective fixing of the brickwork and masonry face may be achieved.
  - iv) Pinning bars shall be parallel to the springing line or foundation as applicable but inclined in the transverse direction to an angle of 45° to the normal.
  - v) The orientation of the inclined holes shall achieve an even spread of bars and projected intersections of bars throughout the structure without giving rise to a pattern which may induce cracks.
3. Pinning bars shall be grouted into the hole throughout their length with polyester resin grout.
4. Holes shall be made good using mortar to match that used for pointing the brickwork and masonry.

#### **2484 AR      Stitching of fractures: General**

1. The anchors shall be positioned as directed by the Supervisor on site if not specified on the contract drawings.
2. The stitching anchors are to be Cintec (or equivalent) ribbed stainless steel bars or SHS section, using an inorganic, non-shrink, micro concrete contained within a designed (polyester woven) sock that expands on injection (with the ability to traverse fractures and voids without reducing bond strength) thus enabling the anchor strength to be transferred through the grout field to the structure with low bond shear values. The anchor must be covered by a product guarantee and have been accelerated age-tested, by the Building Research Establishment, to 40 years. The micro concrete grout must confirm to the DIN Standard 18156 (Uberwacht) relating to quality control.
3. Prior to grouting of the anchors, brickwork or masonry 500 mm either side of the fracture shall be cleaned of all calcium and other deposits, and the fracture and any loose mortar joints within the cleaned area shall be raked out and re-pointed.
4. On completion of stitching, fractures are to be mechanically mortared to a depth of at least 100mm, dependent upon the width of fracture.
5. For fractures <5mm the fracture is to be grouted. The fracture is to be caulked and the fracture drilled to accommodate pipes at 600mm centres (diameter to be agreed with the Supervisor). Grout in accordance with clause 2473 AR but with a consistency of thick cream, or an approved resin, is to be pumped at a pressure not exceeding 2 Bars.

#### **2485 AR      Stitching of longitudinal fractures**

1. The requirements of clause 2484AR shall apply.
2. Stitching anchors shall be installed horizontally, through the masonry.
3. Stitching of longitudinal cracks between the voussoirs or brick spandrels and the arch barrel shall be carried out in accordance with the principles shown on general detail drawings 404, 406 and 550.
4. Stitching anchors shall be installed horizontally, parallel to the springing, through the voussoir or arch barrel end and into the arch barrel itself, parallel to the line of the arch springing. The level of the anchor shall be equidistant from the intrados and extrados of the arch barrel. Anchor lengths shall vary along the length of the crack to produce an elongated "s" shaped line on plan. The lengths of anchors on each side of the arch shall be "out of phase" with each other.

5. Holes for stitching anchors shall be drilled in accordance with clause 2490AR
6. The spacing and "out of phase" offset shall be determined by the contractor and submitted to the Supervisor for agreement. Consideration shall be given to distances to the depth of voussoir brick or stonework when determining the location of the stitching anchors. For proprietary products advice shall be sought from the manufacturer in determining the above parameters.
7. The number, length, size and positions of the holes and stitching anchors shall be determined by the Contractor and submitted for the agreement of the Supervisor. Consideration shall be given to the need for tie bars and pattress plates to the spandrels.
8. The initial and final setting time shall be compatible with the anchor manufacturer's instructions. Proprietary anchors shall be installed in accordance with the manufacturer's instructions.
9. Any holes which are not perpendicular to the face of the structure shall be cored using a jig.
10. Diamond coring shall be used, and the cores retained for reinstating the repair. The surface finish to the hole shall ensure that the bond assumed in the design is developed between the grout and the parent material.
11. Surplus grout shall be cleaned from the hole and the face of the structure.
12. On completion, the hole shall be blocked off by mortar or where retained, by replacing the end section of the core and filling the joint with mortar to match the existing structure.
13. On completion of the anchor installation, fractures shall be re- mortared or injected. When pattress plates are used the re-mortaring is to be undertaken before the plates are tightened.

**2486 AR      Cross stitching and grouting of brick arch rings for arch ring separation**

1. Brickwork in the area to be grouted shall be cleaned of all calcium or other deposits. Any defective brickwork, fractures and poor mortar joints in the area to be grouted shall be repaired in accordance with this Specification prior to commencement of grouting operations.
2. Trial drillings shall be carried out to determine the overall thickness of the brickwork to be grouted and the type of back-fill.
3. The drilling grid shall consist of two square grids, offset from each other by half the grid pitch in both orthogonal directions.

4. Unless shown on the Contract Drawings, the grid pitch shall be confirmed by the Contractor on the basis of condition, material, thickness and construction of the structure, and shall achieve effective composite action between the arch rings.
5. Holes shall be drilled and flushed, parallel to the abutment or pier but at an angle of 60° in the transverse direction to the normal, unless shown otherwise on the Contract Drawings.
6. The orientation of inclined holes shall achieve an even spread of bars and projected intersections of bars throughout the structure without giving rise to a pattern which may induce fractures.
7. Grout shall be injected from the lowest hole until it rises from the next highest hole when it should be locked off. The grout shall be injected at a pressure to ensure that grout travels and permeates into the brickwork but minimises excessive leakage, gives due consideration to the condition of the brickwork and does not cause 'blow out'. Grouting pressure to be limited to 2 Bars
8. After initial grouting, the hole shall be re-drilled as soon as practicable after the initial set of the grout, and the stitching bars inserted in the hole. The holes shall be re-grouted in the same pattern. An air release device is to be fitted to each hole to enable full grouting of the hole to be achieved. An alternative method of securing the bar using a polyester grout may be considered. The contractor to supply full details to the Supervisor for approval.
9. Grout leakage from the holes shall be prevented by means of a method of "locking off" the grout flow, to retain the grout in the hole.

**2487 AR      Grouting of brickwork and masonry without stitching**

1. Brickwork or masonry in the area to be grouted shall be cleaned of all calcium or other deposits. Any defective brickwork or masonry, fractures and poor mortar joints in the area to be grouted shall be repaired in accordance with this Specification prior to commencement of grouting operations.
2. Trial drillings shall be carried out to determine the overall thickness of the brickwork or masonry to be grouted.
3. The drilling grid shall consist of two square grids, offset from each other by half the grid in both orthogonal directions.
4. Unless shown otherwise on the Contract Drawings, the grid pitch shall be confirmed by the Contractor on the basis of condition, material, thickness and construction of the structure, to ensure complete penetration into the voids to be grouted.

5. Holes shall be drilled and flushed to suit the grouting equipment and shall be perpendicular to the face of the brickwork or masonry.
6. Grout shall be injected from the lowest hole until it rises from the next highest hole when it should be locked off to prevent loss. The grout shall be injected at a pressure to ensure that grout travels and permeates into the brickwork but minimises excessive leakage, gives due consideration to the condition of the brickwork and does not cause 'blow out'. Grouting to be limited to 2 Bars.
7. An air release device is to be fitted to each hole to enable full grouting of the hole to be achieved.
8. Grout leakage from the holes shall be prevented by means of a method of "locking off" the grout flow, to retain the grout in the hole.

**2488 AR      Injection of Fractures**

1. Fractures in brickwork or masonry shall be filled by an injection of grout or resin.
2. Where fractures to be injected are not shown on the Contract Drawings, fractures to be injected shall be determined by the Contractor. Details of fractures to be injected and where applicable, the procedure for cleaning out fractures prior to injection, the injection process and materials proposed to be used, shall be included in the detailed method statement.
3. When using proprietary systems, injection of fractures shall be carried out in accordance with the manufacturer's recommendations.
4. Mortar or sealing compounds used to seal the face of the fracture shall have achieved sufficient strength before injection commences to withstand the applied pressures.
5. The choice of mortar, sealing compound and injection material shall take into account the fracture width, fracture depth, presence of water and compatibility with the "parent" material.
6. The injection sequence and pressure used shall ensure the fracture is completely filled, and that no damage occurs to the existing structure.

**2489 AR      Re-Mortaring/Re-pointing**

1. All re-pointing identified on the drawings and in the Bills of Quantities shall be considered to require mechanical re-pointing as defined in clause 2474AR.
2. The sequence of re-pointing shall ensure that previously re-pointing shall not be damaged by the re-pointing work in progress.

3. Mortar is not to be removed by pressure water jetting, where used for cleaning any wetting agents added to the water shall be low foaming and biodegradable.
4. Prior to re-pointing commencing, a trial panel of defective brickwork or masonry, minimum area 1.0 m<sup>2</sup>, shall be re-pointed, and the agreement of the Supervisor to the standard of finish shall be obtained. The trial panel shall be kept in a condition that permits its use for comparative purposes.
5. All lichen and moss and other deposits shall be removed without damage to the brick face using pressure jet.
6. Defective mortar to both perpends and bed joints shall be raked out by hand and cleaned with wire brushes as necessary. For vertical walls the minimum depth of mortar missing before re-pointing is generally required shall be 1.2 times the joint width or 20 mm whichever is the greater. Where the mortar is raked out this shall not extend to a depth greater than 75mm without further instruction from the Supervisor. Raked out joints shall be free from all dust and loose particles. Brick edges shall be free from old mortar. Where the mortar beyond this depth is unsound, the agreement of the Supervisor shall be obtained before raking out to a greater depth. The stability of the structure shall be maintained at all times.
7. When re-mortaring, provided the type of brick is suitable, the bricks shall be in a damp condition. This may be achieved, if necessary, by wetting the raked-out joints with clean water. The brickwork shall not be soaked.
8. When re-pointing, joints shall be completely filled without any voids. Joints shall not be buttered over.
9. Mortar which has begun to dry out or harden shall not be used for re-mortaring and shall not be reconstituted by the addition of further water. Re-pointed brickwork or masonry shall be protected from frost damage.
10. Joints to arch barrels shall be "struck flush" as work proceeds.
11. Joints, other than those to arch barrels, shall be finished to give "bucket handle" or "weathered" joint as work proceeds. Selection shall be made to match the existing pointing.

**2490 AR      Drilling and Coring**

1. Where required specifically on the drawings, holes shall be formed by diamond core drilling or a similar system which allows the face of the core to be retained for re-use. In other circumstances holes may be formed by either diamond core drilling or rotary percussive drilling.
2. The method of forming holes shall be stated in the detailed method statement. The method chosen shall take account of the condition of the structure, the

accuracy required for the hole diameter, position and alignment, and the surface roughness of the hole required.

3. Coring for installation of tie bars shall not deviate from the intended position by more than  $\pm 75$  mm over the total length of hole drilled.
4. Holes shall, wherever reasonably practicable, be formed through bricks or masonry units as applicable and not through joints.
5. New brickwork. The bond between bricks and mortar and tie bars etc. shall not be damaged by the formation of holes. Holes for stitching, pinning and grouting, other than trial drillings, shall be core-drilled only.
6. Holes for stitching, pinning and grouting, other than trial drillings, shall not extend to within 100 mm of the rear face of the brickwork or masonry, as measured along the centreline of the hole. The thickness of brickwork or masonry may be determined by trial drillings.
7. Before grouting and/or insertion of pinning or stitching bars, holes shall be clear of all water, dust and debris.

#### **2491 AR      Grouting Method**

1. Pointing or mortar shall obtain sufficient strength prior to commencement of the grouting operation.
2. The method of grouting and of materials chosen shall ensure that the grout permeates into the brickwork or masonry but minimises leakage and shall take into account the condition of the brickwork or masonry. The method, choice of materials and anticipated grout take shall be included in the detailed method statement. The grout pressure is to be limited to 2 Bars unless otherwise specified by the Supervisor.
3. The amount of grout take shall be closely monitored and recorded. If grout take exceeds that calculated or otherwise anticipated, grouting shall cease. The reason for the amount of grout take shall be investigated and the Supervisor shall be advised of the Contractor's revised proposals. If leakage of grout is anticipated through porous brickwork, a thixotropic stabiliser for cementitious grouts may be used.
4. On completion of the grouting and prior to removal of the grouting tubes, the grout shall be 'locked off' to prevent leakage. The holes shall be pointed up with mortar to match the existing structure. Second stage grouting of stitching bars must include an air release system to ensure that the hole is fully grouted.
5. On completion, grouting tubes shall be removed, and the original cores shall be inserted into the holes and mortared in to match the existing structure.

6. Reference cores, as agreed with the Supervisor, shall be taken both before and after grouting operations to prove the effectiveness of the grout penetration.

**2492 AR      Cleaning of brickwork and masonry and superficial surface repairs**

1. Cleaning and superficial repairs to brickwork and masonry shall be carried out in accordance with BS 8221-1: 2000. Underlying brickwork or masonry shall not be damaged.
2. The method of cleaning of brickwork and masonry and carrying out superficial repairs including details of the nature of the staining or deposits shall be included in the detailed method statement.

**2495 AR      Mortar**

1. **Brickwork structures:** Mortar for new work and re-mortaring shall be cement: lime: sand mortar (1: ½:4).
2. **Stonework structures:** Mortar for new work and re-mortaring shall be cement: lime: sand mortar (1:1:5).
3. Mortar shall be suitable for mechanical pointing. Pre-bagged mortars and proprietary cartridge type mortars may be used with the written approval of the Supervisor.
4. The strength of mortar mix may be altered on receipt of the result of brick strength tests.
5. A proprietary air entraining agent may be added to aid frost resistance to the above where applicable.

**2497 AR      Requirements for vegetation removal at structures**

1. **General**
  - i) Where it is proposed that work be carried out in statutory designated sites, SSSI's, Conservation Areas, tree preservation orders etc., the appropriate Authority shall be notified.
  - ii) The Contractor shall consult a BASIS approved contractor as early as is practicable to agree an appropriate strategy for the application of the herbicide as required by the contract.
  - iii) Vegetation on structures or in locations that may affect the stability of the structure shall be cut down and where practicable removed.

- iv) Any damage to brickwork or masonry caused by vegetation removal shall be made good.
- v) Should the removal of vegetation threaten the stability of any part of the structure, an exclusion zone for personnel is to be created beneath the area being worked upon and maintained until the work is complete.

## **2. Tree Removal**

- i) All tree work shall be carried out by competent and where applicable certified, contractors' personnel in accordance with BS 3998, BS 7370 and Forest Industry Guides as applicable.
- ii) The contractor's attention is drawn to the sensitive nature of the work with adjacent landowners and the general public.
- iii) Tree felling shall be carried out in a controlled manner to ensure that trees fall away from property and equipment.

## **3. Stump Treatment**

- i) All tree, shrub and scrub stumps shall be treated to prevent re-growth.
- ii) A blue water-soluble dye shall be added to the herbicide at a rate of 1.0 ml to 10 litres of herbicide or other rate recommended by the manufacturer to ensure identification of treated stumps.
- iii) Stumps shall be treated immediately after cutting and when dry weather is expected. If re-growth occurs, the stump shall be re-cut to provide a new cut face, and the treatment shall be repeated.

## **4. Herbicides**

- i) Herbicides shall be approved by the Department of environment, food and rural affairs (DEFRA) appropriate to the proposed use, and recommended by Natural England, the Countryside Council for Wales or the Scottish Natural Heritage appropriate to the location. Herbicides to be used in the vicinity of a body of water shall be recommended by the Environment Agency, Water Authority or Scottish Environment Protection Agency as applicable. The choice of herbicide shall take proper regard of any necessity to consider the selective, or the toxic nature of such herbicides.
- ii) Application of herbicides shall be confined to the areas specified. Spillage or spray drift of the material on to any other area shall be prevented. Herbicides shall not be applied in wet or windy conditions, or stored, mixed or used in the vicinity of any watercourse or other body of water.
- iii) Refer to Clause 202SR part 4.

## 2607 AR      **Painting of Bridge Numbers**

1. The Contractor shall mark the identity of the structure in two prominent positions as directed by the Supervisor. In all other cases where the Supervisor has not predetermined the location the Contractor will install the structure identity markers in the following positions:
2. Location of the Structure Identity:
  - i) One number on the road or track formation side of the bridge parapets
  - ii) One number on the face of one of the abutments or piers
3. Information Contained on Markings:
  - i) All bridge markings must include the following:
  - ii) Engineer's line reference [ELR] and the **bridge number or mileage** (if no number exists) and be black lettering 50mm high on a white background **300mm wide by 210 high** as shown below.



4. The Contractor on award of the contract shall submit his painting proposals including paint type and method of application to the Supervisor for his consideration / approval.

## 2608 AR      **Site Investigation Requirements if Cradle Access is Proposed**

1. Should the Contractors method of access include for the use of cradles supported off the old trackbed the following is to be carried out to prove the competence of the supporting structure and identify defects or unacceptable structural details such as stone slabs or vaulted construction.
2. A minimum of 3 trenches located transversely across the line of the proposed runways are to be excavated in positions to be agreed by the Supervisor. The trenches are to be a maximum of 900mm deep where possible. Care to be taken not to damage the existing bridge or waterproofing to the bridge. Alternatively, the contractor may use an NDT method such as ground radar to check for voids. To be confirmed by trial pits. The trenches are to be backfilled and well compacted on completion.

3. A runway beam or support to the track over isolated voids can be provided to maintain the stability of the cradle structure. Calculations are to be provided to confirm its adequacy.

## LIST OF SUBSTITUTE CLAUSES, TABLES AND FIGURES

Note: Clause 202 SR is copyright of Historical Railways Estate, used by Permission.

Clause No.	Title and Written Text
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202 SR	Existing Trees, Stumps and Roots
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1. Existing Trees

The Contractor shall, before commencing any clearing in the areas concerned, clearly mark any trees proposed to be removed for the works under the direction of the Supervisor. The Contractor shall only remove trees and hedges, etc. as approved by the Supervisor. No other trees shall be felled, and care shall be taken to avoid damaging the remaining trees during any felling or other operations. The contractor shall not lop or cut back any other trees near the Works unless agreed by the Supervisor.

2. Protection to Trees

Existing trees to be retained on or adjacent to the Works shall be protected as directed by the Supervisor, any existing protective surrounds to trees on the site shall be preserved unless otherwise directed by the Supervisor.

Should any tree which it is intended to preserve be uprooted, destroyed, or in the opinion of the Supervisor damaged beyond reasonable chance of survival in its original shape due to the Contractor's negligence, then the Contractor shall provide and plant a suitable replacement of the same species and in a similar condition as agreed by the Supervisor. If such replacement trees and shrubs are unobtainable, then other species selected by the Supervisor shall be provided and planted and the Contractor's liability shall continue until the end of the Defect Correction Period.

3. Removal from the Site

The contractors waste management plan should describe the location, method of removal and destination of all site waste. All trees, stumps, roots, bushes which have been removed, shall be taken from the site. Disposal of materials arising from site clearance by burning shall not be permitted.

4. Herbicides

The Contractor shall satisfy the Supervisor that the herbicide contractor is registered by BASIS before the work is permitted to commence on site. All herbicide used shall be non-toxic in normal use to human beings, birds and animals. No watercourse shall be contaminated with herbicide.

The Contractor shall contact BASIS (British Agrochemical Standards Inspection Scheme) for a list of approved herbicide practitioners. Only BASIS registered contractors shall be deemed qualified to specify and apply an appropriate

herbicide. Relevant COSHH data sheets shall be provided to the Supervisor by the herbicide contractor, together with site-specific Method Statements prior to any work being carried out.

**APPENDIX 0/2:<sup>(08/93)</sup> CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT**

**Clause No.      Alteration to be Made**

**202                      Clearing**

**Sub-Clause 6**

1. Materials arising from the site clearance which are not required, or unacceptable for the use in the Permanent Works and not included in Appendix 2/3, shall become the property of the Contractor and shall be disposed of by him either off Site, or if agreed by the Supervisor, on Site in an approved manner. Materials included in Appendix 2/3 shall be carefully dismantled, taken up or taken down, cleaned and retained for re-use, stacked, labelled and protected or loaded, and transported to store as described in Appendix 2/3 and items damaged in the operation shall be replaced.
2. When required in Appendix 2/3, voids left by items that have been removed shall be backfilled immediately in accordance with the appropriate clause in the 600 Series.

**2406                      Masonry Units (Bricks)**

**At end of clause add the following new sub-clauses:**

1. Engineering and facing bricks shall be to durability designation FL and shall be solid without holes or have a frog on one face.
2. Common bricks shall be used internally or for backing. When exposed in finished work common bricks shall be as for facing bricks.
3. Bricks shall have a compressive strength, elastic modulus, water absorption and initial suction characteristics compatible with the existing bricks in the structure. The nominal size and appearance shall match the bricks in the structure.
4. Should the Contractor propose to reuse bricks from other redundant structures, such bricks shall be tested to confirm the characteristics indicated above. Samples shall be provided to the Supervisor for agreement to the inclusion of such bricks in the repair.
5. Bricks from redundant structures shall be in good condition with all old mortar removed.
6. Non-standard bricks shall comply with BS 4729.

**At end of clause add the following new sub-clauses:**

1. Pointing or mastic sealing compounds shall be polysulphide one part gun grade compounds complying with BS EN ISO11600 for joint gaps less than 13 mm. For joint gaps greater than 13 mm up to the maximum of 50 mm the compounds shall be butyl pre-extruded strip mastic or knife grade as appropriate.
2. Samples of the proposed bricks or blocks shall be provided to the Supervisor for acceptance. Samples shall be selected in accordance with the requirements of BS EN 771-1 and 2, as applicable. Bricks delivered to the Site shall be equal in all respects to the accepted samples with quality assurance monitored by sampling.
3. The moisture content of clay bricks shall be controlled before laying ensure that the suction rate is not greater than 2 kg/m<sup>2</sup>/minute. Calcium silicate bricks shall not be wetted without the agreement of the Supervisor.
4. The suction rate of the brick shall not exceed 2 kg/m<sup>2</sup>/minute.
5. Notwithstanding the provisions of the preceding Clauses, where brickwork is required to match and to be bonded with existing brickwork, equivalent sizes of bricks shall be used to those in adjacent brickwork.
6. Imperfect bricks and blocks and over or under burnt bricks shall not be incorporated in any part of the Works and shall be removed from the Site.
7. All walls shall be carried up in a uniform manner and shall be raked back. No toothings will be permitted and no portion raised more than 1.0 metre above another at any one time, nor more than sixteen successive courses raised in one day. Perpendents shall be kept vertical and courses horizontal. All bricks shall be well "battered" with mortar, with cross joints and collar joints solidly filled. In no case shall facework be built overhand.
8. Bricks containing a frog shall be laid with the frog uppermost and filled with mortar.
9. The top surfaces of unfinished brickwork and blockwork shall be protected when work is not in progress, and special care taken to prevent any perforations, cavities etc. becoming filled with water, during periods of rainfall.
10. Adequate splash boards shall be provided while the work proceeds, and from time to time and upon completion, or as directed. The faces of the brickwork, blockwork, and masonry work shall be brushed free of all mortar particles and the whole left neat and tidy.

11. No washing down shall be allowed until such time as the joints are fully set. Hydrochloric acid shall not be used for washing down without the agreement of the Supervisor. Putlog and all other temporary holes shall be carefully filled in and made good with matched bricks and mortar pointing.
12. During inclement weather bricks shall be protected in the stack by waterproof sheeting to keep the bricks relatively dry.
13. Brickwork, except in arch rings shall be jointed and pointed with "weathered" or "bucket handle" joints not exceeding 10 mm thick or to match existing, with the mortar flushed up solid in every course, including all cross and collar joints. Mortar joints in arch rings shall be pointed "flush", including those exposed upon the intrados of the arch. At the removal of the centring, faces of brickwork, as revealed, shall be concurrently scraped and cleaned.
14. Jointing shall be carried out as the work proceeds while the mortar is still green.
15. No re-mortaring shall be carried out working overhand.

## APPENDIX 0/3: LIST OF NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT

Appendix 0/3 is comprised of two lists, A and B, of numbered appendices as follows:

List 'A' is a complete list of the numbered appendices referred to in the Specification for Highway works with those not adopted marked 'not used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

### Guide to types of Numbered Appendices - who compiles/completes

#### Symbol

- (Co) Compiler compiles: Identified in the Notes for Guidance examples by the term 'Sample' included in their title
- (Co/C) Compiler partially compiles, and Contractor completes and returns to Overseeing Organisation
- (Co/T) Compiler partially compiles, and Tenderer completes and returns with Tender
- (C) Contractor completes and returns to Overseeing Organisation
- (I) For Contractor's information only
- (P) This indicates the Appendix is a national pro forma and format must not be altered

List B gives the list of Contract-specific numbered appendices devised for the Contract.

Volume No	Appendix No	Appendix Title
		NONE

**LIST A: List of Numbered Appendices referred to in the Specification for Highway Works**

Volume No.	Completed by	Appx No.	Title
	(Co)	( 0/1	<b>INTRODUCTION</b> Contract-specific Additional, Substitute and Cancelled Clauses, Tables and Figures Included in the Contract
		( 0/2	Contract-specific Minor Alterations to Existing Clauses, Tables and Figures Included in the Contract
		( 0/3	List of contract-specific Numbered Appendices Referred to in the Specification and Included in the Contract
		( 0/4	List of Drawings Included in the Contract
		( 0/5	Special National Alterations of the Overseeing Organisations of Scotland/Wales/Northern Ireland
	(Co) (Co)(C)	( 1/1	<b>PRELIMINARIES</b> NOT USED
		( 1/2	NOT USED
		( 1/3	NOT USED
		( 1/4	NOT USED
		( 1/5	Testing to be Carried out by the Contractor
		( 1/6	NOT USED
		( 1/7	Site Extent and Limitations on Use
		( 1/8	Operatives for the Overseeing Organisation
		( 1/9	Control of Noise and Vibration
		( 1/10	NOT USED
		( 1/11	Temporary Works Design
		( 1/12	Setting Out and Existing Ground Levels
		( 1/13	Programme of Works
		( 1/14	Payment Application
		( 1/15	NOT USED
		( 1/16	Privately and Publicly Owned Services & Supplies
		( 1/17	Traffic Safety & Management
		( 1/18	NOT USED
		( 1/19	Routing of Vehicles
		( 1/20	NOT USED
		( 1/21	NOT USED
		( 1/22	Progress Photographs
		( 1/23	Risks to Health and Safety
		( 1/24	Quality Management System
		( 1/25	NOT USED
		( 1/27	NOT USED

			<b>SITE CLEARANCE</b>
	(Co)	( 2/1	NOT USED
		( 2/2	NOT USED
		( 2/3	Retention of Material Arising from Site Clearance
		( 2/4	NOT USED
		( 2/5	Hazardous Materials
	(Co)	3/1	<b>FENCING</b>
			Fencing, Gates and Stiles
	(Co)	( 4/1	<b>(05/04) ROAD RESTRAINT SYSTEMS (VEHICLE AND PEDESTRIAN)</b>
	(C)	( 4/2	NOT USED
			NOT USED
	(Co)	( 5/1	<b>DRAINAGE AND SERVICE DUCTS</b>
		( 5/2	Drainage Requirements
		( 5/3	NOT USED
		( 5/4	NOT USED
		( 5/5	NOT USED
		( 5/6	NOT USED
		( 5/7	NOT USED
	(Co)	( 6/1	<b>EARTHWORKS</b>
		( 6/2	Requirements for Acceptability and Testing etc. of Earthworks Materials
		( 6/3	Requirements for Dealing with Class U2 Unacceptable Materials (11/04)
		( 6/4	Requirements for Excavation, Deposition and Compaction (Other than Dynamic Compaction)
		( 6/5	NOT USED
		( 6/6	Geotextiles Used to Separate Earthworks Materials
		( 6/7	Fill to Structures and Fill Above Structural Foundations
		( 6/8	NOT USED
		( 6/9	Topsoil, Grass and Turfing
		( 6/10	NOT USED
	(Co)	( 6/11	NOT USED
		( 6/12	NOT USED
		( 6/13	NOT USED
		( 6/14	NOT USED
		( 6/15	Limiting Values for Harm to Human Health and the Environment

			<b>ROAD PAVEMENTS – GENERAL</b>
(Co)	(	7/1	NOT USED
	(	7/2	NOT USED
(Co)(C)(T)(P)	(	7/3	NOT USED
	(	7/4	NOT USED
	(	7/5	NOT USED
	(	7/6	NOT USED
(Co)(C)(T)(P)	(	7/7	NOT USED
	(	7/8	NOT USED
	(	7/9	NOT USED
(C)	(	7/10	NOT USED
	(	7/11	NOT USED
	(	7/12	NOT USED
(Co)	(	7/13	NOT USED
	(	7/14	NOT USED
	(	7/15	NOT USED
	(	7/16	NOT USED
(C)	(	7/17	NOT USED
(Co)	(	7/18	NOT USED
	(	7/19	NOT USED
	(	7/20	NOT USED
(Co)(C)(T)	(	7/21	NOT USED
	(	7/22	NOT USED
			<b>ROAD PAVEMENTS – CONCRETE AND CEMENT BOUND MATERIALS</b>
(T)		10/1	NOT USED
			<b>KERBS, FOOTWAYS AND PAVED AREAS</b>
(Co)		11/1	NOT USED
(Co)		11/2#	NOT USED
			<b>TRAFFIC SIGNS</b>
	(	12/1#	Traffic Signs: General
(Co)	(	12/2	NOT USED
	(	12/3	NOT USED
	(	12/4	NOT USED
(Co)	(	12/5	NOT USED
	(	12/6	NOT USED
			<b>ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS (11/03)</b>
(Co)	(	13/1#	NOT USED
(C)(P)	(	13/2	NOT USED

	(P)	(	13/3	NOT USED
	(Co)	(	13/4	NOT USED
	(C)(P)	(	13/5	NOT USED
	(P)	(	13/6	NOT USED
	(Co/T)	(	13/7#	NOT USED
	(C)(P)	(	13/8	NOT USED
	(P)	(	13/9	NOT USED
				<b>ELECTIRCAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS</b>
		(	14/1	NOT USED
	(Co)	(	14/2	NOT USED
		(	14/3	NOT USED
	(Co/C)		14/4	NOT USED
	(Co)		14/5	NOT USED
				<b>MOTORWAY COMMUNICATIONS</b>
	(Co)		15/1	NOT USED
			15/2	NOT USED
				<b>PILING AND EMBEDDED RETAINING WALLS</b>
		(	16/1	NOT USED
		(	16/2	NOT USED
		(	16/3	NOT USED
		(	16/4	NOT USED
		(	16/5	NOT USED
	(Co)	(	16/6	NOT USED
		(	16/7	NOT USED
		(	16/8	NOT USED
		(	16/9	NOT USED
		(	16/10	NOT USED
		(	16/11	NOT USED
	(Co)	(	16/12	NOT USED
		(	16/13	NOT USED
		(	16/14	NOT USED
		(	16/15	NOT USED
		(	16/16	NOT USED
	(Co)	(	16/17	NOT USED
		(	16/18	NOT USED
				<b>STRUCTURAL CONCRETE</b>
	(Co)	(	17/1	Schedule for the Specification of Designed Concrete
		(	17/2	NOT USED
		(	17/3	Concrete – Surface Finishes
		(	17/4	Concrete General

	(	17/5	NOT USED
	(	17/6	NOT USED
	(	17/7	NOT USED
			<b>STRUCTURAL STEELWORK</b>
(Co)	(	18/1	Requirements for Structural Steelwork
			<b>PROTECTION OF STEELWORK AGAINST CORROSION</b>
(C)(P)	(	19/1	NOT USED
(C)(P)	(	19/2	NOT USED
(C)(P)	(	19/3	NOT USED
(C)(P)	(	19/4#	NOT USED
(Co)	(	19/5	NOT USED
			<b>WATERPROOFING FOR STRUCTURES</b>
(Co)		20/1	NOT USED
			<b>BRIDGE BEARINGS</b>
(Co)		21/1	NOT USED
(Co)		22/1	NOT USED
			<b>BRIDGE EXPANSION JOINTS AND SEALING OF GAPS</b>
(Co)		23/1	NOT USED
(Co)		23/2	NOT USED
			<b>BRICKWORK, BLOCKWORK AND STONEMWORK</b>
(Co)		24/1	Brickwork, Blockwork and Stonework
			<b>SPECIAL STRUCTURES</b>
(Co)	(	25/1	NOT USED
	(	25/2	NOT USED
	(	25/3	NOT USED
(Co)	(	25/4	NOT USED
	(	25/5	NOT USED
			<b>MISCELLANEOUS</b>
(Co)	(	26/1	NOT USED
	(	26/2	NOT USED
	(	26/3	NOT USED
			<b>LANDSCAPE AND ECOLOGY</b>
(Co)(C)(P)	(	30/1	NOT USED
	(	30/2	NOT USED
(Co)		30/3	NOT USED
		30/4	NOT USED
(Co)		30/5	NOT USED
(Co)(C)(P)		30/6	NOT USED
(Co)		30/7	NOT USED
		30/8	NOT USED

	(Co)	30/9	NOT USED
		30/10	NOT USED
		30/11	NOT USED
		30/12	Special Ecological Measures
	(C)(P)	50/1	NOT USED
	(C)(P)	50/2	NOT USED
	(C)(P)	50/3	NOT USED
	(C)(P)	50/4#	NOT USED
	(Co)	50/5	NOT USED

**MAINTENANCE PAINTING OF STEELWORK**

## APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT

### 1. Contract-specific Drawings supplied to the Tenderer.

Drawing No.	Rev.	Drawing Title
B28280-EW-0001	03	STRUCTURE HXH/4A REMEDIAL REPAIRS EXISTING GENERAL ARRANGEMENT
B28280-EW-0002	03	STRUCTURE HXH/4A REMEDIAL REPAIRS REPAIRS TO ELEVATIONS
B28280-EW-0003	03	STRUCTURE HXH/4A REMEDIAL REPAIRS REPAIRS TO SPANS 1, 2 AND 3
B28280-EW-0004	03	STRUCTURE HXH/4A REMEDIAL REPAIRS REPAIRS TO SPANS 4, 5 AND 6
B28280-EW-0005	03	STRUCTURE HXH/4A REMEDIAL REPAIRS REPAIRS TO SPANS 7, 8 AND 9
B28280-EW-0006	03	STRUCTURE HXH/4A REMEDIAL REPAIRS REPAIRS TO SPAN 10 AND INTERNAL PARAPET FACES
B28280-EW-0007	01	STRUCTURE HXH/4A WATERPROOFING INSTALLATION WATERPROOFING DETAILS

**APPENDIX 0/5: SPECIAL NATIONAL ALTERATIONS OF THE OVERSEEING DEPARTMENT OF SCOTLAND/WALES/NORTHERN IRELAND**

The following Additions, Substitutes, Cancellations and minor alterations shall be made:

NONE

## APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE CONTRACTOR

### SERIES 600: EARTHWORKS

#### CLASS 6C Granular Fill

Clause	Test Description	Test Frequency <sup>(f)</sup>	Comments
601 and Table 6/1	Grading	1 per 200 tonnes	-
	10% fines value	1 per 400 tonnes	-
	Optimum mc	1 per 400 tonnes	-
	mc	1 per 200 tonnes	-
	Plastic limit	1 per 400 tonnes	-

#### Compaction of Fills - Method Compaction

Clause	Test Description	Test Frequency <sup>(f)</sup>	Comments
612	mc	1 per 100m <sup>2</sup> of Fill material	The area applies separately to each compacted layer and to each zone where filling is taking place.

#### Topsoil (Material Class 5) and Subsoil

Clause	Test Description	Test Frequency <sup>(f)</sup>	Comments
618	Grading	1 per source	Refer to Appendix 6/8
	pH	1 per source	Refer to Appendix 6/8
	Nutrient content	1 per source	British Standard 3882

**SERIES 1700: CONCRETE**

Clause	Work, Goods or Materials	Test	Frequency	Test Certificate	Comments
1707	Concrete	Cube strength (N)	Reinforced concrete two cubes from 24m <sup>3</sup> or 4 batches whichever represents the lesser volume	Required	
			Mass concrete-two cubes from 50m <sup>3</sup> or 50 batches whichever represents the lesser volume		
			Additional cubes for special purposes		[See also Table NG 17/1]
			2 cubes from each of two samples of each batch		[Tests/samples should be scheduled as required See NG 1707.6]
		Cube strength identity testing as described in Appendix 17/4 (N)	[As required]		[Requirements should be given in Appendix 17/4 as appropriate] [See sub-Clause 1707.2 and Appendix 1/6]
		Density	[As required] 1 per 50m <sup>3</sup>		[Requirements should be given in Appendix 17/1 as appropriate]
		Modulus of elasticity	1 per batch		

## SERIES 2400: BRICKWORK BLOCKWORK AND STONEMWORK

Clause	Work, Goods or Materials	Test	Frequency	Test Certificate	Comments
Series 2400					
2401	Masonry cement			Required (BS EN 413-1)	Quality management scheme applies [see also clause 7.1 and the National annex NB of BS EN 413-1]
		Chloride content	Monthly*		Test to be carried out by the manufacturer and results included on the test certificate
2402	Sand			Required per consignment (BS EN 13139)	
		Chloride content	Monthly*		Test to be carried out by the manufacturer and results included on the test certificate
2403	Water	Tests specified in BS EN 1008	[As required]		
2404	Mortar admixtures			Required (BS EN 934-3 +A1)	
2405	Lime			Required (BS EN 459-1)	
2406, 2412, 2417 & 2471AR	Bricks	Clay	(Soluble salt content Efflorescence Compressive strength Water absorption Initial rate of suction) (BS EN 771-1/TRL Report 447)	Frequency to be agreed with Supervisor	[Tests/samples (in accordance with BS EN 771-1/TRL Report 447) should be scheduled as required]
		Calcium Silicate			Required (BS 187)
2473 AR	Grout	Compressive strength	Frequency to be agreed with Supervisor		

**If new or replacement brickwork is to be used, existing bricks are to be taken from the structure early in the contract and tested in accordance with clause 2471AR to ensure a suitable replacement brick can be sourced and agreed with the Supervisor.**

## APPENDIX 1/7: SITE EXTENT AND LIMITATIONS ON USE

### 1. Extent of the Site

The proposed extent of the site is indicated by the extents of the permanent works shown on drawing B28280-EW-0001 (Rev03).

### 2. Working Areas

The working areas shall be determined by the Contractor and agreed with the Supervisor. **The Contractor shall be responsible for all negotiations with landowners and others regarding access arrangements and site areas.** The extent of the working areas shall include for the area necessary for the Contractor's temporary signing, traffic management and all Temporary Works. The working areas and all access routes used must be handed back at the end of the contract in the same condition as prior to commencement of the contract. The Contractor will be responsible for making all arrangements and applications with the relevant authorities regarding his method of working, road, lane or bridleway closures and diversions etc. The current owner of the land where the Geocell is to be installed could not be identified from the land registry. The Contractor is to identify the landowner and seek permission for the installation of the Geocell.

### 3. Limitations on the Use of the Site

#### Loading Restrictions

There is currently no vehicle access over the deck therefore the loading capacity of the structure for normal traffic is unknown. A stability analysis has been undertaken for typical dumper and tracked excavator load models. The Contractor is to confirm that the deck is suitable to support any plant, construction vehicles or equipment they propose to bring onto the deck that exceeds the approved vehicle loading prior to undertaking the works.

#### Access Restrictions

Vehicular access to the deck is not currently available. A housing development currently prevents access to the south end of the viaduct. The north end of the viaduct is heavily vegetated with mature trees, protected by a preservation orders, established. Large steel plate barriers present at both ends of the structure prevent access to the deck. Early contractor advice indicates that the south approach is the most viable construction access route. The approaches to the structure along the former railway line and surrounding area are subject to a tree preservation order. No trees will be permitted to be trimmed or removed to form access without prior approval via the Tree Preservation Order consent process.

A minor watercourse, 'Hebble Brook', is conveyed beneath the bridleway embankments via a brick arch culvert. The culvert outlet is below Span 6. An additional flood relief arch culvert in poor condition is present below the bridleway embankment and outlets below Span 5.

**The Contractor remains responsible for determining the access to all areas of the structure for undertaking the works. Additionally, the Contractor remains responsible for undertaking an appraisal of the structure to ensure suitability and capacity for their**

**proposed access arrangements and any plant, materials and equipment required to complete the works.**

Refer to Landownership Details in Volume 3 Section 6 for further information regarding surrounding land ownership.

#### Services Restrictions

An overhead BT cable passes through Span 3 (spans numbered north to south in accordance with 2019 detailed examination). A low-pressure gas main, both low and high voltage electricity cables, a BT cable and a water main are buried below the road passing under Span 2. The indicative locations of the overhead and buried services are shown on scheme drawing B28280-EW-0001 Rev 03. Trenches excavated across the full width between the parapets of the viaduct confirmed that there are no buried services within the deck. The Contractor is required to undertake ground radar or CAT and Signal Generator survey of the works area to map out service locations and identify any design clashes or changes since the site investigation was undertaken.

The results of a previous Services Search are provided in Volume 3, Section 8. The Contractor is responsible for verifying the previous services search results and undertaking further searches where required.

The results of a Utility Survey Report undertaken by Central Alliance in January 2023 is provided in Volume 3, Section 8.

#### Highway Constraints

A public road 'Boy Lane' passes below Span 2. No footpaths or significant verges are present on either side of the road.

Bridleway '09/483/1' runs parallel to the west side of the structure. There are no other known public rights of way within the vicinity of the structure.

The Contractor will determine for himself whether any restrictions are imposed by the local authority. The local highways authority is Calderdale Metropolitan Borough Council, and the contact details are as follows:

Street Works,  
Calderdale Council,  
Town Hall,  
Crossley Street,  
Halifax,  
West Yorkshire,  
HX1 1UJ

Telephone: 01422 288002

Email: [streetworksandenforcement@calderdale.gov.uk](mailto:streetworksandenforcement@calderdale.gov.uk)

#### Planning Constraints

The local planning authority, Calderdale Metropolitan Borough Council, were informed of the proposed repair works in December 2020 and were again informed of the Repair

and Waterproofing proposals in April 2023. The Council have failed to respond to any notification and have not provided any comments.

The viaduct does not have listed status and the proposed works are for repairs and waterproofing for the longevity of the structure. The works are to have minimal effect on the appearance of the structure and are not thought to represent any material planning considerations. It is therefore not anticipated that full planning permission will be required.

#### Ecological Constraints

An ecological survey was conducted at viaduct HXH/4a 'Wheatley Viaduct'. It comprised a desktop study and a site survey carried out by ecologists from Jacobs UK Ltd. in July 2020.

HXH/4a was assessed as having features with a high potential to support both roosting and hibernating bats. The structure deck and access routes were assessed as having moderate potential for use by badgers. The deck over the viaduct was assessed as having moderate potential to provide suitable reptile habitat.

Static bat detectors were deployed within the culverts beneath the structure to record survey data during the winter bat hibernation period from in February to March 2023.

Three summer emergence and re-entry surveys were undertaken between May and September in 2022 to confirm the presence of Common Pipistrelle Bat roosts within the spans. A European Protected Species bat licence will be applied for by Jacobs ecologists prior to the works commencing.

A pre-construction walkover with an Ecological Clerk of Works (ECoW) is required to check the access route as land ownership access issues limited previous surveys. The Contractor is to liaise with Jacobs ecologist (Contact – Katy Duff, Email - [katy.duff@jacobs.com](mailto:katy.duff@jacobs.com)) a minimum of four weeks in advance of their proposed start date to allow a suitable trained ECoW to be resourced to undertake the pre-works surveys.

A survey of the deck and proposed access route is required to check for badger setts at any time of the year prior to commencement of works. A winter survey is preferable as less vegetation will be present across the deck.

A Reptile Habitat Suitability Survey of the deck and access route should be conducted at any time of the year. If habitat is found to be suitable to support reptiles, then a two-stage vegetation clearance method will be required under a Precautionary Working Method Statement (PWMS) and ECoW supervision.

Refer to Ecological Memo in Volume 3 Section 7 for further information.

#### 4. Extent Limitations on the use of the Site

The Contractor's attention is drawn to the requirements of Appendix 1/17 (Traffic Safety and Management).

## **APPENDIX 1/8: OPERATIVES FOR THE OVERSEEING ORGANISATION**

The Contractor is to make available when requested a competent person to assist the Supervisor when surveying and measuring.

## APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION

### Noise

1. The Client believes that the following measures would be acceptable, and these are given as a guide; however, the Contractor remains responsible for confirming all restrictions in relation to noise with the Local Authority for submission with their tender. If formal consent to their proposed methods of work is required, then the Contractor is to detail within his proposed methodology and is responsible for gaining the consents and undertaking mitigation in order to minimise noise.
2. The normal working hours within the Site shall be Monday to Friday between 0800 and 1800 hours and Saturday between 0800 and 1300 hours, with no working on public holidays and Sundays. Exceptionally, consent for work outside these hours may be given after any necessary consultation. Seven days' notice is required from the Contractor when seeking such consent.
3. The noise levels (see Note (i) below) scheduled below for periods outside the normal working hours will only be permitted when consent has been given to exceptional working.
4. The ambient noise level, Leq (see Note (ii) below) from all sources when measured 2.0m above the ground one metre from the facade of any occupied dwelling shall either not exceed the appropriate level given in the Schedule or not exceed by more than 3 dB(A) the existing ambient noise level, Leq (see Note (iii) below), at the same location measured over the same period, whichever level is the greater. The maximum sound level at any noise control station shall not exceed the level given in the Schedules in Paragraph 16. Exceptionally the Contractor may be given permission to carry out works which exceed the noise levels in the Schedule, provided that 28 days' notice of the date and timing of these works is given to the Supervisor and the Contractor demonstrates that he intends to take all reasonable measures to mitigate the noise nuisance. After consultations with the Local Authority and any other interested bodies a decision will be given within seven days of receipt of the notice.

Schedule		Total Noise Level at Control Stations		
Period	Hours	Ambient Noise Level, Leq measured at Control Station: dB(A)	Period of Hours over which Leq is applicable	Maximum Sound Level (see Note (iv) below) measured at Control Station: dB(A)
Mondays to Fridays	0800 - 1800	75	12 hours	85
Saturdays	0800 - 1300	75	3 hours	85

#### Notes:

- (i) Noise levels relate to free field conditions. Where noise control stations are located 1 metre from facades of buildings, the permitted noise levels can be increased by 3 dB(A).

- (ii) The ambient noise level, Leq, at a noise control station is the total Leq from all the noise sources in the vicinity over the specified period.
  - (iii) The existing ambient noise level, Leq, at a control station is the total Leq from all the noise sources in the vicinity over the specified period prior to the commencement of the Works.
  - (iv) Maximum sound level is the highest value indicated on a sound level meter which meets the requirements of BS EN 60651 Types 1 or 2 set to SLOW response and frequency weighting A or on an integrating – averaging sound level meter to BS EN 60804.
5. Without prejudice to the Contractor's obligations under the preceding paragraph the Contractor shall comply in particular with the following requirements.
- (a) All vehicles and mechanical plant used for the purpose of the Works shall be maintained in good and efficient working order and shall be fitted with effective integral exhaust silencers.
  - (b) All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use, and ancillary pneumatic percussive tools shall be fitted with integral mufflers or silencers of the type recommended by the manufacturers.
  - (c) Machines in intermittent use shall be shut down in the intervening periods between work or throttled down to a minimum.
  - (d) Where practicable plant with directional noise characteristics shall be positioned to minimise noise at adjacent properties.
  - (e) Static machines shall be sited as far away as practicable from inhabited buildings or other noise sensitive locations.
6. The Contractor shall provide the Supervisor with as much advance notice as possible of any emergency work absolutely necessary for the saving of life or property and the safety of the works or as is required under the terms of the Contract that it is necessary to conduct outside the above normal working hours.
7. The Contractor shall furnish such information as may be required by the Local Environmental Health Officer in relation to noise levels emitted by plant or equipment used or installed on the site or which the Contractor intends to use or install on the site and also afford all reasonable facilities to enable such an Officer to carry out such site noise-monitoring as he may deem to be necessary.
8. The Supervisor shall have the right to order the Contractor to cease forthwith using any item of plant insufficiently silenced or generating noise levels in excess of those specified.
9. Compliance with these conditions and the other requirements of the Contract will not itself constitute any ground of defence against any proceedings instituted under Section 82 of

the Environmental Protection Act 1990 (whereby any occupier of premises may complain to a Magistrate's Court of a noise nuisance).

10. Nothing in this Appendix 1/9 Control of Noise and Vibration absolves the Contractor from the need to comply with the requirements of the Control of Noise at Work Regulations 2005 or the requirements of the Local Authority.

### **Vibration**

1. When requested, the Contractor shall monitor the vibrations induced in any local buildings by the construction of the Works. The vibrations shall be measured by a suitable seismograph or vibration analyser with continuous recording capability. The Contractor shall furnish such information evaluating the effects of vibration as may be requested by the Supervisor and/or the Local Authority in relation to vibration caused by plant or equipment installed on the site.
2. No resultant peak particle velocity measured in any local building shall exceed  $5.0 \text{ mms}^{-1}$ .
3. Nothing in this Appendix 1/9 Control of Noise and Vibration absolves the Contractor from the need to comply with the requirements of the Control of Vibration At Work Regulations 2005 or the requirements of the Local Authority.

## **APPENDIX 1/11: TEMPORARY WORKS DESIGN**

The Contractor is responsible for the design and for checking of all his temporary works.

The Contractor shall, in particular, comply with all relevant requirements of the Construction (Design and Management) Regulations 2015, when undertaking design and installation of temporary works.

Temporary work includes but is not limited to, all shutterings to walls, excavations for access, falsework, scaffolding and the like.

All anticipated temporary works have been noted below, in the Pre-Construction Information in Section 1, Volume 3 – Site Information. The Contractor is responsible for the detailing and undertaking of all temporary works as part of this contract.

### Temporary Works Design Procedure

The process for Form C temporary works acceptance is via National Highways Historical Railways Estate. The Contractor is to provide all completed temporary works designs to HRE for acceptance a minimum of 10 working days in advance of the works.

Jacobs do not provide National Highways Historical Railways Estate with a temporary works technical service and therefore do not provide technical approval for Form C documents. All temporary works designers are however required to liaise with Jacobs, as appointed Principal Designer, and therefore all proposed temporary works should be provided to Jacobs for review a minimum of 10 working days in advance of works.

If the structure / temporary works design necessitates a CATII or CATIII check then this should be procured by the Contractor. If the contractor is unsure as to which category of check is required, then they should seek guidance from National Highways Historical Railways Estate.

Once the Form C is accepted and signed by National Highways Historical Railways Estate, a copy of the certification as well as any future revisions should be sent to the Principal Designer and Supervisor for their information.

In the event that any amendments are required to the temporary works design or temporary works methodology, then the Form C will require revising along with agreement, certification and acceptance from each of the original signatories (unless agreed otherwise by National Highways Historical Railways Estate). A copy should be sent to the Principal Designer and Supervisor.

### Anticipated Temporary Works

- High level access.

The structure is a high multi-span viaduct with numerous repairs required at height to all parts of the structure. The Contractor is required to provide high level access for the repair works to the structure. The Contractor is to provide a method statement within their tender return detailing how high-level access will be safely achieved including all proposed loading and assumptions. All high-level access proposals must be adequate for the anticipated loads associated with operatives, materials and equipment required to complete the works.

- Temporary support to replacement masonry.

The Contractor is to provide details of their proposed method of temporarily supporting replacement brickwork and stonework within their tender return.

- Pollution prevention measures above and adjacent to Hebble Brook.

The Contractor is to provide a method statement detailing the methods they intend to employ to avoid any pollution of the watercourse from repair works.

- Protection measures to the public road beneath Span 2.

Contractor to provide proposals with the tender.

- Temporary access steps on the embankments

Subject to overall access proposals, access steps may be required to descend the embankments at both ends of the viaduct. Temporary access steps down from the bridleway to the foot of the piers may also be required.

## **APPENDIX 1/12: SETTING OUT AND EXISTING GROUND LEVELS**

A joint tactile inspection is to be undertaken by the Contractor and Supervisor at the commencement of the works to investigate hollow sounding areas reported in the arch barrels. If deemed necessary, investigatory core holes will be cored and inspected using an endoscope to confirm the presence and extent of any arch ring separation. Should arch ring separation be found, the extent of cross-stitching and grouting of the affected areas shall be defined by the Supervisor.

All dimensions have been taken from the site survey completed in August 2020. The data should be confirmed by the Contractor where necessary prior to commencing the repair works.

All visible markings associated with the works shall be removed at the end of the Construction Phase.

The Contractor is to verify all structure dimensions, mark up the existing drawing B28280-EW-0001 Rev03 and submit drawings to the Supervisor for acceptance.

## APPENDIX 1/13: PROGRAMME OF WORKS

The Contractor shall provide the programme in the form of a bar chart produced as a result of a 'critical path analysis' and must abide by the constraints below. All events shall be numbered and annotated with earliest and latest event dates.

The contractor is to submit to Jacobs each method statement a **minimum of 10 working days** prior to carrying out the work activity.

### Schedule of Constraints

- (i) Working hours (see Appendix 1/9).
- (ii) The Contractor shall liaise with the relevant local authorities to determine the required notice for any necessary traffic management, including road/bridleway closures and signage for site entrances. The required notice period shall be incorporated in the Contractor's programme for the works. Contact details for the relevant highways authority are listed in Volume 2, Appendix 1/7.
- (iii) The Contractor shall liaise with all surrounding landowners to determine any access, timing or programme restrictions for the works. Any restrictions are to be detailed in the Contractor's tender return, notified to the Supervisor for consideration and incorporated into the Contractor's programme for the works.
- (iv) The Contractor shall allow sufficient time in the programme to arrange access and possession of the site.
- (v) Selection and approval of proposed materials.
- (vi) Ecological constraints noted in Appendix 1/7.
- (vii) If the Contractor proposes to remove trees to form access to the deck then the timescales for applying for and being granted tree preservation consent should be detailed in the Contractor's tender return and programme for the works.

## **APPENDIX 1/14: PAYMENT APPLICATION**

The payment applications submitted to the Client in accordance with the Conditions of Contract by the Contractor shall, whenever dealing with matters covered by the Bills of Quantities, be set out under Part and Section headings similar to those in the Bills of Quantities and shall separately identify each item and specify quantity, unit, rate and value. Items not described in Bills of Quantities but appropriate for inclusion as measured work shall be shown at the end of the relevant section or under section headings as appropriate indicating quantity, unit rate and value. In respect of all other matters referred to in the Conditions of contract the Contractor shall separately show in the statement quantities, units and rates of goods and/or materials and also details of any other matters to which he considers himself entitled. The Contractor shall allow the Client to inspect invoices for goods or materials included in the statement as may be required.

Procedure for payment is as follows:

The Contractor is to submit a valuation of his works to the Supervisor who shall review and agree the value. Once agreed the Supervisor will provide a certificate to the Contractor and the Client. The Client will then raise a receipt number and will submit to the Contractor. The Contractor shall then submit an invoice with the receipt, CPA & BPA number to the address below. The invoice will be paid within 28 days in accordance with the Conditions of Contract.

Invoice address:

Accounts Payable Department  
National Highways  
The Cube  
199 Wharfside Street  
Birmingham  
B1 1RN

## APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES

- 1 A Services search was undertaken in June 2020. This information is included in Volume 3 – Section 5 Services Search Information, for information only.
- 2 The Contractor must satisfy himself as to the accuracy and location of all Statutory Undertakers, Privately and Publicly owned services by undertaking his own services search before undertaking either excavation or other intrusive work into either the structure or the ground.
- 3 The Contractor remains responsible for protecting all services and thus CAT and generator scans shall be undertaken before the works commence on site to establish the type, location, direction and nature of all services affected by the works.
- 4 The Contractor shall determine with the Statutory Undertakers, Privately and Publicly owned Service Companies and Suppliers, property owners and Others the effect of the proposed works on their apparatus.
- 5 The Contractor shall make arrangements with the Statutory Undertakers, Privately and Publicly owned Service Companies and Suppliers, property owners and others concerned for the co-ordination of his work with all work which needs to be done by them or their contractors concurrently with the works.
- 6 The Contractor shall make arrangements with the Statutory Undertakers, Privately and Publicly owned Service Companies and Suppliers, property owners and others concerned for the phasing of all necessary disconnections, diversion and protection of public and private services affected by the works.
- 7 An overhead BT cable passes through Span 3 (spans numbered north to south in accordance with 2019 detailed examination). A low-pressure gas main, both low and high voltage electricity cables, a BT cable and a water main are buried below the road passing under Span 2.

## **APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT**

### **Traffic Safety and Management Requirements**

The Contractor remains responsible for all detailing, applications, provision and maintenance of any traffic management required during all work related to carrying out the repairs. This is to include establishing any site entrances from the public road and potential interfaces with users of the bridleway or access track to the deck.

The Contractor is required to provide adequate signage for the duration of the works and must be in accordance with the Traffic Signs Manual Chapter 8: Roadworks and temporary situations (2009), Parts 1 and 2 'Traffic Signs Manual' and agreed with the Local Authority.

The Contractor is to submit to the Supervisor his detailed traffic management proposals a minimum of 10 working days in advance of the implementation.

All costs shall be included in the Temporary Works sum.

All diversions and closures required for the works shall be agreed with the Local Authority.

Relevant contact details are included in Appendix 1/7.

## **APPENDIX 1/19: ROUTEING OF VEHICLES**

The Contractor shall be responsible for making all arrangements with regards to access to the site and storage areas.

The Contractor is to submit to the Supervisor his proposals for access and storage areas a minimum of 10 working days in advance of the implementation.

The routing of all vehicles, including access and egress routes, and location of storage areas is to be demonstrated and detailed within the Contractor's Construction Phase Plan.

### **Permitted Access Routes to and From the Site**

1. The Public Roads are the only approved approaches to the works for construction traffic which will be permitted. Early contractor involvement has highlighted the south approach as the most suitable Construction access route.
2. The approaches to the structure along the former railway line and surrounding area are subject to a tree preservation order. No trees will be permitted to be trimmed or removed to form access without prior approval via the Tree Preservation Order consent process.
3. The precise location and layout of access points to the Site within these areas will be subject to prior approval of the Supervisor.

### **Movement of Machinery and Plant**

1. The reversing of vehicles must only take place when the vehicles are in a closed section of the highway under the protection of cones, bollards, signs, and barriers and only under the directions of the designated person.
2. Labour, plant and materials are kept within the confines of the Working Area and not stored on the deck of the structure.
3. No item of plant or vehicle used by the Contractor or their Sub-Contractors in carrying out the Works is operated on carriageway lanes open to the public in such a manner that it would disrupt the normal flow of traffic.

The Contractor must provide sleepers or other protection approved by the Supervisor to all drains, ducts or other utilities wherever they require to move plant or vehicles across such drains, ducts or other utilities and must reinstate at their own expense any such drain or duct which becomes damaged or disturbed.

## APPENDIX 1/22: PROGRESS PHOTOGRAPHS

1 At each site location the following photographs shall be taken:

Location	Type	No.	No. of Copies	Aerial / Ground/ Drone	Frequency Required	Remarks
As directed by the Supervisor	Digital Photography - Images	At least 25	1	Ground	On possession of the site	
As directed by the Supervisor	Digital Photography - Images	At least 25	1	Ground	During Construction Works	
As directed by the Supervisor	Digital Photography - Images	At least 25	1	Ground	On completion of the Works	
As directed by the Supervisor	Digital Photography – Timelapse Images	TBC by Contractor	1	Ground	Throughout construction works	Timelapse Overview of site works
As directed by the Supervisor	Digital Photography - Images	At least 25	1	Drone*	On possession of the site before any works	
As directed by the Supervisor	Digital Photography - Video	At least 5 minutes of editable video footage	1	Drone*	On possession of the site before any works commence	Circular site fly round.
As directed by the Supervisor	Digital Photography - Images	At least 25	1	Drone*	On a minimum of three occasions at key construction activities through the Contract as <del>required with</del>	
As directed by the Supervisor	Digital Photography - Video	At least 5 minutes of editable video footage	1	Drone*	On a minimum of three occasions at key construction activities through the Contract as <del>required with</del>	Circular site fly round.
As directed by the Supervisor	Digital Photography - Images	At least 25	1	Drone*	On completion of all of the Works and clearance of	

As directed by the Supervisor	Digital Photography - Video	At least 5 minutes of editable video footage	1	Drone*	On completion of all of the Works and clearance of site.	Circular site fly round.
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\* see note 5 below.

- 2 All photographs shall be taken by a photographer approved by, and from viewpoints agreed with, the Supervisor.
- 3 Photographs are required of all engineering operations during the works including temporary works. All photographs are to be clearly labelled with date and descriptions of operations.
- 4 All activities involving the use of a drone must be planned and managed in accordance with the Design Manual for Roads and Bridges standard **GG 954 Drone Operations** (version current at time of activity) and the appropriate National Annex.
- 5 File types to be issued are as follows:

Document Type	File Type	Distribution Method
Digital Image (handheld camera)	JPEG (georeferenced)	Secure file transfer
Digital Image (Drone)	JPEG (georeferenced)	Secure file transfer
Video (Drone)	MP4	Secure file transfer (or portable hard drive where agreed with the Supervisor)

- 6 All images and video produced by the Contractor under this Contract are the property of National Highways and are not to be shared with third parties without consent of the Client.
- 7 Digital cameras must be able to take images at a minimum resolution of 12 megapixels with an appropriate lens to produce high quality images for record and publication purposes.
- 8 Digital cameras used for taking videos must record with a minimum 4K resolution.
- 9 The Contractor should submit their proposals for photography equipment and settings to the Supervisor 2 weeks before the first use.

## **APPENDIX 1/23: RISK TO HEALTH AND SAFETY FROM MATERIALS OR SUBSTANCES**

- 1 COSHH regulations shall be strictly enforced on handling and use of any hazardous material.
- 2 The Contractor shall take all reasonable steps to prevent members of the public being affected by substances hazardous to health including air or water borne contaminants or any other hazardous substances due to any operation.
- 3 The Contractor informs the Supervisor at all stages of his proposed actions in respect of dealing with hazardous substances. The Contractor provides the Supervisor with copies of his assessments undertaken in accordance with COSHH and other relevant regulations, together with written details of his proposals for implementing the requirements of this Appendix.
- 4 Monitoring to be undertaken by Contractor. Workers and in particular ground workers should be vigilant. Should soils appear to be contaminated or give off unusual odours the advice of a specialist should be sought to identify the cause and advise on the appropriate measures to be taken to deal with the affected soils if necessary.
- 5 The Contractor makes available all necessary personal protective equipment and other safety equipment necessary for the protection of persons who may be exposed to hazardous substances in connection with the Works. The Contractor ensures that all of his staff are fully trained in the use of the equipment and that the appropriate equipment is used by such persons when there is a risk of exposure to substances hazardous to health.
- 6 Eating, drinking and smoking should be confined to suitable messing areas with appropriate washing facilities provided.

Note: smoking is not permitted in public places and in workplaces, offices, rooms, or cabins, or in cabs or bodies of vehicles used at work.

- 7 The Contractor shall comply with the requirements of Schedule 2 - Welfare facilities of the HSE publication L153 - Managing Health and Safety in Construction; Guidance to the CDM Regulations 2015.
- 8 The Contractor should assume that the existing metallic paint on the large steel plate barriers present at both ends of the structure contain lead. The Contractor shall ensure that their works methodology and associated documentation satisfies the requirements contained within the Control of Lead at Work Regulations 2002 Approved Code of Practice and guidance.

### **Monitoring to be undertaken by the Contractor**

1. The Contractor must prepare and maintain a register of all substances hazardous to health that are brought on to the Site. The Contractor must operate a documented system to control the issue and use of such material in connection with the Works subject to the agreement of the Supervisor.

2. Compliance with the requirements of this Appendix shall not in any way relieve the Contractor of their statutory obligations.

## **APPENDIX 1/24: QUALITY MANAGEMENT SYSTEMS**

1. For requirements for a quality management system, see Section SC 600 of the Scope of the Historical Railways Estate Works Framework and Clause Z17 of the Conditions.

## **APPENDIX 2/3: RETENTION OF MATERIAL ARISING FROM SITE CLEARANCE**

1. All material arising from site clearance, vegetation clearance, damaged broken out brickwork or masonry not suitable for reuse becomes the property of the Contractor, who is responsible for its disposal, with the exception of any remains of Archaeological Value.
2. Dismantled and cut out brickwork or masonry shall be retained for reuse in carrying out repairs to the structure if in good condition and considered suitable for the purpose.
3. No further materials are required to be retained for the Supervisor.

## **APPENDIX 2/5: HAZARDOUS MATERIALS**

- 1 The Contractor is responsible for identifying, excavating, handling, storing and disposing of all hazardous materials encountered during the works.
- 2 The paint system on the steel plate barriers have the potential for lead content.

Reference for working should be made to the Control of Lead at Work (third edition) Regulations 2002 Approved Code of Practice and Guidance.

The Contractor is to provide details of their proposed SSoW for the working with and around lead paint within their tender return.

### **APPENDIX 3/1: FENCING, GATES AND STILES**

1. Temporary fencing is to be provided at the site to prevent unauthorised access for the duration of the works.
2. The Contractor is responsible for specifying, erecting, maintaining, and removing all temporary fencing required for the works and accessing the site.
3. Any fencing within the works footprint required to be removed temporarily is to be reinstated on completion of the works on a like for like basis.
4. Steel plate barriers are present at both ends of the structure deck. Existing barriers, when removed to facilitate access, are to be reinstated following completion of all works.

## APPENDIX 5/1: DRAINAGE REQUIREMENTS

### Proposed Waterproofing Design Overview

1. The waterproofing system is designed to remove rainwater from the deck and prevent ingress of water into the fabric of the structure. Having excavated the existing deck fill to the profile shown on the tender drawings, a layer of cushioning geotextile is laid on the exposed ballast or fill, which has been regulated with sand or other approved granular material, if necessary. The heat-welded waterproofing membrane is then fitted over the geotextile and a further layer of protective geotextile laid over the membrane. Ballast, either existing or new imported ballast, is placed on the geotextile to the depth specified on the drawings.
2. The waterproofing membrane is to connect to the stone string course below the existing parapet walls to either side of the structure using a hammer fix fastener arrangement. At the ends of the viaduct the waterproofing membrane is to connect to new strip foundations installed between the parapets along the line of the steel barriers.
3. A perforated 150mm diameter HDPE pipe is to be laid on top of the membrane at the centre of the deck, along the entire length. The pipe is to be laid to suit the longitudinally graded falls from North to South.
4. An inspection chamber is to be installed to the main longitudinal drainage run above the south abutment. A solid 150mm HDPE pipe will be connected to the inspection chamber with a transverse fall of 1:50 minimum towards the east spandrel face. A 175mm diameter hole is to be cored through the spandrel to facilitate the connection of the solid HDPE pipe to the outside face of the structure.
5. A 150mm diameter cast iron effect aluminium pipe will connect to the HDPE pipe via a flex-seal adaptor coupling. A 92.5° cast iron effect aluminium bend will connect to the pipe leading to a 150mm aluminium rectangular hopper head. The hopper head will fix to the wall using M10 anchor bolts with an embedment length of 90mm.
6. A 150mm diameter cast iron effect solid aluminium downpipe will be connected to the outlet of the hopper and fixed to the pier face by 150mm diameter aluminium brackets. The brackets will be spaced at 1m maximum spacing with less than 500mm distance between pipe couplings and brackets. A 92.5° bend will be connected at the bottom.
7. Water from the structure will be discharged into a 5 x 7m TERRAM Geocell installed at the base of the south east wingwall to aid with erosion control of the slope. The pipe termination detail at the base of the pier is to be agreed on site between the Contractor and the Supervisor.
8. At regular intervals along the main drainage pipe run, nominally 30m, a rodding eye will be installed to allow the clearance of any blockages.
9. The stockpiled existing ballast is then to be reinstated above the drainage system to the depth specified on the drawings and in accordance with the approved method of material

removal and replacement. The ballast is to be screened for organic material before reinstatement.

10. Once in place, testing of the system is to be carried out to ensure it is functioning efficiently.
11. A layer of Layer of 'Terram 1000' or similar approved geotextile will be placed on top of the reinstated deck fill
12. A 150mm layer of imported Class 6C will be placed on top of the geotextile to mitigate further minor vegetation growth.
13. All drainage and waterproofing details are available on drawing B28280-EW-0007.

#### Drainage and Waterproofing Materials Specification:

##### Pipes

1. Drainage pipes for use within the deck waterproofing system shall conform with the following requirements:
  - (i) The pipes shall be HDPE structured wall pipes of 150mm diameter and have a current British Board of Agrément certificate stating that they are suitable for the drainage of surface waters.
  - (ii) The system shall be stored, handled, transported and installed in accordance with the provisions of BS 5955: Part 6: 1980.
  - (iii) The system shall be installed with sealed joints.
  - (iv) The pipe shall have a blue inner wall to facilitate CCTV surveying.
2. The 150mm diameter perforated deck drainage pipes shall have a minimum slot width of 2mm and the area of perforation shall not be less than 3120mm<sup>2</sup> per metre. A suitable product is Polypipe Ridgidrain ADS full circumferentially perforated pipe. The contractor shall specify the slot size/perforation area when ordering the pipes.
3. A 3.7m long solid 150mm diameter HDPE pipe shall be used to convey the surface water from the inspection chamber base through to the inside face of the spandrel wall. An adaptor coupling will be fitted to the inside face of the spandrel to connect to a new 150mm diameter, 1.0m long, aluminium pipe through the cored hole in the spandrel. An additional coupling will connect the spandrel pipe to the rectangular hopper head at the south east wingwall. Additional solid 150mm diameter HDPE pipe, fixings and connections shall be used to convey the outflow from the south east end of the structure to the Geocell. A suitable product is Polypipe Ridgidrain ADS solid pipe.
4. A 150mm diameter cast iron effect solid aluminium downpipe will be connected to the outlet of the hopper and fixed to the pier face by 150mm diameter aluminium brackets no greater than 150mm from the face of the structure. Spacing between the brackets should be no greater than 1m.

## Hopper

The aluminium outfall pipe through the spandrel near the south east wingwall will discharge into a hopper before connecting to the aluminium downpipe. The hopper head is to be a rectangular aluminium cast iron effect hopper head with a 150mm diameter outlet as detailed in the tender drawings.

A hopper head that conforms with the above specification is RWH207 supplied by:

Guttercrest Ltd.  
Victoria Road,  
Oswestry,  
Shropshire  
SY11 2HX

Tel: 01691 663300

Email: [info@guttercrest.co.uk](mailto:info@guttercrest.co.uk)

The Contractor may specify an alternative hopper system which conforms with the above requirements for the consideration of the Supervisor.

## Inspection Chambers

The main longitudinal drainage pipes will connect to a 460mm diameter polypropylene inspection chamber in the centre of the deck adjacent to the barrier at the south end. The base connection will connect to the transverse HDPE pipe towards the north spandrel wall. The additional inlets/outlets are to be blanked off. The inspection chamber is to be connected at the base with the deck waterproofing membrane to ensure the base and outfall pipe towards the south east spandrel are watertight.

1. The inspection chamber will have a ductile iron cover with a double seal and comply with BS EN 124:1994.
2. The inspection chamber and silt trap is to have a 100mm ST4 concrete bedding at the base of the chamber. A 300mm wide, 250mm deep ST4 concrete will be cast around the chamber and the cover frame. The chamber and silt trap will be installed in accordance with manufacturer's instructions.

## TERRAM Geocell

At the south east end of the structure, along the existing embankment slope, the solid aluminium pipe will outfall onto a TERRAM Geocell panel installed within the embankment.

- 1 All existing vegetation will be removed and the top 100mm of the existing slope will be planed and shaped to achieve an even gradient.
- 2 Partially open out the TERRAM Geocell panel and initially pin in place using steel u-bars (or other approved fixings) along the crest of the slope.

- 3 TERRAM Geocell panel to be fully expanded down the slope manually pulling into tension so that the cells are fully open but without undue stress. Several cells around the perimeter should be pinned or infilled to hold the cells in an open and fully expanded position.
- 4 Prior to filling, every cell around the perimeter and generally on an orthogonal grid at 1m centres down and across the slope should be fixed. Spacing of the Geocell fixings are required to be 24 No fixings in a 1 x 1m grid and 64 No around the perimeter. 88No. fixings are to be provided in total as required by the slope gradient and cell size, soil infill depth and the sub grade soil parameters.
- 5 The infill material should be well compacted Class 5B topsoil. The material in the cells should be filled in a uniform manner ensuring there are no localised areas which are overloaded. Placement may be by mechanical or manual means commencing at the crest (top) of the slope and progressing downwards.
- 6 TERRAM Geocells are to be fully filled and covered by a uniform layer of overburden (typically 20mm deep).

A Geocell system which conforms with this specification is the 'TERRAM GEOCELL For Erosion Control' available from:

Fiberweb Geosynthetics Limited  
Blackwater Trading Estate  
The Causway  
Moldon,  
Essex  
CM9 4GG  
England

Tel: 01621 874200  
[info@terram.com](mailto:info@terram.com)

The Contractor may specify an alternative system which conforms with or exceeds the above specification for the consideration of the Supervisor.

#### Rodding Eyes

Rodding eyes are to be fitted to the longitudinal perforated pipe to allow maintenance as per drawing B28280-EW-0007.

1. Rodding eyes to be installed at 30m intervals along the main drainage run, unless stated otherwise on the contract drawings.
2. 600mm square, 150mm deep ST4 concrete surround to be provided to the rodding eyes.
3. Concrete to be cast upon a 1m<sup>2</sup> 1000g visqueen patch.
4. Rodding pipe, 100mm diameter, to be jointed onto perforated pipe at 45-degree angle to allow rodding in the direction of the intended flow of the pipe.

#### Fill Material

1. Pipe bedding and surround material shall be Class 6A Selected 10mm single sized stone to Table 6/1 of the Specification for Highway Works.
2. The backfill which forms the bulk of the drainage blanket shall, if possible, be won from the existing trackbed ballast. Prior to backfilling, this material shall be cleaned by removal of all vegetation, foreign bodies and as much fine materials as can reasonably and to the approval of the Supervisor, be screened from the ballast. Any shortfall in granular backfill shall be supplied as clean imported stone.

In the absence of existing ballast, new granular material shall be imported as instructed by the Supervisor. This shall be Class 6C granular fill in accordance with the Specification for Highway Works.

At high points within the deck drainage, it may be necessary to locally build up fill along the parapet walls to provide cover to the waterproofing membrane joint detail to the parapet wall (see details on drawing B28280-EW-0007). At no point must the top of parapet wall be less than 1.0m from the deck level.

#### Geotextile Material

The geotextile materials used in the drainage blanket shall:

- (i) In both machine and cross machine directions, sustain a tensile load of not less than 5.0kN/m at break and have a minimum failure strain of 10% when determined in accordance with BS EN 10319:1996
- (ii) Have a minimum puncture resistance of 1200N when determined in accordance with BS EN ISO 12236: 2006
- (iii) Have a minimum tear resistance of 200N when determined in accordance with ASTM Standard D4533-85;
- (iv) Have a size distribution of pore openings such that the apparent opening size when determined in accordance with BS EN ISO 12956: 2010 or other appropriate test, is 100 microns;
- (v) Allow water to flow through it, in either direction, normal to its principal plane at a rate of not less than 90 l/m<sup>2</sup>.s under a constant head of water of 100mm and a maximum breakthrough head of 50mm when determined in accordance with BS EN ISO 12958: 2010
- (vi) The geotextile materials used in the drainage blanket shall be stored in compliance with the manufacturer's recommendations. Joining methods shall comply with the manufacturer's recommendations and clause 5.15 of the specification.

#### Waterproofing Layer

A waterproofing system shall be applied to the redundant rail viaduct in order to prevent water ingress and to arrest deterioration of the structure.

1. The waterproofing works shall be carried out using an integrated waterproofing system designed specifically for rail structures. The system shall be based upon a 1.5mm thick, flexible polypropylene sheet membrane.
2. The system should be adaptable so as to accommodate different substrate conditions (including concrete, masonry and backfill materials) and profiles when the works commence on site.
3. All components of the system shall be suitable for use in permanently exposed locations as well as in applications where they may be constantly immersed in water.
4. The waterproofing shall be loose laid and terminated in accordance with the details shown in the tender drawings and the supplier's standard details.
5. The membrane shall be proficiently joined and detailed using industrial hot air welding equipment (minimum seam width to be 40mm) in accordance with the manufacturer's instructions, to provide a completely impervious barrier. No solvent welded seams shall be allowed. The membrane shall be easy to repair using similar welding techniques and capable of being seam welded in wet weather with no resultant loss of integrity. The permanent protection layer should be applied immediately after the membrane is laid and care should be taken at all times to ensure that no damage will occur.
6. The membrane shall be laid sandwiched between two layers of 1000g/m<sup>2</sup> protective non-woven, needle-punched geotextile. Exceptionally coarse substrates which prevent full membrane contact or which present a risk of puncture from the underside, should be blinded with sand prior to laying the base geotextile protection layer.

Membrane 1.5mm thick specification:

Elongation @ Break	>500%	Test Method ASTM D412
Tensile Strength	>12Mpa	Test Method ASTM D412
Tear Resistance	>60kN/m	Test Method ASTM D624
Hardness	80/100 (Shore A)	Test Method ASTM D2240
Brittleness temp.	-40°C	Test Method ASTM D213

Geotextile 1000g/m<sup>2</sup> specification:

Thickness	7.0mm @ 2kPa load
Push Through Load (CBR Pt. 4)	2240N

7. All components of the system shall be provided by one supplier who must be Link-up qualified and operating a Quality System registered to ISO 9001:2000.

Only contractors that are trained and authorised by the supplier of the waterproofing system may install the waterproofing and protection materials.

A system which conforms with this specification is the 'Hytec FPP System' available from:

Stirling Lloyd Polychem Ltd.  
Union Bank  
King Street  
KNUTSFORD  
Cheshire WA16 6EF

Tel: 01565 633111  
Fax: 01565 633555  
E mail: [info@stirlinglloyd.com](mailto:info@stirlinglloyd.com)  
Website: [www.stirlinglloyd.com](http://www.stirlinglloyd.com)

The Contractor may specify an alternative system which conforms with or exceeds the above specification for the consideration of the Supervisor.

Hytec System Components:

1.5mm thick Hytec FPP sheet membrane

GEO 1000 Geotextile Protection

Hytec Termination Components (as per Stirling Lloyd Polychem Ltd's detailed drawings).

**APPENDIX 6/1: REQUIREMENTS FOR ACCEPTABILITY & TESTING ETC., OF EARTHWORKS MATERIALS**

1. The fill material for use in the Contract shall be in accordance with Clause 602.1, 608.1 and Table 6/1, and where a reference is made in Table 6/1 to this Appendix.
2. Class 3 material is not permitted in the Works.
3. Acceptability limits for permitted materials for Table 6/1-1 are shown below. Material shall be acceptable if the appropriate test results lie within the upper and lower limits.

**TABLE 6/1-1: MATERIAL ACCEPTABILITY LIMITS**

Class	Material Property	Acceptability Limits	
		Lower	Upper
6C	Selected Granular Material Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, chalk, well burnt colliery spoil, slag or any combination thereof.  Grading to BS 1377: Part 2 (Selected Well Graded Granular Material)	Tab 6/2	Tab 6/2
		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">                     Refer to Series 600: EARTHWORKS 2.0 Contract Specific Minor Alterations to Existing Clauses, Tables and Figures, for amendments to Table 6/2                 </div>	
	10% fines value	50kN	-
	Moisture content	Optimum mc - 2%	-

OMC is optimum moisture content obtained from BS 1377 Part 4 method 3.4

**TABLE 6/1-1: MATERIAL ACCEPTABILITY LIMITS**

Class	Material Property	Acceptability Limits	
		Lower	Upper
Acceptable excavated material	Selected excavated material from carriageway, parapets and bridge deck.	-	Maximum particle size - 150mm diameter
	10% fines value	50kN	-
	Moisture content	Optimum mc - 2%	-

Notes:

- (a) Moisture content shall be determined on the material passing the 37.5 mm BS sieve.
  - (b) The CBR of any Class 6C material (except where designed to be loosely placed) shall be greater than 15 %
  - (c) The CBR values for Class 6C shall be verified by the Contractor.
1. The Contractor shall be responsible for the classification and confirmation of acceptability of all earthwork materials. This will require trial pitting and testing at the point of excavation for site won materials.

For imported materials, testing shall be carried out at the point of deposition. Testing frequencies are given in Appendix 1/5.

- (i) If for any reason in the Supervisor's opinion, the material has altered its classification or become unacceptable for whatever reason, he may require the Contractor to repeat classification and acceptability testing in accordance with Appendix 1/5.
- (ii) Prior to the excavation and/or placement of materials the Contractor shall provide the Supervisor with a copy of the test results relevant to the material which he intends to use. These results should be submitted to the Supervisor 2 days prior to excavation / placement. Testing for each material shall be of the frequency stated in Appendix 1/5
- (iii) The Contractor shall keep an updated schedule of testing, a copy of which will be submitted to the Supervisor on weekly basis.

This schedule should record the following: -

- Sample number (a unique reference number).
- Sample location (co-ordinated reference point and reduced level).
- Description of the material to be tested.

- Date sampled.
  - Description of tests to be carried out.
  - Date sample dispatched for testing.
  - Date test result received.
2. All imported classes of material shall have chemical constituents falling below the Department of Environment, Food and Rural Affairs' Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGVs) for "Residential with Plant Uptake" end use (series of documents produced by DEFRA) or, where no CLEA values are available, the threshold trigger value for Parks, Playing Fields, Open Space and Landscape Areas and Phytotoxicity as defined by ICRL (1987) A Guidance on the assessment and redevelopment of contaminated land, ICRL 59/83 July 1997. In addition, materials shall be non-leaching in accordance with the Landfill (England and Wales) Regulations 2002 for acceptance at inert landfills.

## **APPENDIX 6/2: REQUIREMENTS FOR DEALING WITH CLASS U2 UNACCEPTABLE MATERIAL**

### **Unacceptable Material Class U2**

Any contaminated material shall be handled with caution and in a safe manner and disposed of to a licensed tip. Refer to Appendix 1/23 for handling of contaminated material.

## APPENDIX 6/3: REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

### Earthworks Requirements

The drawing which gives related earthworks requirements is:

Drawing No	Title	Revision
B28280-EW-0007	Waterproofing Details	01

### Blasting for excavations

Blasting shall not be permitted.

### Cutting faces

Undercutting of cut faces shall be carried out in lengths not exceeding 5 metres.

### Excavation in the Proximity of Services

Excavation of material around existing services shall be carried out in accordance with Health & Safety Guidelines HS(G)47.

### Compaction

The use of the nuclear moisture/density gauge shall be permitted for compliance testing of field dry densities (Clause 612.15) unless otherwise instructed by the Supervisor.

### Benching

Requirements for benching and shaping to natural earthworks faces to receive fill is shown on the Contract Drawings.

### Sequence of Fill

The sequence of fill shall be as level as possible and shall not exceed 150mm.

## **APPENDIX 6/5: GEOTEXTILES USED TO SEPARATE EARTHWORKS MATERIALS**

### **Geotextiles Used in Earthworks**

The drawings which give reference to geotextiles to be used in separating layers are listed in Appendix 6/3.

## APPENDIX 6/6: FILL TO STRUCTURES AND FILL ABOVE STRUCTURAL FOUNDATIONS

Filling of the deck is to be in accordance with the specification. The backfilling must be undertaken evenly throughout the deck so as not cause asymmetrical forces throughout the structure. Care must be taken when backfilling to ensure that the waterproofing system is not damaged in any way. If plant is to cross any drainage pipes while backfilling, adequate cover to the pipe shall be achieved beforehand. The Contractor is referred to CD 533 Determination of pipe and bedding combinations for drainage works for pipe bedding details, alternatively, the pipes are to be plated over.

### Imported Fill above Waterproofing membrane

Reinstated (and imported) fill above the drainage layer, shall comply with Appendix 5/1: Fill Material.

1. Fill to structures and fill above structural foundations is detailed on drawing B28280-EW-0007 Rev01.

The sequence of placing fill shall be designed to keep the surface as level as possible. Layers of fill shall not exceed 150mm depth.

### Maintaining Stability of Multi span Arches

Stability analysis for the structure has been undertaken, see Volume 2, Section 8.

#### 1. Approved Method

The fill must be removed and replaced in **maximum** 150mm deep layers **over the full length of the structure** using the following plant:

- 1 No. Tracked excavator, maximum weight – 8 tonnes
- 1 No 4WD Powerswivel Dumper, 2130mm track, 2480mm wheel base, maximum laden weight – 9.3 tonnes with 2200mm width.

Where practical, plant movements are to be restricted to the centre of the deck cross-section. Caution is to be taken by the Contractor when loading the spandrel walls.

#### 2. Contractor's Alternative Method

If the contractor proposes an alternative method, the Contractor's method of working, including sequence for removal/placing of fill, type of equipment, etc must be included within their tender submission for assessment to ensure that it does not destabilize the structure. No stock piling is permitted on the structure.

The Contractor shall propose an independent suitably qualified professional to undertake this assessment and a completed Form C for Client approval. A blank Form C is provided in Volume 2, Section 7.

Throughout the earthworks on the deck, a monitoring system must be installed and operated to identify any signs of movement of the piers. A visual inspection of the parapets and spandrel walls is to be made at the end of each shift and accurate levels are to be taken on fixed points during and following all excavation and replacement works. Documented evidence of the results is to be kept and a "permission to continue" method of working instigated following satisfactory results from the monitoring.

## **APPENDIX 6/8: TOPSOIL, GRASS SEEDING AND TURFING**

### **1 MATERIALS**

#### **1.1 Imported Topsoil Class 5B**

- (a) Imported topsoil, Class 5B shall be required when stocks of excavated topsoil, Class 5A, are insufficient quantity or of inadequate quality for the areas to receive topsoil.
- (b) Imported topsoil Class 5B shall be agricultural quality obtained from an approved source. It shall comply with BS 3882 (2015) and have pH value of between 5.5 and 7.5. Topsoil shall be good quality medium loam obtained from the top surface of the field and shall be easily moulded when moist. It must be neither too sticky nor leave a smooth polished surface when smeared. It shall be free from chemical or other pollution and not contain stones or flints in excessive quantities and that present must not exceed 50mm in any dimension. It must not include subsoil, excessive quantities of clay, sand, gravel, chalk, or lime, nor may it include rubbish or other extraneous matter, pernicious weeds or couch grass nor roots or top growth of trees or shrubs. No organic material derived from a sewage works will be accepted as topsoil.
- (c) The Contractor shall supply a sample load of topsoil for approval prior to commencing operations. The sample, if approved, shall be set on one side to remain as indicative of the quality required until the topsoiling is completed. Contractor shall allow in his prices for soil analysis tests to be carried out.

### **2 WORKMANSHIP**

#### **2.1 Ground Preparation and Cultivation**

- (a) Preparation of grassed areas shall be carried out only during periods of dry weather and not either during rainfall or when the soil is so wet that to work it would result in the loss of structure.
- (b) All areas shall be cultivated prior to planting using tines and disc harrows to remove compaction to 300mm depth in plant beds. Stones over 25mm in size, perennial weeds and rubbish shall be removed off site and the ground left clean and graded to evenly running falls.
- (c) The spreading of topsoil shall only be carried out in dry weather and ground conditions.
- (d) The Contractor shall not use any topsoil which has been contaminated with sub-soil rubbish, oil-based produces or other materials toxic to plant life.

### **3 HYDROSEEDING**

#### **3.1 General Description of the Works**

The hydraulic seeding works shall comprise of the following: supply all labour, material and equipment for:

- (i) Seedbed cultivation
- (ii) Application of mulch, fertilisers, seeding as per specification
- (iii) Maintenance of site as specified for a maximum period up to the defects date.

#### **3.2 Weather and Ground Conditions**

All the works shall be undertaken only in weather conditions suitable for each operation. Seeding operations should be commenced or should be suspended when the soil is frost-bound, excessively wet, waterlogged, snow covered, or excessively hard and dry.

### **3.3 Programme**

All seeding works must be completed between the beginning of April and the end of September, or in line with the seeding supplier/ manufacturer's guidelines.

All seeding works are to be completed prior to the Section/ Phase 2 Completion Date.

### **3.4 Pesticides**

Apply pesticides in accordance with the Plant Protection Products (Sustainable Use) Regulations 2012 ACOP.

Apply pesticides carefully and strictly in accordance with the manufacturer's recommendations and current legislative requirements.

### **3.5 Weeds**

The Contractor shall control weeds as required by the Specification.

### **3.6 Hydraulic Mulch Seeding – Reinstatement**

The Contractor should allow for one visit at the end of the Defects Period in order to determine that there are no bare patches:

In the event that standards are not met within the Defects Period, the Contractor shall re-sow the parts of the site, as identified by the Supervisor, at his own cost. In all cases the re-seeding will conform to the specification unless otherwise agreed with the Supervisor.

### **3.7 Seedbed Preparation – Heathland & Wild Flora/ Grass Areas**

#### **3.7.1 Seed handling**

When delivered to site seed should be stored in dry, cool (0 to +10°C) conditions out of direct sunlight. All bags should be clearly labelled and should be protected from damage and contamination by substances likely to decrease their germination.

### **3.8 Hydraulic Mulch Seeding**

Hydraulic mulch seeding should proceed as soon as possible after the seedbed has been prepared. The following materials should be mixed and applied with 2-4 litres of water per m<sup>2</sup> to form a homogenous slurry:

Mulch -Wood cellulose or jute fibre @100-150g/m<sup>2</sup>\*

Pigmentation (biodegradable)

Liquid Slow-Release Fertiliser (omit for low nutrient status grass swards) @ 20 - 40 ltr/ha\*

Tackifier - Alginate or gum based @ 3-5g/m<sup>2</sup>\*

Seed as specified @ 10-25g/m<sup>2</sup>\*

\*The lower figures are for topsails and the higher figures are for subsoil's

### **3.8.1 Method of application**

The following procedure applies to mixing the contents of the hydraulic seeding tank:

1. Fill one half of the tank with water and commence agitation
2. Add seed mixture
3. Add mulch gradually as the remainder of the tank is filled with water
4. Add fertilisers (omit for low nutrient swards)
5. Add tackifier
6. Mix tank contents for 5-10 minutes or until the slurry is homogenous
7. Spray evenly onto the soil surface
8. The slurry mixture must be sprayed as soon as possible and should not remain in the tank for longer than one hour.

### **3.9 Standards**

All good and materials used in the execution of this contract shall be produced, as far as practicable, in the United Kingdom or other member country of the EEC.

The Supervisor reserves the right to inspect any materials, delivery notes and orders or to take samples at any time. Any materials not complying with British Standards, or this specification will be rejected.

Where appropriate British Standard Specification or British Standard Code of Practice issued by the British Standards Institution is current, the Contractor is required to ensure that, as the case may be, all goods and materials used or supplied, and all workmanship shall be at least in accordance with that Standard. In all cases the standard of workmanship shall be to the satisfaction of the Supervisor. British Standards which are relevant to the specification re:

BS4428 (1989) General landscape operations.

All works shall be carried out in compliance with this specification, and with BS4428, in so far as it does not conflict with the specification.

## **APPENDIX 6/15: LIMITING VALUES FOR HARM TO HUMAN HEALTH AND THE ENVIRONMENT**

The Contractor remains responsible for protecting all operatives and members of the public from harmful materials encountered during the works.

A Waste Classification Assessment report classified the material above Span 1 as hazardous due to presence of Total Petroleum Hydrocarbons (TPH). No other hazardous materials were identified from the samples tested. Refer to Section 8 of Volume 3 – Site Investigation Report and Survey Data.

Analysis of samples of fill taken from the viaduct deck were undertaken as part of a ground investigation in January 2023. Refer to Section 8 of Volume 3 – Site Investigation Report and Survey Data.

## **APPENDIX 12/1: TRAFFIC SIGNS**

The Contractor shall ensure traffic management proposals meet the requirements of the Traffic Signs Manual Chapter 8: Roadworks and temporary situations (2009), Parts 1 and 2 when entering into or working upon the public highway. All arrangements shall be as agreed with the Local Authority and/ or National Highways.

See Appendix 1/17.

## **APPENDIX 17/1: CONCRETE CLASSIFICATION OF MIXES**

### **Concrete**

Standardised prescribed concrete, in accordance with BS 8500-2, is to be used to provide a secure waterproofing termination connection at the ends of the structure and form the collar and surrounds for inspection chamber and rodding eyes. ST2 concrete will be used to form new strip foundations at both ends. ST4 concrete will be used to form the surrounds, collar and bedding.

.

**APPENDIX 17/3: CONCRETE – SURFACE FINISHES**

- 1 An F2 finish, in accordance with clause 1708, is to be formed on all concrete faces required for the waterproofing termination, unless stated otherwise on the contract drawings.

#### **APPENDIX 17/4: CONCRETE GENERAL**

- 1 The concrete footing below the steel barrier is required to provide a sound surface to terminate the proposed waterproofing membrane. Prescribed concrete mix of ST2 (C10) in accordance with BS 8500-2 is to be used to form the surface (refer to Appendix 17/1).
- 2 Concrete for the surround and protection of the rodding eye surrounds, inspection chamber will be ST4 (C20) and comply with BS 8500-2.
- 3 The Contractor is to propose his concreting methods to the Supervisor for acceptance.

## APPENDIX 18/1: REQUIREMENTS FOR STRUCTURAL STEELWORK

Cintec anchors are required to be installed through the existing voussoir fractures within the arch barrels of the structure and through the fractured pier faces. A pre-works high-level joint inspection will be undertaken by the Supervisor and the Contractor to confirm severity, extent and exact location of the fractures.

### Voussoir / spandrel separation fractures

1. Cintec anchors and cores shall be nominally spaced at 600-900mm centres. Number, spacing and location to be confirmed by Supervisor following joint inspection.
2. Anchors lengths are to alternate between minimum lengths of 1500mm and 2100mm as detailed on drawings B28280-EW-0003 to 0005 (all Rev03) or as otherwise agreed in writing with the Supervisor.
3. Nominal 60mm diameter cores are to be drilled through the arch barrel face.
4. Cintec anchors are to be 30 x 30 x 3mm SHS, to be installed in accordance with the Manufacturer's instructions and standard drawing J20308A/YCE/404.

### Pier Fractures

5. Cintec anchors and cores shall be nominally spaced at 600mm centres. Number, spacing and location to be confirmed by Supervisor following joint inspection.
6. Anchors lengths to stitch fractures in the ends of the pier are to alternate between minimum lengths of 1500mm and 2100mm as detailed on drawing B28280-EW-0002 Rev03 or as otherwise agreed in writing with the Supervisor. Anchor lengths to stitch the fracture in the end of the pier are to be of an appropriate length to suit the width of the pier at the height of installation.
7. Nominal 60mm diameter cores are to be drilled in the end and faces of the pier.
8. Cintec anchors are to be 30 x 30 x 3mm SHS, to be installed in accordance with the Manufacturer's instructions.

Contractor to refer to HRE standard repair drawing J20308A-YCE-404.

## **APPENDIX 24/1: BRICKWORK, BLOCKWORK AND STONEMWORK**

The required brickwork and stonework repairs are shown on drawings B28280-EW-0002 to 0006 (Rev 03) and shall be undertaken in accordance with Series 2400 of the Specification for Highway Works and Appendix 0/1 contained within this contract. The Contractor is to use adequate temporary support systems for the removal and replacement of masonry as detailed within Appendix 0/1 within this contract.

All dismantled and cut out brickwork / stonework shall be retained for reuse in repairing the structure if deemed suitable for the purpose.

Any replacement brickwork and / stonework are to match existing in size and colour and be Class FL frost resistant. Bonding, bed depth and mortar colour are to be the same as existing.

Details of proposed replacement masonry are to be provided to the Supervisor for acceptance early in the contract.

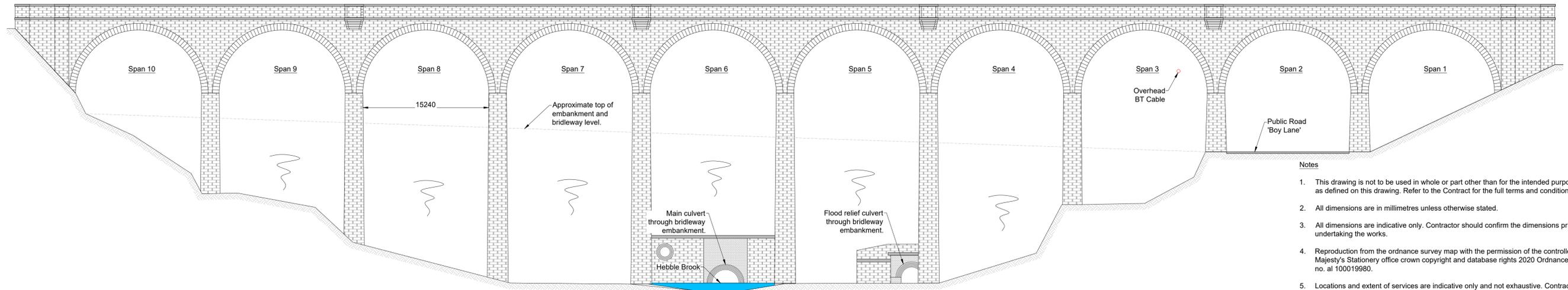
Where 'plastic' repairs have been specified, the colour shall match the colour of the existing masonry. The Contractor is to propose a specification and construction methodology for plastic repair. The 'plastic' repair specification is to be accepted by the Supervisor before incorporating into the works.

## **APPENDIX 30/12: SPECIAL ECOLOGICAL MEASURES**

A Preliminary Ecological Appraisal was undertaken at structure HXH/4a 'Wheatley Viaduct' in July 2020. The aim of the survey was to determine any potential ecological constraints to the works.

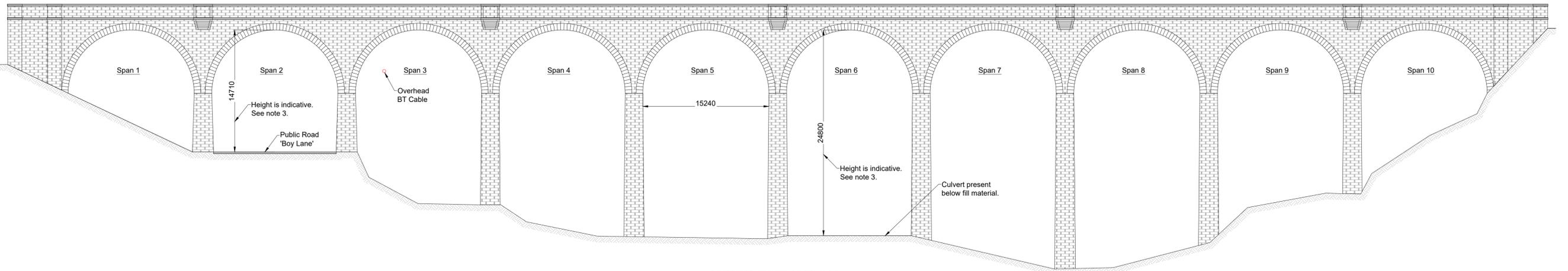
For details of the Ecological aspects and restrictions of the site and works, please refer to the enclosed Ecological Appraisal in Volume 3, Section 7.

## 2. DRAWINGS



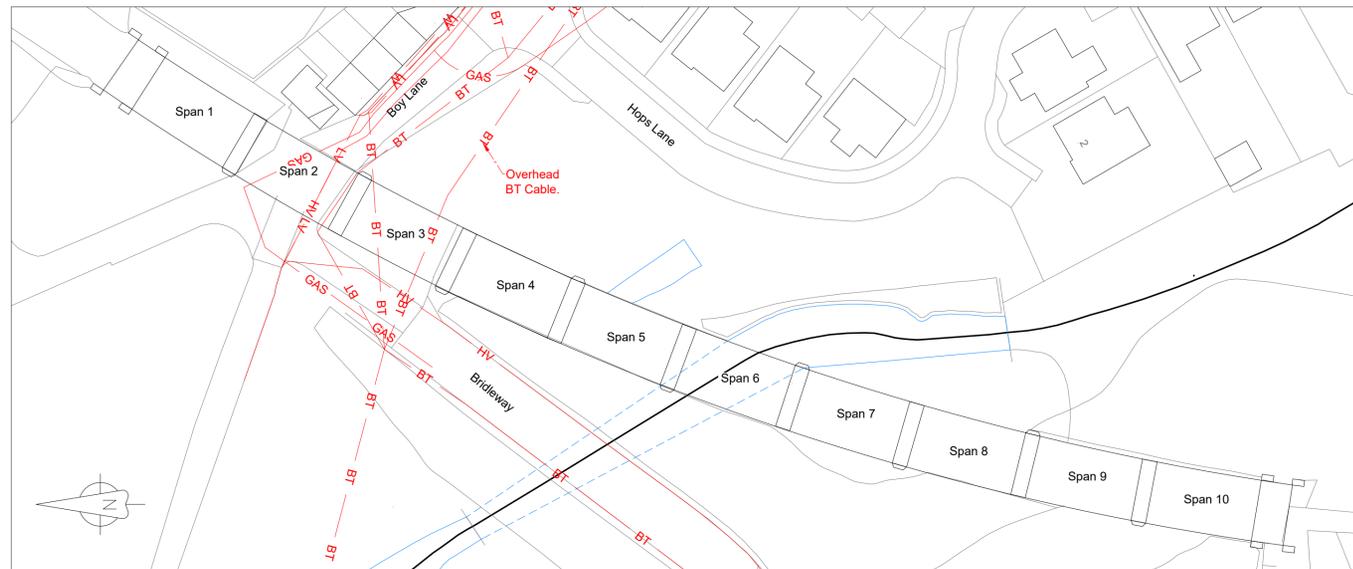
**EAST ELEVATION**  
SCALE 1:250

- Notes**
1. This drawing is not to be used in whole or part other than for the intended purpose and project, as defined on this drawing. Refer to the Contract for the full terms and conditions.
  2. All dimensions are in millimetres unless otherwise stated.
  3. All dimensions are indicative only. Contractor should confirm the dimensions prior to undertaking the works.
  4. Reproduction from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationery Office copyright and database rights 2020 Ordnance Survey licence no. al 100019980.
  5. Locations and extent of services are indicative only and not exhaustive. Contractor to confirm exact location, nature and owner of any services within the area affected by the permanent or temporary works.
  6. Date of site survey :- 03/08/2020.
  7. Curvature and skew of the structure has been omitted from the elevation drawings for clarity.

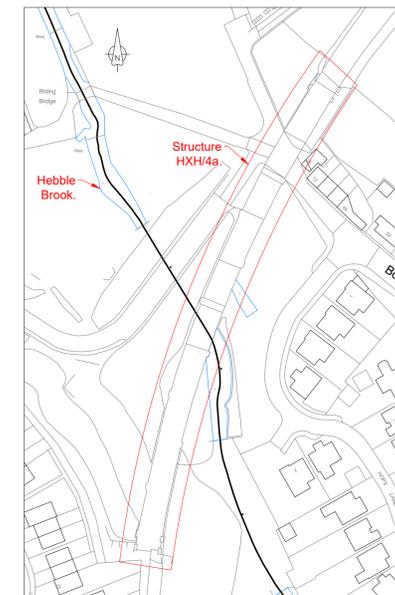


**WEST ELEVATION**  
SCALE 1:250

**FOR CONSTRUCTION**



**PLAN**  
SCALE 1:500



**LOCATION PLAN**  
SCALE 1:1250

03	29/03/2021	For Construction	CD	JCW	JCW	NR
02	22/02/2021	Form B	CD	JCW	JCW	NR
01	22/12/2020	Form A	CD	JCW	JCW	NR
Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd

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Client

Historical Railways Estate on behalf of the DfT

Project

HRE Works Framework

Drawing title

**STRUCTURE HXH/4a  
REMEDIAL REPAIRS  
EXISTING GENERAL  
ARRANGEMENT**

Drawing status **FOR CONSTRUCTION** Suitability

Scale AS NOTED @ A1 DO NOT SCALE

Jacobs No. B28280DA/EW Rev

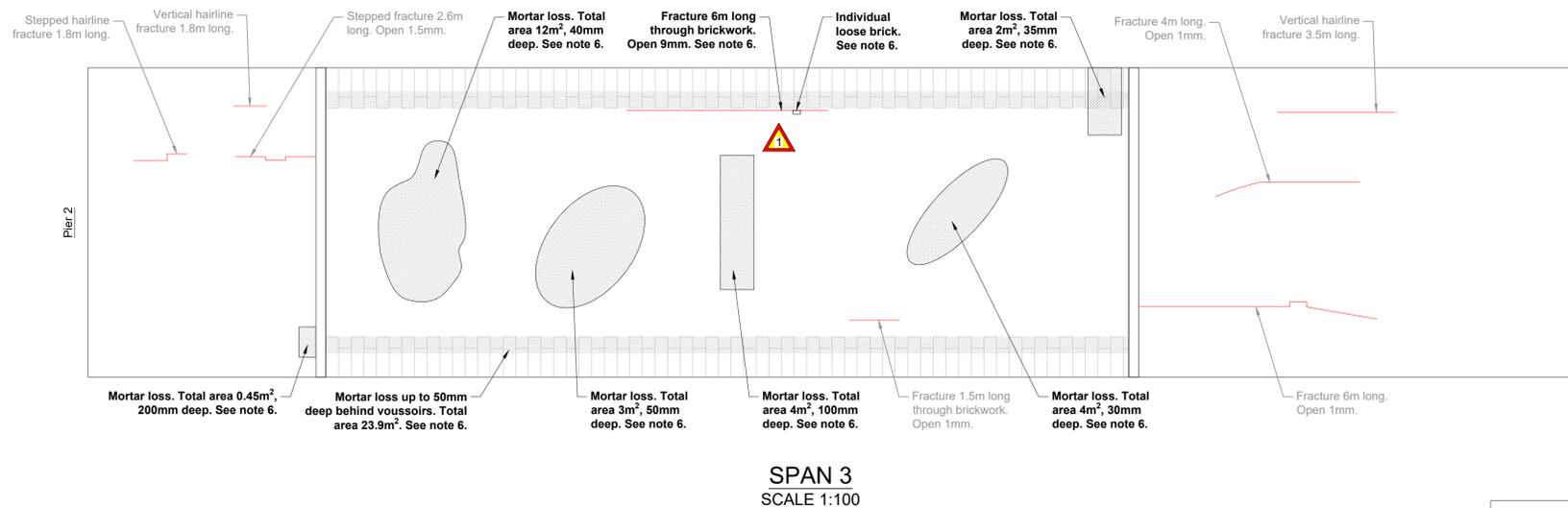
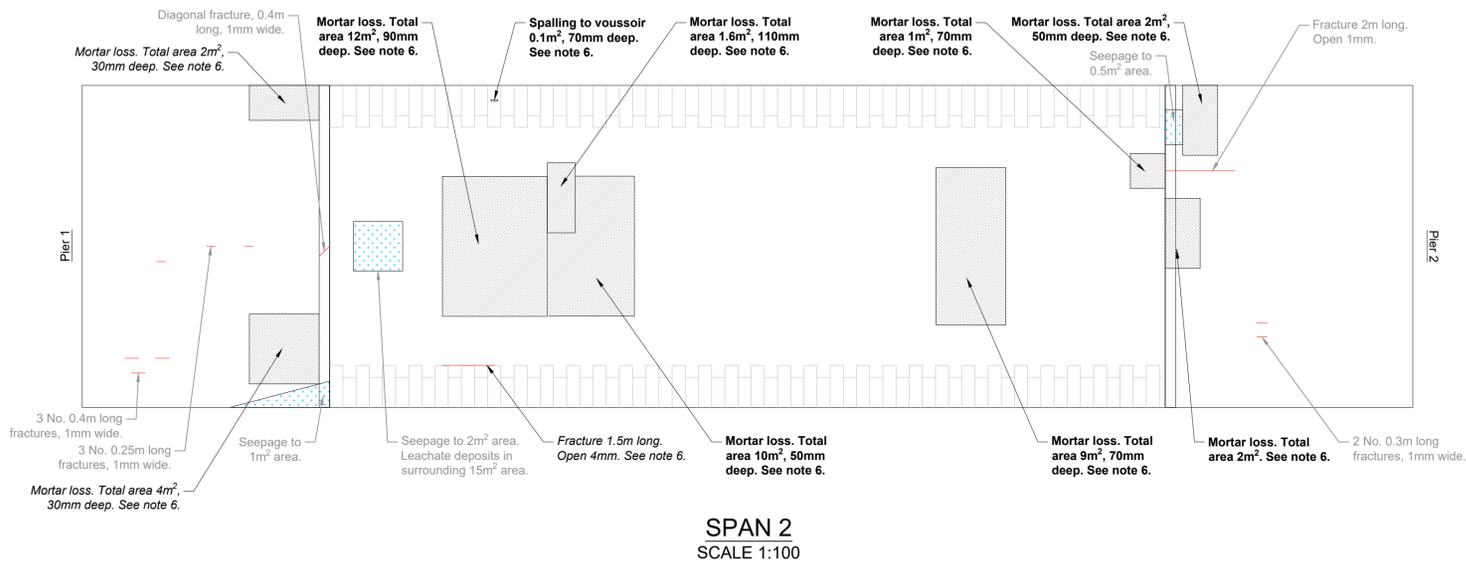
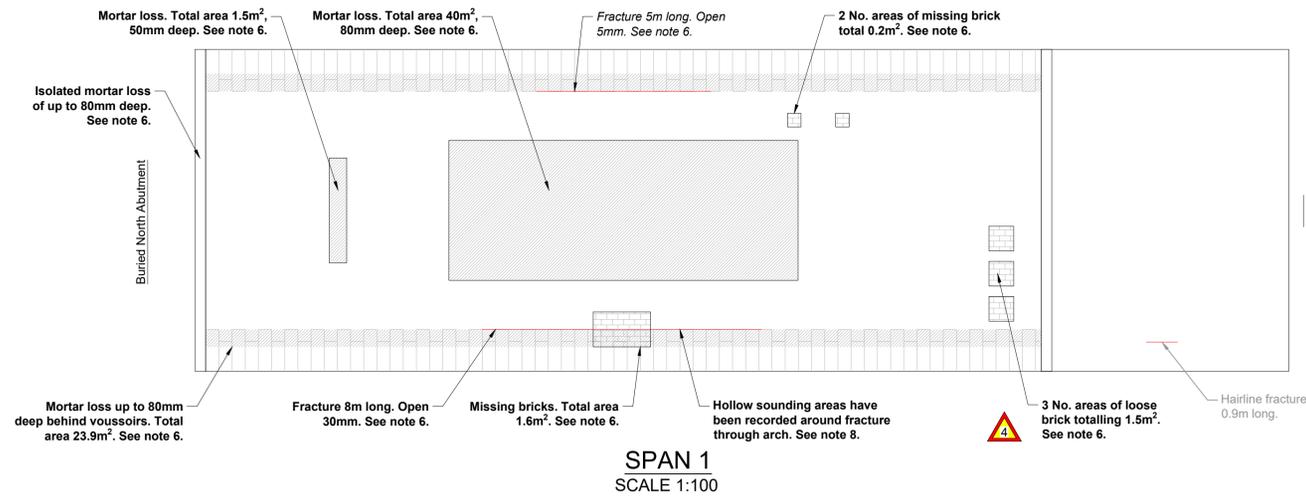
Client No. N/A 03

Drawing number  
**B28280-EW-0001**

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HEALTH, SAFETY AND ENVIRONMENTAL BOX	
Key	In addition to the hazards/risk normally associated with the types of work detailed on this drawing, note the following:
Hazard Log Ref.	<b>DESCRIPTION OF HAZARD</b>
1	Poor condition of the structure resulting in deterioration or collapse during the works.
4	Collapse of structure or falling masonry during repair operations to loose or defective brickwork.
<b>CONSTRUCTION RISKS</b>	
In addition to the hazards/risk normally associated with the types of work detailed on this drawing, take note of the above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement. Details of the design mitigation measures and residual risks are contained within the HERRR.	



**Notes**

- This drawing is not to be used in whole or in part other than for the intended purpose and project as defined on this drawing. Refer to the Contract for full terms and conditions.
- All dimensions are in millimetres unless stated otherwise. Dimensions are indicative only. Contractor should confirm dimensions prior to undertaking works.
- Locations and extent of services are indicative only and not exhaustive.
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- Spalled areas: All spalled stonework is to be dressed back prior to a joint inspection to agree the appropriate repair. Typical repair methods include:
  - 'Plastic' repair for areas up to 0.5m² and 100mm deep (subject to agreement with the Supervisor)
  - Cut out and replace stone for areas and/or depths larger than the above

Mortar loss, fractures and open joints: All joints with mortar loss / fractures are to be raked out and re-mortared.

High Priority	<b>Bold</b>
Medium Priority	<i>Italics</i>
Low Priority	Grey

Stone	Spalling		Mortar Loss		Fracture	
	High	Medium	High	Medium	High	Medium
High	>45mm	>35mm	>35mm	>5mm	>5mm	>5mm
Medium	30-45mm	20-35mm	20-35mm	2-5mm	2-5mm	2-5mm
Low	<30mm	<20mm	<20mm	<2mm	<2mm	<2mm

Stone	Spalling		Mortar Loss		Fracture	
	High	Medium	High	Medium	High	Medium
High	>35mm	>20mm	>20mm	>5mm	>5mm	>5mm
Medium	20-35mm	10-20mm	10-20mm	2-5mm	2-5mm	2-5mm
Low	<20mm	<10mm	<10mm	<2mm	<2mm	<2mm

Spandrel Separation Fractures: The exact length of the fractures are to be confirmed on site by the Contractor and Supervisor. 30x30x3 SHS Cintec Anchors to be used. 2No. sizes of anchors will be used with the shorter being min 1500mm and the larger min 2000mm. The anchors to be used alternately, at 600-900mm centres (to be confirmed with the Supervisor). Cintec Anchors are to be provided and installed in accordance with the standard drawing J20308A-YCE-404.

All defects in grey are for information only and do not need to be repaired as part of the works.

- All vegetation on the structure is to be removed. Trees growing adjacent to the structure with the potential to cause deterioration to the masonry are also to be removed.
- Hollow sounding areas have been reported in the arch barrels. A joint tactile inspection by the Contractor and Supervisor of the arch barrels is to be undertaken at the commencement of the works. If deemed necessary, investigatory core holes will be cored and inspected using an endoscope to confirm the presence and extent of any arch ring separation. Should arch ring separation be found, the extent of cross-stitching and grouting of the affected areas shall be defined by the Supervisor.

**FOR CONSTRUCTION**



03	29/03/2021	For Construction	CD	JCW	JCW	NR
02	22/02/2021	Form B	CD	JCW	JCW	NR
01	22/12/2020	Form A	CD	JCW	JCW	NR
Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd

**JACOBS**  
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Tel: +44 (0)1904 924 950  
WEBSITE: WWW.JACOBS.COM

Client: Historical Railways Estate on behalf of the DfT

Project: HRE Works Framework

Drawing title: **STRUCTURE HXH/4a  
REMEDIAL REPAIRS  
REPAIRS TO SPANS 1, 2 AND 3**

Drawing status: **FOR CONSTRUCTION** Suitability

Scale: AS NOTED @ A1 DO NOT SCALE

Jacobs No. B28280DA/EW Rev

Client No. N/A Rev **03**

Drawing number: **B28280-EW-0003**

THIS DRAWING IS TO BE READ IN CONJUNCTION  
WITH THE 2019 DETAILED EXAMINATION REPORT

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**Notes**

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  - Cut out and replace stone for areas and/or depths larger than the above

Mortar loss, fractures and open joints: All joints with mortar loss / fractures are to be raked out and re-mortared.

High Priority	<b>Bold</b>
Medium Priority	<i>Italics</i>
Low Priority	Grey

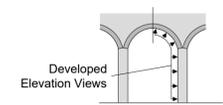
Priority	Spalling	Mortar Loss	Fracture
High	>45mm	>35mm	>5mm
Medium	30-45mm	20-35mm	2-5mm
Low	<30mm	<20mm	<2mm

Priority	Spalling	Mortar Loss	Fracture
High	>35mm	>20mm	>5mm
Medium	20-35mm	10-20mm	2-5mm
Low	<20mm	<10mm	<2mm

**Spandrel Separation Fractures:** The exact length of the fractures are to be confirmed on site by the Contractor and Supervisor. 30x30x3 SHS Cintec Anchors to be used. 2No. sizes of anchors will be used with the shorter being min 1500mm and the larger min 2000mm. The anchors to be used alternately, at 600-900mm centres (to be confirmed with the Supervisor). Cintec Anchors are to be provided and installed in accordance with the standard drawing J20308A-YCE-404.

All defects in grey are for information only and do not need to be repaired as part of the works.

- All vegetation on the structure is to be removed. Trees growing adjacent to the structure with the potential to cause deterioration to the masonry are also to be removed.
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Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd
03	29/03/2021	For Construction	CD	JCW	JCW	NR
02	22/02/2021	Form B	CD	JCW	JCW	NR
01	22/12/2020	Form A	CD	JCW	JCW	NR



Client: Historical Railways Estate on behalf of the DfT

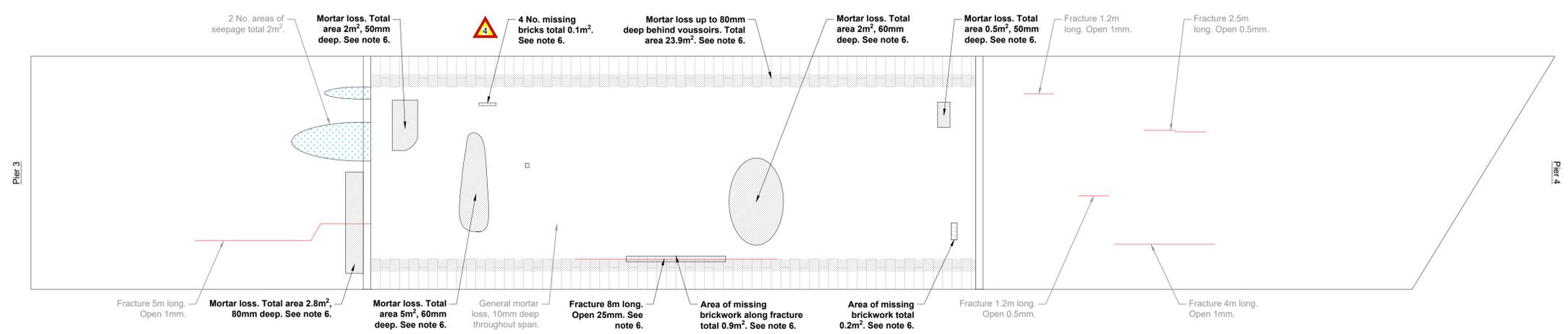
Project: HRE Works Framework

Drawing title: STRUCTURE HX/H/4a  
REMEDIAL REPAIRS  
REPAIRS TO SPANS 4, 5 AND 6

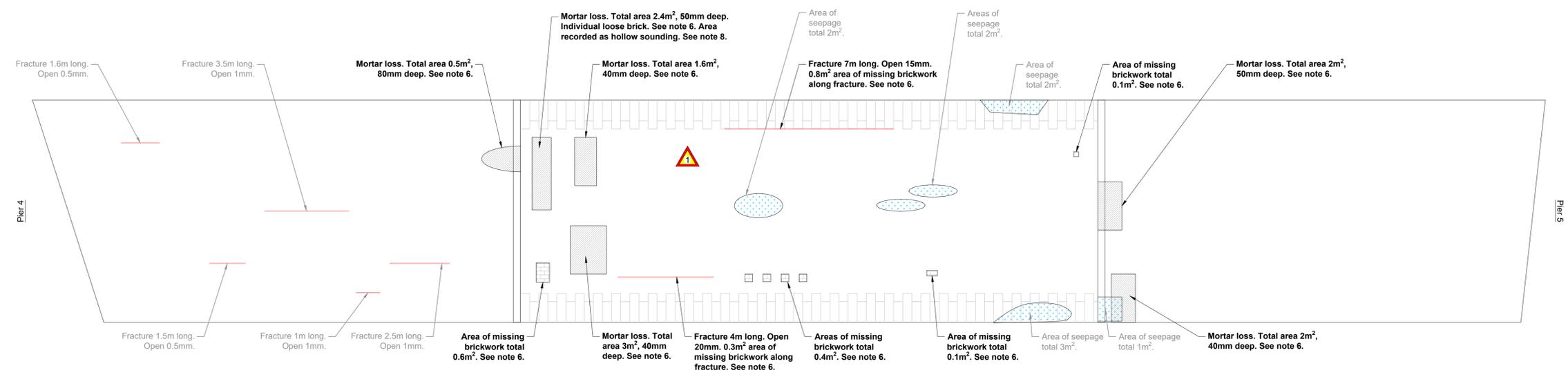
Drawing status	FOR CONSTRUCTION	Suitability	
Scale	AS NOTED @ A1	DO NOT SCALE	
Jacobs No.	B28280DA/EW	Rev	03
Client No.	N/A		

Drawing number: B28280-EW-0004

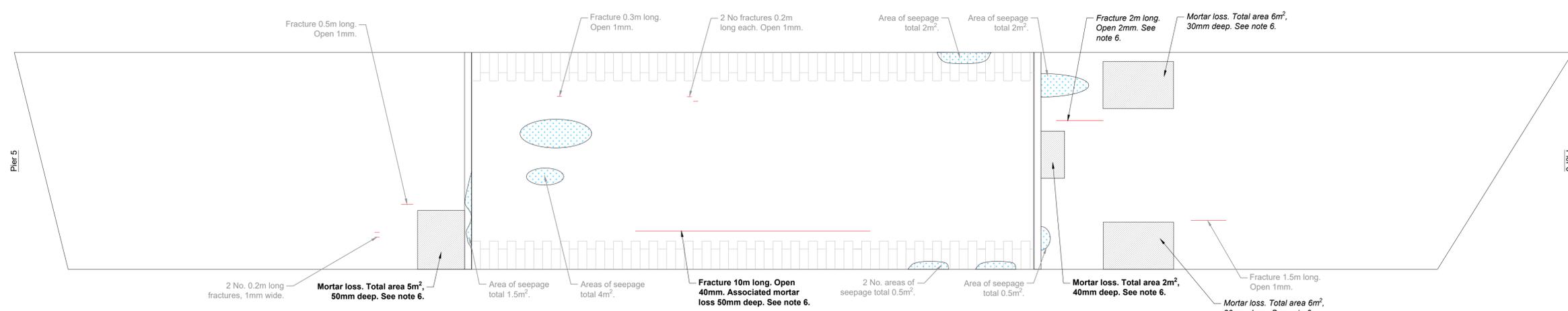
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**SPAN 4**  
SCALE 1:100



**SPAN 5**  
SCALE 1:100

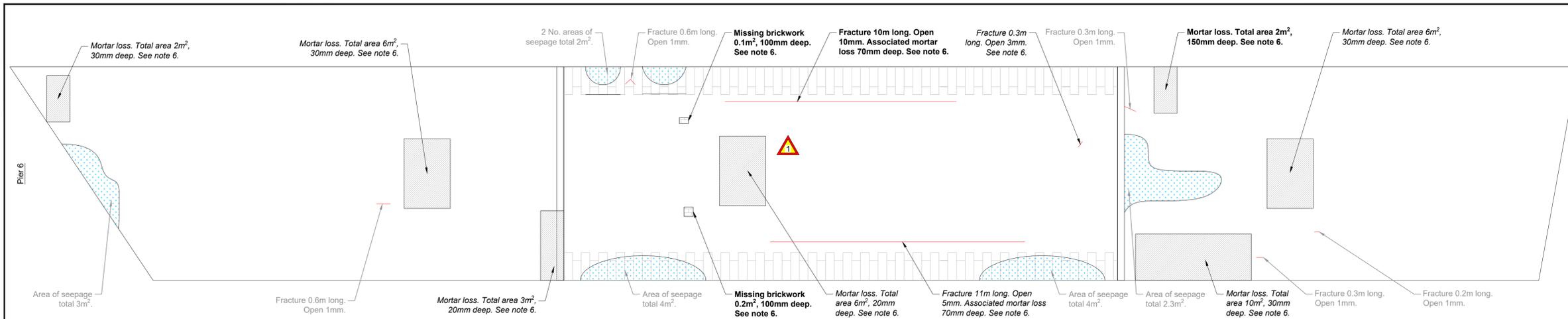


**SPAN 6**  
SCALE 1:100

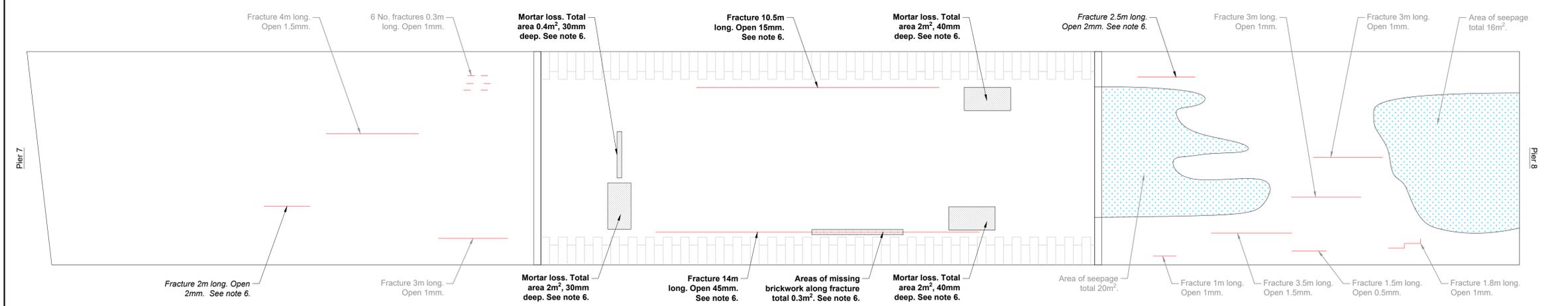
HEALTH, SAFETY AND ENVIRONMENTAL BOX	
In addition to the hazards/risk normally associated with the types of work detailed on this drawing, note the following:	
Hazard Log Ref.	DESCRIPTION OF HAZARD
1	Poor condition of the structure resulting in deterioration or collapse during the works.
4	Collapse of structure or falling masonry during repair operations to loose or defective brickwork.
CONSTRUCTION RISKS	
In addition to the hazards/risk normally associated with the types of work detailed on this drawing, take note of the above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement. Details of the design mitigation measures and residual risks are contained within the HERRR.	

**FOR CONSTRUCTION**

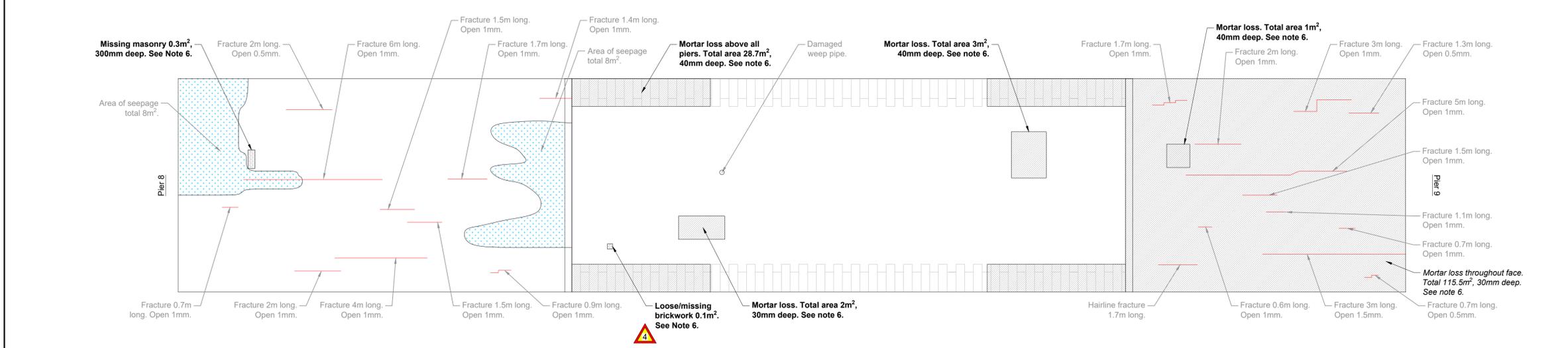
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE 2019 DETAILED EXAMINATION REPORT



SPAN 7  
SCALE 1:100



SPAN 8  
SCALE 1:100



SPAN 9  
SCALE 1:100

- Notes**
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    - "Plastic" repair for areas up to 0.5m<sup>2</sup> and 100mm deep (subject to agreement with the Supervisor)
    - Cut out and replace stone for areas and/or depths larger than the above

Mortar loss, fractures and open joints: All joints with mortar loss / fractures are to be raked out and re-mortared.

High Priority	<b>Bold</b>
Medium Priority	<i>Italics</i>
Low Priority	Grey

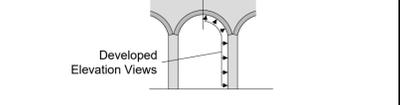
Zone	Spalling		Mortar Loss		Fracture	
	High	Medium	High	Medium	High	Medium
High	>45mm	>35mm	>35mm	>5mm	>5mm	>5mm
Medium	30-45mm	20-35mm	20-35mm	2-5mm	2-5mm	2-5mm
Low	<30mm	<20mm	<20mm	<2mm	<2mm	<2mm

Zone	Spalling		Mortar Loss		Fracture	
	High	Medium	High	Medium	High	Medium
High	>35mm	>20mm	>20mm	>5mm	>5mm	>5mm
Medium	20-35mm	10-20mm	10-20mm	2-5mm	2-5mm	2-5mm
Low	<20mm	<10mm	<10mm	<2mm	<2mm	<2mm

Spandrel Separation Fractures: The exact length of the fractures are to be confirmed on site by the Contractor and Supervisor. 30x30x3 SHS Cintec Anchors to be used. 2No. sizes of anchors will be used with the shorter being min 1500mm and the larger min 2000mm. The anchors to be used alternately, at 600-900mm centres (to be confirmed with the Supervisor). Cintec Anchors are to be provided and installed in accordance with the standard drawing J20308A-YCE-404.

All defects in grey are for information only and do not need to be repaired as part of the works.

- All vegetation on the structure is to be removed. Trees growing adjacent to the structure with the potential to cause deterioration to the masonry are also to be removed.
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Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd
03	29/03/2021	For Construction	CD	JCW	JCW	NR
02	22/02/2021	Form B	CD	JCW	JCW	NR
01	22/12/2020	Form A	CD	JCW	JCW	NR

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Client  
**Historical Railways Estate on behalf of the DfT**

Project  
**HRE Works Framework**

Drawing title  
**STRUCTURE HX/H/4a  
REMEDIAL REPAIRS  
REPAIRS TO SPANS 7, 8 AND 9**

Drawing status	<b>FOR CONSTRUCTION</b>	Suitability	
Scale	AS NOTED @ A1	DO NOT SCALE	
Scale No.	B28280DA/EW	Rev	<b>03</b>
Client No.	N/A		

Drawing number  
**B28280-EW-0005**

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Key	
	<b>HEALTH, SAFETY AND ENVIRONMENTAL BOX</b> In addition to the hazards/risk normally associated with the types of work detailed on this drawing, note the following:
Hazard Log Ref.	<b>DESCRIPTION OF HAZARD</b>
1	Poor condition of the structure resulting in deterioration or collapse during the works.
4	Collapse of structure or falling masonry during repair operations to loose or defective brickwork.
<b>CONSTRUCTION RISKS</b>	
In addition to the hazards/risk normally associated with the types of work detailed on this drawing, take note of the above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement. Details of the design mitigation measures and residual risks are contained within the HERRR.	

**FOR CONSTRUCTION**

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE 2019 DETAILED EXAMINATION REPORT

Key	
<b>HEALTH, SAFETY AND ENVIRONMENTAL BOX</b>	
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Hazard Log Ref.	<b>DESCRIPTION OF HAZARD</b>
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In addition to the hazards/risk normally associated with the types of work detailed on this drawing, take note of the above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement. Details of the design mitigation measures and residual risks are contained within the HERRR.	

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    - Cut out and replace stone for areas and/or depths larger than the above
- Mortar loss, fractures and open joints: All joints with mortar loss / fractures are to be raked out and re-mortared.

High Priority	<b>Bold</b>
Medium Priority	<i>Italics</i>
Low Priority	Grey

	Spalling	Mortar Loss	Fracture
Stone			
High	>45mm	>35mm	>5mm
Medium	30-45mm	20-35mm	2-5mm
Low	<30mm	<20mm	<2mm

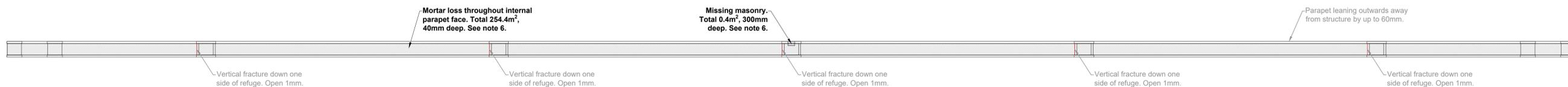
	Spalling	Mortar Loss	Fracture
Brick			
High	>35mm	>20mm	>5mm
Medium	20-35mm	10-20mm	2-5mm
Low	<20mm	<10mm	<2mm

Spandrel Separation Fractures: The exact length of the fractures are to be confirmed on site by the Contractor and Supervisor. 30x30x3 SHS Cintec Anchors to be used. 2No. sizes of anchors will be used with the shorter being min 1500mm and the larger min 2000mm. The anchors to be used alternately, at 600-900mm centres (to be confirmed with the Supervisor). Cintec Anchors are to be provided and installed in accordance with the standard drawing J20308A-YCE-404.

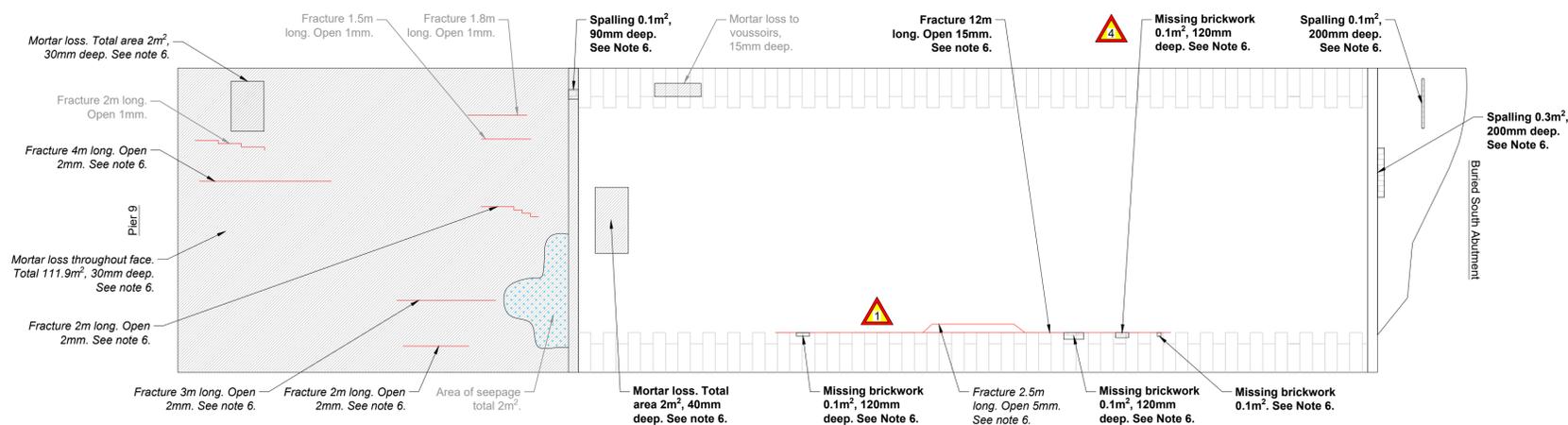
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**FOR CONSTRUCTION**



03	29/03/2021	For Construction	CD	JCW	JCW	NR
02	22/02/2021	Form B	CD	JCW	JCW	NR
01	22/12/2020	Form A	CD	JCW	JCW	NR
Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd

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Tel: +44 (0)1904 924 950  
WEBSITE: WWW.JACOBS.COM

Client: Historical Railways Estate on behalf of the DfT

Project: HRE Works Framework

Drawing title: **STRUCTURE HXH/4a  
REMEDIAL REPAIRS  
REPAIRS TO SPAN 10 AND  
INTERNAL PARAPET FACES**

Drawing status: **FOR CONSTRUCTION** Suitability

Scale: AS NOTED @ A1 DO NOT SCALE

Jacobs No. B28280DA/EW Rev

Client No. N/A Rev **03**

Drawing number: **B28280-EW-0006**

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### 3. DESIGNER'S RISK ASSESSMENT

Latest Meeti	31/05/2023	<b>Update Critical Risk Table</b>	Probability	Worst Potential Severity (WPS) of Impact
Phase			1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event
Project Client:	HXH/4a Remedial Repairs B28280DA/EW HE HRE			

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
1	C	Working adjacent to or underneath structure.	Poor condition of the structure. Deterioration/ collapse of the structure during works leading to harm to workers and public.	All	4	5	20	The purpose of the works is to repair the structure to prevent further deterioration.  There are no design measures to eliminate the hazard prior to completion of the works.	All identified defects have been included on the general arrangement drawings for the Contractors information.  Whole viaduct is to be inspected before works begin for any potentially dangerous unstable areas and appropriate action taken to make safe.  The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced further by design measures.  Warning signs to inform public of works to be installed around site, particularly along the bridleway and along public road beneath Span 2 . Suitable segregation is to be implemented by the Contractor as appropriate.	2	5	10	Contractor not undertaking works in accordance with specification / PCIP leading to deterioration/collapse of the structure during works.  Harm to workers / public.  Instability of viaduct if agreed methodology for repairs not adhered to.	Contract specification. Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements  Scheme Drawing No. B28280-DA/EW-0002 - 0006 (Rev 03)
2	C	Working near watercourse. Hebble Brook passes below Span.	Working near watercourse - drowning Flash flooding.	All	3	5	15	Working near watercourse is necessary for the completion of the works, therefore the hazard cannot be eliminated by design measures.	The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced by design measures.  The Contractor is to contact the EA to confirm potential flood patterns prior to undertaking the works. If required, a flood warning alarm system will be arranged.  In the event of a flash flood during repair works, measures shall be in place to prevent any flood damage mid-construction (sandbags, pumping, ditching).	2	5	10	Flash flooding.  Drowning / harm to workers.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements

Latest Meeti	31/05/2023
Phase	
C	
M	
U	
D	
Project	HXH/4a Remedial Repairs
Project	B28280DA/EW
Client:	HE HRE

Update Critical Risk Table

Probability	Worst Potential Severity (WPS) of Impact
<p>1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely</p>	<p>1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. <b>10. Multiple fatalities and catastrophic event</b></p>

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
3	C	Use of access scaffolding / roped access / MEWP to conduct high level repairs.	Working at height. <i>Collapse of scaffolding due to poor ground conditions, weather and masonry collapse onto platform leading to harm to workers.</i>	All	3	5	15	Due to the high level nature of the repairs, there are no practicable design measures to eliminate the hazard.	<p>The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced by design measures. Contractor is to provide details of how they intend to perform high level repair works within their method statement.</p> <p>Requirements for site investigations, if cradle access is proposed, is included in Volume 2, Appendix 0/1 of the contract specification.</p> <p>Ground and structure, where necessary, to be checked for suitability before scaffold erection.</p> <p>Regular stability checks to be made of scaffolding including implementation of 'scaff-tag' system.</p> <p>Escape plans to be in place for all high level working and working above water.</p>	2	5	10	Working at height. Collapse of scaffolding/ cradles if ground conditions are not adequately assessed. Harm to workers.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements

Latest Meeti	31/05/2023	<b>Update Critical Risk Table</b>	Probability	Worst Potential Severity (WPS) of Impact
Phase			1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event
Project Client:	HXH/4a Remedial Repairs B28280DA/EW HE HRE			

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
4	C	Removal of brickwork / stone.	Cutting out and replacing areas of defective brickwork / stone. Collapse / dropping during repair operations. Harm to workers.	All	3	4	12	The purpose of the works is to repair the structure. There are no practicable design measures to eliminate the hazard.	Appropriate temporary works, in accordance with the HRE standard drawings and brickwork repair specification are to be completed by competent Temporary Works designer. The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced further by design measures. Exclusion zones to be in place prior to masonry repair operations commencing. Edge boards to be fitted to high level access to prevent falling debris.	2	4	8	Contractor failing to work in accordance with the HRE standard drawings and brickwork repair specification leading to localised collapses and harm to workers. Dropping brickwork leading to harm to workers / public if insufficient protection measures are used.	Contract Specification / Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements
5	C	Plant movement across deck	Construction traffic traversing the deck <i>Potential overloading of structure causing collapse.</i>	All	4	5	20	The structure has not been assessed for vehicular / plant loading and therefore its suitability to support these loadings is unknown. Contractor is to ensure that the structure is suitable to support any proposed plant, equipment or temporary works.	The hazard is a matter for the Contractors Construction Phase Plan. Contractor to provide details of proposed construction loading and results of stability analysis (if required) prior to undertaking works.	3	5	15	Contractor failing to ensure the deck is suitable to carry proposed loading during construction. Overloading of structure e.g. stockpiling materials, causing collapse leading to harm to workers / public.	Contract Specification / Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements

Latest Meeti	31/05/2023	<b>Update Critical Risk Table</b>	Probability	Worst Potential Severity (WPS) of Impact
Phase			1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event
Project Client:	HXH/4a Remedial Repairs B28280DA/EW HE HRE			

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
6	C	Working on site	Overhead BT cable passes below third span from north end.  <i>Striking of service during works. Damage to/from services. Harm to workers and/or public.</i>	All	3	5	15	If practical, live services should be switched off or protected/relocated by the manufacturing plant who have installed them.  Should this not be practical the possibility of striking a live service cannot be completely eliminated at design stage.	All identified services are shown on the design drawings.  Contractor is to establish the exact location and owner of all services prior to commencement of the works.  Construction Phase Plan to be prepared by the works contractor to detail how all services, people and plant will be protected throughout the works.	2	5	10	Contractor not adhering to agreed working constraints leading to service strike causing harm to workers/public.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements.  Scheme Drawing No. B28280-DA/EW-0001 (Rev 03)
7	C	Removal of heavy stone blocks and brickwork.	Lifting operations.  Dropping during lifting operations and manipulation of heavy stone and brickwork sections.  Harm to workers; damage to property; harm to public.	All	3	4	12	There are no practicable design measures to eliminate the hazard.	Where practical to do so 'plastic' masonry repair has been specified in place of traditional masonry replacement in an endeavour to limit lifting operations.  The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced further by design measures.  Mechanical methods to be used to move heavy objects where possible.  All lifting operations to be in accordance with LOLER approved code of practice.  Applicable lift plans shall be put in place by the Contractor for all lifting operations. Lift plans to be prepared and signed off by a trained, competent person.	2	4	8	Contractor failing to implement appropriate lifting plans / operations leading to harm to workers / public.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements  Scheme Drawing No. B28280-DA/EW-0002 - 0006 (Rev 03)

Latest Meeti	31/05/2023	<b>Update Critical Risk Table</b>	Probability	Worst Potential Severity (WPS) of Impact
Phase			1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event
Project Client:	HXH/4a Remedial Repairs B28280DA/EW HE HRE			

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
8	C	Working in public realm.	Bridleway along west elevation of structure. Vandalism / trespass. Harm to workers.	All	3	4	12	Vandalism and trespass are always risks which cannot be eliminated at design stage.	The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced by design measures.  Secure temporary fencing with appropriate warning signage to be installed on site.  All plant to be secured when not in use. No tools / loose materials to be left accessible overnight / at weekends.  Contractor to provide details of how they intend to secure the site, machinery, equipment and materials from trespassers.	2	4	8	Vandalism and trespass leading to harm to workers / public.  Contractor not securing site with adequate fencing / signs leading to accidental trespass by public using footpaths.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements
9	C	Vegetation removal on, around the viaduct and along vehicle approach.	Tree felling / use of power tools (e.g. chainsaws) Harm to workers / public. <u>No tree removal to be undertaken without prior approval via the Tree Preservation Order consent process.</u>	All	3	5	15	There are no practicable design measures to eliminate the hazard.	The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced by design measures.  Contractor's methodology to consider a safe systematic approach.  Only trained competent operatives to undertake felling and vegetation clearing operations. Only vegetation which cannot be handled by mechanical means is to be cleared by hand.	2	5	10	Tree felling / use of power tools (e.g. chainsaw)  Harm to workers / public.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements

Latest Meeti	31/05/2023	<b>Update Critical Risk Table</b>	Probability	Worst Potential Severity (WPS) of Impact
Phase			1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event
Project Client:	HXH/4a Remedial Repairs B28280DA/EW HE HRE			

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
10	C	Access to / from site	Steep embankments at both ends of the viaduct. Harm to workers.	All	3	5	15	There are no practicable design measures to eliminate the hazard.	The hazard is a matter for the Contractors Construction Phase Plan and cannot be reduced by design measures.  The Contractor is to give due consideration to forming safe access beneath the spans. This could include cutting steps into the embankments or constructing scaffold steps.	2	5	10	Inadequate or unsuitable access provided by the Contractor leading to harm to workers.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements
11	C	Working over Private Garden and Public Road	Private Garden below Span 1 and Unclassified road, 'Boy Lane' passes below Span 2. Harm to public, workers.	All	3	5	15	There are no practicable design measures to eliminate the hazard.	Prior to undertaking the works the Contractor will apply for a closure of the road and implement appropriate exclusion zones while undertaking any repairs to Spans 1 and 2.  Contractor to provide signage and temporary protection barriers and inform public and landowners of work area/traffic.	2	5	10	Harm to workers and public.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements.  Drawing B28280-DA/EW-0001-0002 (Rev 03).
12	C	Working on site	Trespassers Theft / Vandalism. Damage to structure / equipment. Harm to public / workers.  <b>The south end of structure and proposed access route is in close proximity to residential area.</b>	All	3	4	12	Vandalism and trespass are always risks that cannot be eliminated at design stage.	The hazard is a matter for the Contractor's Construction Phase Plan and cannot be reduced by design measures.  Secure temporary fencing with appropriate warning signage to be installed on site.  All plant to be secured when not in use. No tools / loose materials to be left accessible overnight / at weekends.  Out of hours security procedures should be included within the tender documents.	2	4	8	Vandalism and trespass leading to harm to workers / public.	Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements

Latest Meeti	31/05/2023	<b>Update Critical Risk Table</b>	Probability	Worst Potential Severity (WPS) of Impact
Phase			1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event
Project Client:	HXH/4a Remedial Repairs B28280DA/EW HE HRE			

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
13	C	Access to/from site	Rural roads are adjacent to the structure. Access via unsurfaced heavily vegetated track.  Harm to public and workers.	All	2	2	4	Given the location of the site the hazard cannot be eliminated by the designer and is a matter for the Contractors H&S plan.	Contractor to contact Local Council in advance of the works to inform them that the works will take place to this area.  Contractor to provide a traffic management plan to detail how deliveries and plant will be managed during the works.  Due to tree preservation order, no trees should be felled to form access to the deck.	1	2	2	Injury to workers and public	Contract Specification / Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements.
14	C	Excavation of deck for waterproofing	Excavation of deck.  Excessive excavation and / or asymmetrical loading of the arches causing collapse.	All	3	3	9	There are no practicable design measures to eliminate the hazard.	Proposed drainage design limits the amount of fill material to be removed.  Exclusion zones may be created beneath the spans when excavation to deck is being undertaken, if deemed necessary.  A stability analysis has been undertaken for the structure and included in contract specification.  No stockpiling of imported or excavated material will be allowed on the viaduct. Specified plant and sequence of work to be included in the Contract Documents to be adopted.	1	3	3	Contractor not undertaking works in accordance with specification / PCIP leading to deterioration /collapse of the structure during works.  Harm to workers and public.	Contract Specification / Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements.

Latest Meeti	31/05/2023
Phase	
C	
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Project	HXH/4a Remedial Repairs
Project	B28280DA/EW
Client:	HE HRE

Update Critical Risk Table

Probability	Worst Potential Severity (WPS) of Impact
<p>1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely</p>	<p>1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. <b>10. Multiple fatalities and catastrophic event</b></p>

1	3	4	5	6	7	8	9	11	12	13	14	15	16	17
Risk ID.	Phase	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)
15	C	Plant movement across deck	Movement of plant. Potential overloading of existing structure.	All	3	3	9	There are no practicable design measures to eliminate the hazard.	A stability analysis has been undertaken for the structure and included it in the contract specification.	1	3	3	Contractor not undertaking works in accordance with specification / PCIP leading to deterioration /collapse of the structure during works.  Harm to workers and public.	Contract Specification / Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements.
16	C	Excavation of deck for waterproofing	Buried services are present within the deck of the structure. Striking of buried service cables / pipes during coring works. Undocumented buried services. <i>Damage to / from buried services.</i> <i>Harm to workers / public</i>	All	4	4	16	If practical the live service must be switched off or protected / relocated by the service providers. Should this not be practical the possibility of striking a live service cannot be completely eliminated at design stage.  Trenches have been excavated between the parapets to confirm the absence of buried services. It should be confirmed by the contractor that this has not changed since the site investigation was undertaken.	The hazard is a matter for the Contractor's Construction Phase Plan and cannot be reduced by design measures.  A desktop services search was undertaken in June 2020, identifying all recorded services within the vicinity of the site footprint. The presence of all documented services are shown on the design drawings. The Contractor is to satisfy themselves of the validity of the search results.  Method statements from works Contractor to be reviewed prior to works.	1	4	4	Failure of the Contractor to provide adequate exclusion / protection measures leading to service strike causing harm to workers / public.  Striking of live undocumented buried service.	Contract Specification Pre-Construction Information Pack / Contractors H&S Management Plan / Contractors Method Statements. (when complete)  Scheme Drawing No. B28280-EW-0001 Rev 03

#### **4. PLANNING CONSENT**

The local planning authority, Calderdale Metropolitan Borough Council, were informed of the proposed repair works in December 2020 and were again informed of the Repair and Waterproofing proposals in April 2023. The Council have failed to respond to any notification and have not provided any comments.

The viaduct does not have listed status and the proposed works are for repairs and waterproofing for the longevity of the structure. The works are to have minimal effect on the appearance of the structure and are not thought to represent any material planning considerations. It is therefore not anticipated that full planning permission will be required.

The approaches to the structure along the former railway line and surrounding area are subject to a tree preservation order. No trees will be permitted to be trimmed or removed to form access without prior approval via the Tree Preservation Order consent process.

## 5. CHECKLIST FOR SUB-CONTRACTOR APPRAISAL

## Clients Expectations for the Assessment Criteria of Sub Contractors (CDM/Safety)

*In addition to the Principal Contractor's own assessment procedures for establishing the suitability and competency of their subcontractors, the Client HRE would request that the following are included into the Principal Contractor's assessments.*

**Company Name:** .....

**Company Address**

.....  
 .....  
 .....  
 .....

**Company Contact Name** .....

**Phone Number** .....

**Assessment Date** .....

**Name of Assessor** .....

Ref	Description	Yes	No	Comments
1	Is company Link Up registered			
2	Can company demonstrate, through its procedures, effective safety management and compliance with current CDM and Health and Safety legislation requirements			
3	Is company ISO 9000 registered			
3a	Company does not have ISO 9000, but can demonstrate a competent Quality management system			
4	Is company ISO 14000 registered			
4a	Company does not have ISO 14000, but can demonstrate a competent Environmental management system			
5	Will company require an Audit (office based)			

6	H & S Company Policy supplied			
7	Environmental Policy supplied			
8	Does company have procedures to demonstrate recognition and analysis of H & S Hazards			
9	Does company have procedures to demonstrate recognition and analysis of Environmental Hazards			
10	Does company have procedures to demonstrate assessment and evaluation of H & S Risks			
11	Does company have procedures to demonstrate assessment and evaluation of Environmental Risks			
12	Has the company had any H & S Claims, improvement or prohibition notices made against it during the last 3 years.			
13	Has company provided evidence of safety experience on similar schemes.			
14	Does company have adequate PI insurance			
15	Does company have adequate PL insurance			
16	Can company demonstrate adequate financial stability			
17	Can company demonstrate that it has adequate manpower for the work			
18	Can company demonstrate that it has competent staff required to undertake the work			
19	Can the company demonstrate that it has an effective training program for employees			

20	Does the company demonstrate that it fully understands the requirements of the Scope of Works			

## **6. F10 - NOTIFICATION OF CONSTRUCTION PROJECT**

It is anticipated that the Project will be Notifiable to the HSE under the Construction (Design and Management) Regulations 2015. An F(10) Notification will be made to the HSE following acceptance of the Contractor's tender by the Client.

## 7. FORM C

FORM 'C'

GC/TP0356

Appendix: 4

Issue: 1

Revision: A (Feb 1993)

ELR/ Bridge No .....

**CERTIFICATION FOR DESIGN AND CHECKING OF TEMPORARY WORKS**

Design Group.....  
(or name of Consulting Engineer)

I certify that the design of the temporary works shown on drawing Nos  
.....  
.....

..... comply with the following principal British Standards and Codes of Practice,  
modified as indicated

.....  
.....  
.....

..... (any departures from the above, additional methods or criteria, and their  
justification must be stated)

Signed.....

Title.....

Date.....

I certify that ..... has appropriate qualifications and  
experience to carry out the design described above.

Signed.....

Title.....

Date.....

FORM 'C'

GC/TP0356

Appendix: 4

Issue: 1

Revision: A (Feb 1993)

ELR/ Bridge No .....

**CERTIFICATION FOR DESIGN AND CHECKING OF TEMPORARY WORKS**

I certify that reasonable professional skill and care have been used in the checking of the design shown on drawing Nos. ....

.....  
with a view to securing that the design complies with the following principal British Standards and Codes of Practice, Modified by Historical Railways Estate documents as indicated:.....

.....

(Any departures from above, additional methods or criteria and other justification must be stated)

Signed.....

Title.....

Date.....

I certify that ..... has appropriate qualifications and experience to carry out the check described above, and that reasonable skill and care have been used in carrying out the check

Signed.....

Title.....

Date.....

This certificate is accepted by.....  
on behalf of the Principal Contractor .....

Title.....

Date.....

This certificate is accepted by.....  
on behalf of Historical Railways Estate

Title.....

**FORM 'C'**

**GC/TP0356**

ELR/ Bridge No .....

Appendix: 4

Issue: 1

Revision: A (Feb 1993)

**CERTIFICATION FOR DESIGN AND**  
**CHECKING OF TEMPORARY WORKS**

---

Date.....

## 8. STABILITY ANALYSIS RESULTS

Office	Glasgow			Calc. No.	0451200
Job No. & Title	HXH/4a HRE Stability Analysis	Calcs by	CD	Date	May-23
Section	HXH/4a - Construction Load Check	Checker	JR	Date	May-23

**Object:**

To check the stability off a ten span masonry arch viaduct under loading from construction plant and with reduced depths of fill.

**Method:**

Using RING v 3.2 software by LimitState

**Basic Dimensions:**

Taken from January 2023 Laser Scan Survey of the Structure During Site Investigation.

**Spans (numbered 1 to 10 from North to South)**

Typical Span: 15.24 m

Rise at the Crown: 7.27 m

Arch ring thickness\*: 0.71 m

\* taken from locations where trial trench was excavated to expose arch extrados

**Piers**

Piers are 6'- 0" wide at the top so for model, take: 1.829 m

Pier width measured at base as : 2.591 m

Pier height varies. Average heights taken from laser survey as:

	Measured Average Height (m)	Height for Analysis (m) *
Pier 1	6.85	7.35
Pier 2	10.59	11.09
Pier 3	11.69	12.19
Pier 4	16.64	17.14
Pier 5	17.05	17.55
Pier 6	19.76	20.26
Pier 7	17.12	17.62
Pier 8	12.23	12.73
Pier 9	5.41	5.91

\* top of pier foundation assumed to be 0.5m below ground levels (Bridgeguard CIS No. 18 Cl. 2.4)

**Structural Backing**

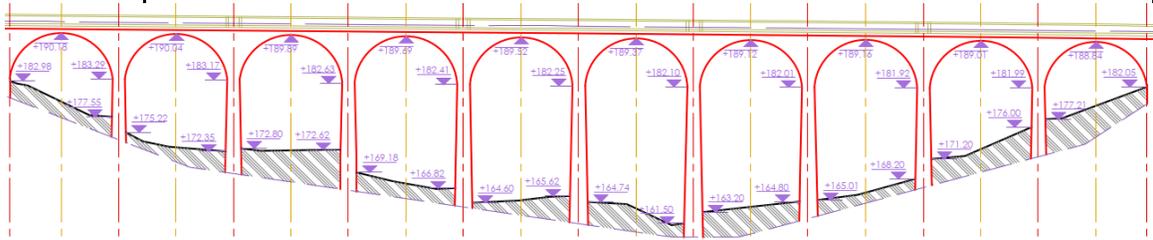
Excavations on the bridge deck did not identify structural backing.

Weep pipes protrude through the haunches at approximately 4.067m above the springing levels.

Assuming the pipes project through the arch barrels at a 45 degree angle, the height of backing will be taken as 4.447m above the springing levels.

Office	Glasgow			Calc. No.	0451200
Job No. & Title	HXH/4a HRE Stability Analysis	Calcs by	CD	Date	May-23
Section	HXH/4a - Construction Load Check	Checker	JR	Date	May-23

### Fill Depth



Fill Depths from Laser Scan (mm):

Span 1	Span 2	Span 3	Span 4	Span 5	Span 6	Span 7	Span 8	Span 9	Span 10
1125	715	689	626	690	703	679	772	860	949

Average Fill Depth from Laser Survey : 0.781 m  
 Allow for removal of 300mm of fill : 0.481 m

Fill Depth Global Geometry:

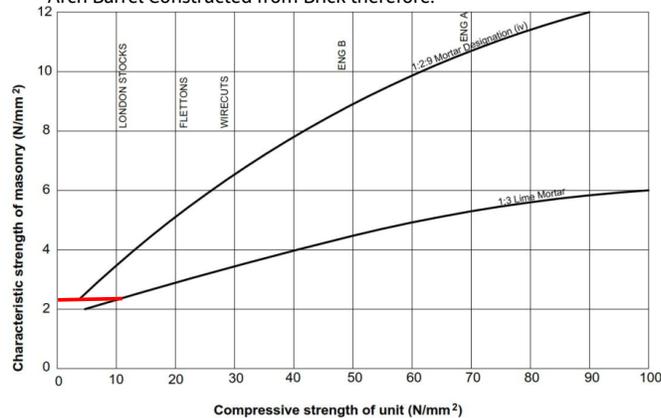
Span Number	X	Y
1	7.620	8.461
2	24.689	8.461
3	41.758	8.461
4	58.826	8.461
5	75.895	8.461
6	92.964	8.461
7	110.033	8.461
8	127.102	8.461
9	144.170	8.461
10	161.239	8.461

Spacing for RING mechanism :

$$\frac{168859}{90} = 1876.2 \text{ mm}$$

### Material Properties

Arch Barrel Constructed from Brick therefore:



Compressive Strength :  
 → 2.3 N/mm<sup>2</sup>

CS454  
 Fig.4.2.7a

Office	Glasgow			Calc. No.	0451200
Job No. & Title	HXH/4a HRE Stability Analysis	Calcs by	CD	Date	May-23
Section	HXH/4a - Construction Load Check	Checker	JR	Date	May-23

CS454  
Table 4.1.1a

Density =  $2100 \text{ kgm}^{-3} \rightarrow 20.6 \text{ kNm}^{-3}$

Backfill Material  $\rightarrow$  Miscellaneous, Density =  $2200 \text{ kgm}^{-3} \rightarrow 21.58 \text{ kNm}^{-3}$

Angle of Internal Friction,  $\phi = 30^\circ \rightarrow 0.524 \text{ Radians}$

Earth Pressure Coefficient = 1  
The earth pressure coefficient has been set as 1.0 as the limitation on the deformation is already accounted for in the live load capacity factor, C

**Construction Vehicle Loading (See data sheets attached)**

Vehicle Definition

JCB JZ70 Tracked Excavator			
Maximum Weight :	<table border="1"><tr><td>8000</td><td>kg</td></tr></table>	8000	kg
8000	kg		
Track Length on Ground:	<table border="1"><tr><td>2200</td><td>m</td></tr></table>	2200	m
2200	m		
Width	<table border="1"><tr><td>2150</td><td>mm</td></tr></table>	2150	mm
2150	mm		
Thwaites Dumper			
Unladen Weight	<table border="1"><tr><td>4295</td><td>kg</td></tr></table>	4295	kg
4295	kg		
Max Safe Laden Weight	<table border="1"><tr><td>5000</td><td>kg</td></tr></table>	5000	kg
5000	kg		
Axle Spacing	<table border="1"><tr><td>2480</td><td>mm</td></tr></table>	2480	mm
2480	mm		
Allow Loaded Length Per Axle	<table border="1"><tr><td>150</td><td>mm</td></tr></table>	150	mm
150	mm		
Width	<table border="1"><tr><td>2130</td><td>mm</td></tr></table>	2130	mm
2130	mm		
Loaded Axle Distribution	6.2T / 3.1T		

Safety Factors

CS 454 requires a live load Capacity factor  $C_{min} =$ 

1.8
-----

It is implied that other factors for 'abnormal traffic' should be obtained from CS 458.

CS 458  
Cl 3.33

Overload Factor\* (OF):

Critical axle = 1.2  
Other axles = 1.1  
\*Not applicable on excavator

CS 458  
Cl 3.34

Dynamic Amplification Factor (DAF) on Critical Axle:

$$DAF = \left[ 1.7 \left( \frac{q_{ka}}{10} \right)^{-0.15} \right] \geq 1.05 \quad (\text{where } q_{ka} \text{ is the basic axle load in kN})$$

Excavator :  $q_{ka} = 78.48 \text{ kN} \rightarrow DAF = 1.248$   
Dumper :  $q_{ka} = 60.79 \text{ kN} \rightarrow DAF = 1.297$

CS 458  
B3.1

Where capacity is marginally exceeded, DAF may be reduced if the speed of the vehicle when crossing the structure is limited to not more than 10mph.  
Reduction not currently applied but may be if capacity was marginally exceeded.

Partial factors for actions at the ultimate limit state,  $\gamma_{fl}$

CS 454 Table A.1 gives a partial factor ( $\gamma_{fl}$ ) for abnormal traffic actions as: 

1.1
-----

Office	Glasgow			Calc. No.	0451200
Job No. & Title	HXH/4a HRE Stability Analysis	Calcs by	CD	Date	May-23
Section	HXH/4a - Construction Load Check	Checker	JR	Date	May-23

*Combined Factors :*

Excavator: Track:  $1.8 \times 1.0 \times 1.248 \times 1.1 = 2.5$

Dumper: Critical Axle:  $1.8 \times 1.2 \times 1.297 \times 1.1 = 3.1$   
 Other Axle:  $1.8 \times 1.1 \times 1.0 \times 1.1 = 2.2$

Load Combinations

Single Excavator  
 $(8000 \times 9.81 \times 2.5 / 1000) = 193.9 \text{ kN}$

Single Dumper  
 $(6197 \times 9.81 \times 3.1 / 1000) = 187.3 \text{ kN}$   
 $(3098 \times 9.81 \times 2.2 / 1000) = 66.2 \text{ kN}$

Dumper and Excavator \*  
 $193.9 + 187.3 + 66.2 \text{ kN}$

\*Allow minimum 2.5m spacing between excavator and dumper.

Effective Width

Minimum Vehicle Width 2130 mm  
 Depth of Fill During Construction, h 481 mm

Can fractures limit effective width on one side? Yes

Effective width =  $2,130 + 481 + 750 = 3361 \text{ mm}$

CS 454  
 Fig 7.7.6.

## Summary

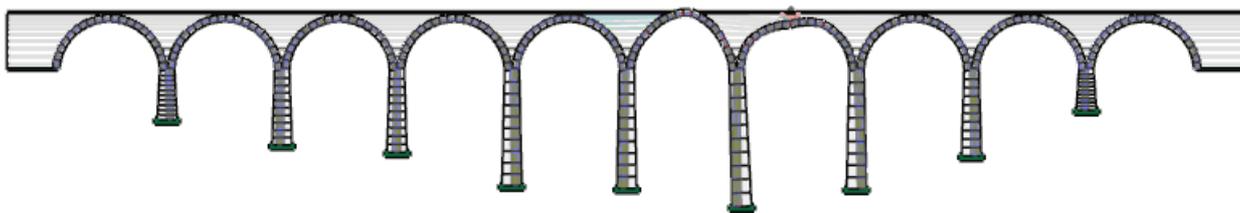
### Details

<b>Bridge name</b> HXH/4a Wheatley Viaduct	<b>Location</b> SE 068 270	<b>Reference No.</b>	<b>Map reference</b> Boy Lane, Wheatley, Calderdale
<b>Bridge type</b> Highway	<b>Name of assessor</b> Christopher Doig	<b>Assessing organization</b> Jacobs Ltd	<b>Date of assessment</b> Thursday, April 13, 2023
<b>Comments</b> 8T Excavator			

### Results

<b>Adequacy factor</b> 4.75 at load case #59 (this is the critical load case)	<b>Solver used (if not default)</b> CLP solver
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### Mode of Response for Current Load Case



## Units

Unless specified otherwise, the following units are used throughout this report:

<b>Distance</b> mm	<b>Force*</b> kN	<b>Moment*</b> kNm	<b>Angle</b> Degrees	<b>Unit weight</b> kN/m <sup>3</sup>	<b>Material strength</b> N/mm <sup>2</sup>
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\* = per metre width

## Geometry

<b>Global:</b>	<b>No. Spans</b> 10	<b>Effective bridge width</b> 3361						
<b>Span 1:</b>	<b>Type</b> Multi-ring	<b>Shape</b> Segmental	<b>No. Rings</b> 1	<b>Span</b> 15240	<b>Midspan rise</b> 7270	<b>Auto-calc. abutment angles?</b> Yes	<b>LHS angle</b> 2.7	<b>RHS angle</b> 2.7
	<b>Ring 1:</b>	<b>No. Blocks</b> 20	<b>Ring thickness</b> 711					
<b>Pier 1:</b>	<b>Backing Height</b> 4447	<b>Pier Height</b> 7350	<b>Width (Top)</b> 1829	<b>Width (Base)</b> 2591	<b>No. Blocks</b> 10			
<b>Span 2:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment</b>	<b>LHS angle</b>	<b>RHS angle</b>

	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	<b>angles?</b> Yes	2.7	2.7
<b>Pier 2:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	11090	1829	2591	10			
<b>Span 3:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 3:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	12190	1829	2591	10			
<b>Span 4:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 4:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17140	1829	2591	10			
<b>Span 5:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 5:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17550	1829	2591	10			
<b>Span 6:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 6:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	20260	1829	2591	10			
<b>Span 7:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 7:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17620	1829	2591	10			
<b>Span 8:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7

	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					
<b>Pier 8:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	12730	1829	2591	10			
<b>Span 9:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7
	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					
<b>Pier 9:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	5910	1829	2591	10			
<b>Span 10:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7
	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					

## Fill Profile Properties

Distances measured from left springing point of left span.

Horizontal distance (x)	Height to surface fill (y)	Surface fill depth (d)	Surface level (y+d)
7620	8460.8	0	8460.8
24688.8	8460.8	0	8460.8
41757.6	8460.8	0	8460.8
58826.4	8460.8	0	8460.8
75895.2	8460.8	0	8460.8
92964	8460.8	0	8460.8
110033	8460.8	0	8460.8
127102	8460.8	0	8460.8
144170	8460.8	0	8460.8
161239	8460.8	0	8460.8

## Partial Factors

### Loads

Masonry unit weight	Fill unit weight	Surface unit weight	Axle load	Dynamic
1	1	1	1	1

### Materials

Masonry strength	Masonry friction
1	1

## Fill Properties

### Backfill

Unit weight	Angle of friction	Cohesion
21.58	30	0

**Model dispersion of live load?**

Yes

**Dispersion type**

Boussinesq

**Soil arch interface, friction multiplier**

0.66

**Mobilisation multiplier on Kp (mp)**

0.33

**Keep mp.Kp > 1?**

Yes

**Model horizontal 'passive' pressures?**

Yes

**Cutoff angle**

30

**Soil arch interface, cohesion multiplier**

0.5

**Mobilisation multiplier on cohesion (mpc)**

0.05

**Auto identify passive zones?**

Yes

## Surface Fill

**Unit weight**

18

**Load dispersion limiting angle**

26.6

## Backing

Position	Backing height	Passive pressures modelled?
Abutment 0	0	Yes
Pier 1	4447	Yes
Pier 2	4447	Yes
Pier 3	4447	Yes
Pier 4	4447	Yes
Pier 5	4447	Yes
Pier 6	4447	Yes
Pier 7	4447	Yes
Pier 8	4447	Yes
Pier 9	4447	Yes
Abutment 10	0	Yes

## Vehicles in Project

Name	Axle No.	Load magnitude	Axle position
Default 1kN Single Axle	1	1	0
Dumper 9.3T	1	187.3	0
Dumper 9.3T	2	66.2	2480
Excavator 8T	1	193.9	0
Dumper and excavator in tandem	1	193.9	0
Dumper and excavator in tandem	2	187.3	3980
Dumper and excavator in tandem	3	66.2	6460

## Vehicles in Load Cases

#	Load Case Name	Vehicle(s)	Position	Mirror?	Dynamic Axles
1	Load Case 1	Excavator 8T	0	No	-
2	Load Case 2	Excavator 8T	1876	No	-
3	Load Case 3	Excavator 8T	3752	No	-
4	Load Case 4	Excavator 8T	5629	No	-
5	Load Case 5	Excavator 8T	7505	No	-
6	Load Case 6	Excavator 8T	9381	No	-
7	Load Case 7	Excavator 8T	11257	No	-
8	Load Case 8	Excavator 8T	13133	No	-
9	Load Case 9	Excavator 8T	15010	No	-
10	Load Case 10	Excavator 8T	16886	No	-
11	Load Case 11	Excavator 8T	18762	No	-
12	Load Case 12	Excavator 8T	20638	No	-
13	Load Case 13	Excavator 8T	22514	No	-
14	Load Case 14	Excavator 8T	24391	No	-
15	Load Case 15	Excavator 8T	26267	No	-
16	Load Case 16	Excavator 8T	28143	No	-
17	Load Case 17	Excavator 8T	30019	No	-
18	Load Case 18	Excavator 8T	31895	No	-

19	Load Case 19	Excavator 8T	33772	No	-
20	Load Case 20	Excavator 8T	35648	No	-
21	Load Case 21	Excavator 8T	37524	No	-
22	Load Case 22	Excavator 8T	39400	No	-
23	Load Case 23	Excavator 8T	41276	No	-
24	Load Case 24	Excavator 8T	43153	No	-
25	Load Case 25	Excavator 8T	45029	No	-
26	Load Case 26	Excavator 8T	46905	No	-
27	Load Case 27	Excavator 8T	48781	No	-
28	Load Case 28	Excavator 8T	50657	No	-
29	Load Case 29	Excavator 8T	52534	No	-
30	Load Case 30	Excavator 8T	54410	No	-
31	Load Case 31	Excavator 8T	56286	No	-
32	Load Case 32	Excavator 8T	58162	No	-
33	Load Case 33	Excavator 8T	60038	No	-
34	Load Case 34	Excavator 8T	61915	No	-
35	Load Case 35	Excavator 8T	63791	No	-
36	Load Case 36	Excavator 8T	65667	No	-
37	Load Case 37	Excavator 8T	67543	No	-
38	Load Case 38	Excavator 8T	69419	No	-
39	Load Case 39	Excavator 8T	71296	No	-
40	Load Case 40	Excavator 8T	73172	No	-
41	Load Case 41	Excavator 8T	75048	No	-
42	Load Case 42	Excavator 8T	76924	No	-
43	Load Case 43	Excavator 8T	78800	No	-
44	Load Case 44	Excavator 8T	80677	No	-
45	Load Case 45	Excavator 8T	82553	No	-
46	Load Case 46	Excavator 8T	84429	No	-
47	Load Case 47	Excavator 8T	86305	No	-
48	Load Case 48	Excavator 8T	88181	No	-
49	Load Case 49	Excavator 8T	90058	No	-
50	Load Case 50	Excavator 8T	91934	No	-
51	Load Case 51	Excavator 8T	93810	No	-
52	Load Case 52	Excavator 8T	95686	No	-
53	Load Case 53	Excavator 8T	97562	No	-
54	Load Case 54	Excavator 8T	99439	No	-
55	Load Case 55	Excavator 8T	101315	No	-
56	Load Case 56	Excavator 8T	103191	No	-
57	Load Case 57	Excavator 8T	105067	No	-
58	Load Case 58	Excavator 8T	106943	No	-
59	Load Case 59	Excavator 8T	108820	No	-
60	Load Case 60	Excavator 8T	110696	No	-
61	Load Case 61	Excavator 8T	112572	No	-
62	Load Case 62	Excavator 8T	114448	No	-
63	Load Case 63	Excavator 8T	116324	No	-
64	Load Case 64	Excavator 8T	118201	No	-
65	Load Case 65	Excavator 8T	120077	No	-
66	Load Case 66	Excavator 8T	121953	No	-
67	Load Case 67	Excavator 8T	123829	No	-
68	Load Case 68	Excavator 8T	125705	No	-
69	Load Case 69	Excavator 8T	127582	No	-
70	Load Case 70	Excavator 8T	129458	No	-
71	Load Case 71	Excavator 8T	131334	No	-
72	Load Case 72	Excavator 8T	133210	No	-
73	Load Case 73	Excavator 8T	135086	No	-
74	Load Case 74	Excavator 8T	136963	No	-
75	Load Case 75	Excavator 8T	138839	No	-
76	Load Case 76	Excavator 8T	140715	No	-
77	Load Case 77	Excavator 8T	142591	No	-
78	Load Case 78	Excavator 8T	144467	No	-
79	Load Case 79	Excavator 8T	146344	No	-
80	Load Case 80	Excavator 8T	148220	No	-
81	Load Case 81	Excavator 8T	150096	No	-
82	Load Case 82	Excavator 8T	151972	No	-
83	Load Case 83	Excavator 8T	153848	No	-
84	Load Case 84	Excavator 8T	155725	No	-
85	Load Case 85	Excavator 8T	157601	No	-
86	Load Case 86	Excavator 8T	159477	No	-
87	Load Case 87	Excavator 8T	161353	No	-
88	Load Case 88	Excavator 8T	163229	No	-
89	Load Case 89	Excavator 8T	165106	No	-
90	Load Case 90	Excavator 8T	166982	No	-

# Load Cases

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#	Load Case Name	Effective Width	Adequacy Factor
1	Load Case 1	3361	23.9
2	Load Case 2	3361	11.3
3	Load Case 3	3361	7.73
4	Load Case 4	3361	5.9
5	Load Case 5	3361	5.98
6	Load Case 6	3361	6.67
7	Load Case 7	3361	7.49
8	Load Case 8	3361	9.72
9	Load Case 9	3361	18.1
10	Load Case 10	3361	22.6
11	Load Case 11	3361	10.7
12	Load Case 12	3361	7.6
13	Load Case 13	3361	5.82
14	Load Case 14	3361	5.67
15	Load Case 15	3361	5.77
16	Load Case 16	3361	7.37
17	Load Case 17	3361	9.45
18	Load Case 18	3361	16.6
19	Load Case 19	3361	25.1
20	Load Case 20	3361	11.3
21	Load Case 21	3361	7.79
22	Load Case 22	3361	5.79
23	Load Case 23	3361	5.63
24	Load Case 24	3361	5.56
25	Load Case 25	3361	6.59
26	Load Case 26	3361	9.18
27	Load Case 27	3361	15.4
28	Load Case 28	3361	28.2
29	Load Case 29	3361	12.1
30	Load Case 30	3361	8.06
31	Load Case 31	3361	5.68
32	Load Case 32	3361	5.36
33	Load Case 33	3361	4.98
34	Load Case 34	3361	5.97
35	Load Case 35	3361	8.96
36	Load Case 36	3361	14.5
37	Load Case 37	3361	31.4
38	Load Case 38	3361	13
39	Load Case 39	3361	8.42
40	Load Case 40	3361	5.49
41	Load Case 41	3361	5.03
42	Load Case 42	3361	4.95
43	Load Case 43	3361	5.65
44	Load Case 44	3361	8.79
45	Load Case 45	3361	13.7
46	Load Case 46	3361	34.7
47	Load Case 47	3361	13.7
48	Load Case 48	3361	8.79
49	Load Case 49	3361	5.65
50	Load Case 50	3361	4.95
51	Load Case 51	3361	4.81
52	Load Case 52	3361	5.2
53	Load Case 53	3361	8.37
54	Load Case 54	3361	13
55	Load Case 55	3361	31.3
56	Load Case 56	3361	14.5
57	Load Case 57	3361	8.97
58	Load Case 58	3361	5.61
59	Load Case 59	3361	4.75
60	Load Case 60	3361	5.06
61	Load Case 61	3361	5.3
62	Load Case 62	3361	8.06
63	Load Case 63	3361	12.1

64	Load Case 64	3361	28.2
65	Load Case 65	3361	15.5
66	Load Case 66	3361	9.18
67	Load Case 67	3361	6.2
68	Load Case 68	3361	4.98
69	Load Case 69	3361	5.18
70	Load Case 70	3361	5.6
71	Load Case 71	3361	7.79
72	Load Case 72	3361	11.3
73	Load Case 73	3361	25
74	Load Case 74	3361	16.6
75	Load Case 75	3361	9.46
76	Load Case 76	3361	7.37
77	Load Case 77	3361	5.57
78	Load Case 78	3361	5.5
79	Load Case 79	3361	5.82
80	Load Case 80	3361	7.6
81	Load Case 81	3361	10.7
82	Load Case 82	3361	22.6
83	Load Case 83	3361	18.1
84	Load Case 84	3361	9.73
85	Load Case 85	3361	7.48
86	Load Case 86	3361	6.67
87	Load Case 87	3361	5.98
88	Load Case 88	3361	5.91
89	Load Case 89	3361	7.73
90	Load Case 90	3361	11.3
91	Load Case 91	3361	23.8

## Summary

### Details

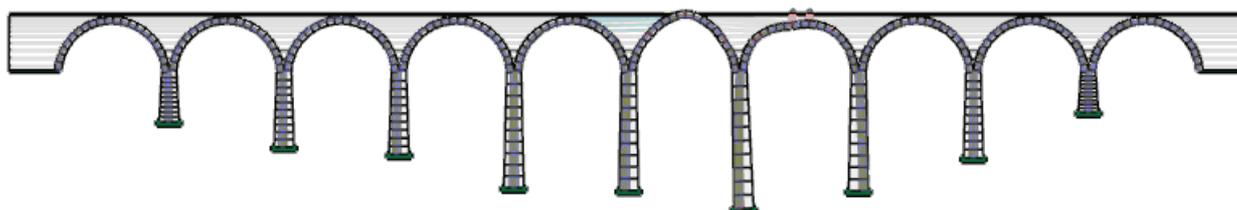
<b>Bridge name</b> HXH/4a Wheatley Viaduct	<b>Location</b> SE 068 270	<b>Reference No.</b>	<b>Map reference</b> Boy Lane, Wheatley, Calderdale
<b>Bridge type</b> Highway	<b>Name of assessor</b> Christopher Doig	<b>Assessing organization</b> Jacobs Ltd	<b>Date of assessment</b> Thursday, April 13, 2023

**Comments**  
9.3T Dumper

### Results

<b>Adequacy factor</b> 3.8 at load case #59 (this is the critical load case)	<b>Solver used (if not default)</b> CLP solver
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### Mode of Response for Current Load Case



## Units

Unless specified otherwise, the following units are used throughout this report:

<b>Distance</b> mm	<b>Force*</b> kN	<b>Moment*</b> kNm	<b>Angle</b> Degrees	<b>Unit weight</b> kN/m <sup>3</sup>	<b>Material strength</b> N/mm <sup>2</sup>
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\* = per metre width

## Geometry

<b>Global:</b>	<b>No. Spans</b> 10	<b>Effective bridge width</b> 3361						
<b>Span 1:</b>	<b>Type</b> Multi-ring	<b>Shape</b> Segmental	<b>No. Rings</b> 1	<b>Span</b> 15240	<b>Midspan rise</b> 7270	<b>Auto-calc. abutment angles?</b> Yes	<b>LHS angle</b> 2.7	<b>RHS angle</b> 2.7
	<b>Ring 1:</b>	<b>No. Blocks</b> 20	<b>Ring thickness</b> 711					
<b>Pier 1:</b>	<b>Backing Height</b> 4447	<b>Pier Height</b> 7350	<b>Width (Top)</b> 1829	<b>Width (Base)</b> 2591	<b>No. Blocks</b> 10			
<b>Span 2:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment</b>	<b>LHS angle</b>	<b>RHS angle</b>

	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	<b>angles?</b> Yes	2.7	2.7
<b>Pier 2:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	11090	1829	2591	10			
<b>Span 3:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 3:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	12190	1829	2591	10			
<b>Span 4:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 4:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17140	1829	2591	10			
<b>Span 5:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 5:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17550	1829	2591	10			
<b>Span 6:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 6:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	20260	1829	2591	10			
<b>Span 7:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 7:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17620	1829	2591	10			
<b>Span 8:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7

	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					
<b>Pier 8:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	12730	1829	2591	10			
<b>Span 9:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7
	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					
<b>Pier 9:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	5910	1829	2591	10			
<b>Span 10:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7
	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					

## Fill Profile Properties

Distances measured from left springing point of left span.

Horizontal distance (x)	Height to surface fill (y)	Surface fill depth (d)	Surface level (y+d)
7620	8460.8	0	8460.8
24688.8	8460.8	0	8460.8
41757.6	8460.8	0	8460.8
58826.4	8460.8	0	8460.8
75895.2	8460.8	0	8460.8
92964	8460.8	0	8460.8
110033	8460.8	0	8460.8
127102	8460.8	0	8460.8
144170	8460.8	0	8460.8
161239	8460.8	0	8460.8

## Partial Factors

### Loads

Masonry unit weight	Fill unit weight	Surface unit weight	Axle load	Dynamic
1	1	1	1	1

### Materials

Masonry strength	Masonry friction
1	1

## Fill Properties

### Backfill

Unit weight	Angle of friction	Cohesion
21.58	30	0

**Model dispersion of live load?**

Yes

**Dispersion type**

Boussinesq

**Soil arch interface, friction multiplier**

0.66

**Mobilisation multiplier on Kp (mp)**

0.33

**Keep mp.Kp > 1?**

Yes

**Model horizontal 'passive' pressures?**

Yes

**Cutoff angle**

30

**Soil arch interface, cohesion multiplier**

0.5

**Mobilisation multiplier on cohesion (mpc)**

0.05

**Auto identify passive zones?**

Yes

## Surface Fill

**Unit weight**

18

**Load dispersion limiting angle**

26.6

## Backing

Position	Backing height	Passive pressures modelled?
Abutment 0	0	Yes
Pier 1	4447	Yes
Pier 2	4447	Yes
Pier 3	4447	Yes
Pier 4	4447	Yes
Pier 5	4447	Yes
Pier 6	4447	Yes
Pier 7	4447	Yes
Pier 8	4447	Yes
Pier 9	4447	Yes
Abutment 10	0	Yes

## Vehicles in Project

Name	Axle No.	Load magnitude	Axle position
Default 1kN Single Axle	1	1	0
Dumper 9.3T	1	187.3	0
Dumper 9.3T	2	66.2	2480
Excavator 8T	1	193.9	0
Dumper and excavator in tandem	1	193.9	0
Dumper and excavator in tandem	2	187.3	3980
Dumper and excavator in tandem	3	66.2	6460

## Vehicles in Load Cases

#	Load Case Name	Vehicle(s)	Position	Mirror?	Dynamic Axles
1	Load Case 1	Dumper 9.3T	0	No	-
2	Load Case 2	Dumper 9.3T	1876	No	-
3	Load Case 3	Dumper 9.3T	3752	No	-
4	Load Case 4	Dumper 9.3T	5629	No	-
5	Load Case 5	Dumper 9.3T	7505	No	-
6	Load Case 6	Dumper 9.3T	9381	No	-
7	Load Case 7	Dumper 9.3T	11257	No	-
8	Load Case 8	Dumper 9.3T	13133	No	-
9	Load Case 9	Dumper 9.3T	15010	No	-
10	Load Case 10	Dumper 9.3T	16886	No	-
11	Load Case 11	Dumper 9.3T	18762	No	-
12	Load Case 12	Dumper 9.3T	20638	No	-
13	Load Case 13	Dumper 9.3T	22514	No	-
14	Load Case 14	Dumper 9.3T	24391	No	-
15	Load Case 15	Dumper 9.3T	26267	No	-
16	Load Case 16	Dumper 9.3T	28143	No	-
17	Load Case 17	Dumper 9.3T	30019	No	-
18	Load Case 18	Dumper 9.3T	31895	No	-

19	Load Case 19	Dumper 9.3T	33772	No	-
20	Load Case 20	Dumper 9.3T	35648	No	-
21	Load Case 21	Dumper 9.3T	37524	No	-
22	Load Case 22	Dumper 9.3T	39400	No	-
23	Load Case 23	Dumper 9.3T	41276	No	-
24	Load Case 24	Dumper 9.3T	43153	No	-
25	Load Case 25	Dumper 9.3T	45029	No	-
26	Load Case 26	Dumper 9.3T	46905	No	-
27	Load Case 27	Dumper 9.3T	48781	No	-
28	Load Case 28	Dumper 9.3T	50657	No	-
29	Load Case 29	Dumper 9.3T	52534	No	-
30	Load Case 30	Dumper 9.3T	54410	No	-
31	Load Case 31	Dumper 9.3T	56286	No	-
32	Load Case 32	Dumper 9.3T	58162	No	-
33	Load Case 33	Dumper 9.3T	60038	No	-
34	Load Case 34	Dumper 9.3T	61915	No	-
35	Load Case 35	Dumper 9.3T	63791	No	-
36	Load Case 36	Dumper 9.3T	65667	No	-
37	Load Case 37	Dumper 9.3T	67543	No	-
38	Load Case 38	Dumper 9.3T	69419	No	-
39	Load Case 39	Dumper 9.3T	71296	No	-
40	Load Case 40	Dumper 9.3T	73172	No	-
41	Load Case 41	Dumper 9.3T	75048	No	-
42	Load Case 42	Dumper 9.3T	76924	No	-
43	Load Case 43	Dumper 9.3T	78800	No	-
44	Load Case 44	Dumper 9.3T	80677	No	-
45	Load Case 45	Dumper 9.3T	82553	No	-
46	Load Case 46	Dumper 9.3T	84429	No	-
47	Load Case 47	Dumper 9.3T	86305	No	-
48	Load Case 48	Dumper 9.3T	88181	No	-
49	Load Case 49	Dumper 9.3T	90058	No	-
50	Load Case 50	Dumper 9.3T	91934	No	-
51	Load Case 51	Dumper 9.3T	93810	No	-
52	Load Case 52	Dumper 9.3T	95686	No	-
53	Load Case 53	Dumper 9.3T	97562	No	-
54	Load Case 54	Dumper 9.3T	99439	No	-
55	Load Case 55	Dumper 9.3T	101315	No	-
56	Load Case 56	Dumper 9.3T	103191	No	-
57	Load Case 57	Dumper 9.3T	105067	No	-
58	Load Case 58	Dumper 9.3T	106943	No	-
59	Load Case 59	Dumper 9.3T	108820	No	-
60	Load Case 60	Dumper 9.3T	110696	No	-
61	Load Case 61	Dumper 9.3T	112572	No	-
62	Load Case 62	Dumper 9.3T	114448	No	-
63	Load Case 63	Dumper 9.3T	116324	No	-
64	Load Case 64	Dumper 9.3T	118201	No	-
65	Load Case 65	Dumper 9.3T	120077	No	-
66	Load Case 66	Dumper 9.3T	121953	No	-
67	Load Case 67	Dumper 9.3T	123829	No	-
68	Load Case 68	Dumper 9.3T	125705	No	-
69	Load Case 69	Dumper 9.3T	127582	No	-
70	Load Case 70	Dumper 9.3T	129458	No	-
71	Load Case 71	Dumper 9.3T	131334	No	-
72	Load Case 72	Dumper 9.3T	133210	No	-
73	Load Case 73	Dumper 9.3T	135086	No	-
74	Load Case 74	Dumper 9.3T	136963	No	-
75	Load Case 75	Dumper 9.3T	138839	No	-
76	Load Case 76	Dumper 9.3T	140715	No	-
77	Load Case 77	Dumper 9.3T	142591	No	-
78	Load Case 78	Dumper 9.3T	144467	No	-
79	Load Case 79	Dumper 9.3T	146344	No	-
80	Load Case 80	Dumper 9.3T	148220	No	-
81	Load Case 81	Dumper 9.3T	150096	No	-
82	Load Case 82	Dumper 9.3T	151972	No	-
83	Load Case 83	Dumper 9.3T	153848	No	-
84	Load Case 84	Dumper 9.3T	155725	No	-
85	Load Case 85	Dumper 9.3T	157601	No	-
86	Load Case 86	Dumper 9.3T	159477	No	-
87	Load Case 87	Dumper 9.3T	161353	No	-
88	Load Case 88	Dumper 9.3T	163229	No	-
89	Load Case 89	Dumper 9.3T	165106	No	-
90	Load Case 90	Dumper 9.3T	166982	No	-

# Load Cases

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#	Load Case Name	Effective Width	Adequacy Factor
1	Load Case 1	3361	16.4
2	Load Case 2	3361	8.68
3	Load Case 3	3361	5.39
4	Load Case 4	3361	5.11
5	Load Case 5	3361	4.96
6	Load Case 6	3361	5.72
7	Load Case 7	3361	5.17
8	Load Case 8	3361	9.26
9	Load Case 9	3361	20.6
10	Load Case 10	3361	15.6
11	Load Case 11	3361	8.53
12	Load Case 12	3361	5.65
13	Load Case 13	3361	4.84
14	Load Case 14	3361	4.56
15	Load Case 15	3361	4.8
16	Load Case 16	3361	5.13
17	Load Case 17	3361	8.72
18	Load Case 18	3361	18.4
19	Load Case 19	3361	16.9
20	Load Case 20	3361	8.81
21	Load Case 21	3361	5.93
22	Load Case 22	3361	4.71
23	Load Case 23	3361	4.54
24	Load Case 24	3361	4.58
25	Load Case 25	3361	5.16
26	Load Case 26	3361	8.28
27	Load Case 27	3361	16.7
28	Load Case 28	3361	18.2
29	Load Case 29	3361	9.01
30	Load Case 30	3361	6.97
31	Load Case 31	3361	4.45
32	Load Case 32	3361	4.23
33	Load Case 33	3361	4.01
34	Load Case 34	3361	5.07
35	Load Case 35	3361	7.94
36	Load Case 36	3361	15.1
37	Load Case 37	3361	19.7
38	Load Case 38	3361	9.3
39	Load Case 39	3361	6.71
40	Load Case 40	3361	4.22
41	Load Case 41	3361	4.15
42	Load Case 42	3361	3.98
43	Load Case 43	3361	4.89
44	Load Case 44	3361	7.69
45	Load Case 45	3361	13.8
46	Load Case 46	3361	21.4
47	Load Case 47	3361	9.66
48	Load Case 48	3361	6.9
49	Load Case 49	3361	4.29
50	Load Case 50	3361	3.96
51	Load Case 51	3361	3.85
52	Load Case 52	3361	4.44
53	Load Case 53	3361	7.53
54	Load Case 54	3361	12.8
55	Load Case 55	3361	23.4
56	Load Case 56	3361	10.3
57	Load Case 57	3361	6.74
58	Load Case 58	3361	4.23
59	Load Case 59	3361	3.8
60	Load Case 60	3361	4.11
61	Load Case 61	3361	4.52
62	Load Case 62	3361	7.42
63	Load Case 63	3361	12

64	Load Case 64	3361	25.8
65	Load Case 65	3361	11.5
66	Load Case 66	3361	7.34
67	Load Case 67	3361	4.6
68	Load Case 68	3361	3.96
69	Load Case 69	3361	4.42
70	Load Case 70	3361	4.69
71	Load Case 71	3361	6.18
72	Load Case 72	3361	11.3
73	Load Case 73	3361	27.7
74	Load Case 74	3361	12.3
75	Load Case 75	3361	7.85
76	Load Case 76	3361	5.15
77	Load Case 77	3361	4.41
78	Load Case 78	3361	4.57
79	Load Case 79	3361	4.78
80	Load Case 80	3361	5.68
81	Load Case 81	3361	10.8
82	Load Case 82	3361	25
83	Load Case 83	3361	13.2
84	Load Case 84	3361	8.04
85	Load Case 85	3361	5.69
86	Load Case 86	3361	5.42
87	Load Case 87	3361	4.73
88	Load Case 88	3361	4.94
89	Load Case 89	3361	5.42
90	Load Case 90	3361	11.2
91	Load Case 91	3361	27.5

## Summary

### Details

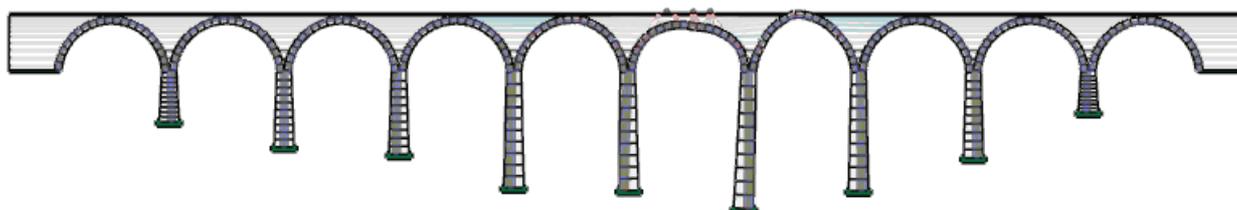
<b>Bridge name</b> HXH/4a Wheatley Viaduct	<b>Location</b> SE 068 270	<b>Reference No.</b>	<b>Map reference</b> Boy Lane, Wheatley, Calderdale
<b>Bridge type</b> Highway	<b>Name of assessor</b> Christopher Doig	<b>Assessing organization</b> Jacobs Ltd	<b>Date of assessment</b> Thursday, April 13, 2023

**Comments**  
Tandem 9.3T Dumper and 8T Excavator

### Results

<b>Adequacy factor</b> 3.07 at load case #49 (this is the critical load case)	<b>Solver used (if not default)</b> CLP solver
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### Mode of Response for Current Load Case



## Units

Unless specified otherwise, the following units are used throughout this report:

<b>Distance</b> mm	<b>Force*</b> kN	<b>Moment*</b> kNm	<b>Angle</b> Degrees	<b>Unit weight</b> kN/m <sup>3</sup>	<b>Material strength</b> N/mm <sup>2</sup>
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\* = per metre width

## Geometry

<b>Global:</b>	<b>No. Spans</b> 10	<b>Effective bridge width</b> 3361						
<b>Span 1:</b>	<b>Type</b> Multi-ring	<b>Shape</b> Segmental	<b>No. Rings</b> 1	<b>Span</b> 15240	<b>Midspan rise</b> 7270	<b>Auto-calc. abutment angles?</b> Yes	<b>LHS angle</b> 2.7	<b>RHS angle</b> 2.7
	<b>Ring 1:</b>	<b>No. Blocks</b> 20	<b>Ring thickness</b> 711					
<b>Pier 1:</b>	<b>Backing Height</b> 4447	<b>Pier Height</b> 7350	<b>Width (Top)</b> 1829	<b>Width (Base)</b> 2591	<b>No. Blocks</b> 10			
<b>Span 2:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment</b>	<b>LHS angle</b>	<b>RHS angle</b>

	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	<b>angles?</b> Yes	2.7	2.7
<b>Pier 2:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	11090	1829	2591	10			
<b>Span 3:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 3:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	12190	1829	2591	10			
<b>Span 4:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 4:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17140	1829	2591	10			
<b>Span 5:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 5:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17550	1829	2591	10			
<b>Span 6:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 6:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	20260	1829	2591	10			
<b>Span 7:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring <b>Ring 1:</b>	Segmental <b>No. Blocks</b>	1 <b>Ring thickness</b>	15240	7270	Yes	2.7	2.7
	20	20	711					
<b>Pier 7:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	17620	1829	2591	10			
<b>Span 8:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7

	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					
<b>Pier 8:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	12730	1829	2591	10			
<b>Span 9:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7
	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					
<b>Pier 9:</b>	<b>Backing Height</b>	<b>Pier Height</b>	<b>Width (Top)</b>	<b>Width (Base)</b>	<b>No. Blocks</b>			
	4447	5910	1829	2591	10			
<b>Span 10:</b>	<b>Type</b>	<b>Shape</b>	<b>No. Rings</b>	<b>Span</b>	<b>Midspan rise</b>	<b>Auto-calc. abutment angles?</b>	<b>LHS angle</b>	<b>RHS angle</b>
	Multi-ring	Segmental	1	15240	7270	Yes	2.7	2.7
	<b>Ring 1:</b>	<b>No. Blocks</b>	<b>Ring thickness</b>					
		20	711					

## Fill Profile Properties

Distances measured from left springing point of left span.

Horizontal distance (x)	Height to surface fill (y)	Surface fill depth (d)	Surface level (y+d)
7620	8460.8	0	8460.8
24688.8	8460.8	0	8460.8
41757.6	8460.8	0	8460.8
58826.4	8460.8	0	8460.8
75895.2	8460.8	0	8460.8
92964	8460.8	0	8460.8
110033	8460.8	0	8460.8
127102	8460.8	0	8460.8
144170	8460.8	0	8460.8
161239	8460.8	0	8460.8

## Partial Factors

### Loads

Masonry unit weight	Fill unit weight	Surface unit weight	Axle load	Dynamic
1	1	1	1	1

### Materials

Masonry strength	Masonry friction
1	1

## Fill Properties

### Backfill

Unit weight	Angle of friction	Cohesion
21.58	30	0

**Model dispersion of live load?**

Yes

**Dispersion type**

Boussinesq

**Soil arch interface, friction multiplier**

0.66

**Mobilisation multiplier on Kp (mp)**

0.33

**Keep mp.Kp > 1?**

Yes

**Model horizontal 'passive' pressures?**

Yes

**Cutoff angle**

30

**Soil arch interface, cohesion multiplier**

0.5

**Mobilisation multiplier on cohesion (mpc)**

0.05

**Auto identify passive zones?**

Yes

## Surface Fill

**Unit weight**

18

**Load dispersion limiting angle**

26.6

## Backing

Position	Backing height	Passive pressures modelled?
Abutment 0	0	Yes
Pier 1	4447	Yes
Pier 2	4447	Yes
Pier 3	4447	Yes
Pier 4	4447	Yes
Pier 5	4447	Yes
Pier 6	4447	Yes
Pier 7	4447	Yes
Pier 8	4447	Yes
Pier 9	4447	Yes
Abutment 10	0	Yes

## Vehicles in Project

Name	Axle No.	Load magnitude	Axle position
Default 1kN Single Axle	1	1	0
Dumper 9.3T	1	187.3	0
Dumper 9.3T	2	66.2	2480
Excavator 8T	1	193.9	0
Dumper and excavator in tandem	1	193.9	0
Dumper and excavator in tandem	2	187.3	3980
Dumper and excavator in tandem	3	66.2	6460

## Vehicles in Load Cases

#	Load Case Name	Vehicle(s)	Position	Mirror?	Dynamic Axles
1	Load Case 1	Dumper and excavator in tandem	0	No	-
2	Load Case 2	Dumper and excavator in tandem	1876	No	-
3	Load Case 3	Dumper and excavator in tandem	3752	No	-
4	Load Case 4	Dumper and excavator in tandem	5629	No	-
5	Load Case 5	Dumper and excavator in tandem	7505	No	-
6	Load Case 6	Dumper and excavator in tandem	9381	No	-
7	Load Case 7	Dumper and excavator in tandem	11257	No	-
8	Load Case 8	Dumper and excavator in tandem	13133	No	-
9	Load Case 9	Dumper and excavator in tandem	15010	No	-
10	Load Case 10	Dumper and excavator in tandem	16886	No	-
11	Load Case 11	Dumper and excavator in tandem	18762	No	-
12	Load Case 12	Dumper and excavator in tandem	20638	No	-
13	Load Case 13	Dumper and excavator in tandem	22514	No	-
14	Load Case 14	Dumper and excavator in tandem	24391	No	-
15	Load Case 15	Dumper and excavator in tandem	26267	No	-
16	Load Case 16	Dumper and excavator in tandem	28143	No	-
17	Load Case 17	Dumper and excavator in tandem	30019	No	-
18	Load Case 18	Dumper and excavator in tandem	31895	No	-

19	Load Case 19	Dumper and excavator in tandem	33772	No	-
20	Load Case 20	Dumper and excavator in tandem	35648	No	-
21	Load Case 21	Dumper and excavator in tandem	37524	No	-
22	Load Case 22	Dumper and excavator in tandem	39400	No	-
23	Load Case 23	Dumper and excavator in tandem	41276	No	-
24	Load Case 24	Dumper and excavator in tandem	43153	No	-
25	Load Case 25	Dumper and excavator in tandem	45029	No	-
26	Load Case 26	Dumper and excavator in tandem	46905	No	-
27	Load Case 27	Dumper and excavator in tandem	48781	No	-
28	Load Case 28	Dumper and excavator in tandem	50657	No	-
29	Load Case 29	Dumper and excavator in tandem	52534	No	-
30	Load Case 30	Dumper and excavator in tandem	54410	No	-
31	Load Case 31	Dumper and excavator in tandem	56286	No	-
32	Load Case 32	Dumper and excavator in tandem	58162	No	-
33	Load Case 33	Dumper and excavator in tandem	60038	No	-
34	Load Case 34	Dumper and excavator in tandem	61915	No	-
35	Load Case 35	Dumper and excavator in tandem	63791	No	-
36	Load Case 36	Dumper and excavator in tandem	65667	No	-
37	Load Case 37	Dumper and excavator in tandem	67543	No	-
38	Load Case 38	Dumper and excavator in tandem	69419	No	-
39	Load Case 39	Dumper and excavator in tandem	71296	No	-
40	Load Case 40	Dumper and excavator in tandem	73172	No	-
41	Load Case 41	Dumper and excavator in tandem	75048	No	-
42	Load Case 42	Dumper and excavator in tandem	76924	No	-
43	Load Case 43	Dumper and excavator in tandem	78800	No	-
44	Load Case 44	Dumper and excavator in tandem	80677	No	-
45	Load Case 45	Dumper and excavator in tandem	82553	No	-
46	Load Case 46	Dumper and excavator in tandem	84429	No	-
47	Load Case 47	Dumper and excavator in tandem	86305	No	-
48	Load Case 48	Dumper and excavator in tandem	88181	No	-
49	Load Case 49	Dumper and excavator in tandem	90058	No	-
50	Load Case 50	Dumper and excavator in tandem	91934	No	-
51	Load Case 51	Dumper and excavator in tandem	93810	No	-
52	Load Case 52	Dumper and excavator in tandem	95686	No	-
53	Load Case 53	Dumper and excavator in tandem	97562	No	-
54	Load Case 54	Dumper and excavator in tandem	99439	No	-
55	Load Case 55	Dumper and excavator in tandem	101315	No	-
56	Load Case 56	Dumper and excavator in tandem	103191	No	-
57	Load Case 57	Dumper and excavator in tandem	105067	No	-
58	Load Case 58	Dumper and excavator in tandem	106943	No	-
59	Load Case 59	Dumper and excavator in tandem	108820	No	-
60	Load Case 60	Dumper and excavator in tandem	110696	No	-
61	Load Case 61	Dumper and excavator in tandem	112572	No	-
62	Load Case 62	Dumper and excavator in tandem	114448	No	-
63	Load Case 63	Dumper and excavator in tandem	116324	No	-
64	Load Case 64	Dumper and excavator in tandem	118201	No	-
65	Load Case 65	Dumper and excavator in tandem	120077	No	-
66	Load Case 66	Dumper and excavator in tandem	121953	No	-
67	Load Case 67	Dumper and excavator in tandem	123829	No	-
68	Load Case 68	Dumper and excavator in tandem	125705	No	-
69	Load Case 69	Dumper and excavator in tandem	127582	No	-
70	Load Case 70	Dumper and excavator in tandem	129458	No	-
71	Load Case 71	Dumper and excavator in tandem	131334	No	-
72	Load Case 72	Dumper and excavator in tandem	133210	No	-
73	Load Case 73	Dumper and excavator in tandem	135086	No	-
74	Load Case 74	Dumper and excavator in tandem	136963	No	-
75	Load Case 75	Dumper and excavator in tandem	138839	No	-
76	Load Case 76	Dumper and excavator in tandem	140715	No	-
77	Load Case 77	Dumper and excavator in tandem	142591	No	-
78	Load Case 78	Dumper and excavator in tandem	144467	No	-
79	Load Case 79	Dumper and excavator in tandem	146344	No	-
80	Load Case 80	Dumper and excavator in tandem	148220	No	-
81	Load Case 81	Dumper and excavator in tandem	150096	No	-
82	Load Case 82	Dumper and excavator in tandem	151972	No	-
83	Load Case 83	Dumper and excavator in tandem	153848	No	-
84	Load Case 84	Dumper and excavator in tandem	155725	No	-
85	Load Case 85	Dumper and excavator in tandem	157601	No	-
86	Load Case 86	Dumper and excavator in tandem	159477	No	-
87	Load Case 87	Dumper and excavator in tandem	161353	No	-
88	Load Case 88	Dumper and excavator in tandem	163229	No	-
89	Load Case 89	Dumper and excavator in tandem	165106	No	-
90	Load Case 90	Dumper and excavator in tandem	166982	No	-

## Load Cases

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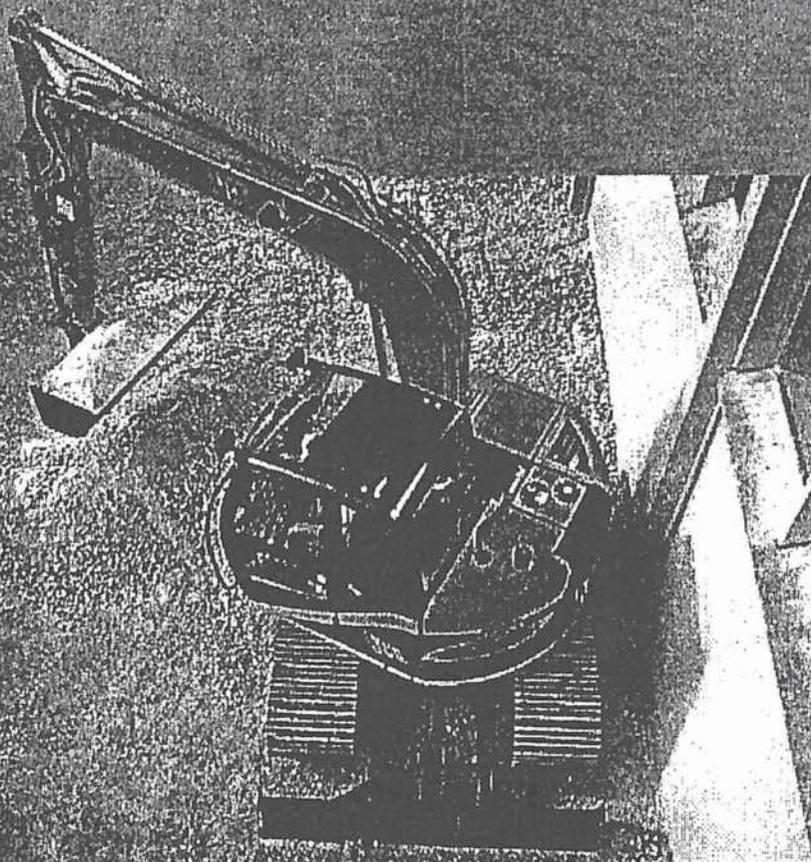
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1	Load Case 1	3361	4.96
2	Load Case 2	3361	4.62
3	Load Case 3	3361	4.5
4	Load Case 4	3361	4.73
5	Load Case 5	3361	5.23
6	Load Case 6	3361	6.09
7	Load Case 7	3361	6.85
8	Load Case 8	3361	9.5
9	Load Case 9	3361	8.02
10	Load Case 10	3361	5.02
11	Load Case 11	3361	4.51
12	Load Case 12	3361	3.99
13	Load Case 13	3361	3.9
14	Load Case 14	3361	4.31
15	Load Case 15	3361	5.21
16	Load Case 16	3361	6.66
17	Load Case 17	3361	9.16
18	Load Case 18	3361	8.27
19	Load Case 19	3361	5.2
20	Load Case 20	3361	4.36
21	Load Case 21	3361	3.91
22	Load Case 22	3361	3.69
23	Load Case 23	3361	4.06
24	Load Case 24	3361	4.98
25	Load Case 25	3361	5.97
26	Load Case 26	3361	8.89
27	Load Case 27	3361	8.57
28	Load Case 28	3361	5.49
29	Load Case 29	3361	4.07
30	Load Case 30	3361	3.64
31	Load Case 31	3361	3.22
32	Load Case 32	3361	3.54
33	Load Case 33	3361	4.17
34	Load Case 34	3361	5.59
35	Load Case 35	3361	8.68
36	Load Case 36	3361	8.8
37	Load Case 37	3361	5.75
38	Load Case 38	3361	3.76
39	Load Case 39	3361	3.52
40	Load Case 40	3361	3.17
41	Load Case 41	3361	3.48
42	Load Case 42	3361	4.06
43	Load Case 43	3361	5.25
44	Load Case 44	3361	8.47
45	Load Case 45	3361	9.1
46	Load Case 46	3361	6.53
47	Load Case 47	3361	3.81
48	Load Case 48	3361	3.43
49	Load Case 49	3361	3.07
50	Load Case 50	3361	3.24
51	Load Case 51	3361	3.78
52	Load Case 52	3361	4.73
53	Load Case 53	3361	8.16
54	Load Case 54	3361	9.46
55	Load Case 55	3361	6.5
56	Load Case 56	3361	3.7
57	Load Case 57	3361	3.23
58	Load Case 58	3361	3.13
59	Load Case 59	3361	3.35
60	Load Case 60	3361	3.97
61	Load Case 61	3361	4.82
62	Load Case 62	3361	7.79
63	Load Case 63	3361	9.99

64	Load Case 64	3361	7.23
65	Load Case 65	3361	4.07
66	Load Case 66	3361	3.4
67	Load Case 67	3361	3.37
68	Load Case 68	3361	3.54
69	Load Case 69	3361	4.44
70	Load Case 70	3361	5.08
71	Load Case 71	3361	7.49
72	Load Case 72	3361	11.3
73	Load Case 73	3361	7.49
74	Load Case 74	3361	4.84
75	Load Case 75	3361	3.9
76	Load Case 76	3361	3.89
77	Load Case 77	3361	3.9
78	Load Case 78	3361	4.54
79	Load Case 79	3361	5.21
80	Load Case 80	3361	7.22
81	Load Case 81	3361	10.6
82	Load Case 82	3361	7.75
83	Load Case 83	3361	5.34
84	Load Case 84	3361	5.44
85	Load Case 85	3361	4.97
86	Load Case 86	3361	4.74
87	Load Case 87	3361	4.82
88	Load Case 88	3361	5.34
89	Load Case 89	3361	7.31
90	Load Case 90	3361	11.1
91	Load Case 91	3361	23.8



# JCB JZ70

# TRACKED EXCAVATOR

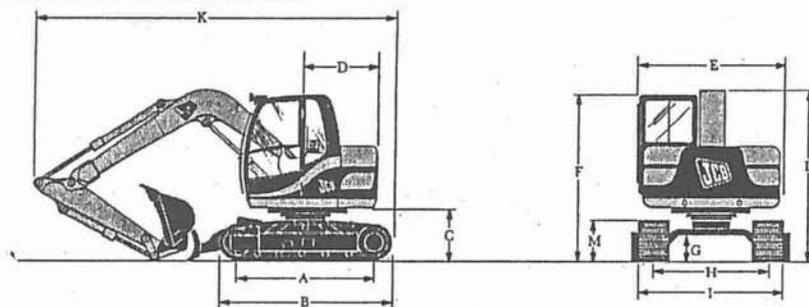


**MAX. OPERATING WEIGHT: 8000kg**  
**NETT ENGINE POWER: 44kW (58hp)**

## GENERAL SPECIFICATION

JZ70

### STATIC DIMENSIONS



A Track length on ground	2200mm (7ft. 2in.)	I Width o/ tracks (450mm shoes)	2150mm (7ft. 1in.)
B Undercarriage overall length	2830mm (9ft. 3in.)	I Width o/ tracks (600mm shoes)	2300mm (7ft. 6in.)
C Counterweight clearance	767mm (2ft. 6in.)	K *Transport length (standard boom)*	5420mm (17ft. 10in.)
D Tallowing radius	1160mm (3ft. 10in.)	K *Transport length (offset boom)*	5360mm (17ft. 7in.)
E Overall width of superstructure	2220mm (7ft. 3in.)	L *Transport height (standard boom)*	2640mm (8ft. 8in.)
F Height over cab	2625mm (8ft. 7in.)	L *Transport height (offset boom)*	2740mm (9ft. 0in.)
G Ground clearance	363mm (1ft. 2in.)	M *Track height	665mm (2ft. 2in.)
H Track gauge	1700mm (5ft. 7in.)		

\*Dimensions quoted with 1.74m dipper arm fitted.

### ENGINE

Model: Isuzu A-4JG1 PAW-02.  
 Type: Water cooled, 4-stroke, 4-cylinder in-line, direct injection, diesel.  
 Nett power: (SAE J1349 and 80/1269/EEC) 44kW (58hp) at 2300 rev/min.  
 Piston Displacement: 3.06 litres (186 cu.in.).  
 Air Filtration: Dry element with secondary safety element.  
 Cooling: Water cooled via large capacity radiator with anti block "wavy" fins and protected by a separate fine mesh grille.  
 Starting system: 24 volt.  
 Batteries: 2 x 12 volt Heavy Duty.  
 Alternator: 24 volt, 40 amp.

### SWING SYSTEM

Swing motor: axial piston type.  
 Swing brake: hydraulic braking plus automatic spring applied disc type parking brake.  
 Final drive: planetary reduction.  
 Swing speed: 9.5 rev/min.  
 Swing gear: large diameter, internally toothed.  
 Swing lock: multi position hydraulic.

### EXCAVATOR END

Choice of either monoboom or offset boom with two dipper lengths to suit the requirements of reach, dig depth, loadover height, tearouts and site versatility.  
 Fabricated tipping links are provided with a choice of lift points.  
 All rams are fully end-damped.

### DOZER BLADE

Max. height (above ground)	375mm (1ft. 3in.)
Dig depth (below ground)	235mm (0ft. 10in.)
Approach angle	26°
Width	2320mm (7ft. 6in.)
Height	460mm (1ft. 6in.)
Reach in front of tracks	480mm (1ft. 7in.)

### TRACK DRIVE

Type: Fully hydrostatic, 2 speed.  
 Travel motors: Axial piston type, fully guarded within undercarriage frame.  
 Final drive: Planetary reduction, bolt-on sprockets.  
 Service brake: Hydraulic counter balance valve to prevent overspeeding on gradients.  
 Park brake: Disc type, spring applied, automatic hydraulic release.  
 Gradeability: 70% (35 deg) continuous.  
 Travel Speed: High - 5 km/h (3.1 mph).  
 Low - 3.4 km/h (2.1 mph).  
 Tractive Effort: 55kN (5600kgf, 12348lbf).

### UNDERCARRIAGE

Construction: Fully welded, "X" frame type with central bellyguarding and sloping sidemembers with dirt relief holes under top rollers.  
 Upper & lower rollers: Heat treated, sealed and lubricated.  
 Track type: sealed and greased.  
 Track adjustment: Grease cylinder type.  
 Track idler: Sealed and lubricated, with spring cushioned recoil.  
**Track shoes:**  
 450mm (18in) triple grouser  
 600mm (24in) triple grouser  
 450mm (18in) rubber tracks  
**Rollers and Shoes (each side):**  
 Upper rollers 1  
 Lower rollers 5  
 Track shoes 39

### SERVICE CAPACITIES

	Litres	UK Gal
Fuel tank	120	26.3
Engine coolant	10.4	2.29
Engine oil	9.6	2.1
Track reduction gear (each side)	1.7	0.37
Hydraulic system	92.0	20.24
Hydraulic tank	55.0	12.11

Reach	2m		3m		4m		5m		6m	
Load Point Height										

**Monoboam, 1.74 Arm, 600mm triple grouser, 0.16m<sup>3</sup> bucket 145kg**

5m			1339*	1339*	1316*	1316*				
4m			1447*	1447*	1398*	1398*				
3m			1803*	1803*	1539*	1539*	1437	1131		
2m			2294*	2294*	1760*	1567	1412	1108		
1m			2701*	2306	1947	1507	1382	1079		
0			2876*	2239	1901	1464	1359	1058		
-1m	4062*	4062*	2831*	2218	1881	1445				
-2m	3582*	3582*	2559*	2232	1852*	1457				
-3m	2673*	2673*	1848*	1848*						
-4m										

**Offset boom, 1.74 Arm, 600mm triple grouser, 0.16m<sup>3</sup> bucket 145kg**

5m	1442*	1442*	1382*	1382*						
4m	1695*	1695*	1471*	1471*	1353*	1353*				
3m			1764*	1764*	1467*	1467*	1332*	1052		
2m			2163*	2163*	1644*	1475	1329	1015		
1m			2484*	2114	1810*	1378	1282	970		
0			2602*	2007	1756	1310	1246	938		
-1m	3570*	3570*	2522*	1975	1725	1281				
-2m			2227*	2001	1601*	1302				
-3m										
-4m										

**Monoboam, 2.18 Arm, 600mm triple grouser, 0.16m<sup>3</sup> bucket 145kg**

5m					1217*	1217*				
4m			1170*	1170*	1211*	1211*	1280*	1147		
3m			1506*	1506*	1362*	1362*	1299*	1136		
2m			2006*	2006*	1599*	1575	1402*	1105		
1m			2491*	2332	1845*	1507	1373	1070		
0			2784*	2238	1891	1453	1343	1041		
-1m	3945*	3945*	2849*	2195	1859	1423	1328	1027		
-2m	3904*	3904*	2684*	2192	1856	1420				
-3m	3151*	3151*	2184*	2184*						
-4m										

**Offset boom, 2.18 Arm, 600mm triple grouser, 0.16m<sup>3</sup> bucket 145kg**

5m	1081*	1081*	1141*	1141*	1172*	1172*				
4m	1295*	1295*	1241*	1241*	1184*	1184*	1172*	1099		
3m			1530*	1530*	1315*	1315*	1201*	1077		
2m			1945*	1945*	1510*	1501	1288*	1027		
1m			2328*	2160	1705*	1390	1283	971		
0			2538*	2013	1752	1305	1234	924		
-1m	3620*	3620*	2549*	1949	1702	1258	1209	900		
-2m	3385*	3385*	2360*	1949	1698	1254				
-3m										
-4m										

Lift capacity (kg) front and rear

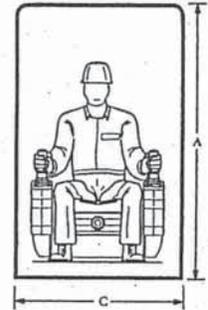
Lift capacity (kg) full circle

Notes: 1. Lifting capacities are based on ISO 10567, that is: 75% of minimum tipping load or 87% of hydraulic lift capacity, whichever is the less. Lifting capacities marked\* are based on hydraulic capacity.  
2. Lift capacities assume that the machine is on firm, level ground and equipped with an approved lifting point and bucket.  
3. Lift capacities may be limited by local regulations. Please refer to your dealer.

CAB

Dimensions	External	Internal
A Cab height (mm)	1703	1650
B Cab length (mm)	1500	1430
C Cab width (mm)	948	940
Distance from seat base to roof (mm)	1130	
Door aperture width (mm)	780	

Unlike other zero tailswing machines, the full size high-comfort cab of the JZ70 gives the operator the room to operate in comfort, helping him to be more productive.



CAB

- Steel cab with high strength rolled section frame conforms to ISO dimensional standards. Noise and vibration isolated by four hydraulically damped mountings.
- All tinted safety glass windows with fully opening two piece windscreen and in screen stowage. Gas strut assisted. Parallelogram wash/wiper. Opening door window.
- Fan forced fresh air ventilation and heater with windscreen demister.
- Fully adjustable deluxe suspension seat with armrests and backrest recline.
- Radio cassette player with digital tuning, cigarette lighter and ashtray are standard fitment.
- Air conditioning is available as an option.

CONTROLS

- Excavator: All servo lever operated, to ISO control pattern.
- Tracks: Individually servo operated by foot pedal or hand lever. Speed selection via foot operated switch.
- Auxiliary: Via joystick switch on LH servo lever.
- Low flow: via switch on RH servo lever.
- Controls isolation: Gate lock lever at cab entrance, via LH console, and a console mounted switch.
- Engine speed: Dial type throttle control plus servo lever mounted one-touch control.
- Engine stop: Ignition key operated.
- Horn: Operated via servo lever mounted button.
- Dozer: via dedicated lever.

AMS

**ADVANCED MANAGEMENT SYSTEM**

The heart of the system is the in cab monitor unit. This gives a graphical display of fuel level and engine and hydraulic oil temperatures, in addition to audio visual warnings and function selection.

The unit also controls the work mode and one touch idle facility.

The monitor and service tool can be used to check the function of pressure switches, solenoids and actual values on monitor gauges.

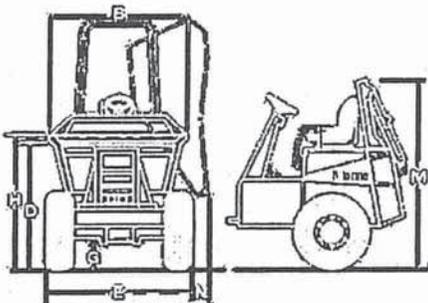
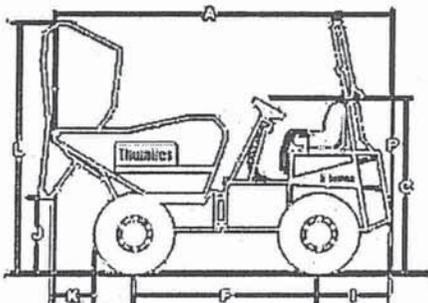
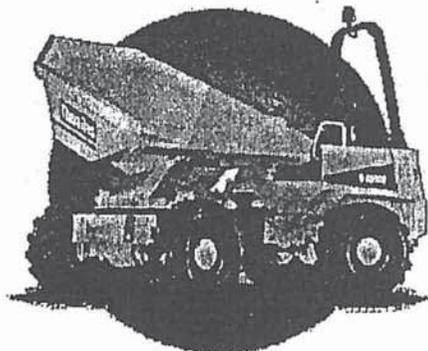
It is easy to amend the preset languages shown on the monitor. Using a service tool additional languages can be made available.

A maintenance Indicator illuminates at the required service interval to make the operator aware of an imminent service. All servicing and basic checks can be carried out using the cab monitor display. A service tool connected to the monitor via a CAN BUS link can be used for more detailed diagnostics and machine history analysis.

# Thwaites

## Products

Our most popular Powerswivel dumper with heavy-duty axles, Perkins 80 bhp 4 cylinder diesel and torque converter, powershuttle transmission. Thwaites' Kinglink chassis for superior stability and traction. Twin-circuit totally enclosed oil-immersed brakes.



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### 4WD Alldrive 5 Tonne Powerswivel

Front Tip Powerswivel

Capacities	Max. safe load	5000kg
	Heaped	3000 litres
	Struck	2200 litres
	Water	1500 litres

**Engine** Perkins 1000 series, 4 cylinder water-cooled diesel, 60 kW (80 bhp) at 2200 rpm. Max. torque 290 Nm (214 lbf ft). Optional Turbodiesel with Powershift Transmission, 75 kW (100 bhp) at 2200 rpm. Max. torque 402 Nm (295 lbf ft). Hour meter, battery isolation switch and heavy-duty cyclonic air cleaner positioned within the lockable engine compartment.

**Noise Levels** Operator's ear 85 LpA, airborne sound power level 105 LwA (to 86/662/EEC).

**Transmission** Torque converter 4 speed forward and reverse powershuttle transmission with column-mounted directional control lever. Heavy-duty gear driven transfer box. Optional 'Powershift' transmission with changes of speed and forward/reverse direction controlled by one column-mounted lever.

Speeds	Forward and Reverse
1	4.3 km/h (2.7 mph)
2	6.9 km/h (4.3 mph)
3	13.0 km/h (8.1 mph)
4	23.9 km/h (14.8 mph)

**Tyres** 12.5/80 x 18  
12 ply  
Track grip tread

**Brakes and Axles** Twin-circuit totally enclosed multiplate oil-immersed discs mounted on both axles with automatic adjustment for wear. Hand-operated parking brake. Heavy-duty axles with epicyclic reduction and fully floating halfshafts.

**Kinglink Chassis** Front and rear chassis constructed from deep section folded steel plate, with three-point Kinglink giving centre articulation and oscillation for better stability, traction and extra safety on site. Remote greasing point provided for lubrication of top Kinglink articulation pin.

**Skip** Hydraulically operated, continuously welded construction. 8mm base with 14mm overlapped seams. Reinforced with substantial box sections for greater strength to minimise damage. No material traps. Powerswivel mounted on ball bearing lumtable with powered rotation through 180° by means of twin slewing cylinders, operated by a single dual axis control lever. Thwaites automatic skip lock. Optional abrasion resistant steel plate (AR400) for skip base, rear and front panel sections.

**Seating & Controls** Adjustable suspension seat, accessible from both sides. Audible warning device for handbrake in 'on' position. Electric horn. Large pedal pads with handbrake and hydraulic controls ready to hand. Super bright warning lights for all critical functions. Operator instructions book secured by wire cable retainer, housed in special slot within steering column leg guard.

**Service Access** Lockable 3 sided cover opens to provide easy access from ground level to engine service points, all located on the same side. Rear chassis panel can be hinged back on retainers. Additional service access door incorporates the battery. Moulded diesel and hydraulic tanks positioned low in the chassis side members, permitting access to the filler caps from ground level.

**Electrics** Wiring harness contained within conduits and all electrical components water resistant to IP65/67 standards.

**Steering & Hydraulics** Hydraulic priority power steering. Filter mounted on the top of the tank accessible from ground

Dimensions			
A	4752mm	B 2134mm	C 2190mm
D	1600mm	E 2130mm	F 2480mm
G	300mm	H 1794mm	I 1167mm
J	1050mm	K 538mm	L 3650mm
M	2365mm	N 117mm	P 3424mm

level. Hydraulic test point fitted as standard.

Tank Capacities	Fuel	70 litres
	Hydraulic	70 litres

**Shipping Cube** 22.16 m³

**Unladen Weight** 4295 kg

**Clearance Diameter** 12.0 m

**Towing Bracket** Standard

**ROPS** For the UK and other markets where it is a legal requirement, a ROPS bar is fitted as standard.

**Optional Extras** Folding ROPS frame. ROPS/FOPS frame and canopy. Full road lighting equipment. UK road equipment. Anti-theft device.

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## VOLUME 3 – SITE INFORMATION

## 1. PRE-CONSTRUCTION INFORMATION

### 1.1 INTRODUCTION TO THE PRE-CONSTRUCTION INFORMATION PACK

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#### 1.1.1. Purpose of Pre-Construction Information Pack

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The purpose of this pre-construction information pack is to provide a safety brief for the Contractor appointed for the project, covering:

- Information on safety considerations affecting the site and its environment
  - Information on Health and safety aspects of the proposed structure and equipment
  - Requirements for Tenderers' submissions on health and safety
  - Requirements for Principal Contractor's Construction Phase Plan
- 

#### 1.1.2. Requirements for Tenderers' Submissions on Health and Safety

---

The Principal Designer is appointed by the Client to assist the Client in providing key project advice in respect of construction health and safety risk management matters and to advise the Client on appointment of competent contractors and the adequacy of management arrangements; ensure the proper co-ordination of the health and safety aspects of the design process; liaise with the Principal Contractor to share safety information relevant to the planning, management and monitoring of the construction phase; facilitate good communication and co-operation between project team members during the design phase and prepare the health and safety file.

The Principal Designer must give suitable and sufficient advice and assistance to Clients in order to help them to comply with their duties. In particular, the duties to:

- appoint competent designers and contractors;
  - ensure that adequate arrangements are in place for managing the project;
- and to: -
- notify HSE about the project (where necessary);
  - co-ordinate design work, planning and other preparation for construction where relevant to health and safety;
  - identify and collect the pre-construction information and advise the Client if surveys need to be commissioned to fill significant gaps;
  - promptly provide in a convenient form to those involved with the design of the structure; and to every Contractor (including the Principal Contractor) who may be or has been appointed by the client, such parts of the preconstruction information which are relevant to each;
  - manage the flow of health and safety information between Clients, designers Principal Contractor and Contractors;

- advise the Client on the suitability of the initial Construction Phase Plan and the arrangements made to ensure that welfare facilities are on site from the start;
- produce or update a relevant, user friendly, Health and Safety File suitable for future use at the end of the Construction Phase.

The Client has the duty of ensuring that the Principal Contractor is competent and has made adequate provision for health and safety.

To enable the Principal Designer to assist the Client in making this assessment, the following information is to be provided by tendering Contractors in support of their tender submission:

- Contractor's health and safety policy statement
- Contractor's organisation and arrangements for health and safety
- Contractor's arrangements for ensuring compliance with all relevant legislation
- Accident and ill-health records
- Details of any previous HSE prosecutions or prohibitions
- QA systems and procedures
- Completed checklist for all proposed sub-contractors. The checklist is contained in Volume 2, Section 5.

A method statement shall be provided by the Contractor. This shall detail the methods proposed for the works, safety arrangements to be employed, details of road closures and traffic management.

The Contractor shall include in his Tender submission a method statement stating how he proposes to arrange the following:

- Site access and egress
- Welfare arrangements
- Location of temporary accommodation
- Location of unloading and storage areas
- Traffic management and routes
- Security arrangements to ensure only authorised persons gain access to the site (including out of hours security)
- Elevated access to the structure and working at height
- Temporary works proposals to support the brickwork and stonework repair areas

- Works to be undertaken above watercourse
- Works to be undertaken above public road
- Works to be undertaken above private garden
- Waterproofing works on the deck
- Arrangements for working with contaminated fill material

The method statements shall be incorporated in the Principal Contractor's Construction Phase Plan. Each contractor will prepare detailed and specific method statements where the risk is significant. Each method statement will identify the specific methods to be used to control the risks identified. The Principal Contractor needs to review contractor's construction method statements to ensure:

- Risks to safety have been mitigated
- Adequate health and safety arrangements have been specified
- It is compatible with the Construction Phase (Health and Safety) Plan
- It is compatible with the work of other contractors

Each method statement and updates will be submitted to Jacobs for review on behalf of HRE.

**The Contractor is to submit to Jacobs each method statement a minimum of 10 working days prior to carrying out the work activity**

The Contractor shall provide sufficient information in both the Construction Phase Plan submitted in accordance with Regulations 12 and 13 of the Construction (Design and Management) Regulations 2015 (CDM Regulations) and in the submitted Programme of Works to identify key stages and dates when relevant information will be submitted to the Principal Designer and the Supervisor in order to comply with the CDM Regulations.

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### 1.1.3. Development of the Health and Safety Plan

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The Principal Contractor will be appointed as such and has duties as set out in the CDM Regulations 2015, including, in particular, Regulations: 8, 12-15 and Part 4 of the Regulations. It should be noted that through the design of temporary works the Contractor also takes on the duties of Designer as set out in the CDM 2015 Regulations, including, in particular Regulations 9 and 10. On appointment the Principal Contractor is required to develop the Pre-construction Information prepared by the Principal Designer into his own Construction Phase Plan prepared before construction work begins and defining how the Principal Contractor's duties under the CDM Regulations are to be carried out, the Construction Phase Plan shall cover:-

- the methods adopted to ensure that designers and contractors they appoint are competent and adequately resourced;

- the arrangements and provision of suitable welfare facilities at the start and throughout the Construction Phase and while there is an attendance on site by workers to carry out any construction work under the project;
- the methods to promptly communicate and to ensure that, in particular, health, safety and welfare matters, including induction, information and training to Contractors they may appoint, and to the Client, Principal Designer and Designers and to any other person who might be affected by the project;
- notification and liaising with the Principal Designer for implementation of changes in design, including temporary works design where required;
- methods to be adopted to prevent unauthorised access to the construction site;
- methods to implement and enforce any necessary Site Rules;
- method to be adopted for ensuring that workers are consulted about health and safety matters;
- method of promptly notifying the Client, Principal Designer and designers of any circumstances or occurrences that may require design changes, or that could impact on the health, safety and welfare of workers and/ or for the future maintenance of works constructed under the project;
- method to update the Construction Phase Plan, inform and maintain liaison with the Client, Principal Designer, Designers, other Contractors and to any other person, following implementation of design and/ or construction or material changes;
- provision of information to the Principal Designer promptly with any information relevant to the health and safety file;
- Risk assessments will be carried out by Contractors in accordance with current legislative requirements and will be required to substantiate Contractor's safety method statements. Where risks common to several contractors exist the risk assessment shall be co-ordinated by the Principal Contractor;

in addition, Principal Contractors are required to satisfy themselves and ensure that:

-

- Clients are aware of their duties,
- that a Principal Designer has been appointed and that all parties are clear on roles before they start work;
- they are competent to address the health and safety issues likely to be involved in the management of the construction phase;
- Construction Phase is properly planned, managed and monitored, with adequately resourced, competent site management appropriate to the risk and activity;
- every Contractor who will work on the project is informed of the minimum amount of time which they will be allowed for planning and preparation before they begin work on site;
- that all Contractors are provided with the information about the project that they need to enable them to carry out their work safely and without risk to health. Requests from Contractors for information should be met promptly;
- safe working and co-ordination and co-operation occurs between contractors and designers;
- method statements are obtained and checked from sub-contractors and other contractors;
- monitoring of health and safety performance of sub-contractors and other contractors is carried out.

The Principal Contractor and all works contractors and sub-contractors are required to implement the requirements of all current health and safety legislation and the requirements of the CDM Regulations 2015.

The CDM Regulations 2015 stipulate that construction work is not to be commenced until the Principal Contractor has provided the Client with a satisfactory Construction Phase Plan.

The Principal Designer will be responsible for assessing the adequacy of the Principal Contractor's Construction Phase Plan on behalf of the Client.

## 1.2 DESCRIPTION OF PROJECT

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### 1.2.1. Key Dates/Times

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Planned site works start date:	TBC by the Contractor in agreement with the Client
Planned site works finish date:	TBC by the Contractor in agreement with the Client
Site works length:	25 weeks (TBC by the Contractor in agreement with the Client)
Time allocated for contractor to complete health and safety file:	2 weeks after Completion
The minimum time to be allowed between appointment of the Principal Contractor and instruction to commence work on site:	TBC by the Contractor in agreement with the client

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### 1.2.2. Responsible Parties

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Principal Designer:	Jacobs UK Ltd. 20 George Hudson Street York YO1 6WR Tel: 01904 924 950
Design Contact	Jacobs UK Ltd; contact Christopher Doig 95 Bothwell Street Glasgow G2 7HX Tel: 01904 924 876 Email: <a href="mailto:Christopher.Doig@Jacobs.com">Christopher.Doig@Jacobs.com</a>
Supervisor:	Matthew Winship (Jacobs UK Ltd) 20 George Hudson Street York YO1 6WR Tel: 01904 924 868 Email: <a href="mailto:Matthew.Winship@Jacobs.com">Matthew.Winship@Jacobs.com</a>
Client/ Project Manager:	Fiona Smith National Highways Historical Railways Estate 37 Tanner Row York YO1 6WP Tel: 01904 621 924

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1.2.3. Location of Sites

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The site location map can be found in Volume 3, Section 2.

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1.2.4. Nature of the Construction Work

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The works are described within Volume 2 – Scope and detailed on the construction drawings listed in Volume 2, Specification Appendix 0/4.

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1.2.5. Timescale for Completion of Construction Work

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Timescale restrictions are given in the Key Dates/Times section above and in Appendix 1/13.

The Contractor is to submit a project programme with the tender submission.

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1.2.6. Structure to be used as a workplace

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N/A

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1.2.7. Extent and location of existing records and plans.

---

The latest examination reports are included in Volume 3, Section 3. Additional background information will be made available on request.

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1.2.8. Existing Traffic Systems and Restrictions

---

The Contractor is expected to undertake their own risk assessments of the road / highway conditions and access to the structure for contractor operations during the construction phase. Control measures should be outlined in the Contractor's Traffic Management Plan.

---

1.2.9. Surrounding Area

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Structure HXH/4a, 'Wheatley Viaduct', is a 10-span masonry arch viaduct that carried the former Halifax High Level branch railway line. The structure is located 3km North West of Halifax, Calderdale. The OS grid reference for the structure is SE 068 270.

Access over the viaduct deck is prevented at both ends by large steel plate barriers with no entry points. The approach to the south is occupied by residential properties

and to the north is a narrow, unmade track running parallel to the cutting. A private garden is present below Span 1 and a minor road 'Boy Lane' passes below Span 2. A minor watercourse 'Hebble Brook' is carried through a culvert passing below Span 6. An additional flood relief culvert in poor condition passes below Span 5.

Bridleway '09/483/1' runs parallel to the west side of the structure. There are no other known public rights of way within the vicinity of the structure.

A search of landownership records has been undertaken and information is available in Section 6, Volume 3 – Site Information.

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#### 1.2.10. Existing Ground Conditions

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A preliminary review of the British Geological Survey map suggests that the ground beneath the structure is likely formed from clay. There are steep embankments down from the bridleway that runs parallel to the west side of the viaduct and to the embankments below Spans 1 and 10.

A Waste Classification Assessment report classified the material above Span 1 as hazardous due to presence of Total Petroleum Hydrocarbons (TPH). No other hazardous materials were identified from the samples tested. Refer to Section 8 of Volume 3 – Site Investigation Report and Survey Data.

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#### 1.2.11. Existing Services

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A services search was carried out by Jacobs in June 2020. For details of the results of this search, please see the desktop service search correspondence in Volume 3, Section 5 - Services Search Information.

An overhead BT cable passes through Span 3. A low-pressure gas main, both low and high voltage electricity cables, a BT cable and a water main are buried below the road passing under Span 2.

The Contractor is required to locate the position of the services by scanning methods such as CAT and signal generator and/or confirm via trial holes prior to the main works commencing. The results of a Utility Survey Report undertaken by Central Alliance in January 2023 is provided in Volume 3, Section 8. The Contractor is responsible for confirming the validity of the survey.

**The Contractor will be responsible for liaison with the appropriate Statutory Undertaker and agreeing the necessary protection for any services encountered during the proposed works.**

The indicative locations of the documented services are shown on scheme drawing B28280-EW-0001 Rev 03.

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#### 1.2.12. Existing Drawings

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Scheme drawings can be found in Volume 2, Section 2 – Scope.

Topographical survey drawings can be found in Volume 3, Section 8 - Site Investigation Report and Survey Data.

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#### 1.2.13. Surveys and Inspections

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These can be found in Section 3 of Volume 3 – Site Information.

## 1.3 CLIENT'S CONSIDERATIONS AND MANAGEMENT REQUIREMENTS

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### 1.3.1. Arrangements for - Planning for and managing the construction work, including any health and safety goals for the project

---

Historical Railways Estate goals for the project are zero safety incidents or accidents.

The Contractor shall include in his Tender submission a method statement stating how he proposes to safely manage the following:

- Site access and egress
- Welfare arrangements
- Location of temporary accommodation
- Location of unloading and storage areas
- Traffic management and routes
- Security arrangements to ensure only authorised persons gain access to the site (including out of hours security)
- Elevated access to the structure and working at height
- Temporary works proposals for the support of brickwork and stonework repair areas
- Works to be undertaken above the watercourse.
- Works to be undertaken above public road
- Works to be undertaken above private garden
- Waterproofing works on the deck
- Arrangements for working with contaminated fill material

The method statements shall be incorporated in the Principal Contractor's Construction Phase (Health and Safety) Plan.

The Principal Contractor will be appointed as such and has duties as set out in the CDM Regulations.

---

### 1.3.2. Arrangements for - Communication and liaison between client and others

---

The Principal Contractor and Contractors will be expected to establish arrangements for monitoring health and safety during construction and for periodic

review of these arrangements. Details are to be included in the construction phase plan.

Details are to be provided by the Designer and Principal Designer to show how effective communications with the Client and Principal Contractor will be maintained.

The Principal Contractor must collate and record information on all accidents and near misses and investigate them so that measures can be taken to prevent recurrence.

The methodology for monitoring and reviewing arrangements shall be fully described in the Principal Contractor's construction phase plan.

Contractor's communication is to be through the Supervisor (details to be provided at site start-up meeting), as per the specification.

---

### 1.3.3. Arrangements for - Security of the site

---

The Principal Contractor shall ensure that suitable precautions are established and maintained to minimise the risk to the public during the works. Where appropriate, provision of secure fencing for the perimeter of any compound or work sites on the road network will be provided as a minimum. The type of fencing should be considered by the Principal Contractor and suitable for each location.

The site shall be left and kept in a safe condition outside working hours with all plant and equipment left secure and immobilised.

The Contractor should confirm security arrangements for the project in the Construction Phase Plan and Method Statement submissions. Security measures should address;

- Security of boundaries to construction site,
- Security of plant and equipment on site,
- Surveillance during working hours and out of hour periods,
- Means of identification of authorised contractors and visitors on site,
- Means of reporting security incidents e.g. unauthorised entry to site, vandalism, and theft events.

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### 1.3.4. Arrangements for - Welfare provision

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The contractor is to provide adequate welfare facilities in accordance with the Construction (Design and Management) Regulations 2015 and Schedule 2 of the Guidance to the Regulations L153 – Managing Health and Safety In Construction and is required to maintain these in a serviceable clean condition.

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### 1.3.5. Safety Training

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All persons employed on the project must, irrespective of their status, attend a site-specific safety induction. Contractors shall ensure that all personnel are appropriately trained and experienced for the allotted tasks.

---

### 1.3.6. Requirement relating to the health and safety of the client's employees or customers or those involved in the project such as:

---

(i) Site hoarding requirements,

Principal Contractor to detail proposals. The Principal Contractor shall ensure that suitable precautions are established and maintained to minimise the risk to the public during the works. Where appropriate, provision of secure fencing for the perimeter of any compound or work sites on the road network will be provided as a minimum. The type of fencing should be considered by the Principal Contractor and suitable for each location.

The site shall be left and kept in a safe condition outside working hours with all plant and equipment left secure and immobilised.

(ii) Site transport arrangements or vehicle movement restrictions,

Principal Contractor to detail proposals. The Principal Contractor and Contractors shall comply with the appropriate standards for working on, over or adjacent to a live carriageway including, but not limited to, the Traffic Signs Manual Chapter 8.

Construction vehicle movements will be restricted as detailed in Appendix 6/6.

(iii) Client permit-to-work systems,

It is not anticipated that the Client shall issue specific permits to work. This function shall be borne by the Principal Contractor.

(iv) Fire precautions,

Good working practices to be adhered to. Refer to design risk assessment for any site-specific fire risks (Volume 2, Section 3).

(v) Emergency procedures and means of escape,

The Principal Contractor will ensure that first aid facilities together with trained first aiders are available in accordance with Health and Safety (First Aid) Regulations 1991. All site personnel to be briefed on emergency procedures during induction.

(vi) 'No-go' areas or other authorisation requirements for those involved in the project,

N/A

- (vii) Any areas the client has designated as confined spaces,

N/A

- (viii) Smoking and parking restrictions.

Contractor to detail requirements.

- (ix) Personal Protective Equipment

Appointed Contractors are to carry out assessments of requirements for personal protective equipment and arrange provision in accordance with the Personal Protective Equipment at Work Regulations, 2022.

#### 1.4 ENVIRONMENTAL RESTRICTIONS AND EXISTING ON-SITE RISKS

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##### 1.4.1. Safety hazards, including;

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For site specific hazards refer to Volume 2, Section 3 - Designer's Risk Assessment.

- (i) Boundaries and access, including temporary access

There is currently no suitable construction access to the viaduct deck. Large steel barriers are present across both ends of the viaduct. The approach to the south is occupied by residential properties and to the north is a narrow, unmade track running parallel to the cutting. Suitable safe access to the deck is to be established by the Contractor.

The approaches to the structure along the former railway line and surrounding area are subject to a tree preservation order. Early contractor involvement has highlighted the south approach as the most suitable Construction access route. These discussions also indicate that no trees would be required to be removed. The Contractor is required to obtain prior approval via the Tree Preservation Order consent process if their proposed access methodology involves trimming back any trees to form access.

There is currently no vehicular access to the viaduct. The Contractor will have to demonstrate a safe system of work for temporary access to the structure.

- (ii) Any restrictions on deliveries or waste collection or storage.

See section (i) above.

A Waste Classification Assessment report classified the material above Span 1 as hazardous due to presence of Total Petroleum Hydrocarbons (TPH). No other hazardous materials were identified from the samples tested. Refer to Section 8 of Volume 3 – Site Investigation Report and Survey Data.

(iii) Adjacent land uses

A public road 'Boy Lane' passes below Span 2. No footpaths or significant verges are present on either side of the road. Bridleway '09/483/1' runs parallel to the west side of the structure. A minor watercourse, 'Hebble Brook', is conveyed beneath the bridleway embankments via a brick arch culvert. The culvert outlet is below Span 6. An additional flood relief arch culvert in poor condition is present below the bridleway embankment and outlets below Span 5.

The approaches to the structure along the former railway line and surrounding area are subject to a tree preservation order. Prior approval via the Tree Preservation Order consent process will be required if the Contractor proposes to trim back any trees to form access. A search of landownership records has been undertaken and information is available in Volume 3, Section 6 – Landownership Details.

(iv) Existing storage of hazardous materials.

There are no known hazardous materials stored on site.

(v) Location of existing services

Services search information is included in Volume 3, Section 5. An overhead BT cable passes through Span 3. A low-pressure gas main, both low and high voltage electricity cables, a BT cable and a water main are buried below the road passing under Span 2. The indicative locations of the private overhead services are shown on scheme drawing B28280-EW-0001 Rev03.

The Contractor is to liaise with service providers (refer to Volume 2, Section 1 Appendix 1/16 for service provider information) and undertake further services searches.

(vi) Ground conditions, underground structures or water courses where this might affect the safe use of plant, for example cranes, or the safety of groundworks.

A minor watercourse, 'Hebble Brook', is conveyed through the bridleway embankments via a brick arch culvert that outlets below Span 6. The depth of the water is liable to vary depending on the season and recent weather. There are steep embankments at the ends of the viaduct which might affect the safe erection of scaffolding.

(vii) Information about existing structures – stability, structural form, fragile or hazardous materials, anchorage points for fall arrest systems (particularly where demolition is involved).

The construction form and depth of the pier foundations is unknown. There may be relieving (vaulted) arches present over the piers. The structure displays various fractures throughout the exposed faces of the piers. The known significant structural defects are shown on drawings B28280-EW-0002 to 0006 Rev03.

The contractor is to consider the pier construction when detailing his proposed plant and access over the deck (if required).

Details on the loading capacity of the structure for normal traffic is currently unknown. A stability analysis has been undertaken for typical dumper and tracked excavator load models. The Contractor is to confirm that the deck is suitable to support any plant, construction vehicles or equipment they propose to bring onto the deck that exceeds the approved vehicle loading prior to undertaking the works.

A detailed examination report is available in Volume 3, Section 3 – Examination Reports.

- (viii) Previous structural modifications, including weakening or strengthening of the structure (particularly where demolition is involved),

N/A

- (ix) Fire damage, ground shrinkage, movement or poor maintenance which may have adversely affected the structure,

The 2019 Detailed Examination Report included within Volume 3 Section 3 identifies various structural defects. Known significant defects are also indicated on design drawings B28280-EW-0002 to 0006 Rev03.

- (x) Any difficulties relating to plant and equipment in the premises, such as overhead gantries whose height restricts access,

Overhead services are present below Span 3.

- (xi) Health and safety information contained in earlier design, construction or 'as-built' drawings, such as details of pre-stressed or post-tensioned structures,

N/A

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#### 1.4.2. Health hazards, including:

---

For site specific hazards refer to Section 3 Designer's Risk Assessment in Volume 2 – Scope.

- (i) Asbestos, including results of surveys (particularly where demolition is involved),

N/A – No asbestos containing materials are assumed to be contained within the viaduct structure based on the construction age and fabric of the structure.

Contractor Site Management / Supervisors are expected to have suitable levels of asbestos awareness training to enable them to identify any potential asbestos hazard should they be discovered on site during the works.

(ii) Existing storage of hazardous materials,

N/A.

(iii) Contaminated land, including results of surveys,

A Waste Classification Assessment report classified the material above Span 1 as hazardous due to the presence of Total Petroleum Hydrocarbons (TPH). No other hazardous materials were identified from the samples tested. Refer to Section 8 of Volume 3 – Site Investigation Report and Survey Data.

(iv) Existing structures containing hazardous materials,

There are no known hazardous materials.

(v) Health risks arising from client's activities.

N/A

## 1.5 SIGNIFICANT DESIGNS AND CONSTRUCTION HAZARDS

For site specific hazards refer to Volume 2, Section 3 Designer's Risk Assessment

---

### 1.5.1. Significant design assumptions and suggested work methods, sequences or other control measures

---

The following sequence of events is suggested to complete the works -

- Form access to the superstructure via the South East approach.
- Establish secure site setup and welfare.
- Remove vegetation, fencing and establish access to the deck and piers as required. No trees are to be removed or trimmed.
- Repair internal faces of parapets.
- Install high level temporary works access to each span.
- Joint high-level inspection by Supervisor and Contractor to investigate large areas of defective brickwork and to identify any additional areas requiring repair. Further repairs and temporary works to be agreed. Proposed repairs to masonry are only those which are considered necessary to provide a 25-year maintenance free period.
- Repair spandrel separation fractures between arch barrel and voussoirs using Cintec anchors.
- Fractures in Pier 8 to be re-mortared and stitched together using Cintec anchors.
- Cut out and replace areas of spalling in arches and piers.
- Re-bed displaced or loose masonry and replace missing masonry.
- Mechanical re-mortaring of piers, spandrels and arch soffits.
- Remove fill from viaduct deck in layers to levels and profile shown on the drawings.
- Cast concrete footing below barriers to provide sound surface to terminate waterproofing membrane.
- Lay waterproofing membrane between geotextiles and grade to suit proposed drainage arrangement.
- Lay 150mm diameter HDPE perforated pipe along the centre of the waterproofing layers, surrounded with 10mm single size stone and geotextile.
- Install inspection chamber at south end of structure.
- Core hole through spandrel and connect 150mm diameter solid outflow pipes down south east wingwall.
- Install Terram Geocell in south east embankment to retain embankment material.
- Reinstate excavated fill over drainage membrane to build deck levels to proposed.
- Lay additional layer of Terram 1000 (or approved similar) geotextile across deck.
- Lay and compact 150mm layer of 6C material on top of geotextile.
- Demobilise from site.

The Contractor may propose an alternative sequence of works and/or methodology for completion of the works, subject to acceptance by the Principal Designer and Client.

---

1.5.2. Arrangements for co-ordination of ongoing design work and handling design changes;

---

Contractor's communication is to be through the Supervisor who will coordinate any ongoing design work or change (details to be provided at site start-up meeting).

The arrangements for design co-ordination are to be developed as the project progresses. This will include details of how the Principal Designer will be involved in the detailed design.

The early involvement of an experienced contractor is intended to minimise hazards associated with construction and temporary works design.

The Principal Designer shall be informed of any design changes and evidence of consideration of health and safety issues shall be forwarded by inclusion in minutes of meetings, or similar outputs.

The Principal Designer shall be involved in the design process during the detailed design and construction. This involvement includes the design of temporary works and items identified in the Contract as Contractor designed.

---

1.5.3. Information on significant risks identified during design;

---

For construction specific hazards refer to Volume 2, Section 3 Designer's Risk Assessment

Currently, all residual risks have been assessed as being within the control of an experienced bridge maintenance contractor. These will be addressed by the Principal Contractor by appropriate sequencing of the works and provision of hazard identification/risk assessments, method statements and management of the works.

---

1.5.4. Pollution

---

Disposal of waste on site is not allowed. The contractor is to make arrangements for the removal of waste in accordance with the Environmental Protection Act 1990, the Environmental Protection (Duty of Care) Regulations 1991 and the Landfill (England and Wales) Regulations 2002 by a licenced waste disposal facility where necessary.

Waste is to be disposed of on sites licensed for the specific purpose. Pollution of water courses by any materials is prohibited.

A Waste Classification Assessment report classified the material above Span 1 as hazardous due to the presence of Total Petroleum Hydrocarbons (TPH). No other

hazardous materials were identified from the samples tested. Refer to Section 8 of Volume 3 – Site Investigation Report and Survey Data.

The Contractor must abide by all Environment Agency restrictions and guidance notes as detailed in the specification.

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1.5.5. Materials requiring particular precautions.

---

<u>Element</u>	<u>Hazard</u>	<u>Control of Risk</u>
Grout Mortar	Damage to eyes	COSHH Sheet required from Principal Contractor
Grout Mortar	Cement burns Contact with skin	COSHH Sheet required from Principal Contractor
Cement, and Fill dust	Inhalation / Ingestion Cement burns - skin contact Damage to eyes	COSHH Sheet required from Principal Contractor
Oils/Lubricants	Flammable and Harmful – Ingestion/ contact	COSHH Sheet required from Principal Contractor
Petrol/Diesel Fuel	Flammable/ explosive and Harmful – Ingestion/ contact	COSHH Sheet required from Principal Contractor
Sand	Irritant Contact with skin or eyes	COSHH Sheet required from Principal Contractor
Cement dry and wet	Harmful and Irritant – contact with skin and eyes	COSHH Sheet required from Principal Contractor
Concrete / Cementitious grout	Harmful and Irritant – eye and skin contact – burns and Risk of Dermatitis	COSHH Sheet required from Principal Contractor

Principal Contractor to identify hazards, establish and evaluate risks and carry out suitable and sufficient risk assessment in compliance with the COSHH Regulations.

## 1.6 THE HEALTH AND SAFETY FILE

The Principal Contractor is to prepare an electronic Health & Safety File, which is to provide a comprehensive information source and guide for the Client and end users enabling a complete understanding of the structure and services for future maintenance. The Principal Contractor is required to obtain or prepare all the information to be included in the Health & Safety File and submit an electronic copy (file format to be 'Microsoft Word' where feasible and 'PDF' where not) to the Supervisor for review by the CDM Advisor and delivery to the Client.

During the progress of the Works, the information necessary for preparing the installation record drawings shall be recorded by the Principal Contractor on drawings in an approved manner. The marked-up drawings shall be made available for inspection and checking upon request. All drawings shall be suitable for microfilming, with stencilled printing with a minimum height of 3 mm. Record drawings to be provided by the principal Contractor in the Health & Safety File shall comprise 2 full-size and one A3 size copies on paper and electronic copy in DWG format.

A complete Health & Safety File document must be submitted 2 weeks after practical completion. The Principal Contractor shall provide the Supervisor with an electronic copy of the final Health & Safety File. The file format of the document should be 'Microsoft Word' where feasible and 'PDF' where not.

*The requirement for the 'Microsoft Word' file is to allow the Principal Designer to input additional data.*

The Health & Safety File information to be provided by the Principal Contractor shall include:

- Details of all designers employed by the Contractor.
- Copies of all consents and approvals obtained by the Contractor.
- Design criteria for elements of work designed by the Contractor.
- General details of construction methods used (method statements provided must be signed copies).
- Maintenance procedures and requirements for the structure and its equipment and external works.
- Drawings showing emergency escape routes, location of emergency and fire-fighting systems, services shut-off valves, switches, etc.
- Marked-up record drawings showing structure and services "as built".
- Copies of manufacturer's current literature for all products, manufacturer's recommendations for cleaning and maintenance, including defined safe methods of work for handling hazardous substances and COSHH safety data sheets.
- Names, addresses, telephone and fax numbers of all subcontractors, suppliers and manufacturers.
- Copies of all guarantees, warranties and maintenance agreements offered by subcontractors and manufacturers.
- Copies of all test certificates and reports required in the specification.
- The sizes, types and routes of all pipework, cables and conduits.
- The exact routes and invert levels and the sizes, types and dates of installation of all underground pipework.
- The exact positions and descriptions of all underground joint boxes and earth electrodes and the name of the jointers responsible.

- The lengths of all underground cables between joint boxes and terminations.
- The locations of any other services or obstructions in the routes of underground pipework and cables.
- HRE, Key Performance Indicator Feedback form completed with contractors' comments and signature. Form to be provided by the Supervisor.

When variations occur during the construction stage which effect the safety arrangements defined in the Pre-Construction Phase (Health and Safety) Plan, the Principal Contractor should liaise with the CDM Advisor to ensure that previous design assumptions regarding safety in construction and maintenance have not been compromised and that new reasonably foreseeable risks have not been created.

During the Construction Phase the Principal Contractor is to mark-up the drawings set aside for this purpose with any differences between the contract drawings, incorporate any site instructions issued and also the actual installation. Any drawing revisions issued as the contract proceeds shall be substituted for the original and a complete record kept.

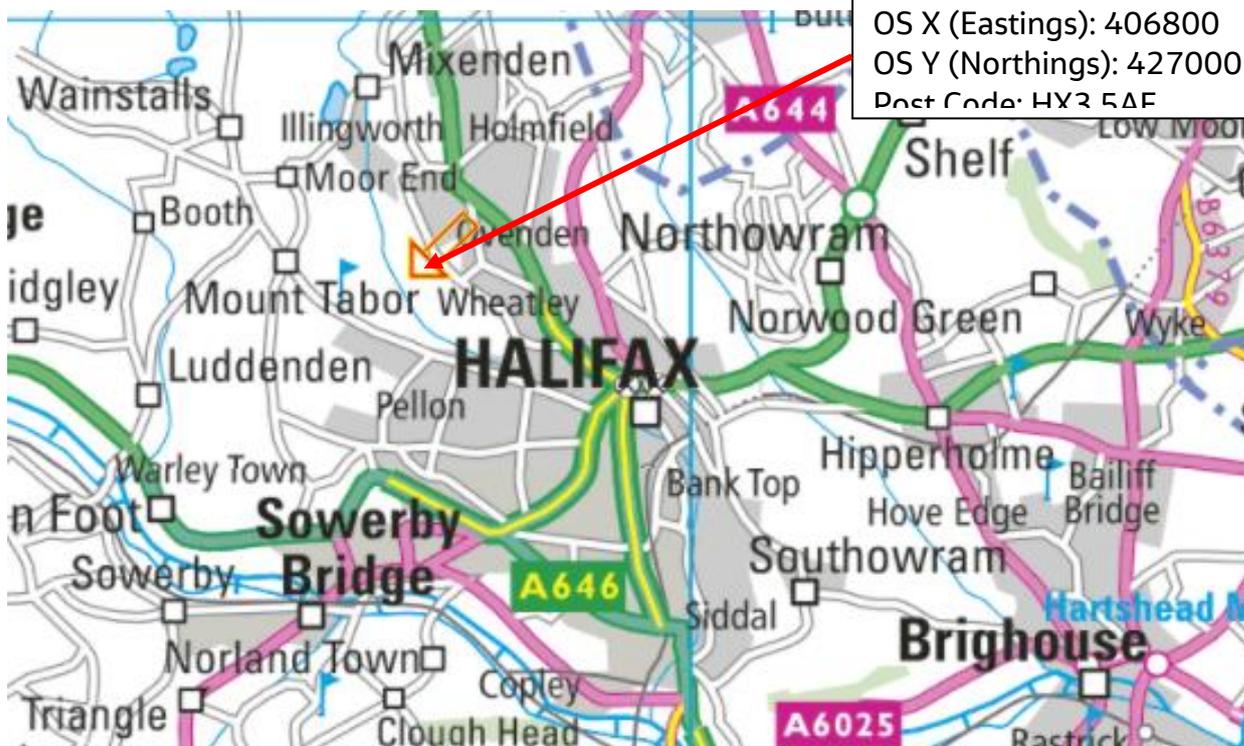
Prior to the final preparation of the drawings the Principal Contractor is to agree with the CDM Advisor what information needs to be shown and prepare drafts for approval. Review all amendments as required with the CDM Advisor.

The Principal Contractor to provide sets of drawings showing all Works installed prepared from approved drafts.

## 2. LOCATION PLANS



HXH/4a  
OS Ref: SE 068 270  
OS X (Eastings): 406800  
OS Y (Northings): 427000  
Post Code: HX3 5AF





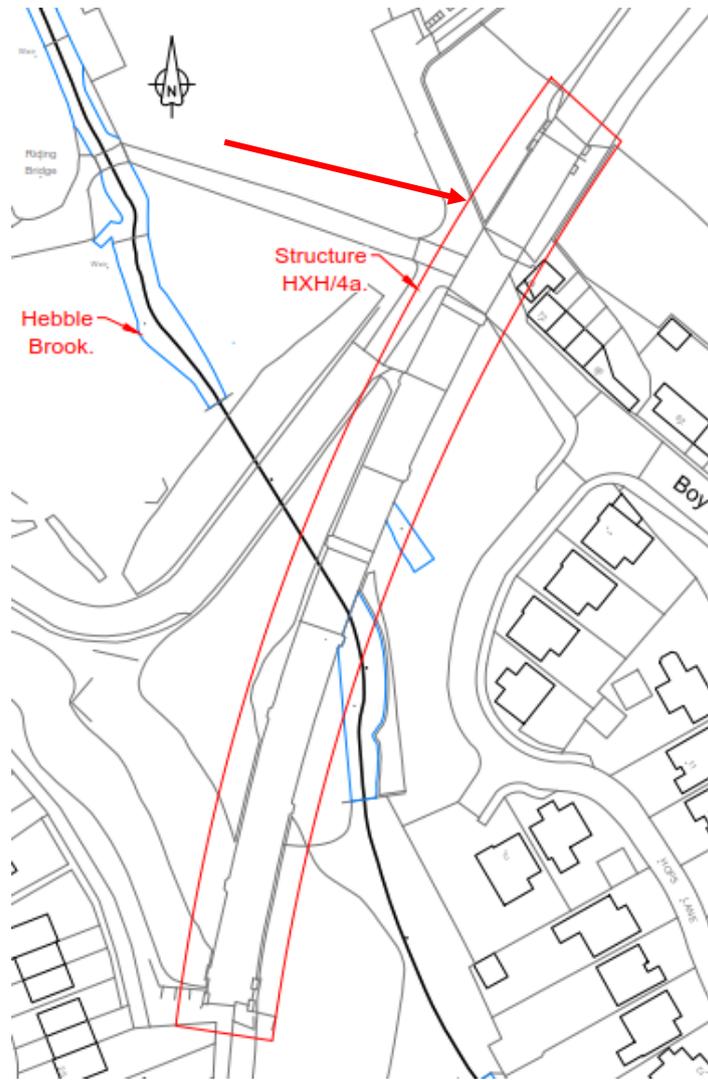
HXH/4a

OS Ref: SE 068 270

OS X (Eastings): 406800

OS Y (Northings): 427000

Post Code: HX3 5AE



### 3. EXAMINATION REPORTS



**BRIDGE & STRUCTURE EXAMINATION REPORT****Highways England  
Visual Examination**

ELR: HXH Contract Mileage: 199m 43chs Struc. Ref: 4A

Examination Type: Visual Examination CARRS Exam ID: 3434 No of Spans: 10 Exam Date: 05/12/2022

NR Route: HRE CARRS GUID: 3434

Structure Name: Halifax High Level Type: BV OS Ref: SE068270

Line Name: Halifax High Level Complete Exam: Yes

**Section A: To Be Completed By The Examining Organisation****PARTS NOT EXAMINED (EXCLUDING FOUNDATIONS)**

None

ITEM	DESCRIPTION	LOCATION	Est. Cost £k +/- 20%	Priority Within	Quantity	Unit	Severity	Probability	Risk Score	Works Category
1	None									

**Engineers Notes:-**

The structure is not subject to any live load so low risk to structural loading.  
The structure found to be in a fair condition with no sign of any significant defect which require immediate attention, the defects noted are typical masonry defect like open joints, missing and displaced masonry not changed significantly from last exam.

Signed For Employer		Name	Farhan Haq (CEng MICE) Msc Structures	Date	16-12-2022
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**BRIDGE & STRUCTURE EXAMINATION REPORT****Highways England  
Visual Examination**

ELR: HXH		Contract Mileage: 199m 43chs				Struc. Ref: 4A			
Examination Type:	Visual Examination	CARRS Exam ID:	3434	No of Spans:	10	Exam Date	05/12/2022		
NR Route:	HRE			CARRS GUID:	3434				
Structure Name:	Halifax High Level			Type:	BV	OS Ref:	SE068270		
Line Name:	Halifax High Level					Last Detailed:	21/02/2019		
Primary Material:	Not applicable					Last Visual:	01/02/2021		
Secondary Material:	Not applicable								
Structure Carries:	Land Over								
<b>Examiners General Comments:</b>									
<b>METHOD OF EXAMINATION</b>									
Standard Visual examination from ground level.									
<b>CONDITION SUMMARY</b>									
The structure examined is HXH 4A (Unique ID 3434). The structure is a 10 span viaduct. The structure is in fair condition with no signs of deterioration.  Previous recommendations:  Please see continuation sheet.									
<b>Previous report endorsement</b>									
I confirm that the last visual and detailed examination reports have been reviewed and the dates of the said report are given in this report.									
<b>Access Route</b>									
Structure located over Boy Lane Halifax, HX3 5FB.									
<b>Parts not Examined? - No</b> None <b>Has the structure been viewed under load? - No</b> No liveload.									
<b>SIGNED:</b>									
<b>EXAMINERS NAME:</b>		Joel Stockdale							
<b>DATE:</b>		05/12/2022							



# BRIDGE & STRUCTURE EXAMINATION REPORT

## Highways England Visual Examination



ELR: HXH

Contract Mileage: 199m 43chs

Struc. Ref: 4A

Name of Part	Status	Condition	Site Hazards Impediments
Arch Ring	Examined	Fair	None.
Ballast Plates & Boards	N/A	N/A	
Bearing	N/A	N/A	
Cross Girders	N/A	N/A	Urgent issue/Close Call Raised
Floor & Deck	Examined	Fair	None.
Longitudinal Timbers	N/A	N/A	
Main Girders	N/A	N/A	Evidence of Trespass/Vandalism
Parapets & Pilasters	Examined	Fair	
Rail Bearers	N/A	N/A	Fly tipping throughout.
Spandrels	Examined	Fair	
Waterproofing	Examined	Fair	Services Present
Abutments	Examined	Fair	None.
Bedstones & Cills	N/A	N/A	
Columns & Cylinders	N/A	N/A	
Piers	Part Examined	Fair	Changes of Use of Structure
Trestles & Crossheads	N/A	N/A	
Wing & Retaining Walls	Examined	Fair	None.
Debris	Examined	Poor	
Drainage	N/A	N/A	Evidence of Repair
Gutters & Downpipes	N/A	N/A	
Handrails	N/A	N/A	None.
Pointing	Examined	Fair	
Painting	N/A	N/A	Use of Solum Track Bed
Vegetation	Examined	Fair	
Revetment Walls	N/A	N/A	None.
Rivets & Bolts	N/A	N/A	
Signage	N/A	N/A	
Track & Road	Examined	Fair	Condition of Approach Boundary
Number Plates	N/A	N/A	
Rubbish	Examined	Poor	Fair.
Concrete Base	N/A	N/A	

### Monitoring Devices Present

Date Tabs		No
Plumb Points		No
Avoguards		No

### Environmental Factors

Item Number	Description	Location

### Record of Observations Under Load

Load Type	General Area Observed	Result Of Observation	Date & Time



# BRIDGE & STRUCTURE EXAMINATION REPORT

## Highways England Visual Examination



ELR: HXH

Contract Mileage: 199m 43chs

Struc. Ref: 4A

### GENERAL PHOTOS

Photo No 1 - East Elevation.  
Photo No 2 - General view of Span 2.  
Photo No 3 - General view of Span 3, woodland below.  
Photo No 4 - No access to topside due to footpath being closed.  
Photo No 5 - General view of Span 1 - Calcite staining to Soffit.  
Photo No 6 - West Elevation.  
Photo No 7 - General view of Span 4.  
Photo No 8 - General view of Span 5.  
Photo No 9 - Span 5 - Culvert outlet dry on day of exam, missing brickwork to the face rings.  
Photo No 10 - General view of Span 6, watercourse running beneath.  
Photo No 11 - Span 6 - Culvert and water outlet appear in good condition.  
Photo No 12 - General view of Span 7.  
Photo No 13 - General view of Span 8.  
Photo No 14 - General view of Span 9.  
Photo No 15 - General view of Span 10.  
Photo No 16 - Locked gate to topside of structure at South end.  
Photo No 17 - Unable to access topside at the South end due to fencing and vegetation.

### DEFECT TRACKING

Photo No 18 - Defect Tracking - Span 4 - Fracture behind West Voussoirs with missing brickwork. Appears No further deterioration.  
Photo No 19 - Defect Tracking - Span 4 - Missing brickwork to the Soffit.  
Photo No 20 - Defect Tracking - Span 5 - Missing brickwork to the Soffit.  
Photo No 21 - Defect Tracking - Rubbish and fly tipping present beneath multiple Spans.  
Photo No 22 - Defect Tracking - Span 6 - Fracture behind West Voussoirs is hard to see from ground level.  
Photo No 23 - Defect Tracking - Fly tipping to West embankment.  
Photo No 24 - Defect Tracking - Area of wet to Pier below Span 8.  
Photo No 25 - Defect Tracking - Span 8 - Longitudinal Fracture behind West Voussoirs runs full length x 1-2mm.  
Photo No 26 - Defect Tracking - Span 10 - Longitudinal fracture behind West Voussoirs runs full length x 2-3mm.  
Photo No 27 - Defect Tracking - East Abutment - Open joints.  
Photo No 28 - Defect Tracking - South East Wingwall - Open joints 1m<sup>2</sup> x 40mm deep.  
Photo No 29 - Defect Tracking - Missing capping stones to East Parapet.  
Photo No 30 - Defect Tracking - Span 10 - Tree growth next to Viaduct.  
Photo No 31 - Defect Tracking - Missing capping stones to West Parapet.

ITEM NO:  
DESCRIPTION:  
LOCATION::  
EXAMINERS COMMENTS:

### PREVIOUSLY UNRECORDED (NEW) DEFECTS - NONE

### ADDITIONAL COMMENTS

Repair area spalling to span 5 soffit which have suffered further loss since previous annual examination visit - PS £4k. - Not actioned.  
Remaining recommendations are broadly as per previous DE (2018-19):  
Early consideration required for the repair/relining of widespread areas of loose/missing/dummy brickwork to soffits of spans - . - Not actioned.  
1, 4 - 6 and 8 - 10 (coupled with the lean of the parapets above, these losses suggest possible underlying "spandrel" fractures . - Not actioned.  
Which may require tie bar strengthening between voussoirs and across the span) - P1 £100k. . - Not actioned.  
Restore missing masonry to NW and SE parapets - P1 £3k. . - Not actioned.



**BRIDGE & STRUCTURE EXAMINATION REPORT**

**Highways England  
Visual Examination**



**ELR: HXH**

**Contract Mileage: 199m 43chs**

**Struc. Ref: 4A**

Make general repairs to the culvert under span 6 - P1 £8k. - Not actioned.

Repair odd areas of loose and missing masonry to wingwalls - P2 £6k. - Not actioned.





Photo No 1 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - East Elevation.



Photo No 2 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 2.



Photo No 3 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 3, woodland below.



Photo No 4 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - No access to topside due to footpath being closed.



Photo No 5 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 1 - Calcite staining to Soffit.



Photo No 6 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - West Elevation.



Photo No 7 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 4.

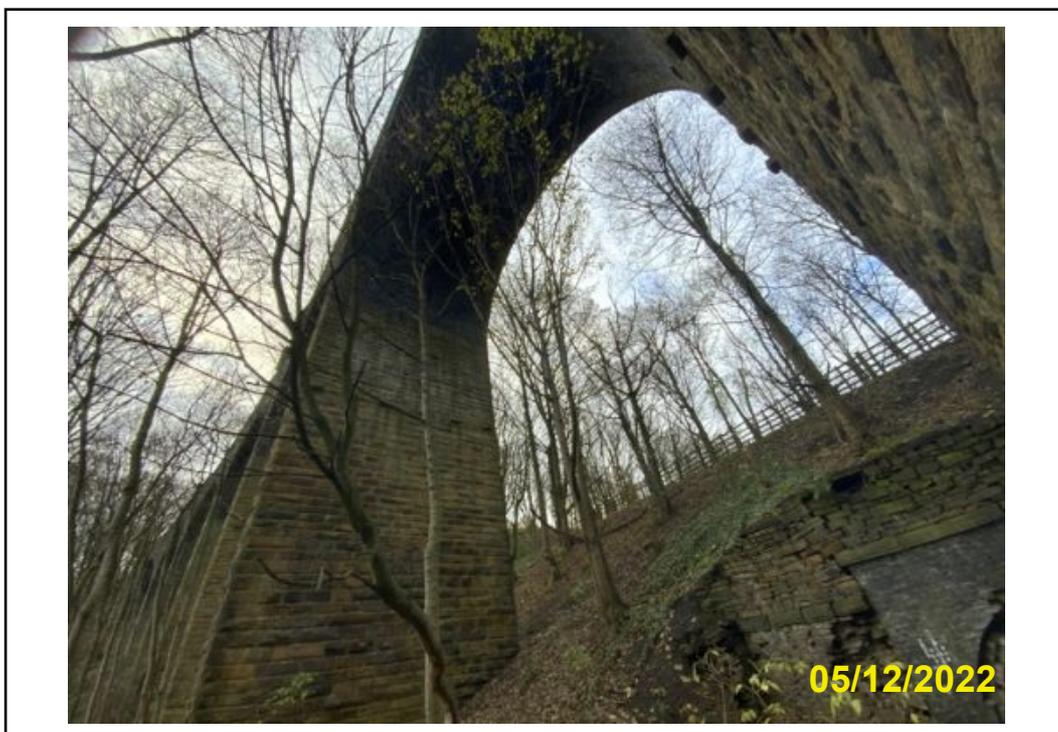


Photo No 8 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 5.



Photo No 9 - HXH - 199m/ls - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - Span 5 - Culvert outlet dry on day of exam, missing brickwork to the face rings.

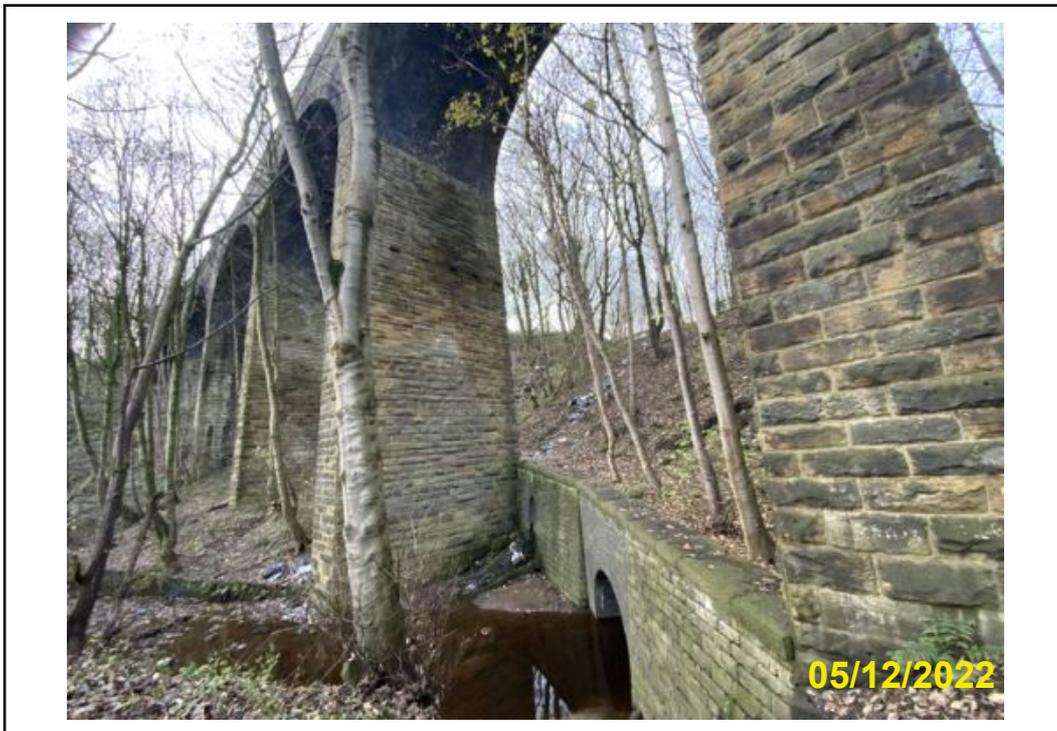


Photo No 10 - HXH - 199m/ls - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 6, watercourse running beneath.



Photo No 11 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - Span 6 - Culvert and water outlet appear in good condition.



Photo No 12 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 7.



Photo No 13 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 8.



Photo No 14 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 9.



Photo No 15 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
General Photo - General view of Span 10.



Photo No 16 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - -  
General Photo - Locked gate to topside of structure at South end.

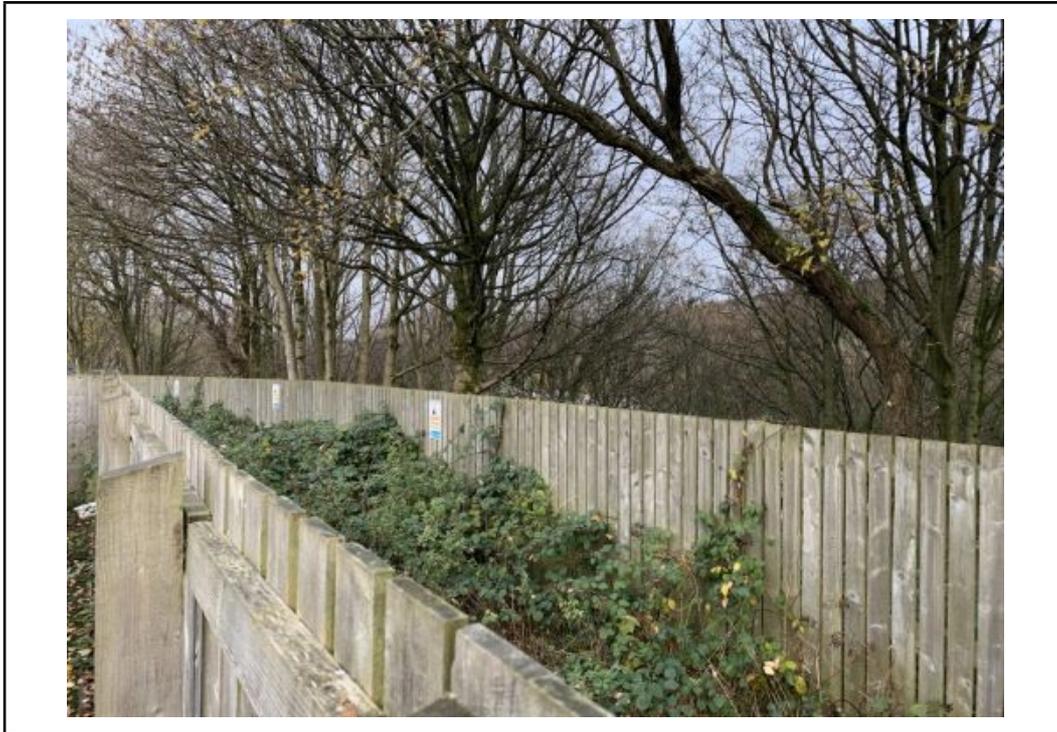


Photo No 17 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - -  
General Photo - Unable to access topside at the South end due to fencing and vegetation.



Photo No 18 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - - Span 4 - Fracture behind West Voussiors with missing brickwork. Appears No further deterioration.



Photo No 19 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Span 4 - Missing brickwork to the Soffit.

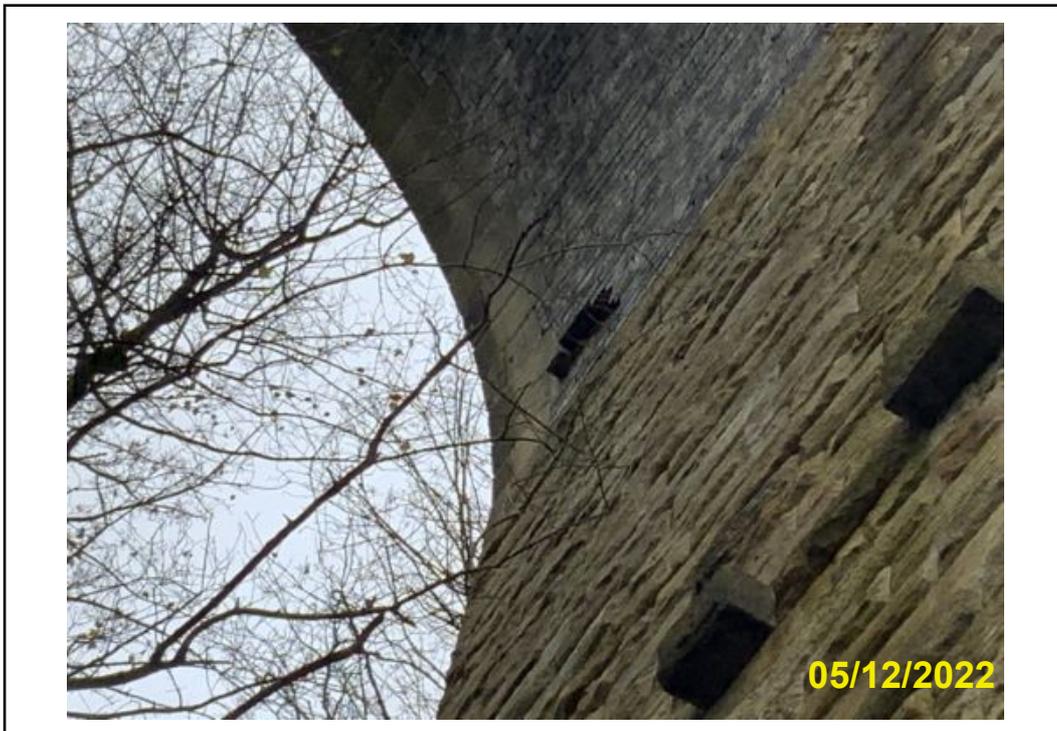


Photo No 20 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Span 5 - Missing brickwork to the Soffit.

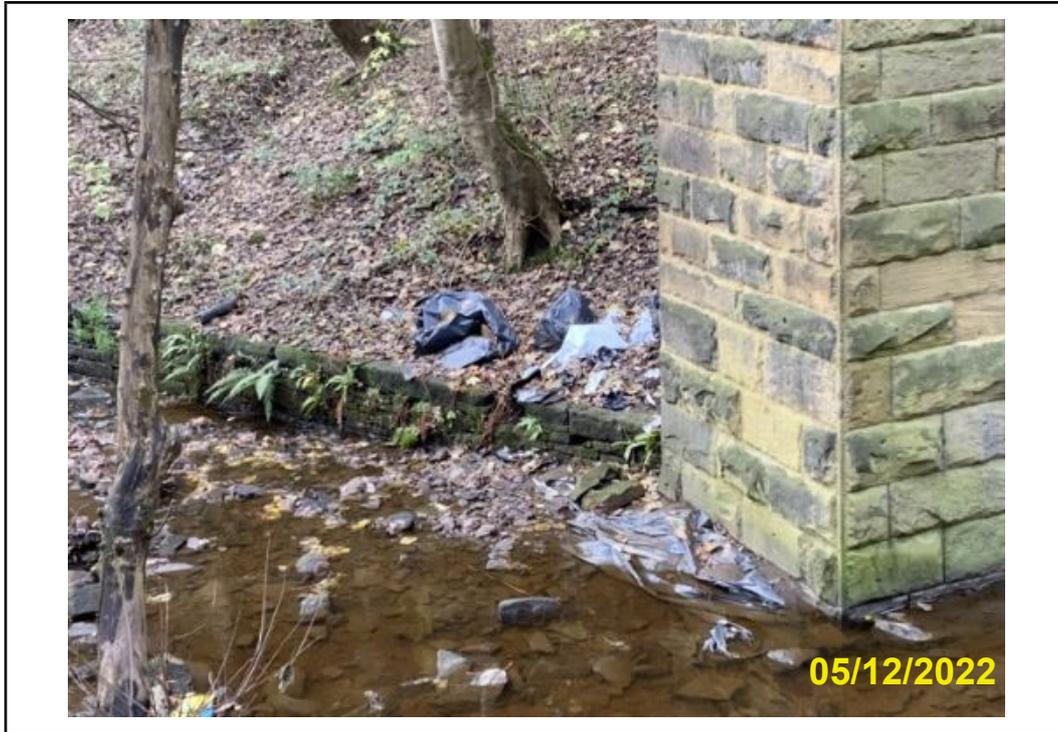


Photo No 21 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Rubbish and fly tipping present beneath multiple Spans.



Photo No 22 - HXH - 199m - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Span 6 - Fracture behind West Voussoirs is hard to see from ground level.



Photo No 23 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Fly tipping to West embankment.



Photo No 24 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Area of wet to Pier below Span 8.



Photo No 25 - HXH - 199mIs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref- - Span 8 - Longitudinal Fracture behind West Voussiors runs full length x 1-2mm.



Photo No 26 - HXH - 199mIs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref- - Span 10 - Longitudinal fracture behind West Voussiors runs full length x 2-3mm.



Photo No 27 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - East Abutment - Open joints.



Photo No 28 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - South East Wingwall - Open joints 1m<sup>2</sup> x 40mm deep.

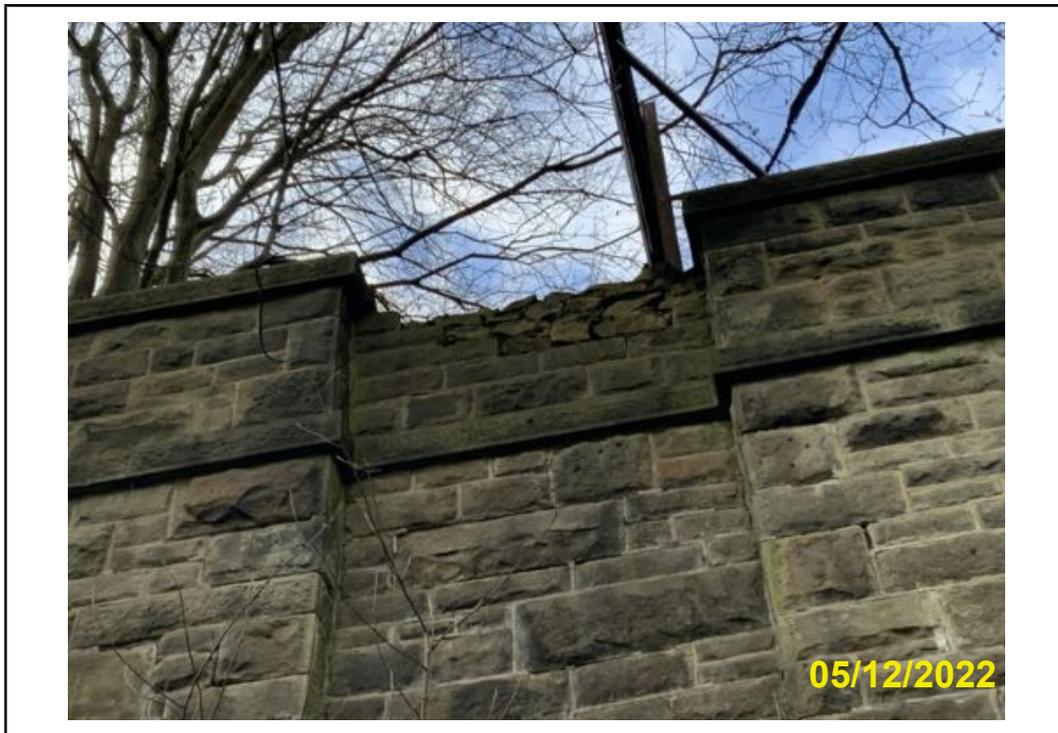


Photo No 29 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Missing capping stones to East Parapet.



Photo No 30 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Span 10 - Tree growth next to Viaduct.

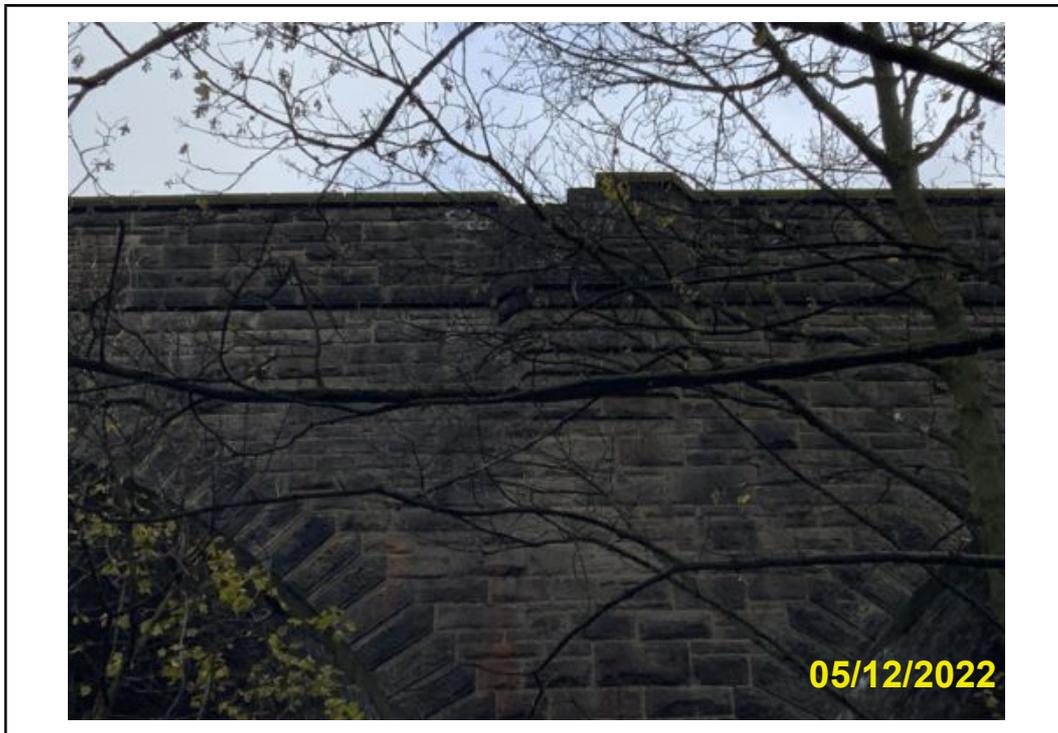


Photo No 31 - HXH - 199m 43chs - 0946yds - 43ch - Structure No - 4A - - 05/12/2022  
Defect Tracking - Ref - Missing capping stones to West Parapet.

#### 4. PHOTOGRAPHS



1. West Elevation



2. Typical arch barrel soffit (Span 5).



3. Culvert outlet below Span 6.



4. Voussoir fractures to Span 7.



5. Loose and displaced brickwork to Span 10



6. Voussoir Fractures and staining to Span 6  
HXH/4a 'Wheatley Viaduct' NEC ECC



# Historical Railways Estate Detailed Examination Report

Line:  
**Halifax High Level**

~~OB / UB / SB / Viaduct / Abutments /~~  
~~RW / Culvert / Pipe~~

ELR: **HXH**

No. of Spans  
**10**

Carrying: **Disused rail**  
Over: **Land & public road**  
Name: **Wheatley Viaduct**

Bridge No.: **4A**  
Mileage: **199m 43ch**  
Exam. Date: **21/02/2019**

Name of Part:

G - Good  
F - Fair  
P - Poor  
B - Bad

Sheet 1 of 121

Main Girders / Beams	-
Cross Girders / Beams	-
Parapet Girders / Beams	-
Jack Arches	-
Tie Rods / Bracing	-
Rivets / Bolts / Stiffeners	-
Soffits / Deck Plates	P
Arch Rings / Voussoirs	F
Spandrels / Stringcourses	F
Abutments / Piers	F
Wing Walls & Newel Posts	F
Parapets / Handrails	F
Copings & Capstones	F
Pilasters / Buttresses	-
Bedstones / Cills / Springers	F
Trusses / Lattices	-
Bearings / Padstones	-
Longitudinal Timbers / Rail Bearers	-
Approach Fencing	G
Height / Weight Restriction Signs	-
Pointing	F
Painting	-
Weepholes	-
Road Surface	F
Vegetation	F

Ordnance Survey Extract



Ordnance Survey Reference: SE 068 270

**General Comments:**

Generally the bridge was in fair condition. The brick soffits were in poor condition with areas of heavy mortar loss and numerous loose / missing bricks. Approx. 30 loose bricks were removed during the examination. Apart from span 2, which passes over a road, the soffits had no remedial works and were a hazard as the area is popular with walkers and public access under the viaduct is easily possible. Piers had numerous minor vertical fractures throughout.

*R.H.*

Examiner and report writer: R. Hunt

Tick as appropriate :	
Operational Rail Line	
Canal & River Trust	
Traffic Management	
Road Closure	
Height Restriction Plates	
Weight Restriction Plates	
Inaccessible Parts	
Existing Datals / Avongards on Structure	
Plumbing Points	
Parapet Risk Assessment	
Underwater Examination carried out during DE	
Vegetation removed during DE <10%	

Recommendations (by the Examining Engineer):

Early consideration required for the repair / relining of widespread areas of loose/missing/drummy brickwork to soffits of spans 1, 4 - 6 and 8 - 10 (coupled with the lean of the parapets above, these losses suggest possible underlying "spandrel" fractures which may require tie bar strengthening between voussoirs and across the span) - P1 £100k.  
Restore missing masonry to NW and SE parapets - P1 £3k.  
Repair odd areas of loose and missing masonry to wingwalls - P2 £6k.  
Ditto to piers 8 and 9 - P2 £1.2k.

**Examination Details**

ELR/Br No/199m 43ch

**Examination Date**

21/02/2019

**Examination Type**

Detailed

**Sundries**

Date Tabs Fitted (T/No.)

Fitting & setting combination locks (C/No.)

Non-Dedication Plates Fitted (N/No.)

**Access**

Normal– on foot or with Ladders (L)

L

MEWP (H)

Abseiling (A)

A

**Underwater Examination**

Probing by Examiner (E)

By Dive Team (D)

**Assessments**

Masonry Parapets (P)

Inspection for Assessment (I)

Extended MEXE Method (M)

**Misc.**

Bat Expert (B)

CCTV (V)

Signed:

Examining Engineer

**Historical Railways Estate  
Detailed Examination Report  
(Continuation Sheet)**

Line: <b>Halifax High Level</b>	Structure Identifier: <b>HXH 4A</b> <b>Ten span masonry arch viaduct with brickwork soffits</b>
------------------------------------	--

Remarks (Refer to parts by name)

**Sheet 3 of 121**

**Examination Team On Site** – R. Hunt STE4, D. Farrar STE4 trainee

**Risk Assessment** – The examination was carried out in accordance with the risk assessments in Appendix L of the Generic Method Statement for the Examination of Structures.

**Access Route to the Structure** – Situated off Wood Lane. Access to south side of viaduct: up back of north west wing wall on HXH 6, walk past HXH 5, carry on until reaching a black metal security fence.

**Site Issues and Impediments to carrying out repairs, DE's or other works** – Large fences at either end of deck. High structure. Road under span 2. Water from culvert openings under spans 5 and 6.

**Date of Last Examination** – 3.1.18

**Detailed Examination carried out within 12 months of Last Visual Examination AND within 6 years of Last Detailed Examination?** – No

**Reason for Late Examination** – Programme Delivery Issues

**Underwater Examination carried out During Examination** – N/A

**Changes to the Use of the Structure and/or the Surrounding Area since Last Examination** – None

**Evidence of Repair / Maintenance / Investigation Work that appears to have been carried out since Last Examination** – None

**Use of Solum/Track Bed** – (for e.g. whether above or below is being used by pedestrians or vehicles or any antisocial behaviour).

**Condition of Approach Fencing and Risk to the Public** – both ends of the bridge were blocked off with 3.5m high steel barriers with no gated entry points that extended over the parapets to either side. ([photos 11 & 12](#))

**Existence and Condition of Weight Restriction Signs including Advanced Signs** – N/A

**Existence and Condition of Height Restriction Signs including Advanced Signs** – N/A

**New Bridge Numbers Painted** – Yes ([photos 9 & 10](#))

**New Mortar Tabs, Avongards, Plumbing Points, Pins, etc. Fitted during this Examination** – No

**New Padlock(s) Fitted to Access Gates / Doors during this Examination** – No

**Historical Railways Estate  
Detailed Examination Report  
(Continuation Sheet)**

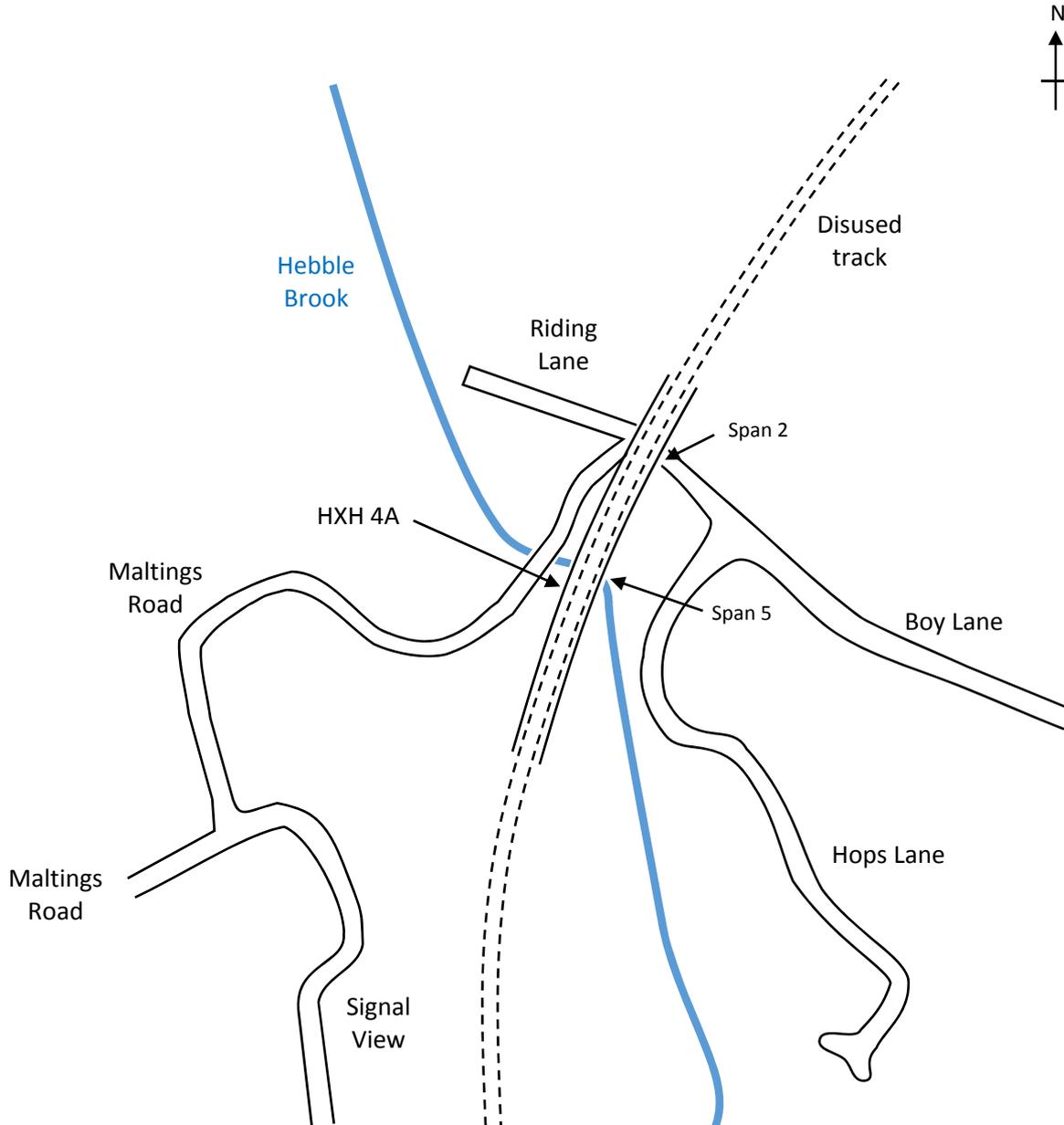
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 4 of 121**

**Orientation of Structure –**



**Historical Railways Estate  
Detailed Examination Report  
(Continuation Sheet)**

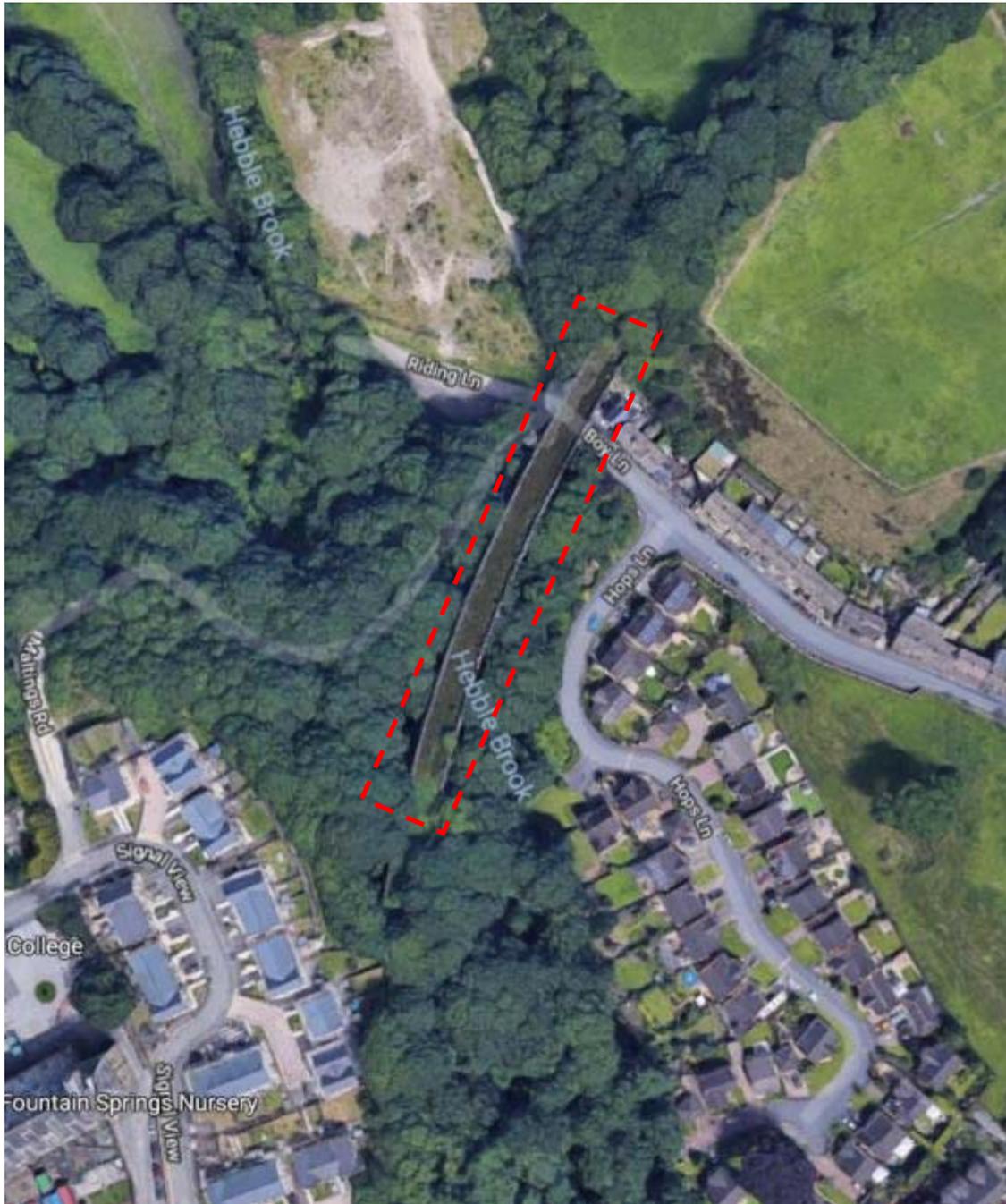
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

Sheet 5 of 121

**Aerial View –**



Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 6 of 121**

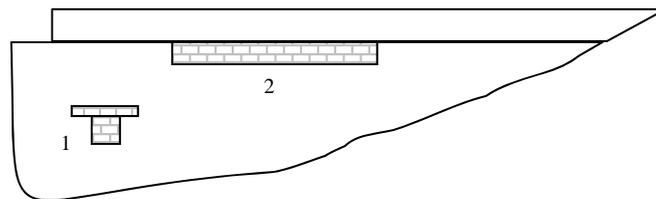
## **SUBSTRUCTURE**

### **North East Abutment**

The abutment was partially buried. **(photo 13)** There were spot areas of mortar loss of up to 80mm. There was an area of seepage to the north west side of the spring course.

### **South West Abutment**

The abutment was partially buried. **(photo 14)** There were spot areas of mortar loss of up to 100mm. There was seepage to the south east side of the abutment.



1. Area of spalled masonry, 1500 x 70 x up to 200mm.
2. Area of spalled masonry, 1500 x 200 x up to 200mm.

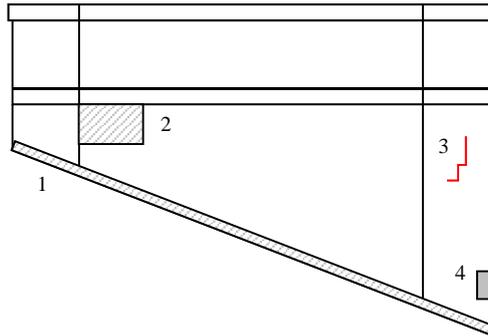
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

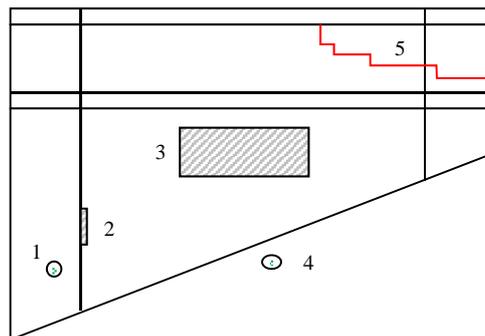
Sheet 7 of 121

**North Wing Wall**



1. Area of mortar loss of up to 100mm to base of wing wall. **(photo 15)**
2. Area of mortar loss, 1000 x 1000mm x up to 40mm.
3. Vertical stepped fracture through masonry and mortar, 1800 x 1mm. **(photo 16)**
4. Area of fractured and missing masonry, 600 x 350 x up to 120mm. **(photo 17)**

**East Wing Wall**



1. Sapling growing from wing wall, 70mm in diameter.
2. Line of fractured mortar / mortar loss to corner joint, 1800 x up to 50mm. **(photo 18)**
3. Area of mortar loss, 1000 x 500mm.
4. Sapling growing adjacent to wing wall, 130mm in diameter. **(photo 19)**
5. Diagonal stepped fracture through mortar, 2700 x up to 2mm. **(photo 20)**

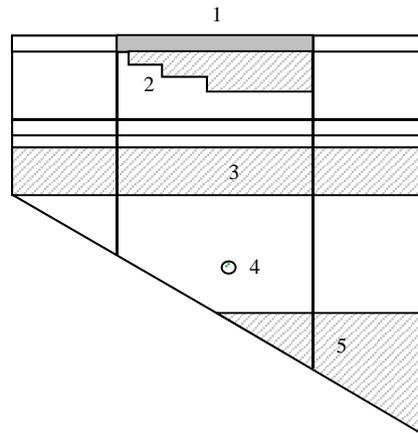
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

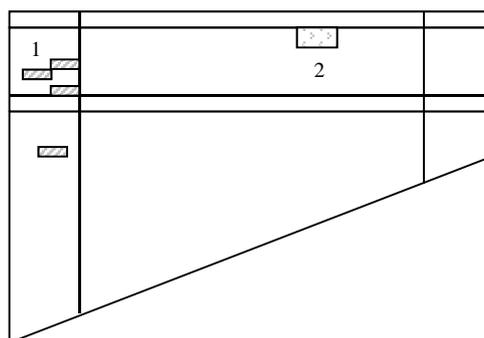
Sheet 8 of 121

**South Wing Wall**



1. Length of coping, 2000mm, removed for barrier. **(photo 21)**
2. Area of masonry repair in poor condition with mortar loss, 1000 x 1000 x up to 80mm. **(photo 21)**
3. Band of cracked and missing mortar, 1500 x 2500 x up to 40mm. **(photo 22)**
4. Weeds and sapling, 50mm in diameter, growing from wing wall. **(photo 23)**
5. Area of mortar loss, 4000 x 2000 x up to 100mm, with associated seepage. **(photo 24)**

**West Wing Wall**



1. Spot lines of mortar loss totalling 1000 x up to 50mm.
2. Area of mortar loss, 780 x 220 x up to 50mm, 1No. block displaced inwards by 35mm. **(photo 25)**

Line:  
**Halifax High Level**

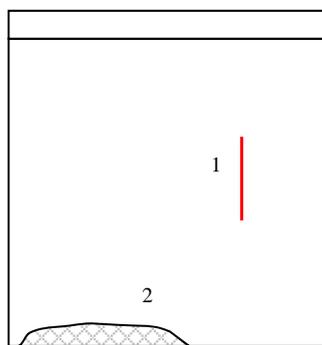
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

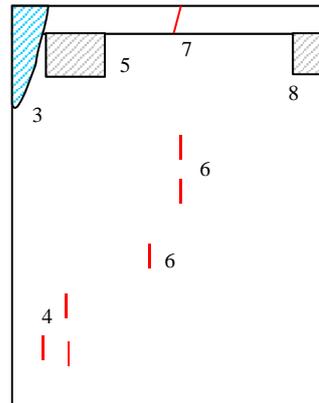
**Sheet 9 of 121**

**Pier 1**

There was spot mortar loss of up to 50mm, mainly to the top and sides of the elevation.



North east elevation



South west elevation

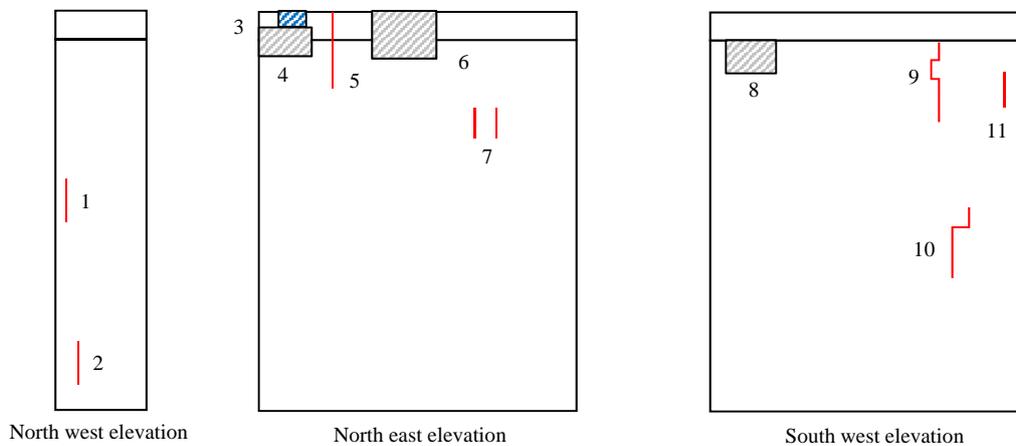
1. Vertical hairline fracture through masonry, 900mm in length.
2. Builder's equipment and wood to base of pier. **(photo 26)**
3. Area of seepage, 1000 x 1000mm.
4. 3No. vertical fractures through individual blocks, each 400 x 1mm. **(photo 27)**
5. Area of mortar loss, 2000 x 2000 x up to 30mm. **(photo 28)**
6. 3No. vertical fractures through individual blocks, each 250 x 1mm.
7. Diagonal fracture through spring course block, 400 x 1mm.
8. Area of mortar loss, 1000 x 2000 x up to 30mm.

Line:  <b>Halifax High Level</b>	Structure Identifier: <b>HXH 4A</b>  <b>Ten span masonry arch viaduct with brickwork soffits</b>
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Remarks (Refer to parts by name) **Sheet 10 of 121**

**Pier 2**

There was general weathering to the masonry of up to 40mm depth. Three hairline cracks through individual blocks were noted to the north east elevation. Eight hairline cracks through individual blocks were noted to the south west elevation. There was spot mortar loss to 20mm to horizontal joints and 50% of vertical joints were open to 80mm, mainly in the upper half.



1. Vertical hairline fracture through masonry, 1500mm in length.
2. Vertical fracture through masonry, 1500 x 0.5mm.
3. Area of seepage, 1000 x 500mm.
4. Area of mortar loss, 1000 x 2000 x up to 50mm.
5. Vertical fracture through masonry, 2000 x 1mm.
6. Area of mortar loss, 2000 x 1000mm.
7. 2No. vertical fractures through 1No. masonry block, each 300 x 1mm.
8. Area of mortar loss, 900 x 500 x up to 200mm. **(photo 29)**
9. Vertical stepped fracture through masonry, 2600 x 1.5mm.
10. Vertical stepped hairline fracture through masonry, 1800mm in length.
11. Vertical hairline fracture through masonry, 1000mm in length. **(photo 30)**

Line:  
**Halifax High Level**

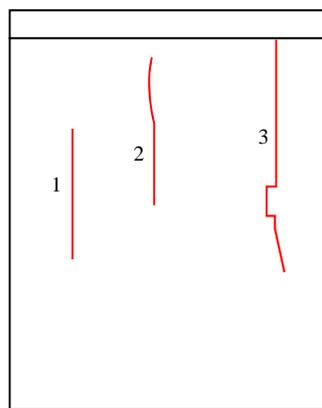
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

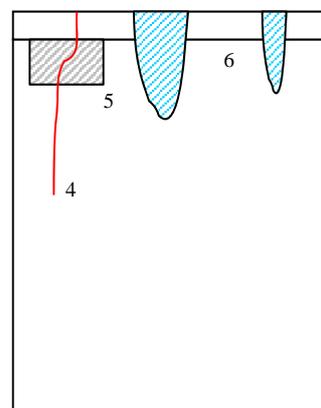
**Sheet 11 of 121**

**Pier 3**

Four hairline cracks through individual blocks were noted to the north east elevation. There was spot mortar loss of up to 100mm throughout the elevations, mainly to the top and sides. (photo 31) A mature tree, 600mm in diameter, was growing adjacent to the north west elevation. (photo 32)



North east elevation



South west elevation



South east elevation

1. Vertical hairline fracture through masonry, 3500mm in length.
2. Vertical fracture through masonry, 4000 x 1mm.
3. Vertical stepped fracture through masonry, 6000 x 1mm. (photo 33)
4. Vertical fracture through masonry, 5000 x 1mm. (photo 34)
5. Area of mortar loss, 4000 x 700 x up to 80mm.
6. 2No. areas of seepage totalling 1000 x 2000mm.
7. Area of mortar loss, 1000 x 1000 x up to 30mm.

Line:  
**Halifax High Level**

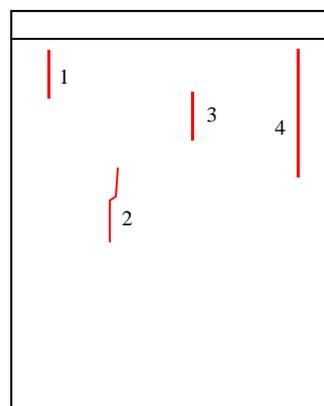
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

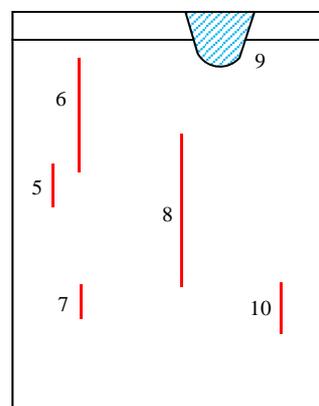
**Sheet 12 of 121**

**Pier 4**

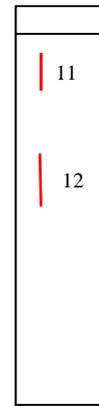
There was spot mortar loss of up to 60mm throughout the elevations, mainly to vertical joints. There were occasional vertical hairline fractures to individual blocks to the north west elevation. A culvert under span 5 could carry water from the river and discharge it along the base of the south west elevation, although this was dry at the time of examination. No sign of scour was noted. **(photos 35 & 36)**



North east elevation



South west elevation



South east elevation

1. Vertical fracture through masonry, 1200 x 1mm.
2. Vertical fracture through masonry, 2500 x 0.5mm.
3. Vertical fracture through masonry, 1200 x 0.5mm.
4. Vertical fracture through masonry, 4000 x 1mm.
5. Vertical fracture through masonry, 1000 x 1mm.
6. Vertical fracture through masonry, 2500 x 1mm. **(photo 37)**
7. Vertical fracture through masonry, 1500 x 0.5mm. **(photo 38)**
8. Vertical fracture through masonry, 3500 x 1mm.
9. Area of seepage, 1000 x 500mm, with associated mortar loss of up to 80mm and vegetation growth. **(photo 39)**
10. Vertical fracture through masonry, 1600 x 0.5mm.
11. Vertical fracture through masonry, 1000 x 1mm. **(photo 40)**
12. Vertical fracture through masonry, 1500 x 0.5mm.

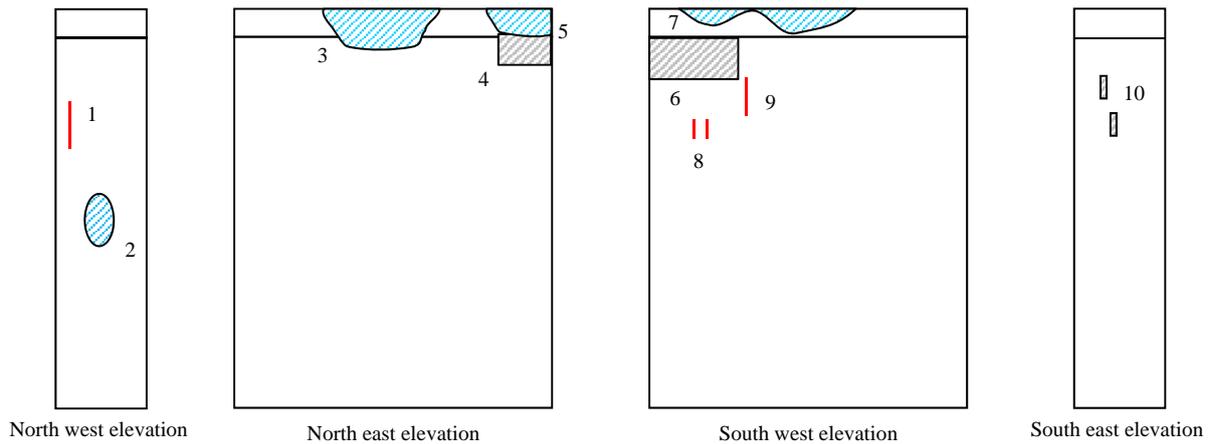
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
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Remarks (Refer to parts by name)

**Sheet 13 of 121**

**Pier 5**



1. Vertical fracture through masonry, 500 x up to 2mm. **(photo 41)**
2. Area of seepage, 1000 x 2000mm.
3. Area of seepage, 2000 x 1000, with associated mortar loss of up to 50mm. **(photo 42)**
4. Area of mortar loss, 2000 x 1000 x up to 40mm.
5. Area of seepage, 1000 x 1000mm.
6. Area of mortar loss, 2500 x 2000 x up to 50mm.
7. Area of seepage, 3000 x 500mm.
8. 2No. vertical fractures through 1No. block, each 200 x 1mm.
9. Vertical fracture through masonry, 500 x 1mm.
10. 2No. lines of mortar loss, each 300 x up to 200mm. **(photo 43)**

Line:  
**Halifax High Level**

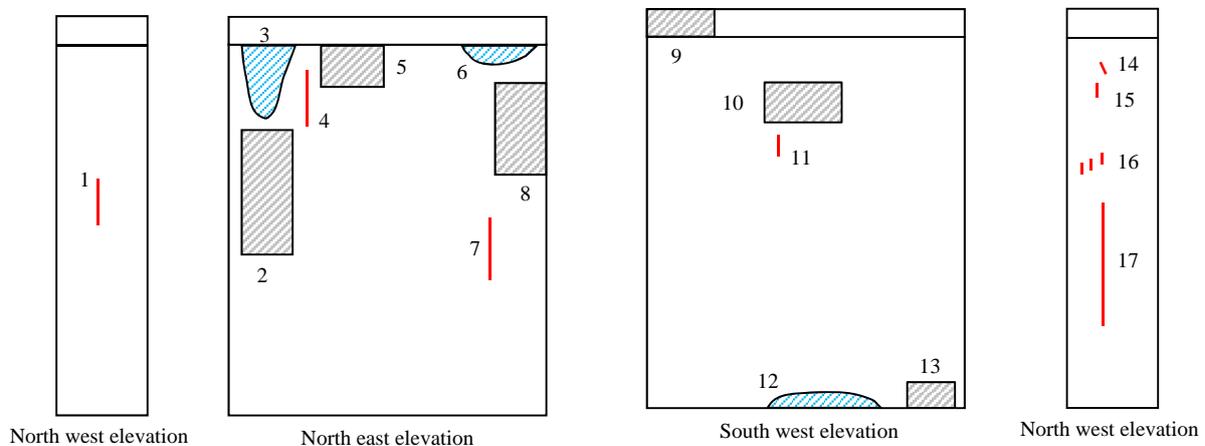
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 14 of 121**

**Pier 6**

The river emerged from two culverts under span 6 and ran along the base of the north east elevation. No sign of scour was noted. (photo 44 & 45) Five hairline cracks through individual blocks were noted to the south west elevation.



1. Vertical fracture through masonry, 600 x 1mm.
2. Area of mortar loss, 2000 x 3000 x up to 30mm.
3. Area of seepage, 1000 x 2000mm. (photo 46)
4. Vertical fracture through masonry, 2000 x up to 2mm. (photo 46)
5. Area of mortar loss, 2000 x 1000 x up to 40mm. (photo 46)
6. Area of seepage, 1000 x 500mm.
7. Vertical fracture through masonry and mortar, 1500 x 1mm. (photo 47)
8. Area of mortar loss, 2000 x 3000 x up to 30mm.
9. Area of mortar loss, 3000 x 1000 x up to 20mm.
10. Area of mortar loss, 3000 x 2000 x up to 30mm.
11. Vertical fracture through masonry, 600 x 1mm.
12. Area of seepage, 3000 x 1000mm.
13. Area of mortar loss, 2000 x 1000 x up to 30mm.
14. Diagonal fracture through 1No. block, 300 x up to 2mm. (photo 48)
15. Vertical fracture through 1No. block, 300 x up to 2mm.
16. 3No. vertical fractures through individual blocks, each 200 x 1mm.
17. Vertical fracture through masonry, 6000 x 1mm.

Line:  
**Halifax High Level**

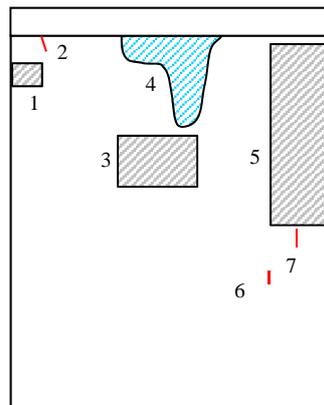
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

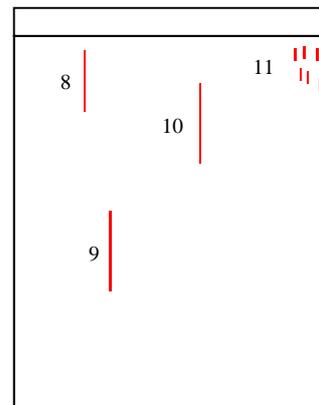
**Sheet 15 of 121**

**Pier 7**

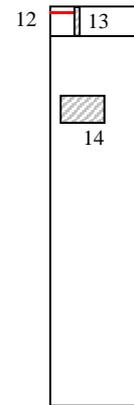
There was spot mortar loss of up to 40mm to horizontal joints and 80mm to vertical joints throughout.



North east elevation



South west elevation



South east elevation

1. Area of mortar loss, 2000 x 1000 x up to 150mm. **(photo 49)**
2. Diagonal fracture through 1No. block, 300 x 1mm.
3. Area of mortar loss, 3000 x 2000 x up to 30mm.
4. Area of seepage, 1500 x 1500mm.
5. Area of mortar loss, 2000 x 5000 x up to 30mm.
6. Vertical fracture through masonry, 200 x 1mm.
7. Vertical fracture through masonry, 300 x 1mm.
8. Vertical fracture through masonry, 3000 x 1mm.
9. Vertical fracture through masonry, 2000 x up to 2mm.
10. Vertical fracture through masonry, 4000 x up to 1.5mm.
11. 6No. vertical fractures through individual blocks, each 300 x 1mm.
12. Horizontal fracture through masonry, 600 x 1mm. **(photo 50)**
13. Line of mortar loss, 300 x up to 100mm.
14. Area of mortar loss, 2000 x 1000 x up to 30mm.

Line:  
**Halifax High Level**

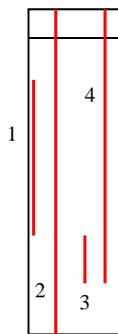
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

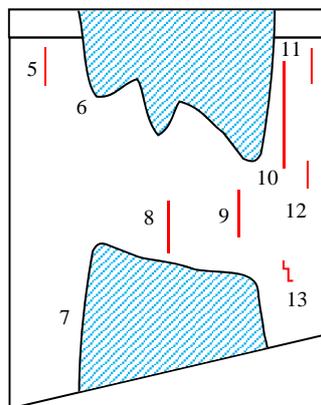
**Sheet 16 of 121**

**Pier 8**

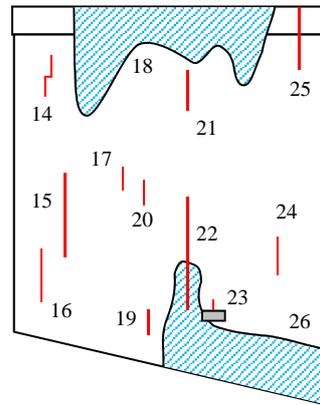
There was spot mortar loss of up to 40mm to horizontal joints and 80mm to vertical joints throughout. Ten hairline cracks through individual blocks were noted to the north east elevation.



North west elevation



North east elevation



South west elevation



South east elevation

1. Vertical fracture through masonry, 3500 x 1mm, with associated seepage.
2. Vertical fracture through masonry, full height x up to 8mm. **(photo 51)**
3. Vertical fracture through masonry, 2000 x 1mm, with associated seepage. **(photo 52)**
4. Vertical fracture through masonry, 7000 x up to 6mm. **(photo 52)**
5. Vertical fracture through masonry, 2500 x up to 2mm. **(photo 53)**
6. Area of seepage, 5000 x 4000mm.
7. Area of seepage, 4000 x 4000mm. **(photo 54)**
8. Vertical fracture through masonry, 3000 x 1mm.
9. Vertical fracture through masonry, 3000 x 1mm.
10. Vertical fracture through masonry, 3500 x up to 1.5mm.
11. Vertical fracture through masonry, 1000 x 1mm. **(photo 55)**
12. Vertical fracture through masonry, 1500 x 0.5mm.
13. Diagonal stepped fracture through masonry, 1800 x 1mm.
14. Vertical stepped fracture through masonry, 900 x 1mm.
15. Vertical fracture through masonry, 4000 x 1mm. **(photo 56)**
16. Vertical fracture through masonry, 2000 x 1mm.
17. Vertical fracture through masonry, 1500 x 1mm.
18. Area of seepage, 4000 x 2000mm.

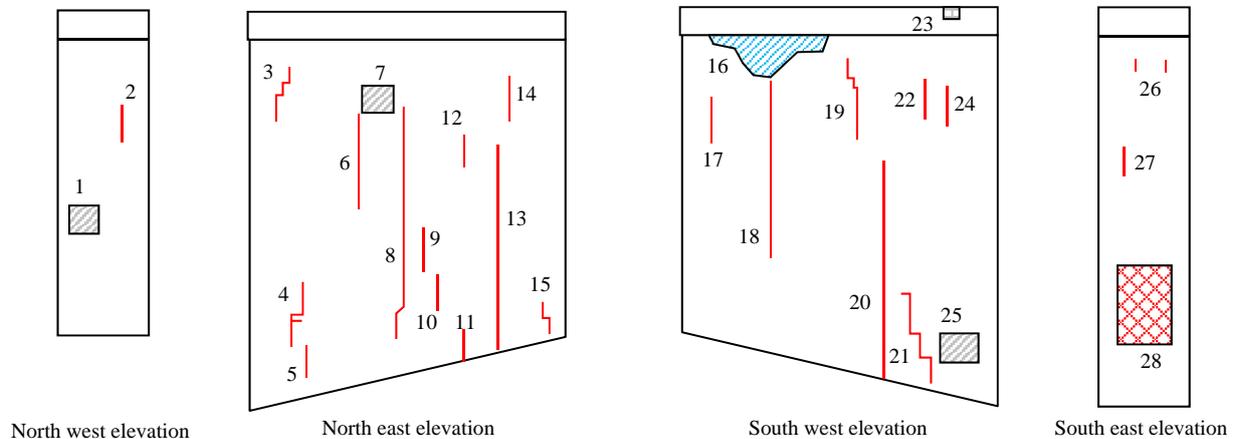
Line:  <b>Halifax High Level</b>	Structure Identifier: <b>HXH 4A</b>  <b>Ten span masonry arch viaduct with brickwork soffits</b>
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Remarks (Refer to parts by name) Sheet 17 of 121

19. Vertical fracture through masonry, 700 x 1mm, with associated seepage. **(photo 57)**
20. Vertical fracture through masonry, 1500 x 1mm.
21. Vertical fracture through masonry, 1700 x 1mm.
22. Vertical fracture through masonry, 6000 x 1mm.
23. 1No. missing block, 800 x 300 x 300mm, vertical fracture to block above, 1mm wide. **(photo 58)**
24. Vertical fracture through masonry, 2000 x 0.5mm.
25. Vertical fracture through masonry, 1400 x 1mm, with associated seepage.
26. Area of seepage, 4000 x 2000mm.
27. Area of fractures through masonry and mortar, 1200 x 700 x up to 3mm. **(photo 59)**
28. Vertical hairline fracture through masonry, 800mm in length.
29. Vertical hairline fracture through masonry, 1100mm in length, with associated seepage.

**Pier 9**

There was spot mortar loss of up to 30mm and spot areas of minor seepage throughout.



1. Area of loose, mortarless masonry, 450 x 500mm. **(photo 60)**
2. Vertical fracture through masonry, 1500 x 1mm.
3. Vertical stepped fracture through masonry, 1700 x 1mm.
4. Vertical stepped fracture through masonry, 3000 x 1mm.
5. Vertical fracture through masonry, 1300 x 0.5mm, with associated seepage.
6. Vertical fracture through masonry, 2000 x 1mm.

Line:

**Halifax High Level**

Structure Identifier: **HXH 4A**

**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

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7. Area of mortar loss, 1000 x 1000 x up to 40mm.
8. Vertical fracture through masonry, 5000 x 1mm.
9. Vertical fracture through masonry, 1500 x 1mm, with associated seepage. **(photo 61)**
10. Vertical fracture through masonry, 1100 x 1mm, with associated seepage. **(photo 61)**
11. Vertical fracture through masonry, 700 x 1mm, with associated seepage.
12. Vertical fracture through masonry, 600 x 1mm.
13. Vertical fracture through masonry, 3000 x up to 1.5mm, with associated seepage. **(photo 62)**
14. Vertical hairline fracture through masonry, 1700mm in length.
15. Vertical stepped fracture through masonry, 700 x 0.5mm.
16. Area of seepage, 2000 x 1000mm.
17. Vertical fracture through masonry, 2000 x up to 2mm.
18. Vertical fracture through masonry, 3000 x up to 2mm. **(photo 63)**
19. Vertical stepped fracture through masonry, 2000 x up to 2mm. **(photo 64)**
20. Vertical fracture through masonry, 4000 x up to 2mm, with associated seepage. **(photo 65)**
21. Vertical stepped fracture through masonry, 2000 x 1mm, with associated seepage.
22. Vertical fracture through masonry, 1500 x 1mm.
23. Area of spalled masonry, 300 x 300 x up to 90mm. **(photo 66)**
24. Vertical fracture through masonry, 1800 x 1mm.
25. Area of mortar loss, 2000 x 1000 x up to 30mm. **(photo 67)**
26. 2No. vertical hairline fractures to individual blocks, each 200mm in length.
27. Vertical fracture through masonry, 600 x 1mm, with associated seepage. **(photo 68)**
28. Area of fractured mortar, 4000 x 1500 x up to 2mm, with associated seepage. **(photo 69)**

Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

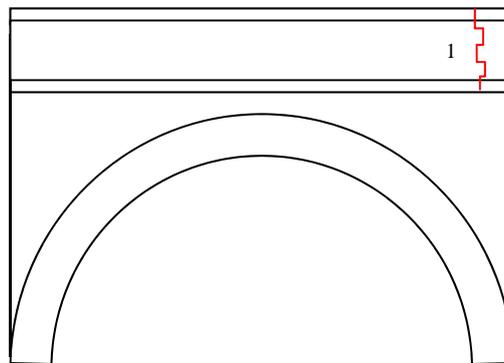
Remarks (Refer to parts by name)

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**SUPERSTRUCTURE**

**Span 1 North West Elevation**

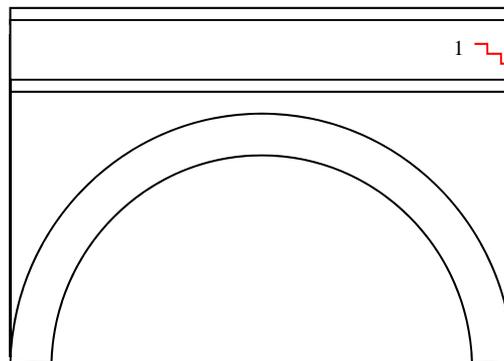
There was spot mortar loss of up to 40mm throughout the parapet. 30% of vertical joints to string course had mortar loss of up to 60mm. **(photo 70)** There was spot mortar loss of up to 30mm throughout the spandrel.



1. Vertical toothed fracture through mortar, 1500 x up to 2mm. **(photo 71)**

**Span 1 South East Elevation**

There was spot mortar loss of up to 30mm throughout the parapet. There was spot mortar loss of up to 30mm throughout the spandrel. **(photo 72)**



1. Diagonal stepped fracture through mortar, 900 x 1mm.

Line:  
**Halifax High Level**

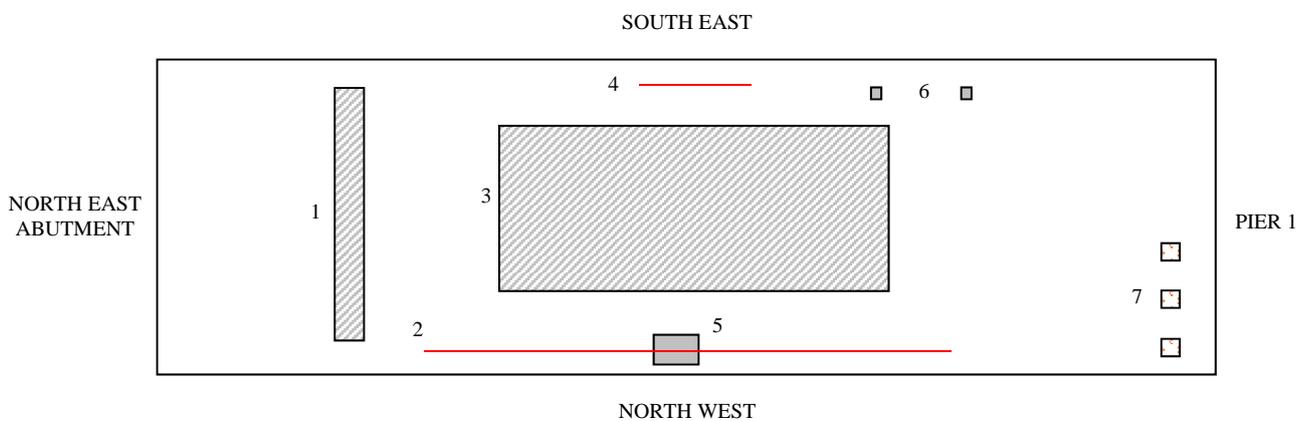
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

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**Span 1 Soffit**

There were spot areas of seepage and leachate deposits from the quarter points to the pier / abutment. There was spot mortar loss behind the voussoirs of up to 80mm. [\(photo 73\)](#)



1. Area of mortar loss, 3000 x 500 x up to 50mm.
2. Longitudinal fracture through brickwork, 8000 x up to 30mm, brickwork along fracture also drummy. [\(photo 74\)](#)
3. Area of mortar loss, 10,000 x 4000 x up to 80mm.
4. Longitudinal fracture through brickwork, 5000 x up to 5mm, brickwork along fracture also drummy. [\(photo 75\)](#)
5. Area of approx. 35No. missing bricks at the crown, 20No. more removed at time of examination. [\(photo 74\)](#)
6. 2No. areas of 3No. missing bricks. [\(photo 76\)](#)
7. 3No. areas of loose to hammer brickwork and mortar loss of up to 80mm, totalling 1000 x 1500mm. [\(photo 77\)](#)

Line:  
**Halifax High Level**

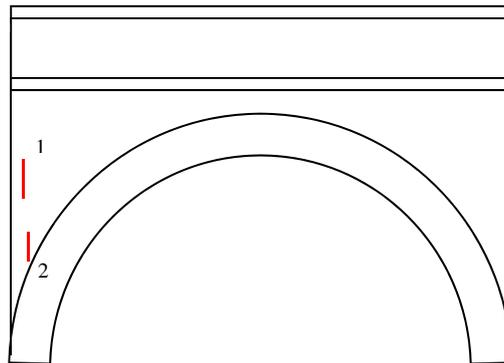
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

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**Span 2 North West Elevation**

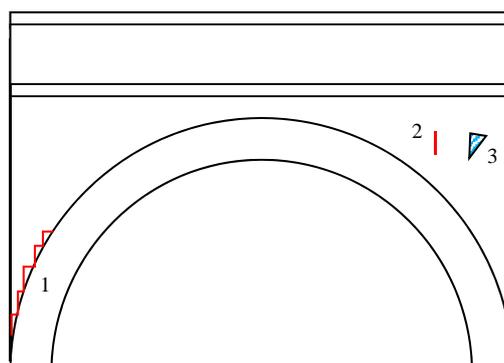
There was spot mortar loss of up to 30mm throughout the spandrel.



1. Vertical fracture through masonry, 400 x 1mm. **(photo 78)**
2. Vertical fracture through masonry, 300 x 1mm.

**Span 2 South East Elevation**

There were 7No. individual blocks with vertical hairline fractures to the spandrel over pier 2.



1. Diagonal stepped separation fracture between voussoirs and spandrel, 3000 x 0.5mm. **(photo 79)**
2. Vertical fracture through masonry, 400 x 1mm. **(photo 80)**
3. Area of seepage, 300 x 300mm.

Line:  
**Halifax High Level**

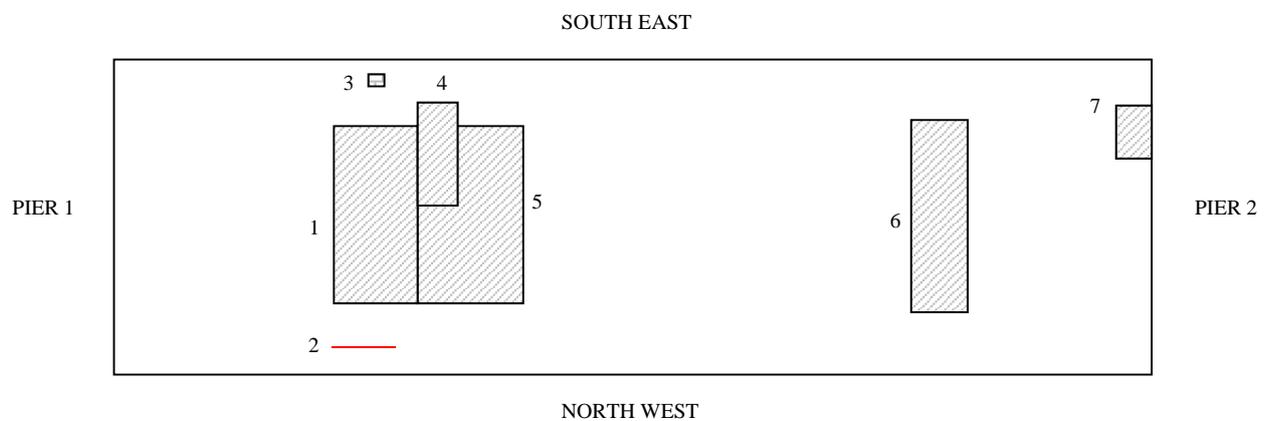
Structure Identifier: **HXH 4A**  
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**Span 2 Soffit**

There were spot areas of minor seepage totalling 2m<sup>2</sup> and leachate deposits totalling 15m<sup>2</sup> from the quarter point to pier 1. [\(photo 81\)](#)



1. Area of mortar loss, 3000 x 4000 x up to 90mm. [\(photo 82\)](#)
2. Longitudinal fracture through brickwork, 1500 x up to 4mm. [\(photo 83\)](#)
3. Area of spalled voussoir, 200 x 50 x up to 70mm.
4. Area of heavy mortar loss, 2000 x 800 x up to 110mm. [\(photo 84\)](#)
5. Area of mortar loss, 2500 x 4000 x up to 50mm.
6. Area of mortar loss, 2000 x 4500 x up to 70mm.
7. Area of mortar loss, 1000 x 1000 x up to 70mm.

Line:

Structure Identifier: **HXH 4A**

**Halifax High Level**

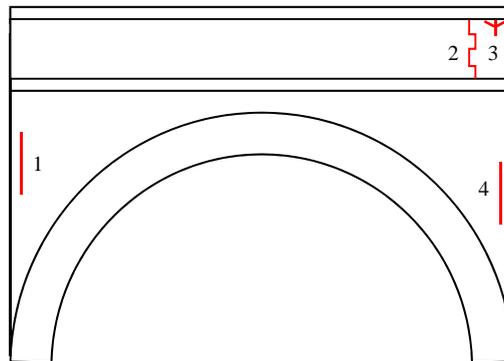
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 23 of 121**

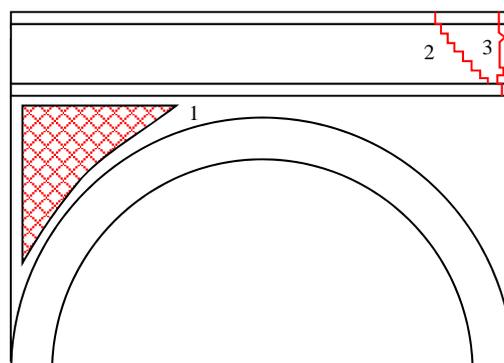
**Span 3 North West Elevation**

There was spot mortar loss of up to 50mm throughout the spandrel. There was spot mortar loss of up to 20mm throughout the parapet.



1. Vertical fracture through masonry, 2700 x 1mm. **(photo 85)**
2. Vertical toothed fracture through mortar, 1500 x 1mm.
3. Multi-directional fractures through 1No. block from old iron fixing, up to 7mm wide. **(photo 86)**
4. Vertical fracture through masonry, 1500 x 0.5mm.

**Span 3 South East Elevation**



1. Area of hairline fractures through mortar and mortar loss of up to 25mm, 1500 x 2000mm, with spot areas of light vegetation growth. **(photo 87)**
2. Diagonal stepped fracture through mortar, 1700 x up to 1.5mm. **(photo 88)**
3. Vertical fracture through mortar, 1500 x 1mm. **(photo 88)**

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**Halifax High Level**

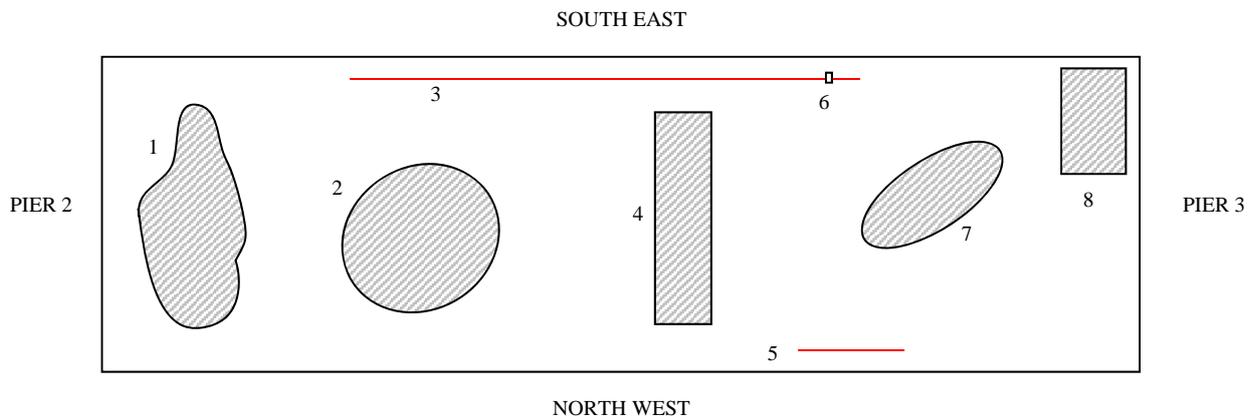
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 24 of 121**

**Span 3 Soffit**

There was spot mortar loss behind the voussoirs of up to 50mm.



1. Area of mortar loss, 3000 x 4000 x up to 40mm. **(photo 89)**
2. Area of mortar loss, 1500 x 2000 x up to 50mm.
3. Longitudinal fracture through brickwork, 6000 x up to 9mm, brickwork and voussoirs to the south east side were lower by up to 7mm with mortar loss of up to 60mm. **(photo 90)**
4. Area of heavy mortar loss to crown, 1000 x 4000 x up to 100mm. **(photo 91)**
5. Longitudinal fracture through brickwork, 1500 x 1mm.
6. 1No. loose brick.
7. Area of mortar loss and seepage, 2000 x 2000 x up to 30mm. **(photo 92)**
8. Area of mortar loss, 1000 x 2000 x up to 35mm.

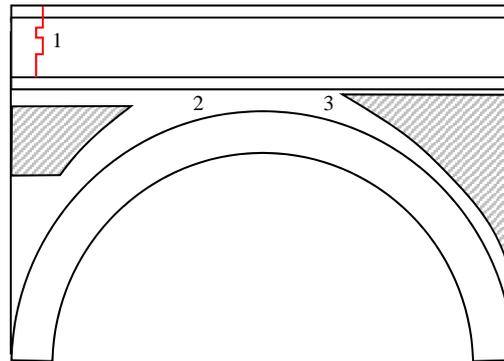
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 25 of 121**

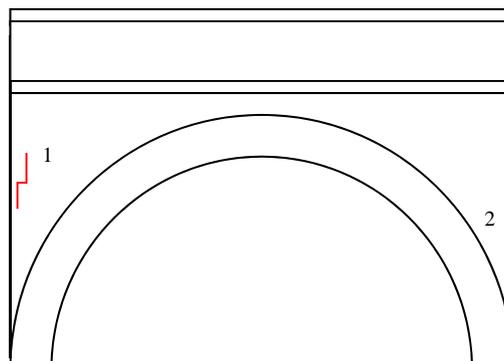
**Span 4 North West Elevation**



1. Vertical stepped fracture through mortar, 1500 x 1mm.
2. Area of mortar loss, 1000 x 500 x up to 30mm.
3. Area of mortar loss, 2000 x 3000 x up to 40mm.

**Span 4 South East Elevation**

There was spot mortar loss of up to 40mm throughout the parapet. There were spot fractures through mortar / mortar loss of up to 30mm and spot light vegetation growth throughout the spandrel. [\(photo 93\)](#)



1. Vertical stepped hairline fracture through mortar and masonry, 1500mm in length. [\(photo 94\)](#)
2. Vertical hairline fracture through mortar and masonry, 1100mm in length.

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**Halifax High Level**

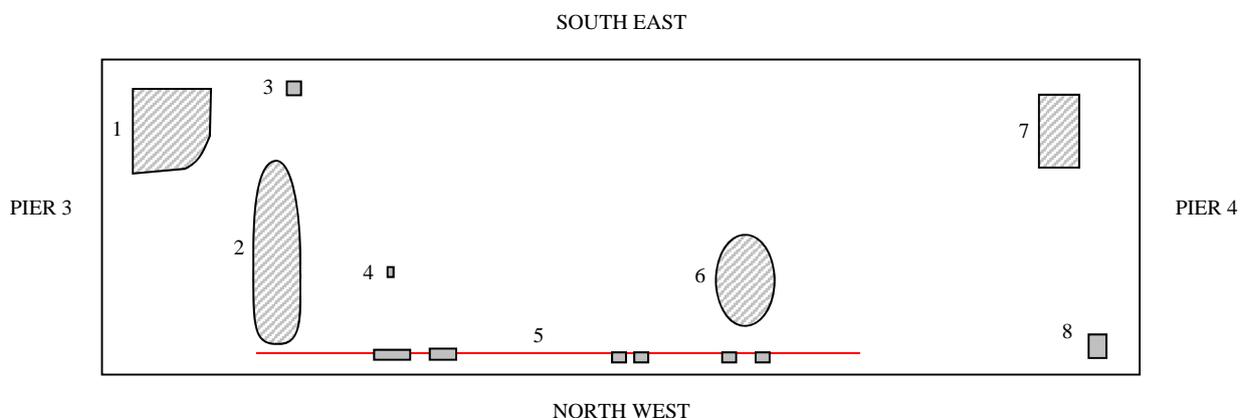
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 26 of 121**

**Span 4 Soffit**

There were spot areas of seepage below the quarter points totalling 6m<sup>2</sup>. There was spot mortar loss of up to 10mm throughout the soffit, with loss of up to 80mm behind the voussoirs.



1. Area of mortar loss, 2000 x 1000 x up to 50mm.
2. Area of mortar loss, 1000 x 5000 x up to 60mm.
3. 3No. missing bricks. [\(photo 95\)](#)
4. 1No. missing brick. [\(photo 96\)](#)
5. Longitudinal fracture through brickwork, 8000 x up to 25mm, approx. 35No. bricks along length of fracture fallen out / removed, usually between fracture and voussoirs. [\(photos 96 & 97\)](#)
6. Area of mortar loss, 1000 x 2000 x up to 60mm.
7. Area of mortar loss, 500 x 1000 x up to 50mm. [\(photo 98\)](#)
8. 6No. missing bricks. [\(photo 99\)](#)

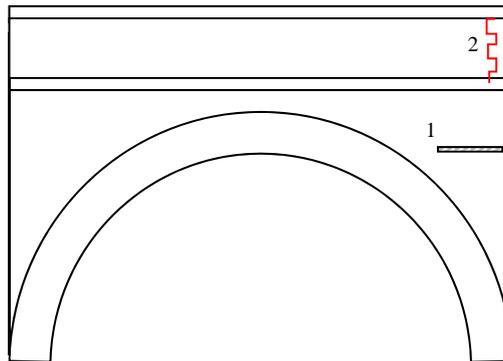
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**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 27 of 121**

**Span 5 North West Elevation**



1. Line of mortar loss, 600 x up to 80mm.
2. Vertical toothed fracture through mortar, 1500 x up to 1.5mm. [\(photo 100\)](#)

**Span 5 South East Elevation**

No defects noted.

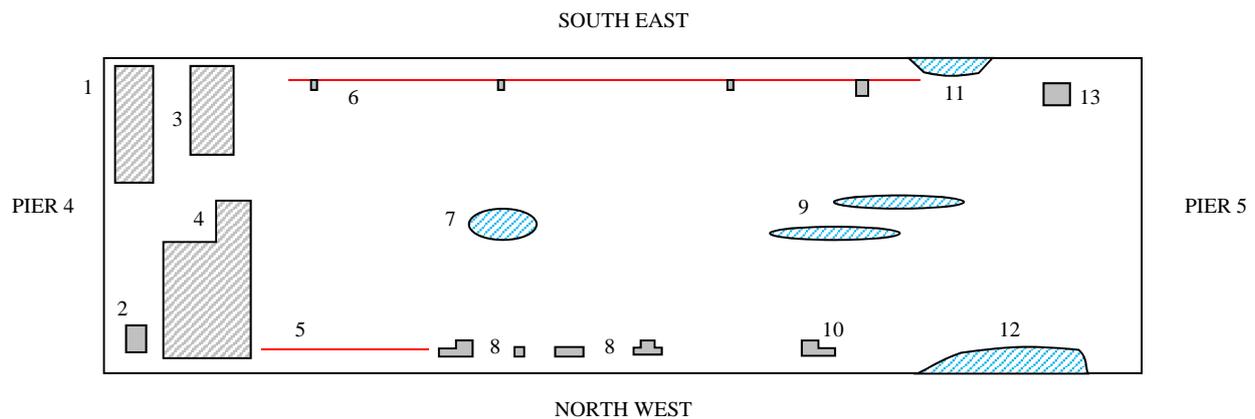
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**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

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**Span 5 Soffit**



1. Area of mortar loss, 3000 x 800 x up to 50mm, with spot seepage, area also drummy, 1No. loose brick removed. **(photo 101)**
2. Area of missing brickwork, 550 x 800 x 120mm, 5No. further bricks removed. **(photos 102 & 103)**
3. Area of mortar loss, 2000 x 800 x up to 40mm.
4. Area of mortar loss, 2000 x 1500 x up to 30mm. **(photo 104)**
5. Longitudinal fracture through brickwork, 4000 x up to 20mm, approx. 12No. bricks along length of fracture fallen out / removed, usually between fracture and voussoirs. **(photo 105)**
6. Longitudinal fracture through brickwork along voussoir ring, 7000 x up to 15mm, with 4No. areas of missing brickwork, 300 x 250 x 150mm, 300 x 250 x 150mm, 300 x 100 x 150mm and 500 x 200 x 150mm.
7. Area of seepage, 2000 x 1000mm.
8. 4No areas of missing brickwork, approx. 12No. in total, 4No. further bricks removed. **(photo 106)**
9. 2No. areas of seepage, each 2000 x 500mm.
10. 4No. missing bricks.
11. Area of seepage, 2000 x 1000mm.
12. Area of seepage, 3000 x 1000mm.
13. Area of missing brickwork, 200 x 200 x 120mm.

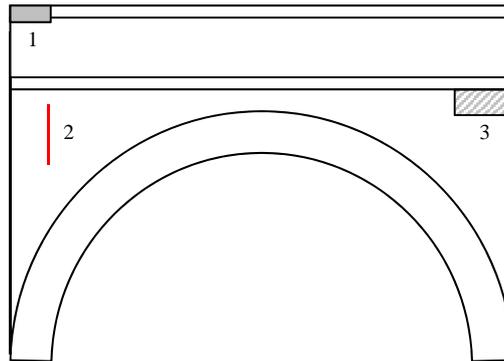
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Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

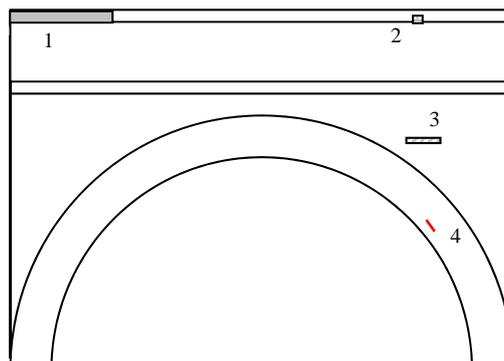
**Sheet 29 of 121**

**Span 6 North West Elevation**



1. Area of missing coping, 2000 x 400mm. **(photo 107)**
2. Vertical fracture through masonry, 2000 x 1mm.
3. Area of mortar loss, 2000 x 1000 x up to 20mm. **(photo 108)**

**Span 6 South East Elevation**



1. Area of missing coping, 10,000 x 400mm, continued on to span 7. **(photo 109)**
2. Area of spalling to coping, 200 x 200 x up to 200mm. **(photo 110)**
3. Line of mortar loss, 400 x up to 20mm. **(photo 111)**
4. Diagonal fracture through 1No. voussoir, 200 x 1mm.

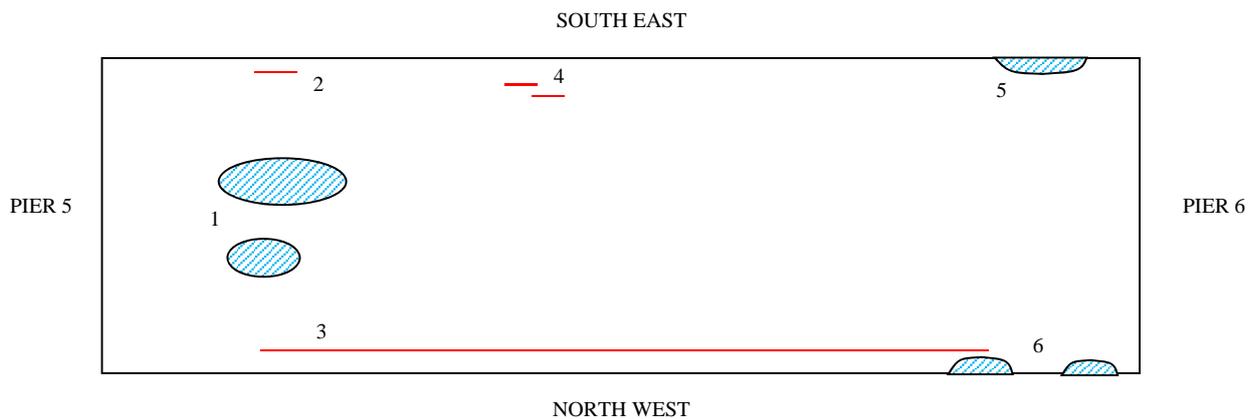
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 30 of 121**

**Span 6 Soffit**



1. 2No. areas of seepage totalling 2000 x 2000mm.
2. Longitudinal fracture through voussoir, 300 x 1mm.
3. Longitudinal fracture through brickwork, 10,000 x up to 40mm, with associated mortar loss of up to 50mm. **(photo 112)**
4. 2No. longitudinal fractures through voussoirs, each 200 x 1mm.
5. Area of seepage, 2000 x 1000mm.
6. 2No. areas of seepage totalling 2000 x 1000mm.

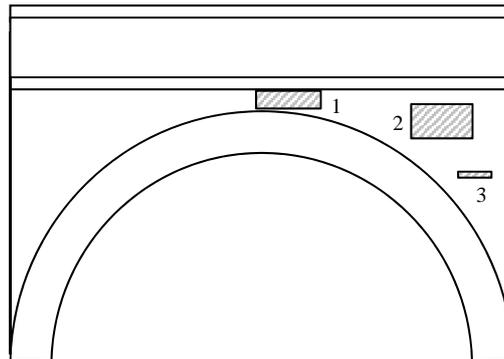
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Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

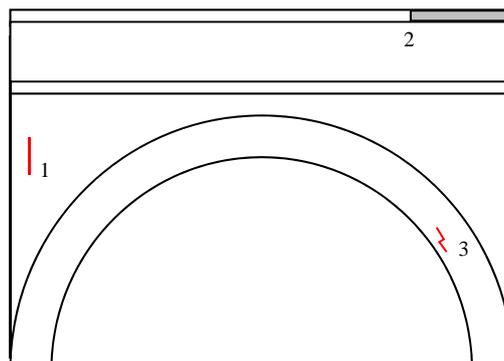
**Sheet 31 of 121**

**Span 7 North West Elevation**



1. Area of mortar loss, 2000 x 1000 x up to 30mm. [\(photo 113\)](#)
2. Area of mortar loss, 2000 x 1500 x up to 30mm.
3. Line of mortar loss, 1000 x up to 50mm.

**Span 7 South East Elevation**



1. Vertical fracture through masonry, 1000 x 1mm. [\(photo 114\)](#)
2. Area of missing coping, 10,000 x 400mm, continued on to span 6. [\(photo 109\)](#)
3. Diagonal stepped fracture through voussoirs, 400 x 1mm. [\(photo 115\)](#)

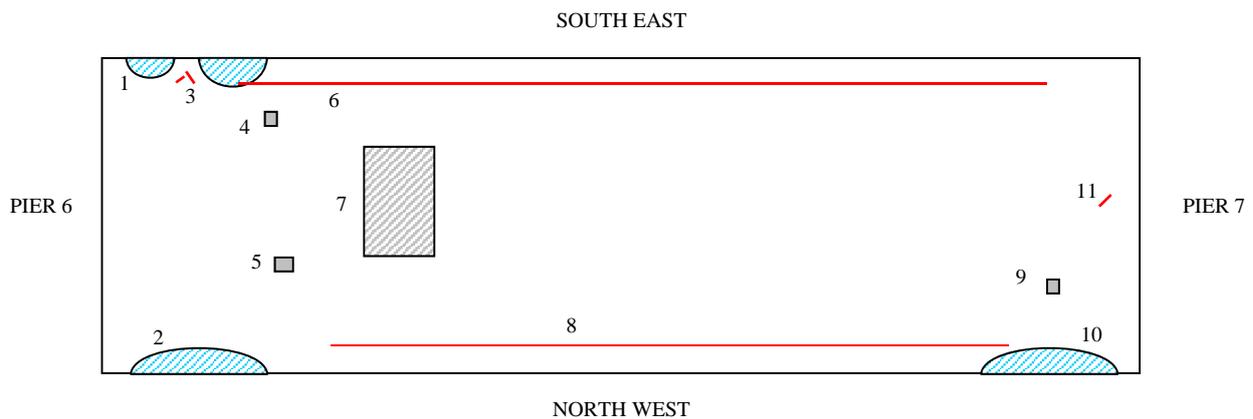
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**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 32 of 121**

**Span 7 Soffit**



1. 2No. areas of seepage totalling 2000 x 1000mm. **(photo 116)**
2. Area of seepage, 4000 x 1000mm.
3. Diagonal fracture through voussoirs, 600 x 1mm. **(photo 116)**
4. Area of missing brickwork, 400 x 250 x 100mm.
5. Area of missing brickwork, 400 x 400 x 100mm.
6. Longitudinal fracture through brickwork, 10,000 x up to 10mm, with mortar loss of up to 70mm. **(photo 117)**
7. Area of mortar loss, 2000 x 3000 x up to 20mm.
8. Longitudinal fracture through brickwork, 11000 x up to 5mm, with mortar loss of up to 70mm.
9. Area of missing brickwork, 400 x 250 x 100mm.
10. Area of seepage, 4000 x 1000mm.
11. Diagonal fracture through brickwork, 300 x up to 3mm.

Line:

**Halifax High Level**

Structure Identifier: **HXH 4A**

**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

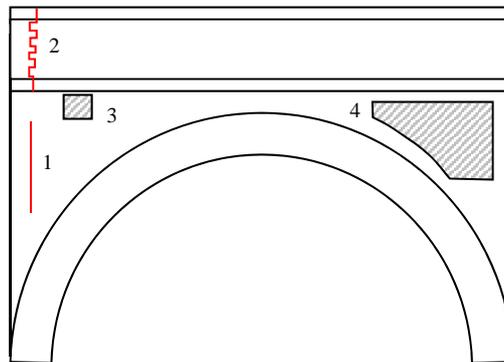
**Sheet 33 of 121**

**Span 8 North West Elevation**

There was spot mortar loss of up to 50mm throughout the spandrel, mainly to the upper half. **(photo 118)**  
There was spot mortar loss of up to 40mm throughout the parapet.

**Span 8 South East Elevation**

There was spot mortar loss of up to 25mm throughout the parapet.



1. Vertical fracture through masonry, 3000 x up to 1.5mm, with associated seepage. **(photo 119)**
2. Vertical toothed fracture through mortar, 1500 x 1mm.
3. Area of mortar loss, 1000 x 1000 x up to 70mm.
4. Area of mortar loss, 2000 x 1000 x up to 40mm.

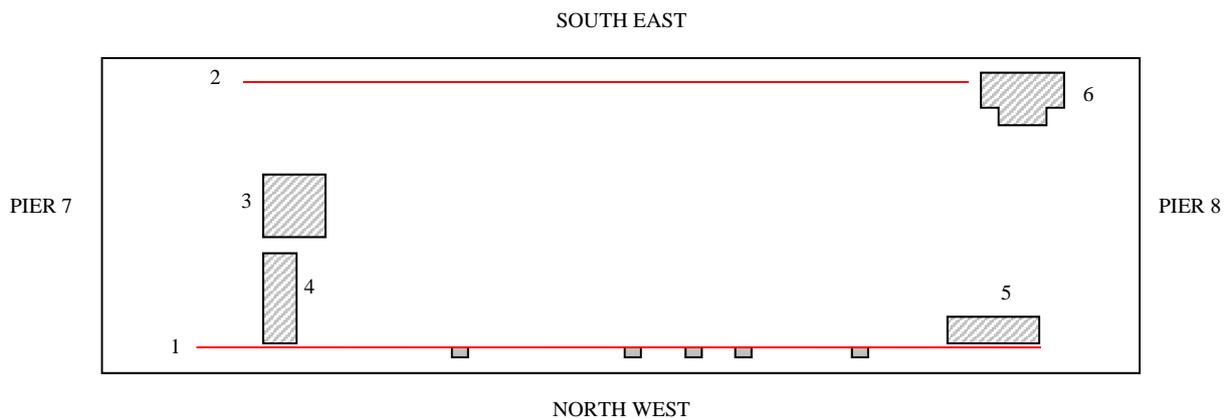
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**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 34 of 121**

**Span 8 Soffit**



1. Longitudinal fracture through brickwork, 14,000 x up to 45mm, 4No. loose bricks removed, 4No. areas of missing brickwork between fracture and voussoirs: 1No. brick, 1½No. bricks, 3No. bricks, 1No. half brick and 3½No. bricks. [\(photos 120, 121, 122, 123, 124 & 125\)](#)
2. Longitudinal fracture through brickwork, 10,500 x up to 15mm.
3. Area of mortar loss, 2000 x 200 x up to 30mm, with associated seepage. [\(photo 126\)](#)
4. Area of mortar loss, 1000 x 2000 x up to 30mm, with associated seepage.
5. Area of mortar loss, 2000 x 1000 x up to 40mm.
6. Area of mortar loss, 2000 x 1000 x up to 40mm.

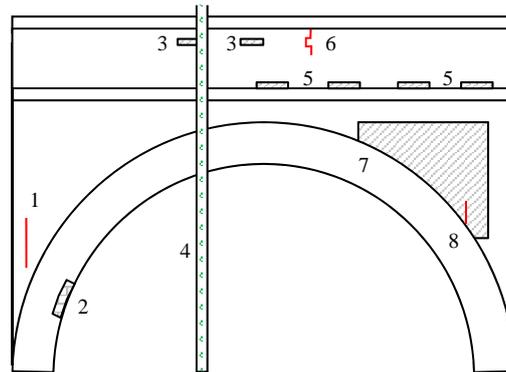
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**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 35 of 121**

**Span 9 North West Elevation**



1. Vertical fracture through masonry, 900 x 0.5mm. [\(photo 127\)](#)
2. Area of spalled masonry to voussoirs, 700 x 200 x up to 100mm.
3. 2No. lines of mortar loss, each 400 x up to 80mm. [\(photo 128\)](#)
4. Mature tree adjacent to elevation, 500mm in diameter, 30m tall, makes contact with the coping. [\(photo 129\)](#)
5. 4No. lines of mortar loss totalling 3500 x up to 25mm.
6. Vertical stepped hairline fracture through mortar, 600mm in length.
7. Area of mortar loss, 2000 x 2000 x up to 50mm. [\(photo 130\)](#)
8. Vertical hairline fracture through masonry, 750mm in length.

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**Halifax High Level**

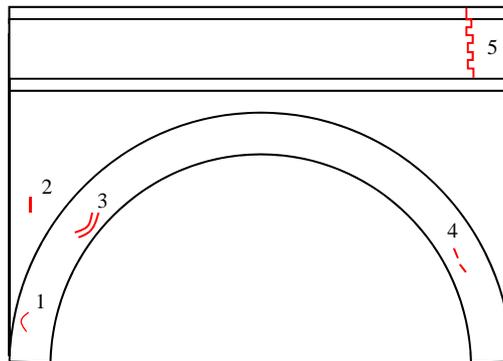
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 36 of 121**

**Span 9 South East Elevation**

There were spot areas of fractured / missing mortar of up to 40mm throughout the spandrel.



1. Diagonal hairline fracture through 2No. voussoirs, 600mm in length.
2. Vertical fracture through masonry, 600 x 1mm, with associated seepage. [\(photo 131\)](#)
3. 2No. diagonal hairline fractures through 2No. voussoirs, each 600mm in length. [\(photo 132\)](#)
4. Diagonal fracture through 2No. voussoirs, 500 x 1mm in length.
5. Vertical toothed fracture through mortar, 1500 x 1mm. [\(photo 133\)](#)

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**Halifax High Level**

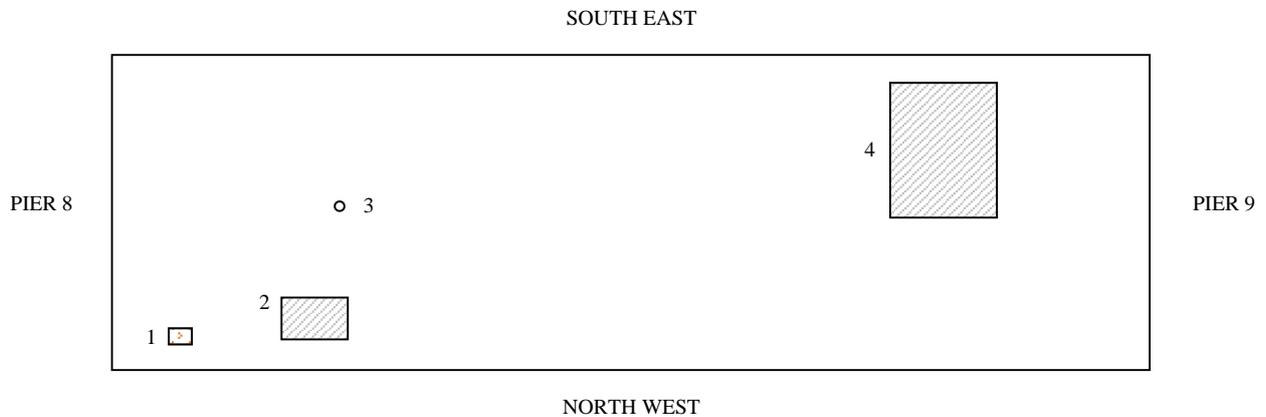
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 37 of 121**

**Span 9 Soffit**

There was mortar loss of up to 40mm between voussoirs and brickwork between the quarter points and piers to both sides of the soffit. There were spot areas of leachate deposits below quarter points, mainly over pier 8. **(photo 134)** There were spot areas of seepage throughout the voussoirs. **(photo 134)**



1. 2No. loose half bricks, 1No. removed. **(photo 135)**
2. Area of mortar loss, 2000 x 1000 x up to 30mm, with associated seepage.
3. Drainage pipe broken but functional.
4. Area of mortar loss, 1500 x 20000 x up to 40mm, with associated seepage. **(photo 136)**



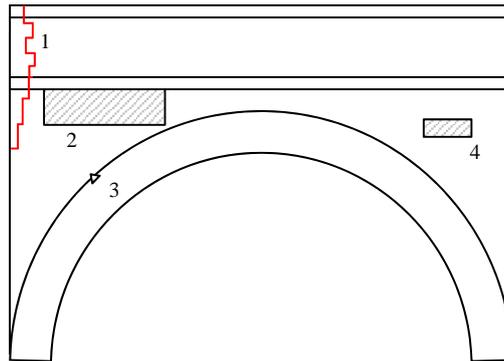
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**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 38 of 121**

**Span 10 North West Elevation**



1. Vertical stepped fracture through mortar, 2000 x up to 3mm. [\(photo 137\)](#)
2. Area of mortar loss, 2000 x 1500 x up to 50mm, with associated light vegetation growth. [\(photo 138\)](#)
3. Area of spalling to voussoir, 200 x 200 x up to 200mm. [\(photo 139\)](#)
4. Area of mortar loss, 2000 x 1000 x up to 50mm.

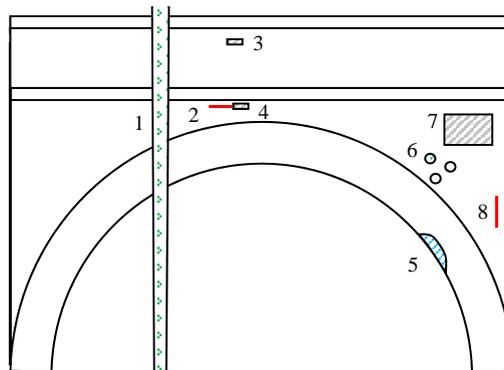
Line:  
**Halifax High Level**

Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 39 of 121**

**Span 10 South East Elevation**



1. Mature tree, 400mm in diameter, growing adjacent to elevation in contact with masonry. [\(photo 140\)](#)
2. Horizontal fracture through masonry, 400 x 1mm. [\(photo 141\)](#)
3. Line of mortar loss, 300 x up to 200mm. [\(photo 142\)](#)
4. Line of mortar loss, 300 x up to 30mm.
5. Area of seepage to voussoirs, 1000 x 1000mm.
6. Spot areas of minor vegetation growth. [\(photo 143\)](#)
7. Area of mortar loss, 2000 x 2000 x up to 50mm.
8. Vertical fracture through masonry, 400 x 1mm, with associated seepage.

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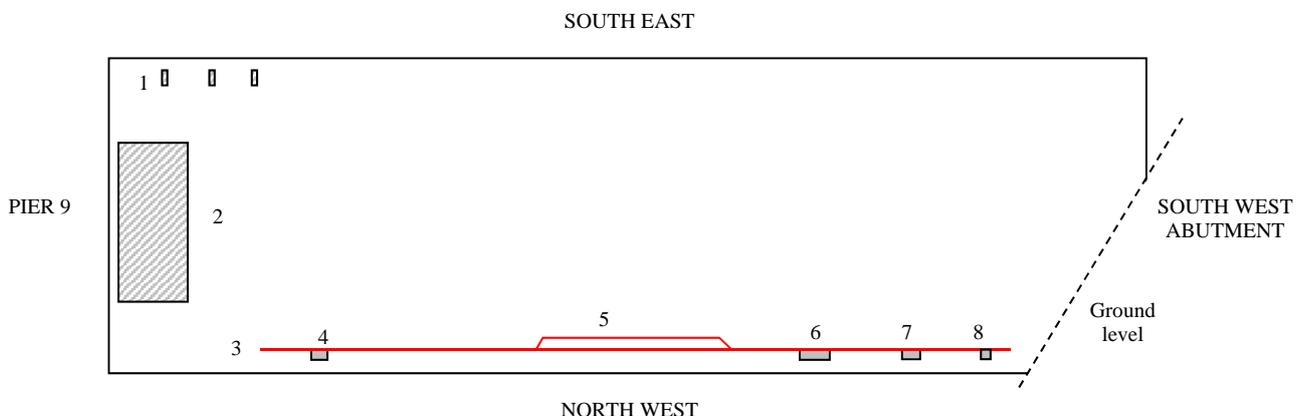
Structure Identifier: **HXH 4A**  
**Ten span masonry arch viaduct with brickwork soffits**

Remarks (Refer to parts by name)

**Sheet 40 of 121**

**Span 10 Soffit**

There were spot areas of seepage below the quarter points to both sides of the soffit. There were spot areas of mortar loss of up to 20mm over the pier and abutment and up to 80mm between the voussoirs and brickwork.



1. 3No. lines of mortar loss between voussoirs and brickwork totalling 400 x 15mm.
2. Area of mortar loss, 1000 x 2000 x up to 40mm. [\(photo 144\)](#)
3. Longitudinal fracture through brickwork, 12,000 x up to 15mm, with associated seepage. [\(photos 145 & 146\)](#)
4. Area of missing brickwork between longitudinal fracture and voussoirs, 400 x 100 x 120mm.
5. Longitudinal fracture through brickwork, 2500 x up to 5mm. [\(photo 146\)](#)
6. Area of missing brickwork between longitudinal fracture and voussoirs, 600 x 200 x 120mm. [\(photo 147\)](#)
7. Area of missing brickwork between longitudinal fracture and voussoirs, 400 x 150 x 120mm.
8. Missing half brick between longitudinal fracture and voussoirs. [\(photo 148\)](#)

Line:  <b>Halifax High Level</b>	Structure Identifier: <b>HXH 4A</b>  <b>Ten span masonry arch viaduct with brickwork soffits</b>
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Remarks (Refer to parts by name) **Sheet 41 of 121**

**Track Top**

The disused track bed over the structure was overgrown, mainly with heather, which had been on fire recently. **(photo 149)** Occasional saplings were growing throughout. **(photo 150)** 2No. mature trees, 280 and 800mm in diameter, were growing to the north east end of the structure. **(photo 151)**

**North West Parapet Internal Elevation**

The parapet was leaning outwards by 40 – 60mm. **(photo 152)** There was spot mortar loss of up to 40mm throughout. All refuges had vertical toothed fractures through mortar, full height x av. 1mm, down at least 1No. side. **(photo 153)** There was an area of missing masonry to the top of the refuge over pier 5, 800 x 500 x 300mm. **(photo 154)**

**South East Parapet Internal Elevation**

The parapet was leaning outwards by 20 – 40mm. There was spot mortar loss of up to 40mm throughout. **(photo 155)** There was an area of missing masonry to the top of the refuge over pier 6, 6000mm of coping and 1000mm of top course of masonry. **(photo 156)** There was an area of missing masonry to the south west end of the parapet adjacent to the barrier, 500 x 700 x 450mm. **(photo 157)**

**Watercourse**

Debris, including fly-tipped material, was noted to the watercourse downstream of the bridge. **(photo 158)** The northern bank of the watercourse downstream of the bridge was heavily eroded, 3No. mature trees (over 30m high) had their roots severely undercut by up to 1500mm. **(photo 159)**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch** Sheet **42 of 121**



**Photo No. 1: North west elevation**



**Photo No. 2: South east elevation**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 3: View along top of structure looking towards north east**



**Photo No. 4: View along top of structure looking towards south west**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 5: View looking along road towards north west**



**Photo No. 6: View looking along road towards south east**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 7: View looking upstream**



**Photo No. 8: View looking downstream**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 9: Structure number painted to south end of west parapet during examination**



**Photo No. 10: Structure number painted to south abutment during examination**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch** Sheet **47** of **121**



**Photo No. 11: Bridge closed sign employed during examination & barrier to north east end of bridge**



**Photo No. 12: Bridge closed sign employed during examination & barrier to south west end of bridge**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

**Balfour Beatty**  
Rail

ELR: **HXH** Br. No.: **4A**

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**Photo No. 13: General view of north east abutment**



**Photo No. 14: General view of south west abutment**

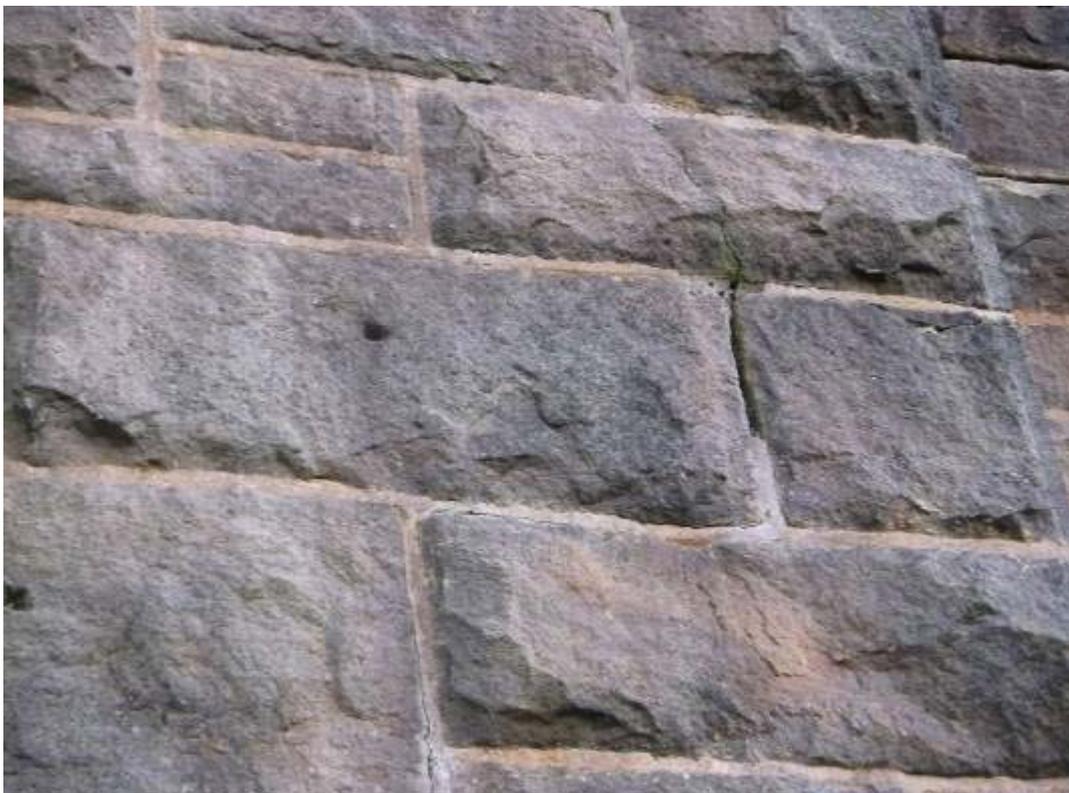
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 15: Area of mortar loss to base of north wing wall**

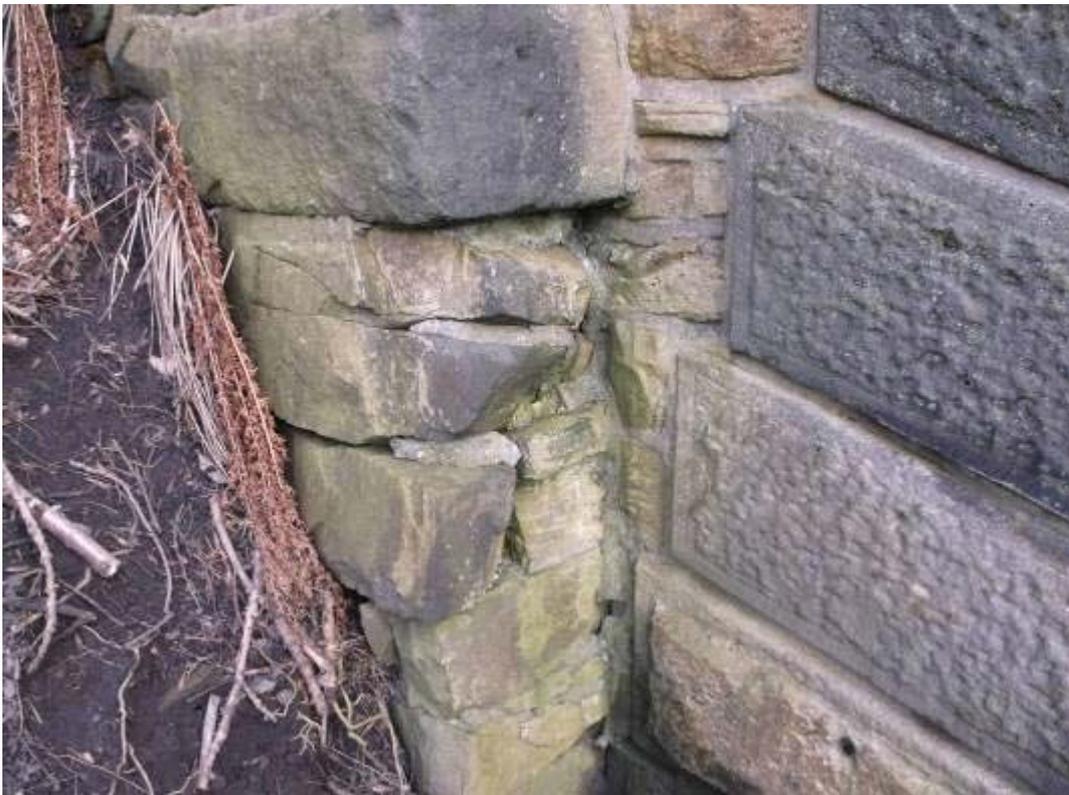


**Photo No. 16: Vertical stepped fracture to north wing wall**

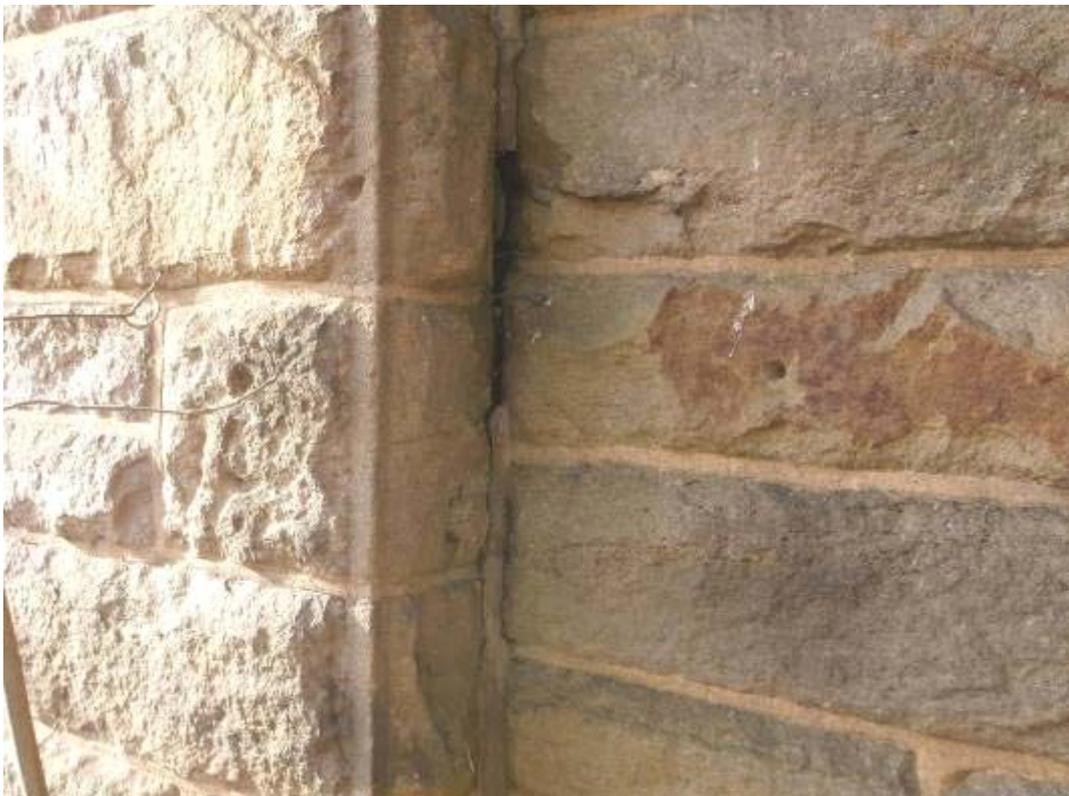
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch** Sheet **50 of 121**



**Photo No. 17: Area of fractured & missing masonry to north wing wall**



**Photo No. 18: Line of fractured mortar / mortar loss to east wing wall**

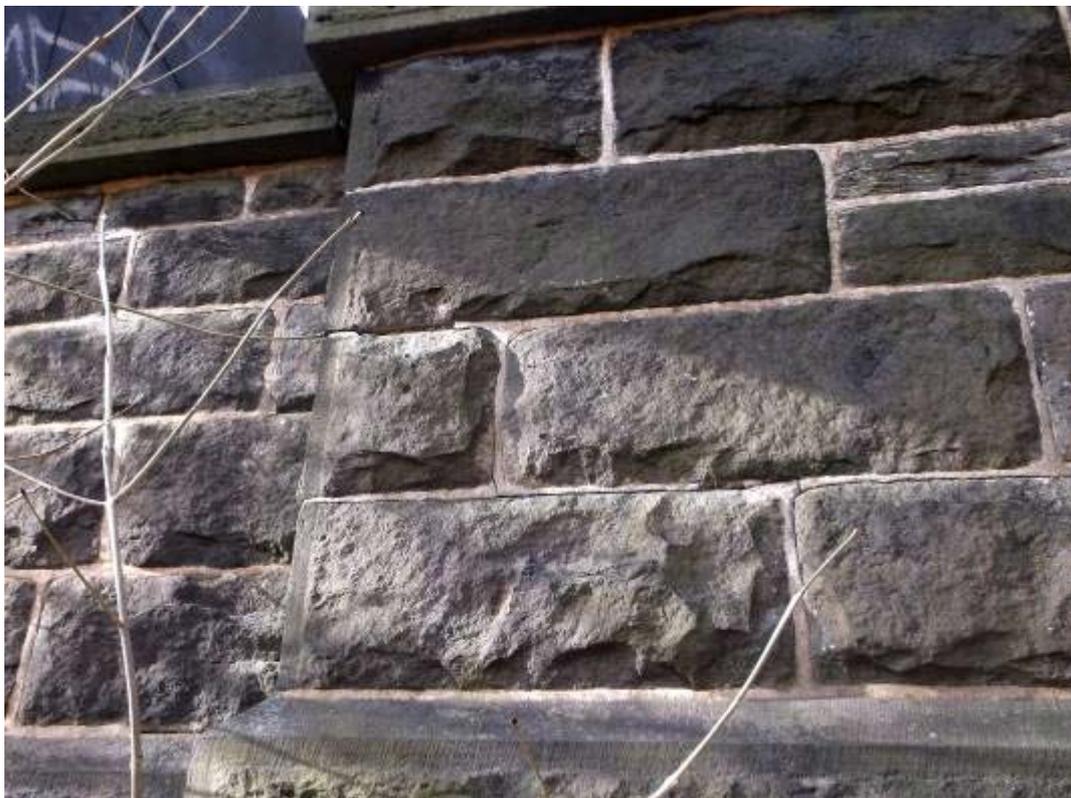
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 19: Sapling growing adjacent to east wing wall**



**Photo No. 20: Diagonal stepped fracture to east wing wall**

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PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 21: Length of missing coping & poor masonry repair to south wing wall**



**Photo No. 22: Band of cracked & missing mortar to south wing wall**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 23: Area of weed & sapling growth to south wing wall**



**Photo No. 24: Area of mortar loss & seepage to south wing wall**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 25: Area of mortar loss & displaced block to west wing wall**



**Photo No. 26: Builder's equipment & wood to base of north east elevation of pier 1**

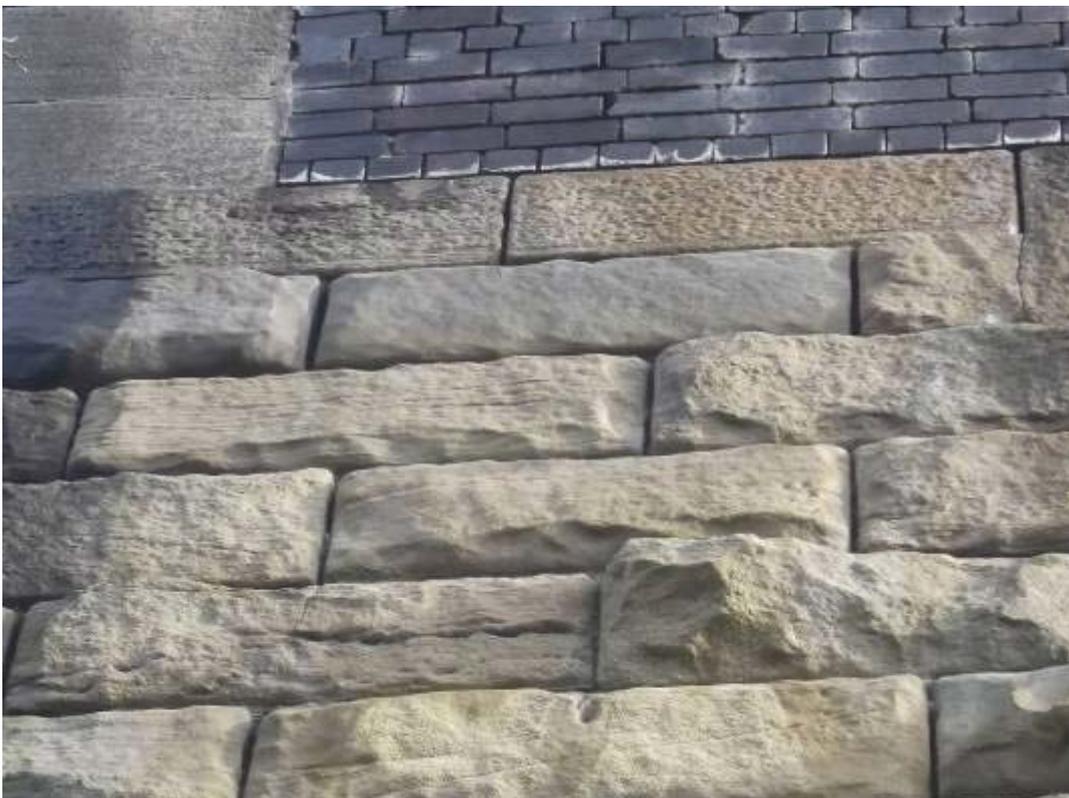
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 27: Vertical fractures to south west elevation of pier 1**



**Photo No. 28: Area of mortar loss to south west elevation of pier 1**

**EXAMINATION REPORT  
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ELR: **HXH** Br. No.: **4A**

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**Photo No. 29: Area of mortar loss to south west elevation of pier 2**



**Photo No. 30: Vertical fracture to south west elevation of pier 2**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch** Sheet **57** of **121**



**Photo No. 31: Typical mortar loss to pier 3**

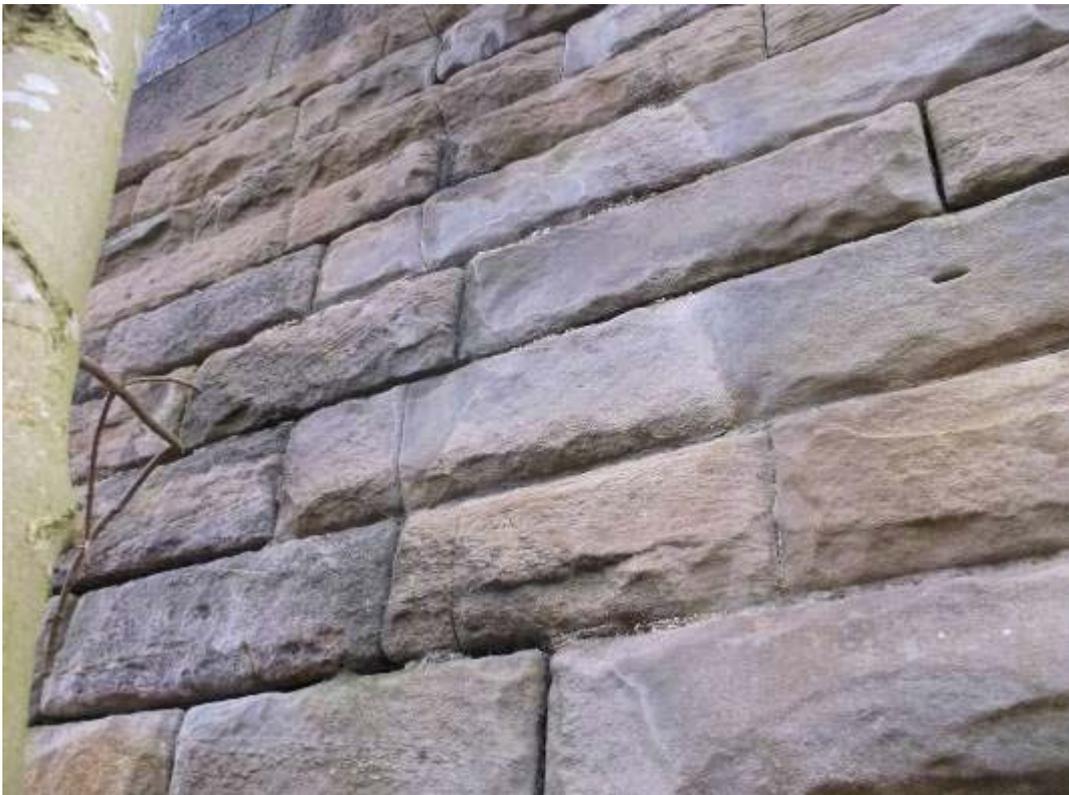


**Photo No. 32: Tree adjacent to north west elevation of pier 3**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 33: Vertical fracture to north east elevation of pier 3**



**Photo No. 34: Vertical fracture to south west elevation of pier 3**

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PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 35: Culvert under span 5, dry at time of examination**



**Photo No. 36: Watercourse from culvert under span 5 running along base of south west elevation of pier 4, dry at time of examination, no evidence of scour noted**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 37: Vertical fracture to south west elevation of pier 4**



**Photo No. 38: Vertical fracture to south west elevation of pier 4**

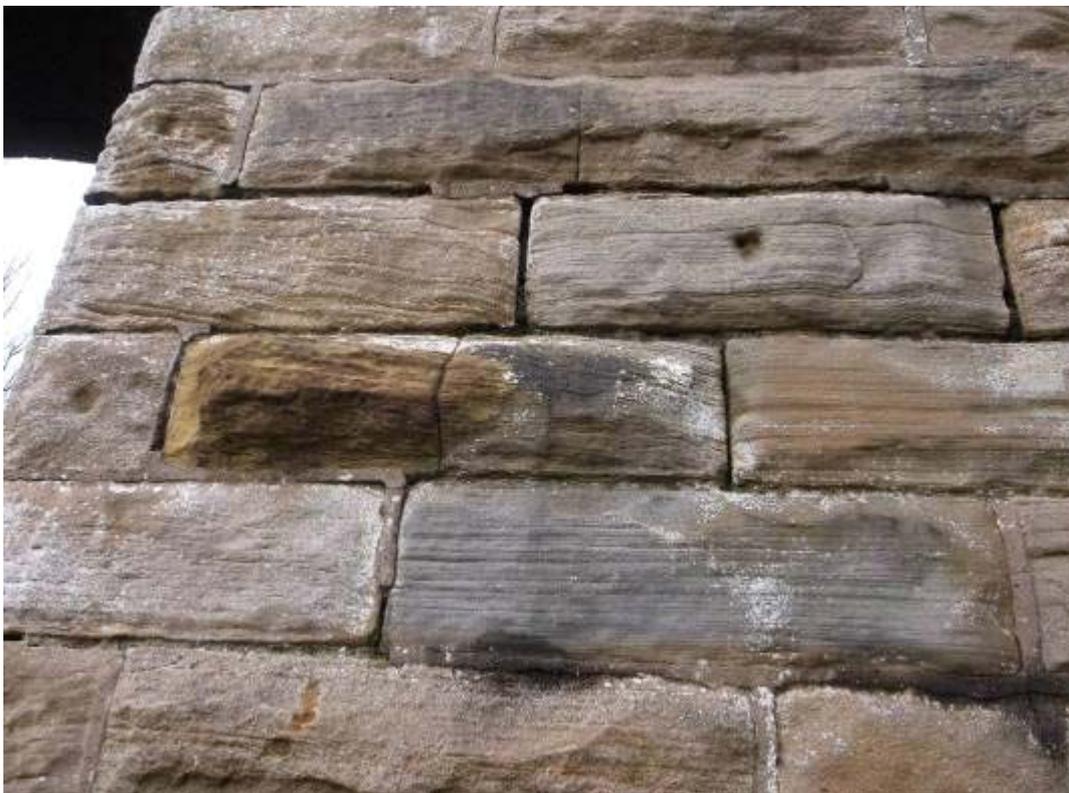
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 39: Area of seepage to south west elevation of pier 4**



**Photo No. 40: Vertical fracture to south east elevation of pier 4**

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**Photo No. 41: Vertical fracture to north west elevation of pier 5**



**Photo No. 42: Area of seepage & mortar loss to north east elevation of pier 5**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 43: Line of mortar loss to south east elevation of pier 5**



**Photo No. 44: Culverts under span 6**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 45: Watercourse from culverts under span 6 running along base of north east elevation of pier 6, no evidence of scour noted**



**Photo No. 46: Area of seepage, mortar loss & vertical fracture to north east elevation of pier 6**

**EXAMINATION REPORT  
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**Photo No. 47: Vertical fracture to north east elevation of pier 6**



**Photo No. 48: Diagonal fracture to north east elevation of pier 6**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 49: Area of mortar loss to north east elevation of pier 7**



**Photo No. 50: Horizontal fracture to south east elevation of pier 7**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 51: Vertical fracture to north west elevation of pier 8**



**Photo No. 52: 2No. vertical fractures to north west elevation of pier 8**

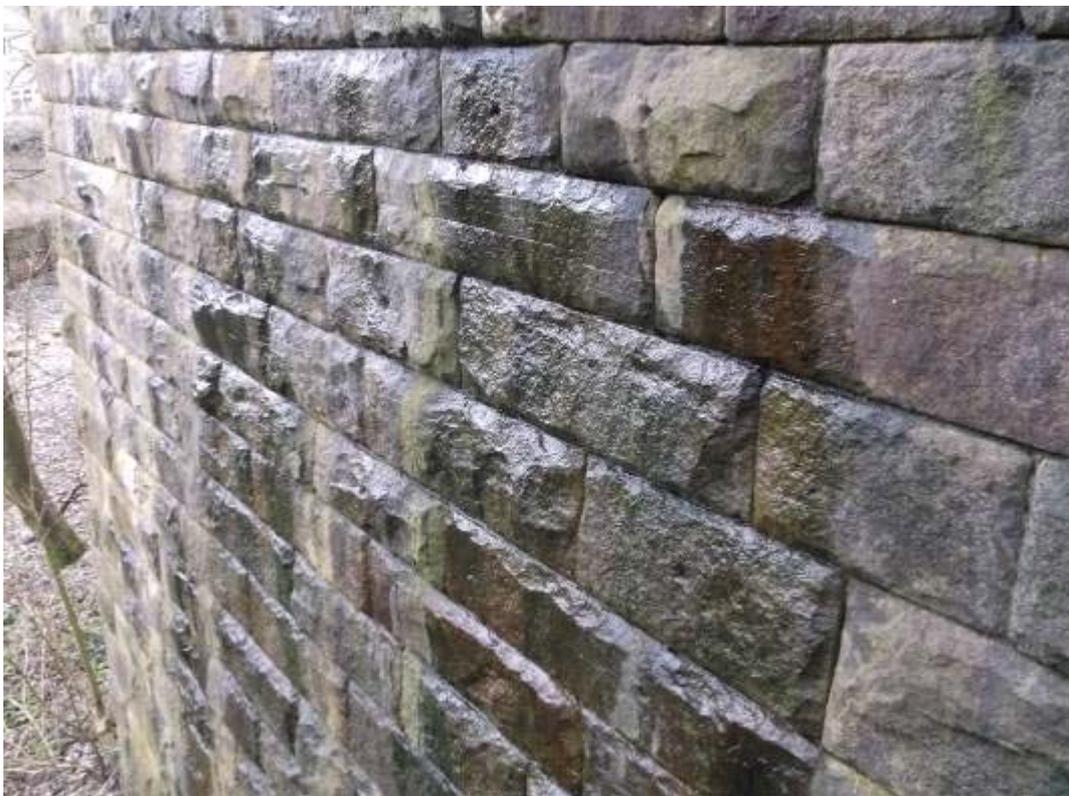
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 53: Vertical fracture to north east elevation of pier 8**



**Photo No. 54: Area of seepage to north east elevation of pier 8**

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PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 55: Vertical fracture to north east elevation of pier 8**



**Photo No. 56: Vertical fracture to south west elevation of pier 8**

**EXAMINATION REPORT  
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ELR: **HXH** Br. No.: **4A**

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**Photo No. 57: Vertical fracture to south west elevation of pier 8**

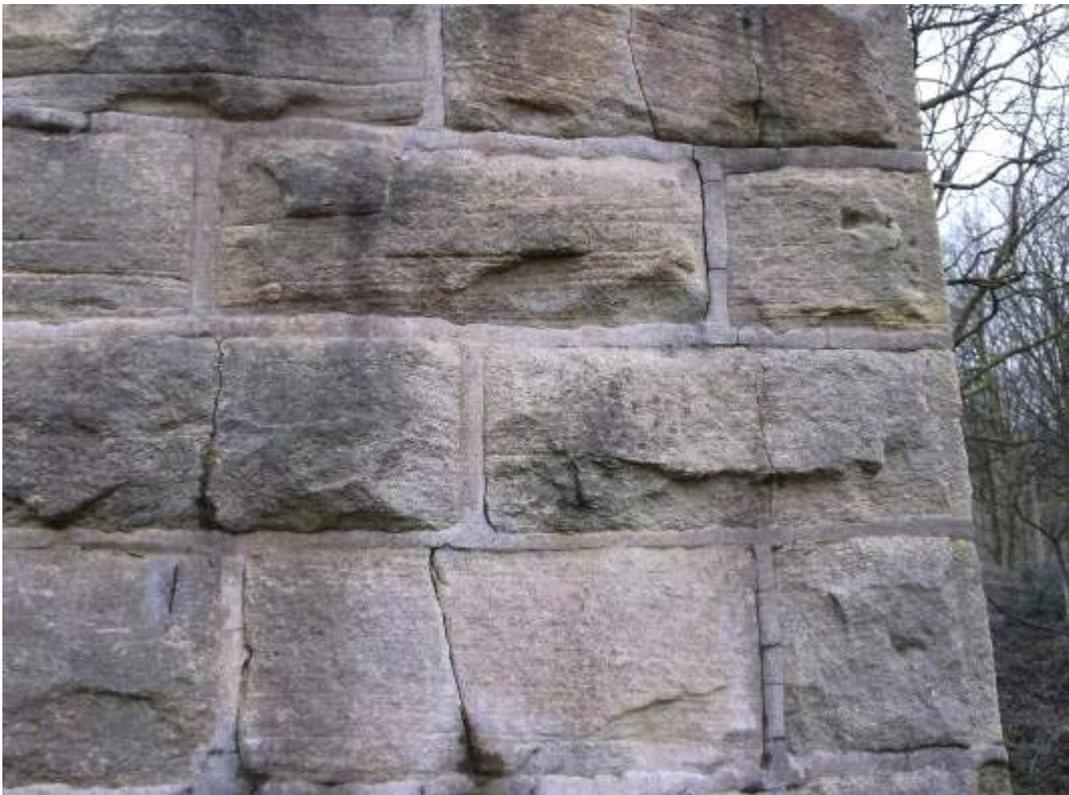


**Photo No. 58: Missing block & vertical fracture to south west elevation of pier 8**

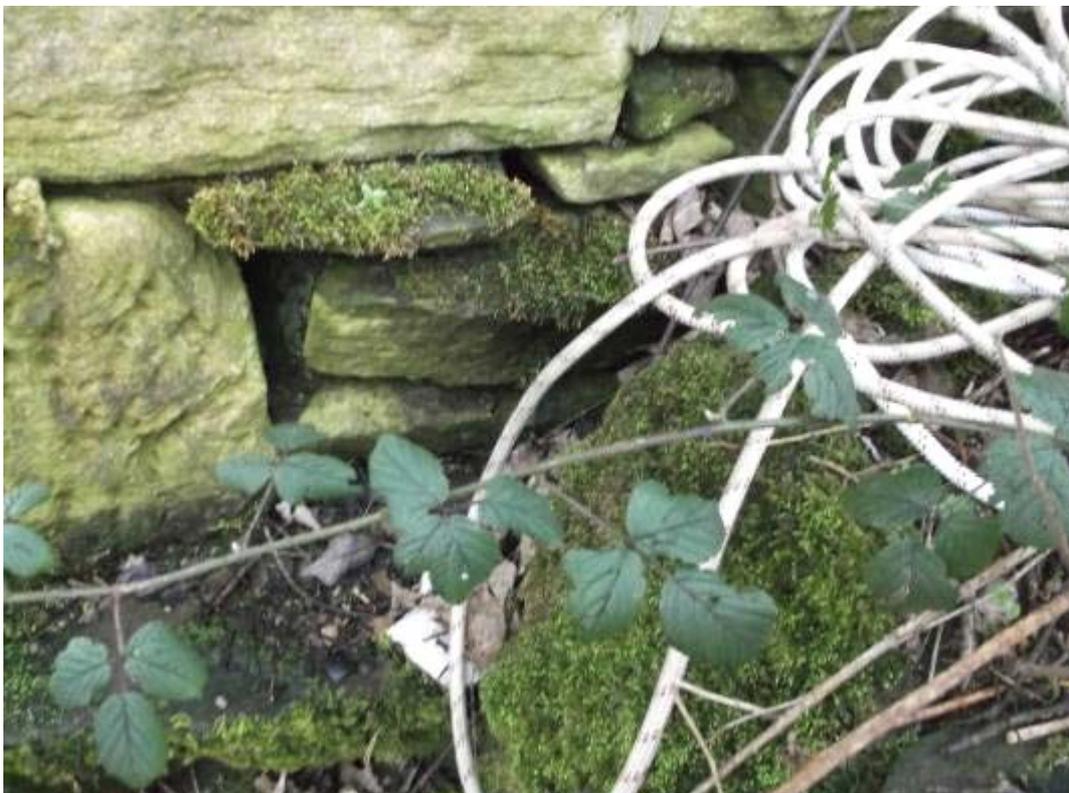
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch** Sheet **71 of 121**



**Photo No. 59: Vertical fracture to south east elevation of pier 8**

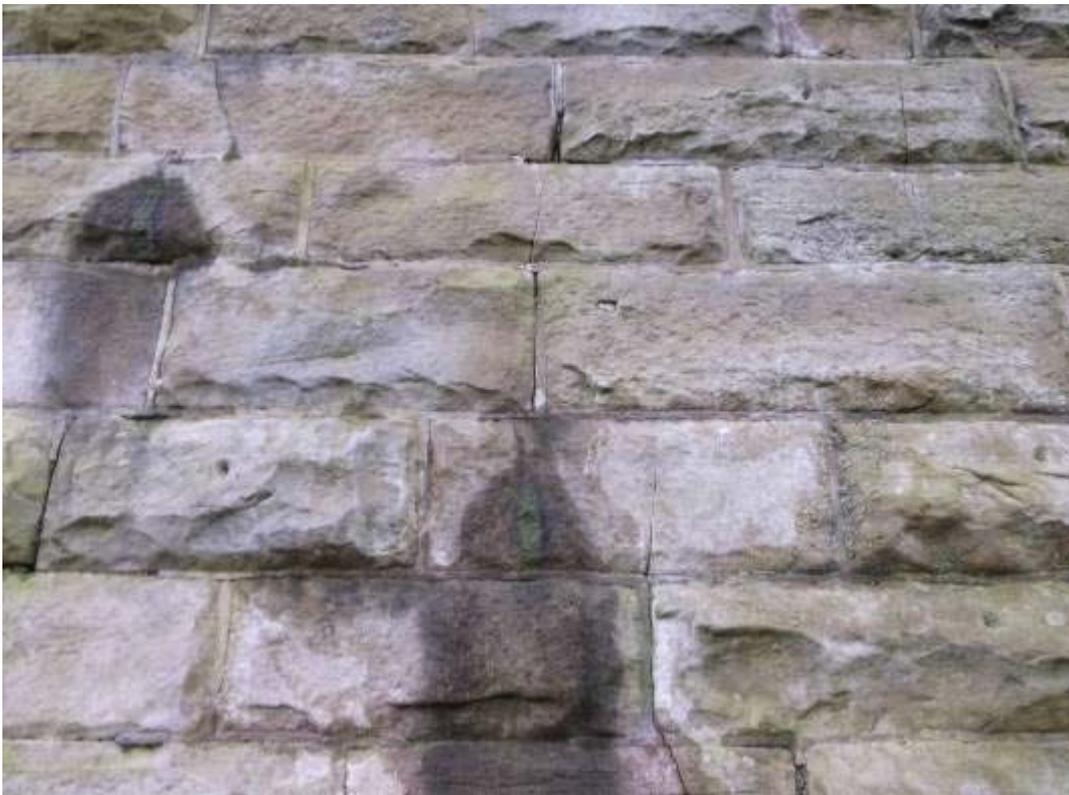


**Photo No. 60: Area of loose, mortarless masonry to north west elevation of pier 9**

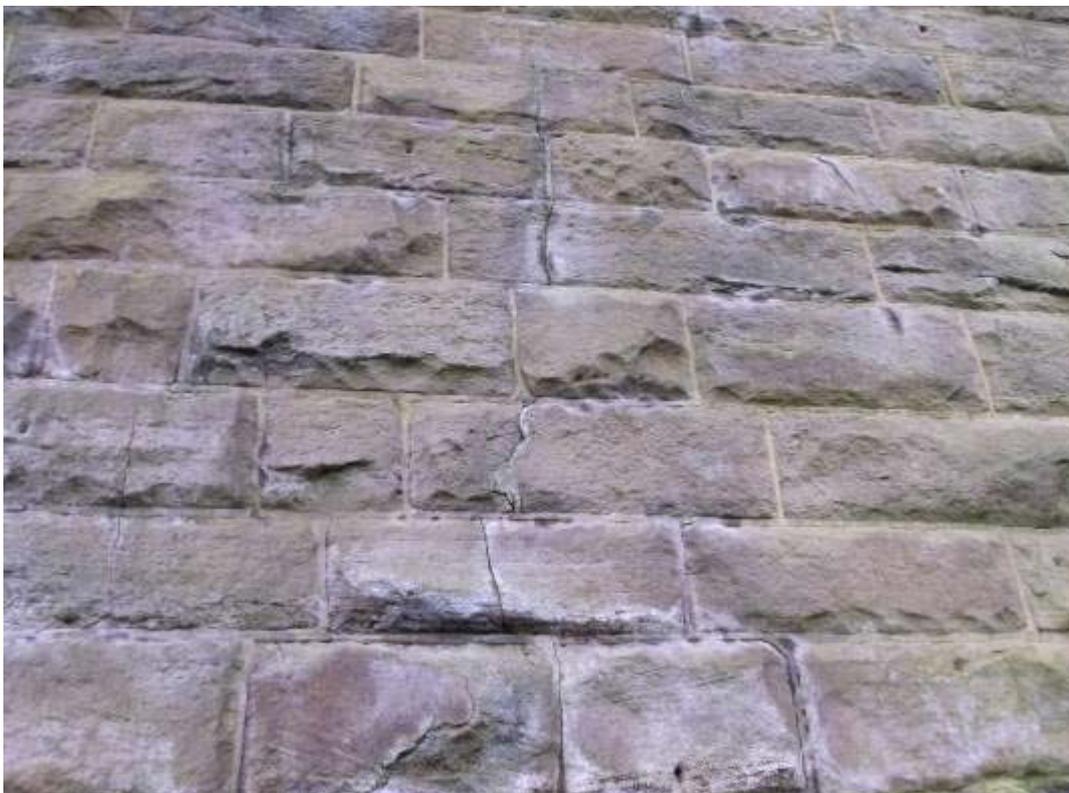
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 61: 2No. vertical fractures with seepage to north east elevation of pier 9**



**Photo No. 62: Vertical fracture to north east elevation of pier 9**

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**Photo No. 63: Vertical fracture to south west elevation of pier 9**



**Photo No. 64: Vertical stepped fracture to south west elevation of pier 9**

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**Photo No. 65: Vertical fracture with seepage to south west elevation of pier 9**



**Photo No. 66: Area of spalled masonry to south west elevation of pier 9**

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**Photo No. 67: Area of mortar loss to south west elevation of pier 9**



**Photo No. 68: Vertical fracture with seepage to south east elevation of pier 9**

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**Photo No. 69: Area of fractured mortar with seepage to south east elevation of pier 9**



**Photo No. 70: Typical mortar loss to vertical joint of string course to north west elevation of span 1**

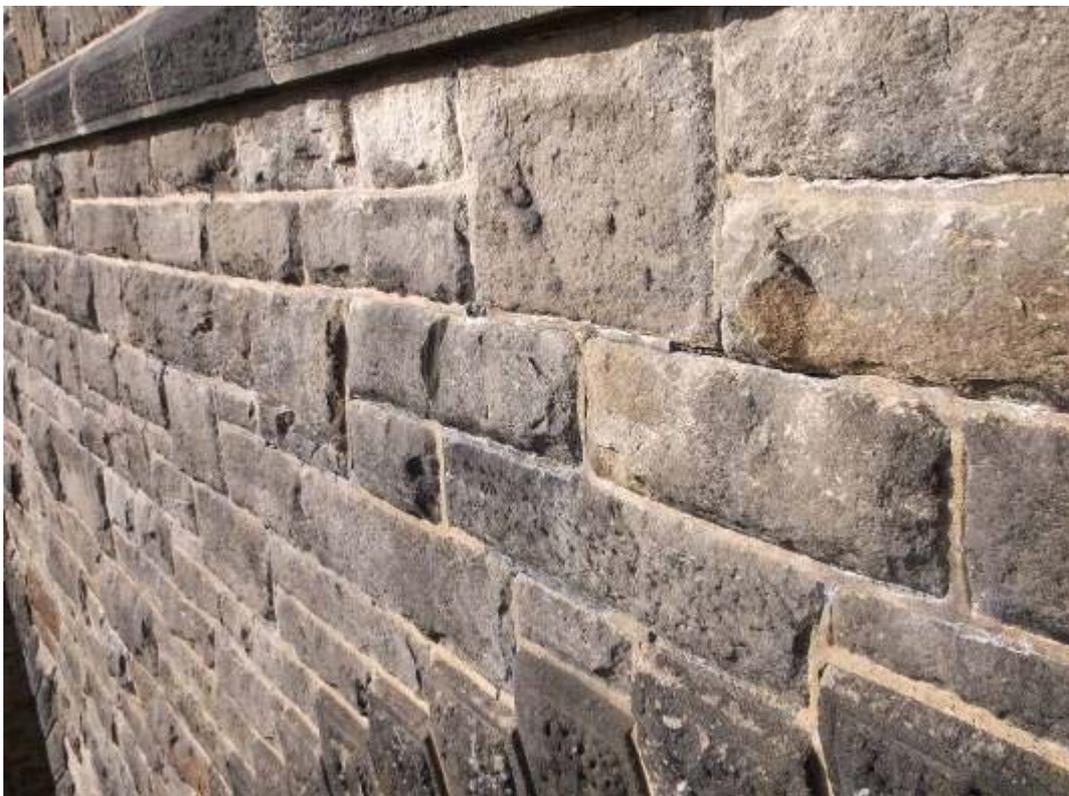
**EXAMINATION REPORT  
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**Photo No. 71: Vertical toothed fracture to parapet of north west elevation of span 1**



**Photo No. 72: Typical spot mortar loss to spandrel of south east elevation of span 1**

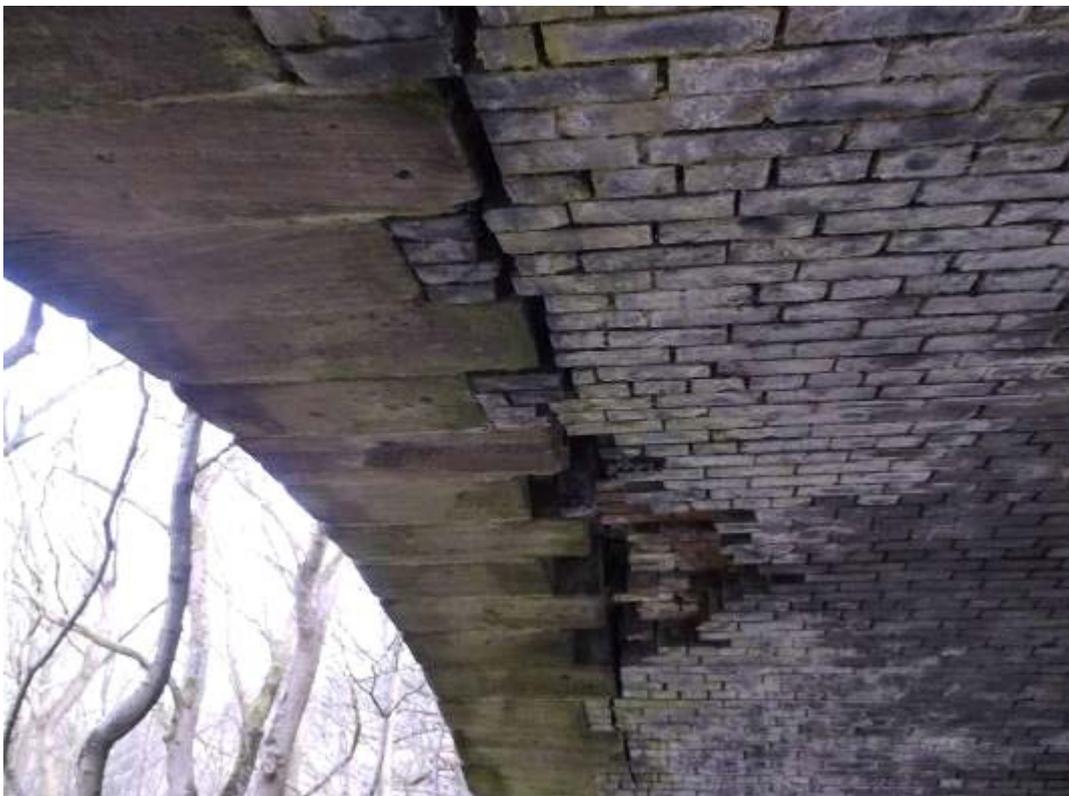
**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

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**Photo No. 73: Typical mortar loss behind voussoirs to soffit of span 1**



**Photo No. 74: Longitudinal fracture with drummy & missing brickwork to soffit of span 1**

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**Photo No. 75: Longitudinal fracture with drummy brickwork to soffit of span 1**



**Photo No. 76: Area of missing brickwork to soffit of span 1**

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**Photo No. 77: Area of loose to hammer brickwork & mortar loss to soffit of span 1**



**Photo No. 78: Vertical fracture to spandrel of north west elevation of span 2**

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**Photo No. 79: Separation fracture to south east elevation of span 2**



**Photo No. 80: Vertical fracture to spandrel of south east elevation of span 2**

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**Photo No. 81: Typical seepage & leachate deposits to soffit of span 2**



**Photo No. 82: Area of mortar loss to soffit of span 2**

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**Photo No. 83: Longitudinal fracture to soffit of span 2**



**Photo No. 84: Area of mortar loss to soffit of span 2**

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**Photo No. 85: Vertical fracture to spandrel of north west elevation of span 3**



**Photo No. 86: Multi-directional fractures to parapet of north west elevation of span 3**

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**Photo No. 87: Area of hairline fractures, mortar loss & vegetation growth to south east elevation of span 3**



**Photo No. 88: Diagonal stepped & vertical fractures to parapet of south east elevation of span 3**

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**Photo No. 89: Area of mortar loss to soffit of span 3**



**Photo No. 90: Longitudinal fracture & mortar loss to soffit of span 3**

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**Photo No. 91: Area of mortar loss to soffit of span 3**



**Photo No. 92: Area of mortar loss & seepage to soffit of span 3**

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**Photo No. 93: Typical spot fractures / mortar loss & vegetation growth to spandrel of south east elevation of span 4**



**Photo No. 94: Vertical fracture to spandrel of south east elevation of span 4**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 95: Area of missing brickwork to soffit of span 4**



**Photo No. 96: Longitudinal fracture and areas of missing brickwork to soffit of span 4**

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**Photo No. 97: Longitudinal fracture and areas of missing brickwork to soffit of span 4**



**Photo No. 98: Area of mortar loss to soffit of span 4**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 99: Area of missing brickwork to soffit of span 4**



**Photo No. 100: Vertical toothed fracture to parapet of north west elevation of span 5**

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**Photo No. 101: Area of seepage, mortar loss, drummy brickwork & removed loose brick to soffit of span 5**



**Photo No. 102: Area of missing brickwork to soffit of span 5**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 103: Area of missing brickwork with further loose brickwork removed to soffit of span 5**



**Photo No. 104: Area of mortar loss to soffit of span 5**

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**Photo No. 105: Longitudinal fracture with missing brickwork to soffit of span 5**



**Photo No. 106: Typical area of missing brickwork to soffit of span 5**

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**Photo No. 107: Area of missing coping to north west elevation of span 6**



**Photo No. 108: Area of mortar loss to spandrel of north west elevation of span 6**

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**Photo No. 109: Area of missing coping to south east elevation of span 6**



**Photo No. 110: Area of spalled coping to south east elevation of span 6**

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**Photo No. 111: Line of mortar loss to spandrel of south east elevation of span 6**



**Photo No. 112: Longitudinal fracture with mortar loss to soffit of span 6**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 113: Area of mortar loss to north west elevation of span 7**



**Photo No. 114: Vertical fracture to spandrel of south east elevation of span 7**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 115: Diagonal stepped fracture to voussoirs of south east elevation of span 7**



**Photo No. 116: Area of seepage & diagonal fracture to soffit of span 7**

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**Photo No. 117: Longitudinal fracture with mortar loss to soffit of span 7**



**Photo No. 118: Typical mortar loss to north west elevation of span 8**

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**Photo No. 119: Vertical fracture to spandrel of south east elevation of span 8**



**Photo No. 120: Longitudinal fracture with missing brickwork to soffit of span 8**

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**Photo No. 121: Longitudinal fracture with missing brickwork to soffit of span 8**



**Photo No. 122: Area of loose brickwork to soffit of span 8**

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**Photo No. 123: Area of loose brickwork removed to soffit of span 8**



**Photo No. 124: Area of loose brickwork to soffit of span 8**

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**Balfour Beatty**  
Rail

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**Photo No. 125: Area of missing brickwork to soffit of span 8**



**Photo No. 126: Area of mortar loss & seepage to soffit of span 8**

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**Photo No. 127: Vertical fracture to spandrel of north west elevation of span 9**



**Photo No. 128: Line of mortar loss to parapet of north west elevation of span 9**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

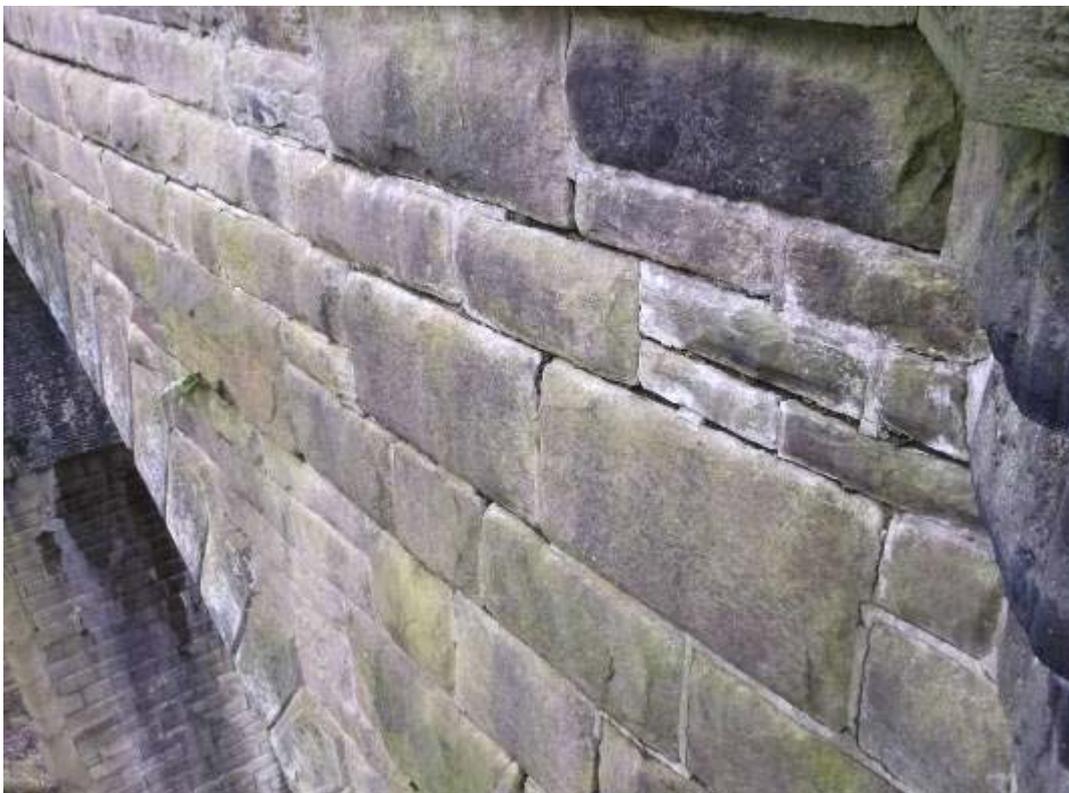
ELR: **HXH** Br. No.: **4A**

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**Photo No. 129: Tree in contact with coping of north west elevation of span 9**



**Photo No. 130: Area of mortar loss to spandrel of north west elevation of span 9**

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**Photo No. 131: Vertical fracture to spandrel of south east elevation of span 9**



**Photo No. 132: 2No. diagonal fractures to voussoirs of south east elevation of span 9**

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**Photo No. 133: Vertical toothed fracture to parapet of south east elevation of span 9**



**Photo No. 134: Typical leachate deposits & spot seepage to soffit of span 9**

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**Photo No. 135: Area of loose and removed brickwork to soffit of span 9**



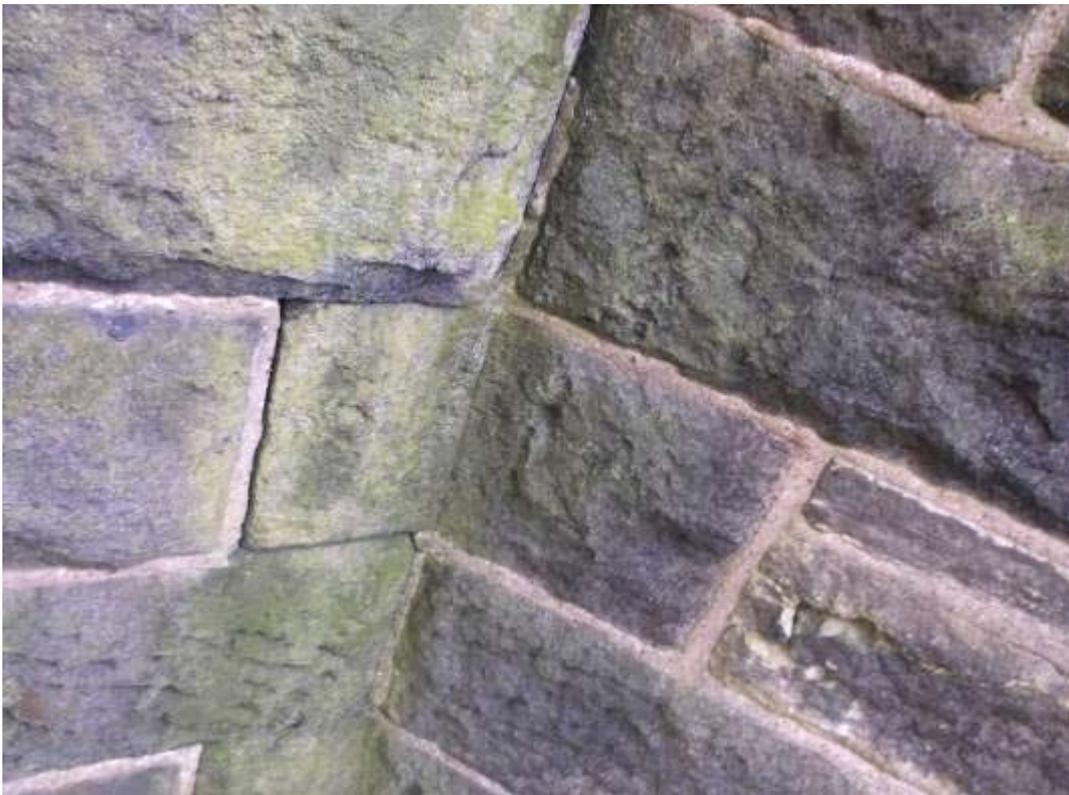
**Photo No. 136: Area of mortar loss and seepage to soffit of span 9**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 137: Vertical stepped fracture to parapet of north west elevation of span 10**



**Photo No. 138: Area of mortar loss & vegetation growth to spandrel of north west elevation of span 10**

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PHOTOGRAPHS OF STRUCTURE**

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**Photo No. 139: Area of spalling to voussoirs of north west elevation of span 10**



**Photo No. 140: Tree in contact with spandrel of south east elevation of span 10**

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**Photo No. 141: Horizontal fracture to spandrel of south east elevation of span 10**



**Photo No. 142: Line of mortar loss to spandrel of south east elevation of span 10**

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**Photo No. 143: Minor vegetation growth to spandrel of south east elevation of span 10**



**Photo No. 144: Area of mortar loss to soffit of span 10**

**EXAMINATION REPORT  
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**Photo No. 145: Longitudinal fracture with seepage to soffit of span 10**



**Photo No. 146: 2No. longitudinal fractures with seepage to soffit of span 10**

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**Photo No. 147: Area of missing brickwork to soffit of span 10**



**Photo No. 148: Missing half brick to soffit of span 10**

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**Photo No. 149: Typical burned heather to track top**



**Photo No. 150: Typical sapling growth to track top**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch**

Sheet 117 of  
**121**



**Photo No. 151: 2No. mature trees growing to track top**



**Photo No. 152: North west parapet leaning outwards**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch**

Sheet 118 of  
**121**



**Photo No. 153: Typical vertical toothed fracture to refuges of north west parapet, internal elevation**



**Photo No. 154: Area of missing masonry to north west parapet, internal elevation**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch**

**Sheet 119 of  
121**



**Photo No. 155: Typical spot mortar loss to south east parapet, internal elevation**



**Photo No. 156: Area of missing masonry to south east parapet, internal elevation**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch**

Sheet 120 of  
**121**



**Photo No. 157: Area of missing masonry to south east parapet, internal elevation**



**Photo No. 158: Debris to watercourse downstream of bridge**

**EXAMINATION REPORT  
PHOTOGRAPHS OF STRUCTURE**

ELR: **HXH** Br. No.: **4A**

Mileage: **199m 43ch**

**Sheet 121 of  
121**



**Photo No. 159: Heavy erosion and undercutting of trees to northern bank of watercourse downstream of bridge**



**Photo No. 160: During examination**

## 5. SERVICES SEARCH INFORMATION



## National One Call

Protecting People and Services in the UK

Online: [www.national-one-call.co.uk](http://www.national-one-call.co.uk)

Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

### Retriever Planning Pack

#### Highways Agency c/o Jacobs UK Ltd

<b>Enquiry Date</b>	19/06/20	<b>Enquiry</b>	NOC/EOLKP819
<b>Contact</b>	Karon Archdale	<b>Service</b>	Retriever
<b>Asset Owners</b>	21	<b>Enquiry Status</b>	Complete
<b>Price Status</b>	Actual	<b>Payment Status</b>	Unpaid

#### Enquiry Specification

Option	What is it?	Selected
Enquiry Type	Enquiry by National One Call	✓
Express	Emailing of Plans as they arrive	✗
Fusion Plan	Compile Plans into 1 Drawing	✗
Delivery	Delivery of Completed Pack by Email	✓

#### Enquiry Documentation

Document	What is it?	Included
<b>PlanToDig Enquiry</b>	Details of Enquiry	✓
<b>Asset Owner Contacts</b>	List of Selected Asset Owners	✓
<b>Text Responses</b>	Instructions from Asset Owners	✓
<b>CoRE</b>	Certificate of Registered Enquiry	✓

#### Appendix A: Asset Owner Plans

See Plans section Cover Page for Details

#### Appendix B: Enquiry Accounting

<b>Invoice</b>	Invoice for Enquiry	✓
----------------	---------------------	---

*For Guidance on PlanToDig*

[View / download our PlanToDig Guide](#)



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### PlanToDig Enquiry

## Highways Agency c/o Jacobs UK Ltd

<b>Date</b>	19/06/20	<b>Enquiry</b>	NOC/EOLKP819
<b>Contact</b>	Karon Archdale	<b>Status</b>	Complete



### Enquiry Site

Disused Railway Bridge (**Public Street / Road**)

OS Centre(Approx):406795,426977 (@7756 sq.mtrs)

### Work Intentions

<b>Intention</b>	<b>Start</b>	<b>Duration</b>
Works Intended	2020-06-29	1 Day

Please send client waiver letter to all known service providers

### Enquiry is Complete

**Status:** This Enquiry has Completed; you should now have all Responses from Asset Owners.

**Asset Owners:** Charges from 21 Asset Owners have been Confirmed

**Timing:** As Asset Owner Areas of Interest and Plans change frequently, please do not rely on Enquiries or Responses that are more than 30 days old.

**Content:** Asset Owner responses should be considered `indicative only` until physically verified. Follow guidance in HSG(47)/NRSWA/CDM etc relating to services verification and excavation methods.



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Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

### Summary of Asset Owner Contacts for NOC/EOLKP819

<b>Enquiry Date</b>	19/06/20	<b>Enquiry</b>	NOC/EOLKP819
<b>Selected Contacts</b>	21	<b>Closed</b>	21
<b>Est. Charges</b>	£123.2	<b>Act. Charges</b>	£70

### Contact List

Asset Owner	Status	Txt	Est.	Act.
<b>Affected by Enquiry</b>				
<b>Asset Owner</b>				
E S Pipelines Ltd	Closed		-	-
<b>Electricity</b>				
Northern Power Grid	Closed		-	-
<b>Gas</b>				
Northern Gas Networks	Closed		-	-
<b>Multi-utility</b>				
Brookfield Utilities UK (was GTC	Closed		-	-
<b>Pipeline</b>				
Linesearch (Pipeline search service)	Closed	T	-	-
<b>Telecommunications</b>				
BT Openreach	Closed		-	-
Virgin Media	Closed	T	£43.00	£43.00
<b>Water / Sewerage</b>				
Yorkshire Water	Closed		£27.00	£27.00
<b>See Response Text</b>				
<b>Electricity</b>				
UTILITY ASSETS LIMITED	Closed	T	-	-
<b>Not Affected</b>				
<b>Electricity</b>				
National Grid Transmission Electricity	Closed		-	-
<b>Gas</b>				
National Grid Transmission (Gas)	Closed		-	-
<b>Multi-utility</b>				
LastMile	Closed	T	-	-
<b>Telecommunications</b>				
BSkyB Telecommunications Services Ltd	Closed	T	-	-
CityFibre	Closed	T	-	-
Colt Telecoms	Closed	T	-	-
Instalcom	Closed	T	-	-
KPN International	Closed	T	-	-
Mobile Broadband Network Ltd	Closed	T	-	-
Trafficmaster Ltd	Closed	T	-	-
Verizon Business	Closed	T	-	-
Vodafone Limited	Closed	T	£53.20	-



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### Contact Comments

Some Asset Owners provide guidance / notes when making their Response - in the interests of safety, these should be provided to any Site Operatives along with any Plans.

Asset Owner	Comments
<b>Affected by Enquiry</b>	
<b>Pipeline</b>	
Linesearch (Pipeline search service)	ES Pipelines in Zone of Interest
<b>Telecommunications</b>	
Virgin Media	The Plant Enquiries Team has now completed your search, and the results are attached. Please note that we try to provide maps where ever available. On occasions where our records show the area is not affected, you may receive a map showing apparatus in the close proximity.
<b>See Response Text</b>	
<b>Electricity</b>	
UTILITY ASSETS LIMITED	Thank you for recently contacting Utility Assets plant record department. We will check whether we have any plant present at your site and contact you within 5 - 7 working days ONLY if we own any plant in the vicinity. If we do not reply, we do not have any apparatus in the area of your works. However, PLEASE TAKE CARE when excavating around electricity cables in the event that not all cables present may be accurately shown. We recommend you use detecting equipment to map the site before excavating and fully comply with HSG47. DO NOT assume that a cable is dead if you don't have a record of its presence. The cable must be treated as live unless PROVEN DEAD by the cable owner. In case of emergency please contact your local electricity distribution company. This is an automated reply from our dedicated asset records email address. If you receive further correspondence from us it will be from <a href="mailto:asset.manager@utilityassets.co.uk">asset.manager@utilityassets.co.uk</a> quoting a site reference number. Asset Manager - Utility Assets Ltd
<b>Not Affected</b>	
<b>Multi-utility</b>	
LastMile	Based on the information provided, I can confirm that Last Mile does not have any plant within the area(s) specified in your request.
<b>Telecommunications</b>	
BSkyB Telecommunications Services Ltd	Please be advised that Sky Telecommunications Services Ltd will not be affected by your proposal.



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Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

<b>CityFibre</b>	<p>You recently requested information pertaining to the above location and in relation to CityFibre Holdings Ltd plant.Reference 0d2e9882-c4f3-448e-9414-6ef6ec721ec6User: UserTitle: NOC/EOLKP819Comment: Boy Ln, HalifaxPlease find attached a plan of the area of your interest that may contain plant which may be affected by your proposed works.The validity of this response is 6 weeks, after such time a new enquiry would need to be made.</p>
<b>Colt Telecoms</b>	<p>Please Note: Our search criteria has changed. We previously searched for Colt Network which was within 200 metres, this has now changed to 50 metres. The negative response will be for all enquiries that the network is 50 metres or more away from the place of enquiry. Dear Sir/Madam, Thank you for your enquiry for the above reference. We can confirm that Colt Technology Services do not have apparatus near the above location as presented on your submitted plan, if any development or scheme amendments fall outside the 50 metre perimeter new plans must be submitted for review. Search is based on Overseeing Organisation Agent data supplied; we do not accept responsibility for O.O. Agent inaccurate data. If we can be of any further assistance please do not hesitate to contact us. Kind regards, Plant Enquiry Team</p>
<b>Instalcom</b>	<p>Dear Sir or Madam, Thank you for your plant enquiry below. We can confirm that CenturyLink Communications UK Limited (formerly Level 3), Global Crossing (Uk) Ltd, Global Crossing PEC, Fibernet UK Ltd and Fibrespan Ltd do not have any apparatus within the indicated works area. Instalcom responds to plant enquiries for all of the above and therefore you only need send one plant enquiry to cover all of these companies. Please note that this response is only valid for 3 months. If your works do not commence within this time period, please resubmit your plant enquiry for assessment before any works commence. Regards Plant Enquiries Administrator</p>
<b>KPN International</b>	<p>With reference to your plant enquiry below, we can confirm that KPN do not have any apparatus within the immediate proximity of your proposed works. If you require any further information, please do not hesitate to contact us. Please note that this response is only valid for 3 months. If your works do not commence within this time period, please resubmit your plant enquiry for assessment before any works commence. Regards Plant Enquiries DeptInstalcom Limited</p>
<b>Mobile Broadband Network Ltd</b>	<p>Dear Sir/Madam Turner \&amp; Townsend Project Management are appointed on behalf of MBNL to conduct Plant (apparatus)</p>



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Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

	<p>Searches in accordance with the relevant NRSWA Act 1991- Diversionary Works legislation. These searches considered plant belonging to EE (T-Mobile and Orange sites) and the HG3 mobile telecommunication networks. Further to your plant enquiry please see the response below to the NRSWA request submitted MBNL do not have any plant that would be affected by the proposed work. Should you have any further queries please use the contact details below. PS: Please can you send all future Plant enquiries for EE or H3G to this email address <a href="mailto:mbnlplantenquiries@turntown.com">mbnlplantenquiries@turntown.com</a> Thank you, Kind regards, MBNL SHQE Team</p>
<b>Trafficmaster Ltd</b>	<p>Our ref: Damian Sweeney TEL: 01234759112 or 07712129249 New Roads and Street Works Act 1991- Sections 83, 84,142 and 143 Codes of Practice Appendix C2 In response to your notice regarding works which you, are proposing to undertake. I can confirm that Trafficmaster does not have equipment installed within the boundary of the works. If you have any further queries regarding this or any other programme, please do not hesitate to contact me on my details below. Yours sincerelyFor \&amp; on Behalf ofTrafficmaster Ltd</p>
<b>Verizon Business</b>	<p>Verizon is a licensed Statutory Undertaker. We have reviewed your plans and have determined that Verizon (Formally known as MCI WorldCom, MFS) has no apparatus in the areas concerned. If you have any further queries please do not hesitate to get in touch. Yours faithfully Plant Protection Officer E.mail <a href="mailto:osp-team@uk.verizon.com">osp-team@uk.verizon.com</a></p>
<b>Vodafone Limited</b>	<p>Please accept this email as confirmation that Vodafone: Fixed does not have apparatus within the vicinity of your proposed works detailed below. Many thanks. Plant Enquiries Team</p>



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Protecting People and Services in the UK

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Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

### **Asset Owner Plans Cover**

Plans received from Asset Owners will be sent to you by email; these may require specialist printers, sometimes up to A0.

Plans may be accompanied by Disclaimers / Instructions etc. which will be contained in the Asset Owner Comments document. These Comments are often as important as the plans themselves as they give direction and context to the plan.

### **Treat All Plans as `Indicative` until physically verified.**

Sometimes an Asset Owner may have provided a Plan even if they considered that they are `Not Affected`.

It is also possible that an Asset Owner has responded as `Affected` but is unable to provide a Plan of their services; this will be stated in the Asset Owner Comments.

### **Ensure that Asset Owner Comments accompany Plans**



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Protecting People and Services in the UK

Online: [www.national-one-call.co.uk](http://www.national-one-call.co.uk)

Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

### Certificate of Registered Enquiry (CoRE)

<b>Enquiry Date</b>	19/06/20	<b>Enquiry</b>	NOC/EOLKP819
<b>Work Intention</b>	Works Intended	<b>Site Type</b>	Public Street / Road

#### Asset Owners Contacted

A CoRE is issued on completion of a PlanToDig Enquiry, when all Responses have been received from the selected Asset Owners. Due to risk of changes to Asset Owner presences / their Area of Interest (AoI), and the probability of changes to plans and service presences, an Enquiry should only be considered 'good' for 30 days following Enquiry Date.

Asset Owner	Comments
<b>Affected by Enquiry</b>	
<b>Asset Owner</b>	
E S Pipelines Ltd	
<b>Electricity</b>	
Northern Power Grid	
<b>Gas</b>	
Northern Gas Networks	
<b>Multi-utility</b>	
Brookfield Utilities UK (was GTC)	
<b>Pipeline</b>	
Linesearch (Pipeline search service)	✓
<b>Telecommunications</b>	
BT Openreach	
Virgin Media	✓
<b>Water / Sewerage</b>	
Yorkshire Water	
<b>See Response Text</b>	
<b>Electricity</b>	
UTILITY ASSETS LIMITED	✓
<b>Not Affected</b>	
<b>Electricity</b>	
National Grid Transmission Electricity	
<b>Gas</b>	
National Grid Transmission (Gas)	
<b>Multi-utility</b>	
LastMile	✓
<b>Telecommunications</b>	
BSkyB Telecommunications Services Ltd	✓



## National One Call

Protecting People and Services in the UK

Online: [www.national-one-call.co.uk](http://www.national-one-call.co.uk)

Call us: 0800 0853 865 (Mon-Fri, 9am-5pm)

---

<b>CityFibre</b>	✓
<b>Colt Telecoms</b>	✓
<b>Instalcom</b>	✓
<b>KPN International</b>	✓
<b>Mobile Broadband Network Ltd</b>	✓
<b>Trafficmaster Ltd</b>	✓
<b>Verizon Business</b>	✓
<b>Vodafone Limited</b>	✓

**Warning: GTC Apparatus Exists in This Area**  
**Our Plant Enquiry Service Ref: 1392031**  
**Your Enquiry Ref: NOC/EOLKP819**

**PLEASE NOTE:** Where drawings are large, these have been provided in smaller segments. A drawing index is provided as the first file listed for each network reference (example of a network reference: N1234567) shown below. This is intended to help you find the drawing relevant to you more quickly. Please take care to ensure that you use the relevant drawings for every network listed below as we may have multiple networks and multiple utilities in this area.

**N7038119**

**Gas**

**N0014218**

**Electric**

**N0015276**

**Electric**

This information is for guidance only and the precise position of the plant must be established, prior to your works, using hand-digging methods only. The contractor will be held responsible for any damage caused to our asset. Please note our assets now include those owned and operated by:

- GTC Pipelines Limited
- Independent Pipelines Limited
- Quadrant Pipelines Limited
- Electricity Network Company Limited
- Independent Power Networks Limited
- Independent Water Networks Limited
- Open Fibre Networks Limited
- Independent Community Heating Limited

If you have any queries or require any further information please do not hesitate to contact us.

All works in the vicinity of our networks should be undertaken in accordance with the attached document "GU-DPR-IG-0022: Safe working in the vicinity of utility networks". Reference should also be made to HSG47 Avoiding Danger from Underground Services.

**Important: The area of your proposed works may contain gas mains operating at Medium and Intermediate Pressure tiers or electric cables operating at High Voltage – please refer to the network drawings included with this email. If your proposed works are likely to involve excavation within 10 metres of any of these assets, including but not limited to gas governors and electric substations you MUST inform GTC Plant Enquiries by calling 01359 240363 and quoting your Plant Enquiries Service Reference number.**

**Important: Drawings provided by this service may include utility assets not owned or managed by GTC. Conversely our drawings will NOT display assets from all third parties. It is your responsibility to ensure you have requested information from all utility asset owners.**

**Gas Escape or Damage MUST be reported on 0800 111 999. National Grid / DNGT will attend to make safe and repair.**

**Electricity Network Damage MUST be reported to ENC on 0800 032 6990.**

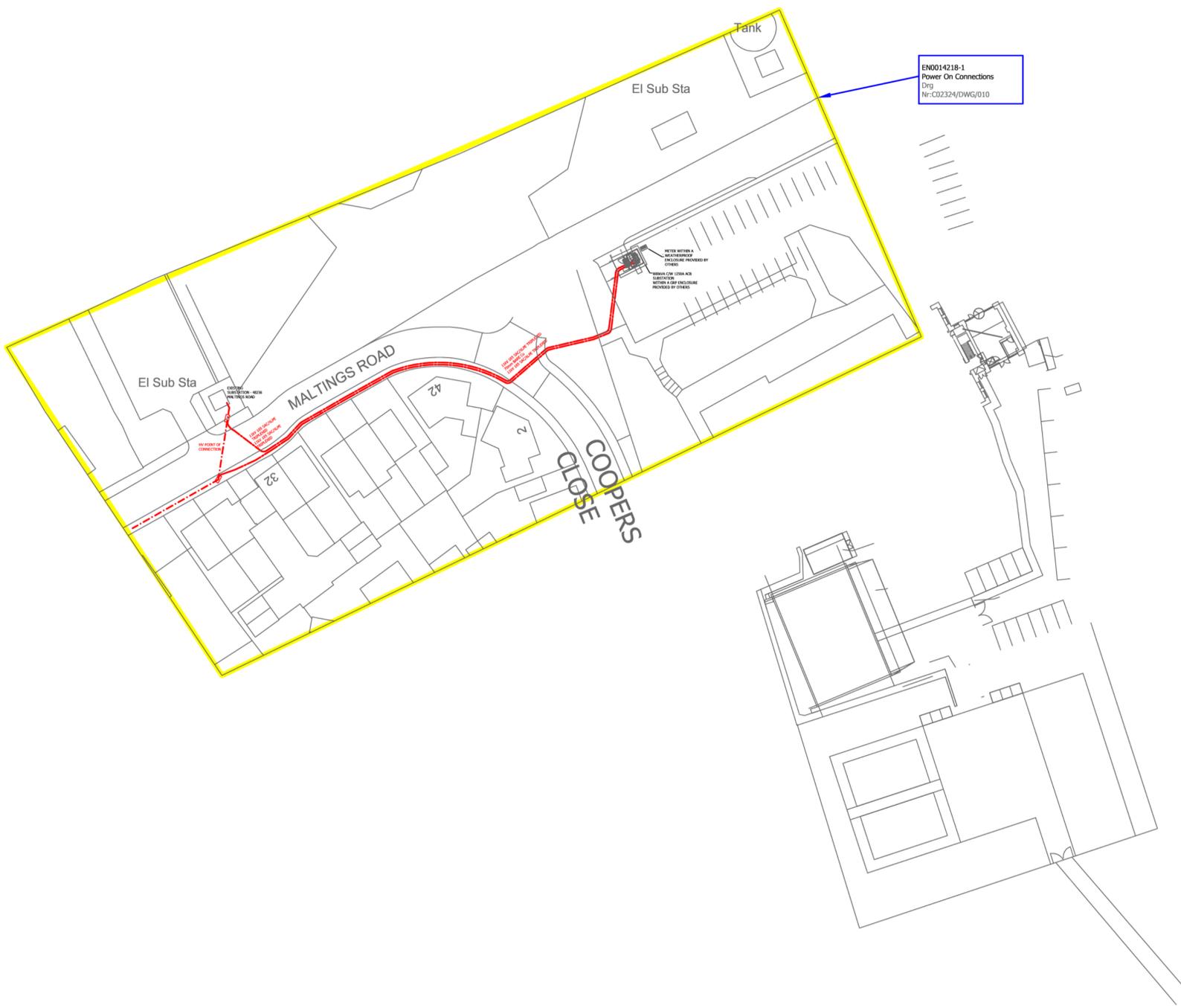
**Water Network Damage MUST be reported to IWNL on 02920 028 711**  
**Fibre Network Damage MUST be reported to IFNL on 0845 051 1669**

**Thank you for using the GTC Plant Enquiries Service.**

Your sincerely,

GTC Plant Enquiry Service

Rev	Revision Note	Date	Drawn by	Approved
1-0	Original drawing-C02324/DWG/010	18/09/13	MC	N/A
1-1	Drawing Updated-C02324/DWG/010 Rev 2	15/10/13	VM	N/A
1-2	Design Updated-C02324/DWG/001 Rev 2	16/02/18	CH	N/A



**Proposed HV Mains**  
All HV cables to be laid in pre-excavated trench to 600mm cover, provided by the developer (except A - B). Road crossings to be plastic rigid duct, at 750mm cover to the finished level.

**Proposed LV Mains**  
All LV cables to be laid in pre-excavated trench to 450mm cover, provided by the developer (except A - B). Road crossings to be plastic rigid duct, at 750mm cover to the finished level.

**Harmonised Mains Cables - Phase Identification**  
For new colour convention mains, the connected phases will be shown as BR, BK, GR where BR = Brown (RdY), BK = Black (RdY), GR = Grey (RdY).

All services are to be ducted. Duct laid by the developer at 450mm cover to the finished level. Road crossings to be ducted with 150mm rigid duct.

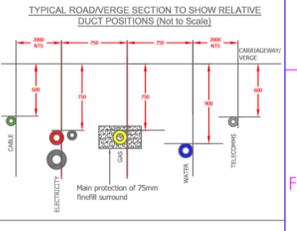
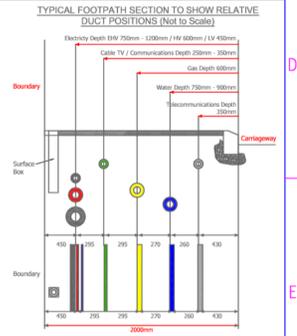
**LEGEND**

33kV cable - Proposed	---
33kV cable - Existing / Laid	---
11kV cable - Proposed	---
11kV cable - Existing / Laid	---
LV cable - Proposed	---
LV cable - Existing / Laid	---
Service cable	---
Offsite cable	---
Offsite service	---
Meter position	---
Cable joint - LV	---
Cable joint - HV	---
2 Way Link Box	---
4 Way Link Box	---
Sub station (doors shown)	---
Cable with duct	---
LV Feeder Pillar	---
Hot end & earth electrode - LV	---
Hot end & earth electrode - HV	---
Street lighting column	---
Earth	---

**Cable Sizes**

Cable Size	Duct Size
33mm micro cable	33mm duct
Micro cables	50mm duct

ANY DEVIATION FROM THESE SIZES IS AT THE DEVELOPER'S OWN RISK



This plan shows those cables owned by The Electricity Network Company Ltd. Electric cables owned by other operators or otherwise privately owned, may be present in this area. Information with regard to such cables should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. No liability of any kind whatsoever is accepted by the company, its agents, servants or contractors for any error or omission. Safe digging practices, in accordance with HSG07, must be used to verify and establish the actual position of cables, services and other equipment on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near electrical equipment.

This electrical network design has been carried out by:

Electricity Network Manager  
GTC  
Woodak Business Park  
Bury St Edmunds  
Suffolk  
IP30 9UP

Tel : 01359 240363  
Fax : 01359 244398  
[www.gtc-uk.co.uk](http://www.gtc-uk.co.uk)

All cables and equipment used on this design are to be in accordance with GB1 standards.

Drawing Scale : 1:500  
O.S.REF : 406536 426795  
Network Number : N0014218-1  
Project Number :  
Drawing Number : EN0014218-1\_R1-2\_1\_of\_2

Developer : Power On Connections  
Location : Maltings Road  
HALIFAX  
HX2

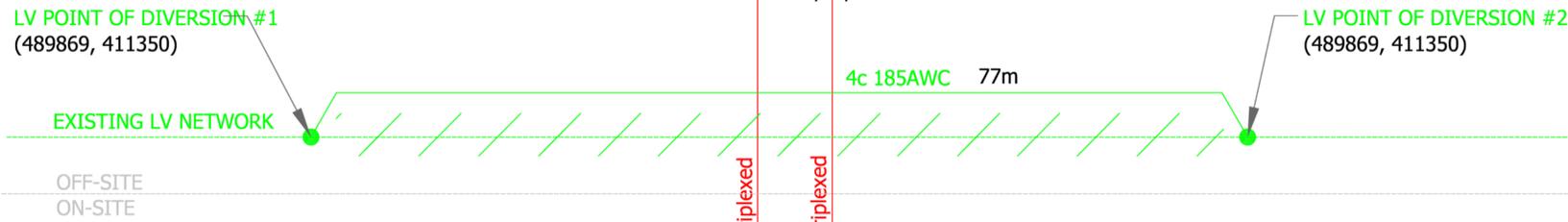
**enc**  
the electricity network company

SHEET SIZE A1

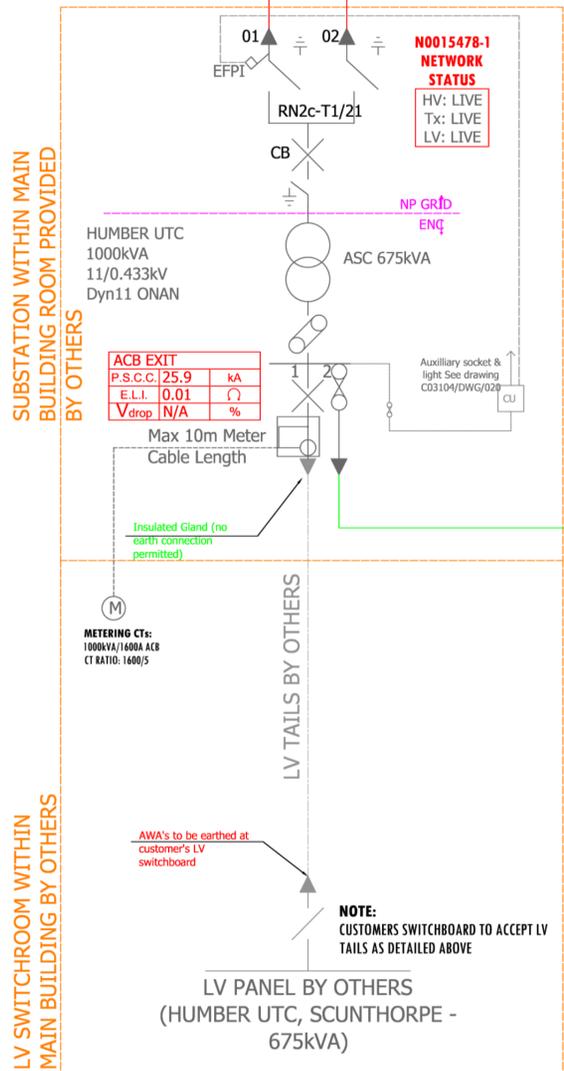
THIS DRAWING SHOWS:  
GTC NETWORK

Rev	Revision Note	Date	Drawn by	Approved
1-0	Original drawing-C02324/DWG/010	18/09/13	MC	N/A
1-1	Drawing Updated-C02324/DWG/010 Rev 2	15/10/13	VM	N/A
1-2	Design Updated-C02324/DWG/001 Rev 2	16/02/18	CH	N/A

Refer to plan centered at  
(489869, 411350) issued by NP  
Grid dated 04/08/14



STANDARD ACB PROTECTION SETTINGS TO GRADE WITH STANDARD TLF & VIP RELAY SETTINGS	
Transformer Rating	1000kVA
ACB Type	Masterpact NT16H2 with Micrologic 5.0E control unit
Ir (xIn)	3
Itd (xIr)	Off
Ii (xIn)	1
tr (s)	0.1 with Pt on
tsd (s)	1,300A
Overload trip current	2000A
Earth fault 5 sec trip current	
Notes	Above settings assume standard "long term rating" plug used.



RN2c-T1 - TFL Protection			
Transformer Size 11kV (kVA)			
CT Ratio	315	500	800
	5A	10A	15A
	5A	7.5A	10A

Way	Rating	Feeder Name
1	1600A	HUMBER UTC, SCUNTHORPE
2	N/A	BOTTLE END

0kVA 3c 300 AWC 2m

**CUSTOMER'S LV TAILS REQUIREMENTS:**

- POWER ON MUST BE NOTIFIED TO PROVIDE SUPERVISION OF CABLE TERMINATIONS
- ACB WILL NOT ACCEPT MULTI-CORE CABLES
- MAX 630mm<sup>2</sup> 1c Cu/AWA, 2No. CABLES PER PHASE AND 1No. NEUTRAL (1/2 SIZED)
- 1No. SEPARATE G/Y PVC EARTH CONDUCTOR (CPC)
- NO FACILITY FOR EARTHED GLAND AT SUBSTATION (WOODEN COMPRESSION BLOCK ONLY)
- C8B4 LUGS REQUIRED IN ACB PILLAR
- LV CABLES TO COMPLY WITH BS7671 INCLUDING THE FOLLOWING:
  - EARTH LOOP IMPEDANCE AT (UNEARTHED) SUBSTATION END OF CABLES SUFFICIENTLY LOW TO ACHIEVE MAX 5 SECOND DISCONNECTION OF ACB WITH SETTINGS AS SHOWN ABOVE
  - WHERE SUBSTATION ACB IS USED TO PROVIDE BOTH OVERLOAD AND SHORT CIRCUIT PROTECTION THE LV CABLES MUST BE SIZED TO CARRY OVERLOADS UP TO THE ACB SETTINGS - NOT JUST TRANSFORMER FULL LOAD CURRENT (FLC) OR AUTHORISED SUPPLY CAPACITY (ASC)
  - WHERE THE CUSTOMER'S MAIN INCOMING CIRCUIT BREAKER OR FUSES PROVIDE OVERLOAD PROTECTION THEN SMALLER CABLES MAY BE USED (REFER BS 7671 CLAUSE 53.3)
- WHERE THE CUSTOMER'S DESIGNER MUST STILL CHECK THAT THE CUSTOMER'S INSTALLING SETTINGS GIVEN ABOVE

**EARTHING REQUIREMENT AT CUSTOMER'S INTAKE POINT**

SEPARATE EARTH MAT, A MEANS FOR DISCONNECTING IT MUST BE PROVIDED TO FACILITATE MEASURING THE RESISTANCE. THIS MUST BE PROVIDED IN AN ACCESSIBLE POSITION (IN ACCORDANCE WITH THE CURRENT EDITION OF THE IEE WIRING REGULATIONS).

**Proposed HV Mains**  
All HV cables to be laid in pre-excavated trench to 600mm cover, provided by the developer (except A - B). Road crossings to be plastic rigid duct at 750mm cover to the finished level.

**Proposed LV Mains**  
All LV cables to be laid in pre-excavated trench to 450mm cover, provided by the developer (except A - B). Road crossings to be plastic rigid duct at 750mm cover to the finished level.

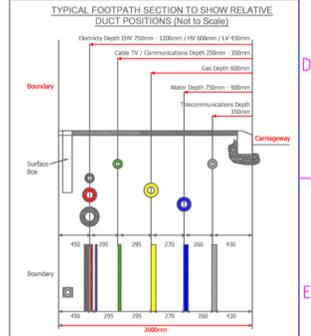
**Harmonised Mains Cables - Phase Identification**  
For new colour convention mains, the connected phases will be shown as BR, BK, GR where BR = Brown (Rd) / BK = Black (Rd) / GR = Grey (Rd).

All services are to be ducted. Duct laid by the developer at 450mm cover to the finished level. Road crossings to be ducted with 150mm rigid duct.

**LEGEND**

33kV cable - Proposed	---
33kV cable - Existing / Laid	---
11kV cable - Proposed	---
11kV cable Existing / Laid	---
LV cable - Proposed	---
LV cable - Existing / Laid	---
Service cable	---
Off-site cable	---
Off-site service	---
Meter position	---
Cable joint - LV	---
Cable joint - HV	---
2 Way Link Box	---
4 Way Link Box	---
Sub station (doors shown)	---
Cable with duct	---
LV Feeder Pillar	---
Hot end & earth electrode - LV	---
Hot end & earth electrode - HV	---
Street lighting column	---
Earth	---

ANY DEVIATION FROM THESE SIZES IS AT THE DEVELOPER'S OWN RISK



This plan shows those cables owned by The Electricity Network Company Ltd. Electric cables owned by other operators or otherwise privately owned, may be present in this area. Information with regard to such cables should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. No liability of any kind whatsoever is accepted by the company, its agents, servants or contractors for any error or omission. Safe digging practices, in accordance with HSG07, must be used to verify and establish the actual position of cables, services and other equipment on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near electrical equipment.

This electrical network design has been carried out by:

Electricity Network Manager  
GTC  
Woodal Business Park  
Bury St Edmunds  
Suffolk  
IP30 9UP

Tel : 01359 240363  
Fax : 01359 244398  
www.gtc-uk.co.uk

All cables and equipment used on this design are to be in accordance with GB standards.

Drawing Scale :	NTS	
O.S.REF :	Enter O.S.REF	
Network Number :	N0014218-1	
Project Number :		
Drawing Number :	EN0014218-1_R1-2_2_of_2	
Developer :	Power On Connections	
Location :	Maltings Road HALIFAX HX2	

THIS DRAWING SHOWS:  
GTC NETWORK



Rev	Revision Note	Date	Drawn by	Approved
1-2	YOQ013 The Maltings (Southdale) Elec Design 20.2.15' added to drawing 'UIP As Laid as per AH' corrected Mains, joints, services amended/corrected	23/10/15	DN	N/A
1-3	UIP Variation: Service meter positions amended.	08/02/16	HST	N/A
1-4	LRC data added from LV17625 LRC tab added	22/02/16	AW	N/A
1-5	LRC data added from LV 18109	31/03/16	CH	N/A
1-6	UIP As Laid as per TW Email Sent: 01/04/16, 09:31	06/04/16	RW	N/A
1-7	LRC data added from LV 19473	10/06/16	ARO	N/A
1-8	UIP As Laid as per LM email Sent: 15/07/16, 13:53, Services 38-47	20/07/16	DH	N/A
1-9	UIP As Laid as per JH, BPID: 38396, mains	10/11/16	DN	N/A
2-0	As-Laid Data Added from Invoice No: 774920	21/04/17	MC	N/A
2-1	UIP as laid data added as per JPID 155096	25/06/18	NC	N/A



**Proposed HV Mains**  
All HV cables to be laid in pre-excavated trench to 600mm cover, provided by the developer (except A - B). Road crossings to be plastic rigid duct to accommodate the mains shown on this drawing, at 750mm cover to the finished level.

**Proposed LV Mains**  
All LV cables to be laid in pre-excavated trench to 450mm cover, provided by the developer (except A - B). Road crossings to be plastic rigid duct to accommodate the mains shown on this drawing, at 750mm cover to the finished level.

**Harmonised Mains Cables - Phase Identification**  
For new colour convention mains, the corrected phases will be shown as BR, BK, GY where BR = Brown (R/L), BK = Black (N/0), GY = Grey (E/L).

All services are to be ducted. Duct laid by the developer at 450mm cover to the finished level. Road crossings to be ducted with 150mm rigid duct.

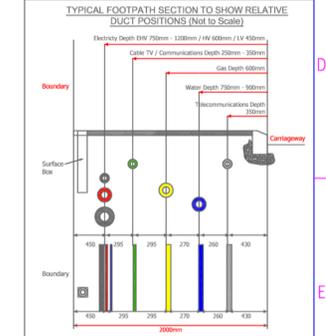
**LEGEND**

- 33kV cable - Proposed
- 33kV cable - Existing / Laid
- 11kV cable - Proposed
- 11kV cable - Existing / Laid
- LV cable - Proposed
- LV cable - Existing / Laid
- Service cable
- Offsite cable
- Offsite service
- Meter position
- Cable joint - LV
- Cable joint - HV
- Way Link Box
- Way Link Box
- Sub station (doors shown)
- Cable with duct
- LV Feeder Pillar
- Hot end & earth electrode - LV
- Hot end & earth electrode - HV
- Street lighting column
- Earth

**Cable Sizes**

33kV	150mm
11kV	75mm
LV	30mm

ANY DEVIATION FROM THESE SIZES IS AT THE DEVELOPER'S OWN RISK



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This electrical network design has been carried out by:

Electricity Network Manager  
GTC  
Woodall Business Park  
Bury St Edmunds  
Suffolk  
IP30 9UP

Tel : 01359 240363  
Fax : 01359 244398  
[www.gtc-uk.co.uk](http://www.gtc-uk.co.uk)

All cables and equipment used on this design are to be in accordance with GB1 standards.

Drawing Scale : 1:500  
O.S.REF : 406597, 426825  
Network Number : N0015276-1  
Project Number :  
Drawing Number : EN0015276-1\_R2-1\_2\_of\_2 LRC  
Southdale Homes  
Developer : The Maltings, Fountain Head Village,  
Location : Halifax, HX2 0TJ

THIS DRAWING SHOWS:

LRC

SHEET SIZE A1



Our Ref: Ref shown on map

Date of issue: shown on map

email: [nnhc@openreach.co.uk](mailto:nnhc@openreach.co.uk)

Dear Customer,

**NR & SW ACT 1991 – PROPOSED WORKS AT: Boy Lane, Halifax.**

**Prior to commencement of work: For free onsite guidance and accurate up to date location of BT Apparatus please contact our Plant Protection Service by the following methods:-**

Email the Click Before You Dig Team [CBYD@openreach.co.uk](mailto:CBYD@openreach.co.uk)

Visit the Click Before You Dig Website [www.openreach.co.uk/cbyd](http://www.openreach.co.uk/cbyd)

Thank you for your request of **NOC/EOLKP819** describing the above proposals.

Enclosed are copies of our drawings marked up to show the approximate locations of BT apparatus in the immediate vicinity of your works. It is intended for general guidance only. No guarantee is given of its accuracy.

The drawings are valid for 90 days from the date of issue and should not be relied upon after this time period has expired.

When planning excavation work or other works near to BT apparatus, please be mindful our apparatus may exist at various depths and may deviate from the marked route.

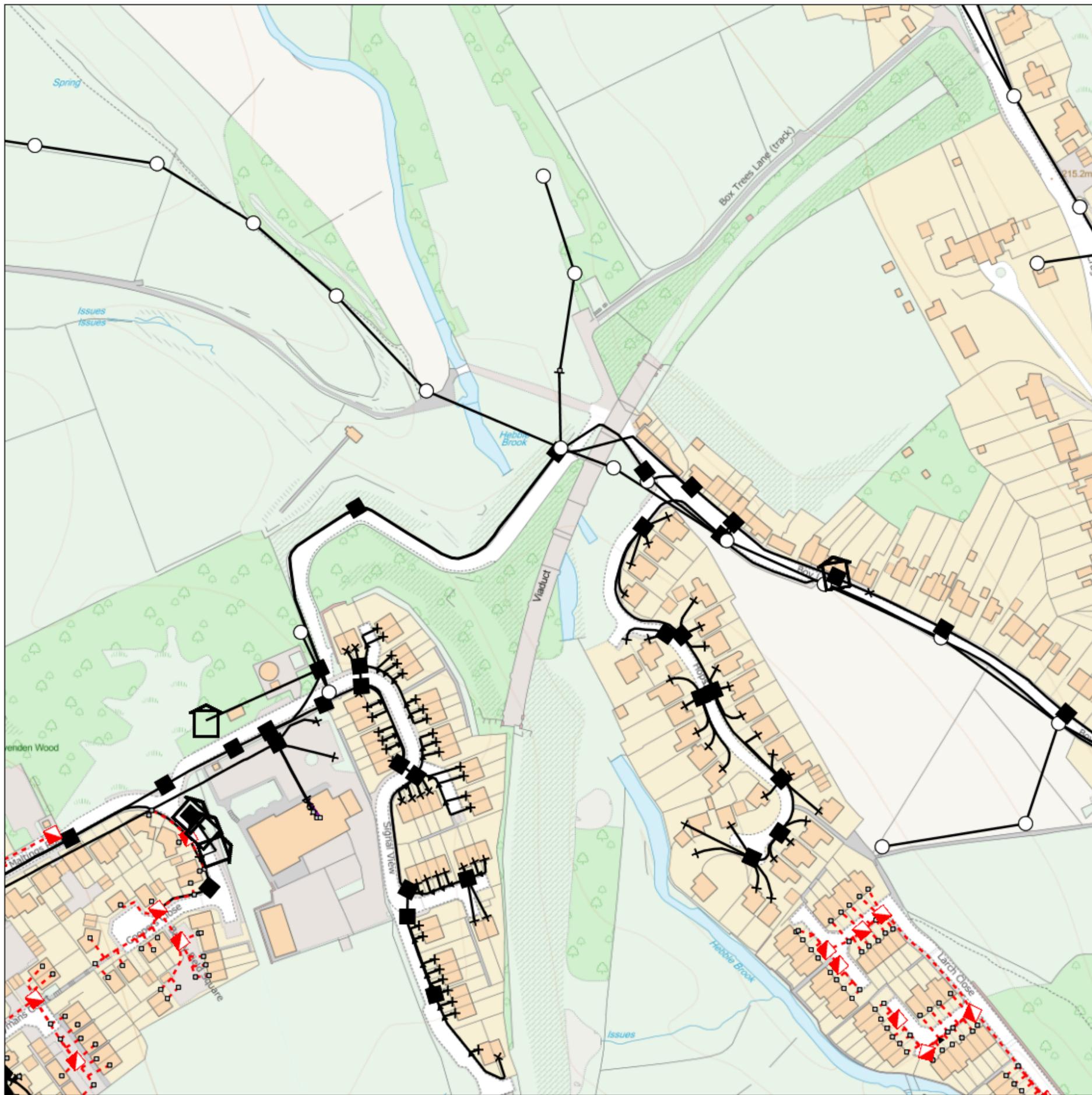
To avoid damage it is recommended that mechanical excavators or borers are not used within 600mm of BT apparatus. If scaffolding is erected, please ensure that our equipment is not enclosed, blocked, covered or otherwise obstructed by the scaffolding.

In the event of BT apparatus being in the area of your works we recommend that your plant/vehicle crossing is either resited, or apply for a budget estimate by submitting detailed plans to our Network Relocation Team at <https://www.ournetwork.openreach.co.uk/altering-our-network.aspx>

Yours faithfully,

**Julie Cullum**  
**NNHC & MBE Manager**

# Maps by email Plant Information Reply



## IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.



**openreach**

### CLICK BEFORE YOU DIG

FOR PROFESSIONAL FREE ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS INCLUDING LOCATE AND MARKING SERVICE

email [cbyd@openreach.co.uk](mailto:cbyd@openreach.co.uk)

ADVANCE NOTICE REQUIRED  
(Office hours: Monday - Friday 08.00 to 17.00)  
[www.openreach.co.uk/cbyd](http://www.openreach.co.uk/cbyd)

### Accidents happen

If you do damage any Openreach equipment please let us know by calling 0800 023 2023 (opt 1 + opt 1) and we can get it fixed ASAP

## KEY TO BT SYMBOLS

			Change Of State	+	Hatchings	
	<i>Planned</i>	<i>Live</i>	Split Coupling	×	Built	
PCP			Duct Tee	▲	Planned	
Pole			Building		Inferred	
Box			Kiosk		Duct	
Manhole			Other proposed plant is shown using dashed lines. BT Symbols not listed above may be disregarded. Existing BT Plant may not be recorded. Information valid at time of preparation. Maps are only valid for 90 days after the date of publication.			
Cabinet						
	<i>Pending Add</i>	<i>In Place</i>	<i>Pending Remove</i>	<i>Not In Use</i>		
Power Cable						
Power Duct				N/A		

Reproduced from the Ordnance Survey map by BT by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office  
(C) Crown Copyright British Telecommunications plc 100028040

BT Ref : O0Y04329S  
Map Reference : (centre) SE0678026940  
Easting/Northing : (centre) 406780,426940  
Issued : 22/06/2020 16:33:03

**WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: [nnhc@openreach.co.uk](mailto:nnhc@openreach.co.uk)**



bitmap\_layout select\_raster

# LEGEND

- EXISTING PLANT
- EXISTING PLANT

bitmap\_layout select\_raster

Head Office  
 CityFibre Holdings Ltd  
 15 Bedford Street,  
 London  
 WC2E 9HE  
 Tel: 0845 293 0774  
 Web: www.cityfibre.com

Asset Office  
 CityFibre Holdings Ltd,  
 Rutherford House,  
 Birchwood,  
 Warrington,  
 WA3 6ZH  
 Email: asset.team@cityfibre.com

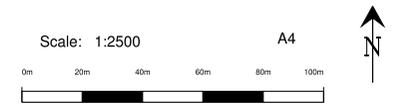
**Disclaimer:**  
 Information shown on this plan is for general guidance only. No warranty is made as to its accuracy. This plan must not be solely relied upon in the event of excavation or other works being carried out in the vicinity of Cityfibre plant. No liability of any kind is accepted by Cityfibre, its agents or servants for any error, omission, discrepancy or deviation. This information is valid for the date printed.

**Project**  
 Plant Enquiry

**Drawing**  
 Existing Plant

**Drawn by:**  
 smallworld Date: 22/06/2020

**Drawing No.** **Revision**  
 CFH\_EP\_000001 001



22/06/2020

LinesearchbeforeUdig Ref: 19184186

Your Ref: NOC/EOLKP819

Dear Sir/Madam,

Further to your enquiry received on 22/06/2020 03:34:16 PM please find attached the ESP Utilities Group (ESP) response to your enquiry.

If your proposed work site was found to be in the vicinity of ESP plant, project drawing as laid extracts for these sites are enclosed (not to scale) for your information which show the approximate location of the ESP gas/electric network close to the area of interest.

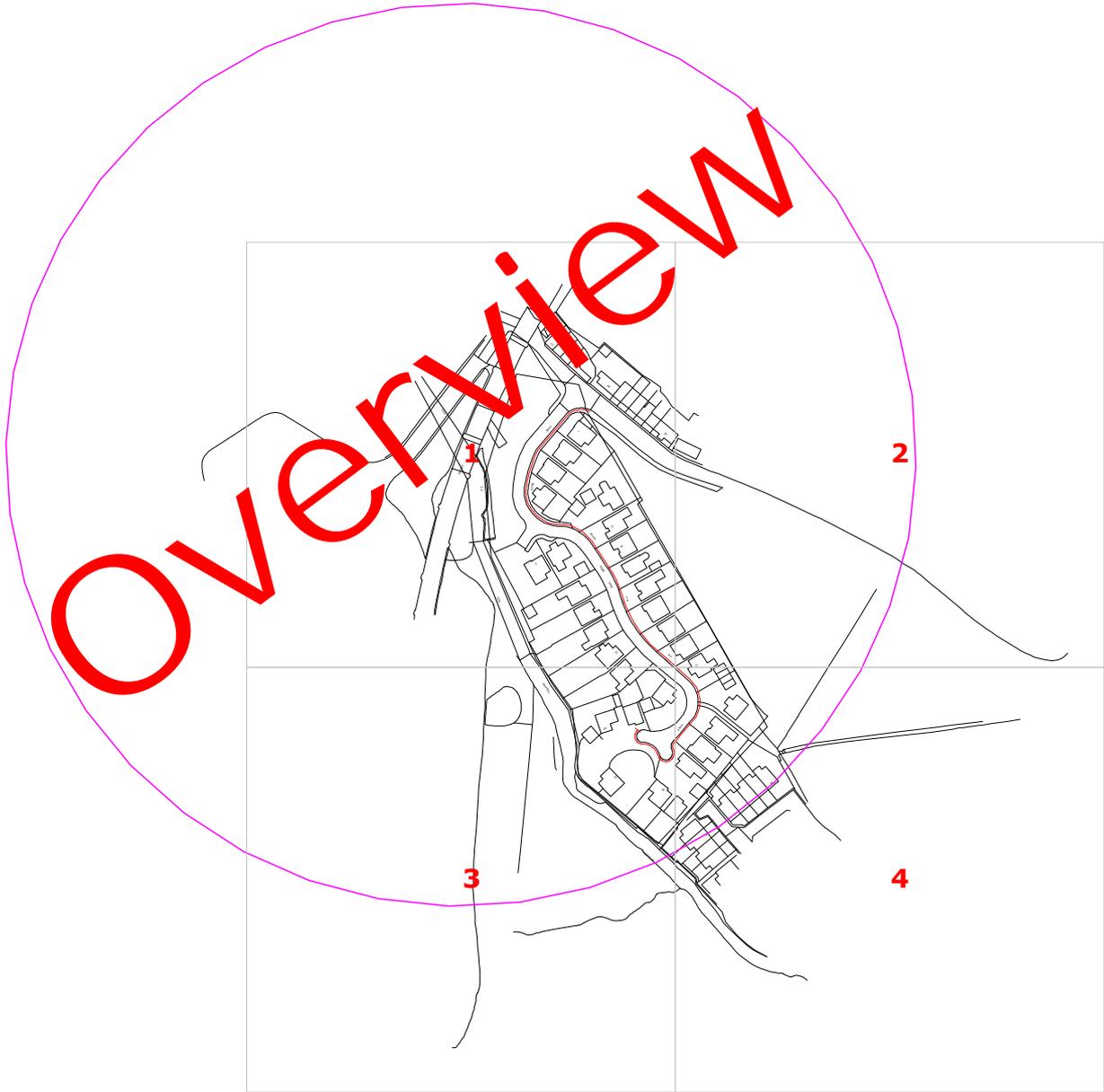
As your plans for the proposed work develop you are required to keep ESP regularly updated about the extent and nature of your proposed works in order for us to fully establish whether any additional precautionary or diversionary works are necessary to protect our gas network.

Arrangements can be set in place so that one of our representatives can meet on site (date to be agreed) and we will be happy to discuss the impact of your proposals on the gas network once we have received the details.

ESP are continually constructing new gas and electricity networks and this notification is valid for 90 days from the date of this letter. If your proposed works start after this period of time, please re-submit your linesearchbeforeUdig enquiry.

Yours sincerely,

ESP Utilities Group Ltd



Date Requested: 22/06/2020

Requested by: Brian McMaster

Job Reference: 19184186

Company: PlanToDig

Your Scheme/Reference: NOC/EOLKP819

**Key for Mains & Service Pipework**



Existing LP mains or services operating up to 75 millibar gauge



Existing MP mains or services operating between 75 millibar and 2 bar gauge



Existing IP mains or services operating between 2 bar and 7 bar gauge

Whilst ESP Utilities Group Ltd (ESP) try to ensure the asset information we provide is accurate, the information is provided Without Prejudice and ESP accept no liability for claims arising from any inaccuracy, omissions or errors contained in this response. The actual position of underground services must be verified and established on site before any mechanical plant is used. Authorities and contractors will be held liable for the full cost of repairs to ESP apparatus and all claims made against them by Third parties as a result of any interference or damage.

REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE SANCTION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE © CROWN COPYRIGHT RESERVED.

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**UTILITIES GROUP**

ESP Utilities Group Ltd  
 Bluebird House  
 Mole Business Park  
 Leatherhead  
 Surrey  
 KT22 7BA  
 Phone: 01372 587500  
 Email: PlantResponses@espug.com

Dig Sites:

Area Line

Approx scale on A4 paper: 1:1000  
 (excluding Overview map)



Date Requested: 22/06/2020

Requested by: Brian McMaster

Job Reference: 19184186

Company: PlanToDig

Your Scheme/Reference: NOC/EOLKP819

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Date Requested: 22/06/2020

Requested by: Brian McMaster

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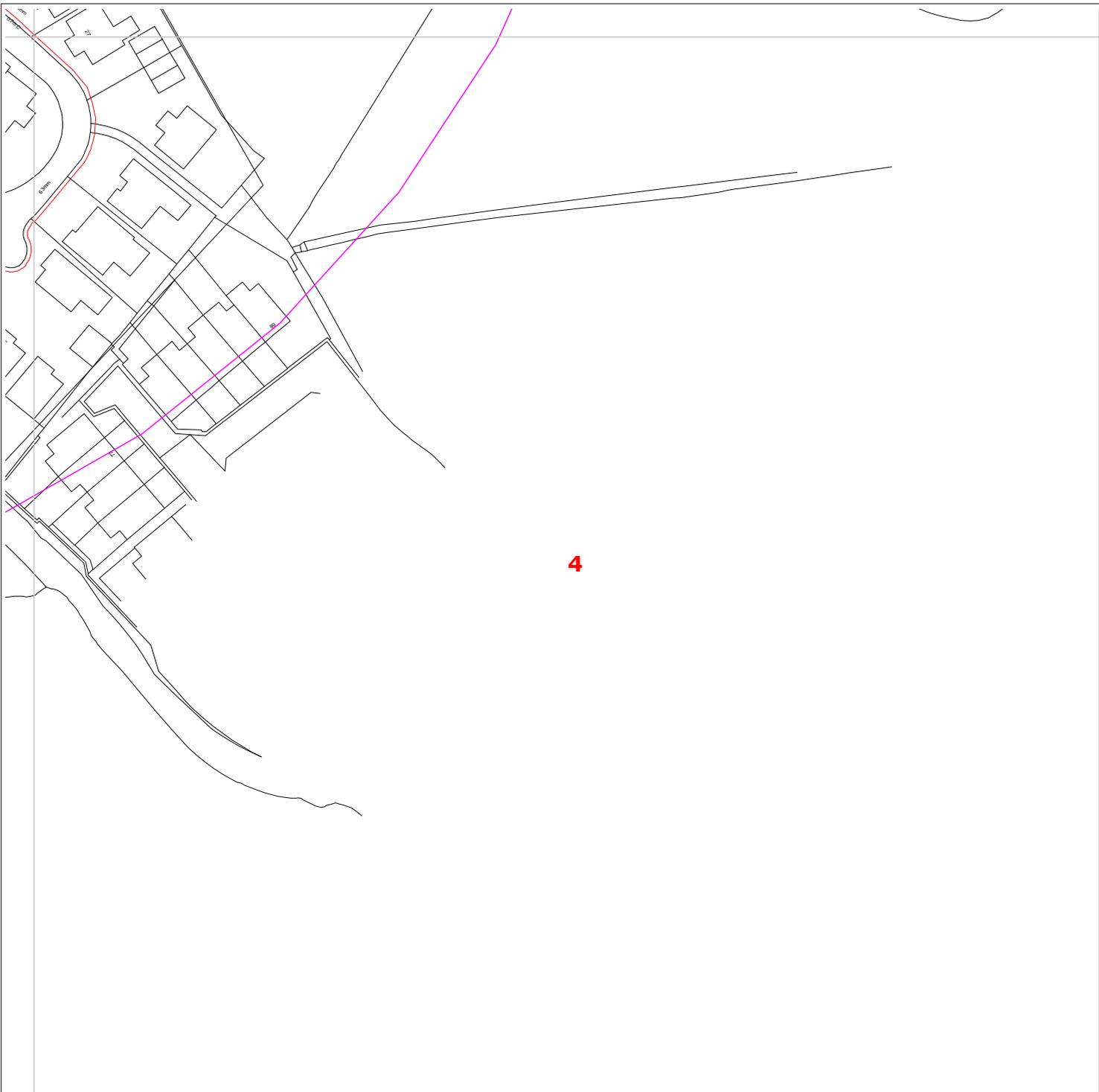


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 Bluebird House  
 Mole Business Park  
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 Surrey  
 KT22 7BA  
 Phone: 01372 587500  
 Email: PlantResponses@espug.com

Dig Sites:

Area Line

Approx scale on A4 paper: 1:1000  
 (excluding Overview map)



4

Date Requested: 22/06/2020

Requested by: Brian McMaster

Job Reference: 19184186

Company: PlanToDig

Your Scheme/Reference: NOC/EOLKP819

**Key for Mains & Service Pipework**



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Existing IP mains or services operating between 2 bar and 7 bar gauge

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**UTILITIES GROUP**

ESP Utilities Group Ltd

Bluebird House

Mole Business Park

Leatherhead

Surrey

KT22 7BA

Phone: 01372 587500

Email: [PlantResponses@espug.com](mailto:PlantResponses@espug.com)

Dig Sites:

Area  Line 

Approx scale on A4 paper: 1:1000  
(excluding Overview map)

**Materials**  
 Materials, fittings, and equipment to be to Gas Industry Standards generally, and acquired through Clancy Docwra's purchase order system. Specifically: PE Pipe, fittings, and equipment shall be to GIS/PL2 Parts 1 to 8. Transition fittings to GIS/PL3. Valves shall be to GIS/V 7 Part 1 GIS/V7 Part 2 as appropriate, with ECV to GIS/V7 Part 3. PE pipe up to 63mm diameter shall be SDR11, all other PE pipe SDR17.6. Steel line pipe to L2; gas risers to BS1387 (Medium or Heavy); threaded joints shall be to BS21.

**Gas Mains**  
 Gas mains shall be routed in accordance with the project drawing and generally be installed in accordance with the layout described in NUJG 7, below. Where NUJG 7 is not applicable, gas mains shall be laid at a depth of cover of 1100mm across country, 750mm in roadways and verges, and 600mm elsewhere. Separation from other plant shall be 250mm parallel and 100mm crossing.

**Minimum proximity to normally occupied buildings shall be as shown in the Table 1 below. Proximities for any pipe not shown shall be taken from IGE/TD3 and individually annotated on the drawing.**

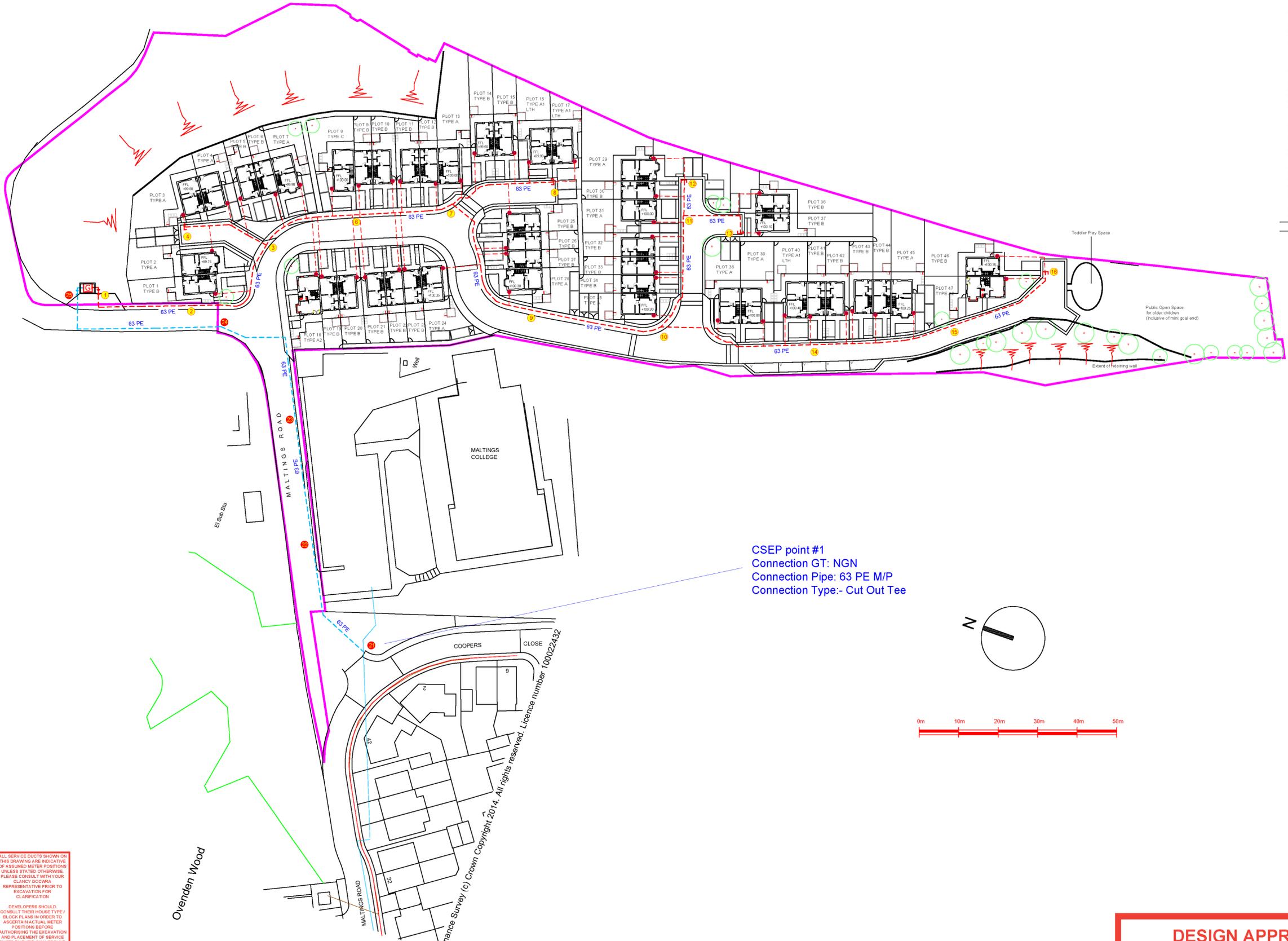
**Gas Services**  
 Unless otherwise shown on the drawing, domestic services shall be of 32mm diameter. Services shall conform to the routes shown on the drawing and they shall:

- terminate on the property face or on the gable within 2m of the property front.
- be routed from the meter to the main at right angles to the face of the property.
- be laid at a depth of cover of 375mm (private gardens) or 450mm (public ground).

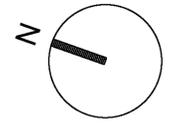
This Plan shows only the pipes owned by E S Pipelines Ltd in its role as a licensed Gas Transporter (GT). Gas pipes owned by other GT's, and also privately owned, may be present in the area. Information with regard to such pipes should be obtained from the owners. The information shown on this plan is given without obligation, or warranty. The accuracy thereof cannot be guaranteed. All service pipes are not necessarily shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by E S Pipelines Ltd, its agents or servants, for any error or omission. Safe digging practices, as detailed in Health and Safety booklet H51047 'Avoiding danger from underground services', must be used to verify and establish the actual position of mains, services and other plant on site before any Mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct or contract labour) working for you on or near gas apparatus. The information on this plan should not be referred to beyond 28 days following the date of issue.

ESN REF:- ESN016272

NOTES:



CSEP point #1  
 Connection GT: NGN  
 Connection Pipe: 63 PE M/P  
 Connection Type:- Cut Out Tee



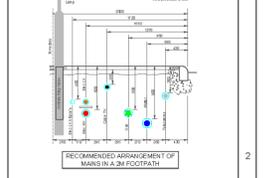
**ClancyDocwra GAS LEGEND**

PROPOSED LP GAS MAIN (DN by NGN)	
PROPOSED LP GAS MAIN	
PROPOSED GAS SERVICES	
EXISTING MP GAS MAIN (150mm - 250mm)	
EXISTING LP GAS MAIN (75mm - 110mm)	
GAS MAIN AS LAID	
GAS SERVICES AS LAID	
DIAMETER CHANGE	
CAPPED END	
METER BOX (60mm)	
METER BOX (150mm)	
VALVE	
GOVERNOR	
LP NOISE	
MP NOISE	
GAS PIPE EXT. DIAMETER	DUCT MIN. INT. DIAMETER
32mm & less	32mm
63mm	63mm
90mm & 125mm	100mm
150 & 180mm	225mm
250mm	OPEN CUT
315mm	OPEN CUT

PLEASE NOTE:  
 ALL SERVICES TO BE 300mm DIAMETER

Table 1 - Proximity to normally Occupied Buildings

Pipe Diameter	LP < 0 ≤ 75mb	MP > 75mb ≤ 2b
≤ 63mm	0.25m	3.0m
90mm & 125mm	0.25m	3.0m
180mm, 250mm & 315mm	1.0m	3.0m
355m & 400mm	1.0m	4.0m



**DISCLAIMER**  
 For details of all existing apparatus, please consult the Records Department of the local authority. Any existing apparatus shown on this drawing is for planning purposes only; the positions of which are to be taken as approximate only.



**ORIGINAL DRAWING SIZE A1**

CAD: A Price	Upperman SD	NGN
Scale: 1:500	Upperman SD	ESP
Date: 10/11/14	Accepted By:	ESN016272
Design: D Leeb	ASU Ref:	

**Proposed Layout Site Plan**

Quota No: YD00013	Site No: SD1009	Client: Southdale
Original Drawing No: 11847 (02) 003	Rev: B	
Site Name: The Maltings Halifax		
Drawing Title: Proposed Gas Layout		
Original Drawing No: MU/YO0013/002	Rev: B	

**DRAWING REVISION DETAILS**

No.	Description	Date	By	Checked
A	Prepared	10/11/14	AP	G.Hammond
B	Revised Site Layout (add 60mm gas riser)	10/11/14	AP	G.Hammond

ALL SERVICE DUCTS SHOWN ON THIS DRAWING ARE INDICATIVE OF ASSUMED METER POSITIONS UNLESS STATED OTHERWISE. PLEASE CONSULT WITH YOUR CLANCY DOCWRA REPRESENTATIVE PRIOR TO EXCAVATION FOR CLARIFICATION.

DEVELOPERS SHOULD CONSULT THEIR HOUSE TYPE / BLOCK PLANS IN ORDER TO ASCERTAIN ACTUAL METER POSITIONS BEFORE AUTHORIZING THE EXCAVATION AND PLACEMENT OF SERVICE DUCTS BY THEIR OWN GROUND WORKERS.

SERVICES FROM METER POSITIONS MUST BE LAID AT A RIGHT ANGLE, IN A STRAIGHT LINE FROM THE FRONT FACING WALL TO THE FEEDER MAIN.

**DESIGN APPROVED**  
**ESP - revision pending**

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Date: 02/07/2020

Mr McMaster  
1 Mill Place Linlithgow Bridge  
Linlithgow Bridge  
EH49 7TL

Tel: 0191 229 4294  
Northern Powergrid Records Information Centre  
New York Road  
Shiremoor  
Newcastle Upon Tyne  
NE27 0LP

Dear Mr McMaster

**Enquiry No: SD268798**  
**Scheme Reference: NOC/EOLKP819**

Thank you for using Northern Powergrid's online Safedig service for your planned works.

Your plan has been generated using our most up to date information. Due to the nature of the information we hold and how often works on the network are carried out, we can only guarantee this plan at the time of generation. We will do our best to notify you if we update the information in your indicated area, but you should endeavour to obtain an up to date plan whenever you commence your works.

The map that has been provided to you will show all the relevant Northern Powergrid electricity cables that are in your indicated dig site, we have included some of the surrounding area as well in case your dig extends further than you previously thought. At any point you may re-apply for your plan to increase the indicated area using the previously submitted details. This plan will be valid for 30 days from the point at which it became available to you.

The enclosed mains records only give the approximate location of known Northern Powergrid apparatus in the area. Great care is therefore needed and all cables and overhead lines must be assumed to be live.

Please note that while all efforts are made to ensure the accuracy of the data, no guarantee can be given. We would refer you to the Health & Safety Executive's publication HS(G)47 "Avoiding Danger From Underground Services" which emphasises that:

- Plans must only be used as a guide in the location of underground cables. The use of a suitable cable-tracing device is essential and careful hand digging of trial holes must be carried out to positively identify and mark the exact route of the cable. You should also bear in mind that a cable is unmistakably located only when it has been safely exposed.
- Cable depths are not generally indicated on our records and can vary considerably even when shown.
- Great caution must be exercised at all times when using mechanical plant. Careful trial digging should always be carried out on the whole route of the planned excavation to ascertain if cables exist.

The Health & Safety executive have another publication, GS6 "Avoidance of Danger from Overhead Electric Lines" that you should be aware of if your work is near overhead powerlines. Both of these documents provide comprehensive guidance for observance of statutory duties under the Electricity at Work Regulations 1989 and the Health & Safety at Work Act 1974. Our provision of these records is based upon the assumption that people using them will have sufficient competence to interpret the information given. Any damage or injury caused will be the responsibility of the organization concerned who will be charged for any repairs.

Please note ground cover must not be altered either above our cables or below overhead lines, in addition no trees should be planted within 3 metres of existing underground cables or 10 metres of overheadlines. All our apparatus is legally covered by a wayleaves agreement, lease or deed or alternatively protected under

the Electricity Act 1989. Should any alteration/diversion of our Company's apparatus be necessary to allow your work to be carried out, budget costs can be provided by writing to Network Connections, Alix House, Falcon Court, Stockton On Tees, TS18 3TU.

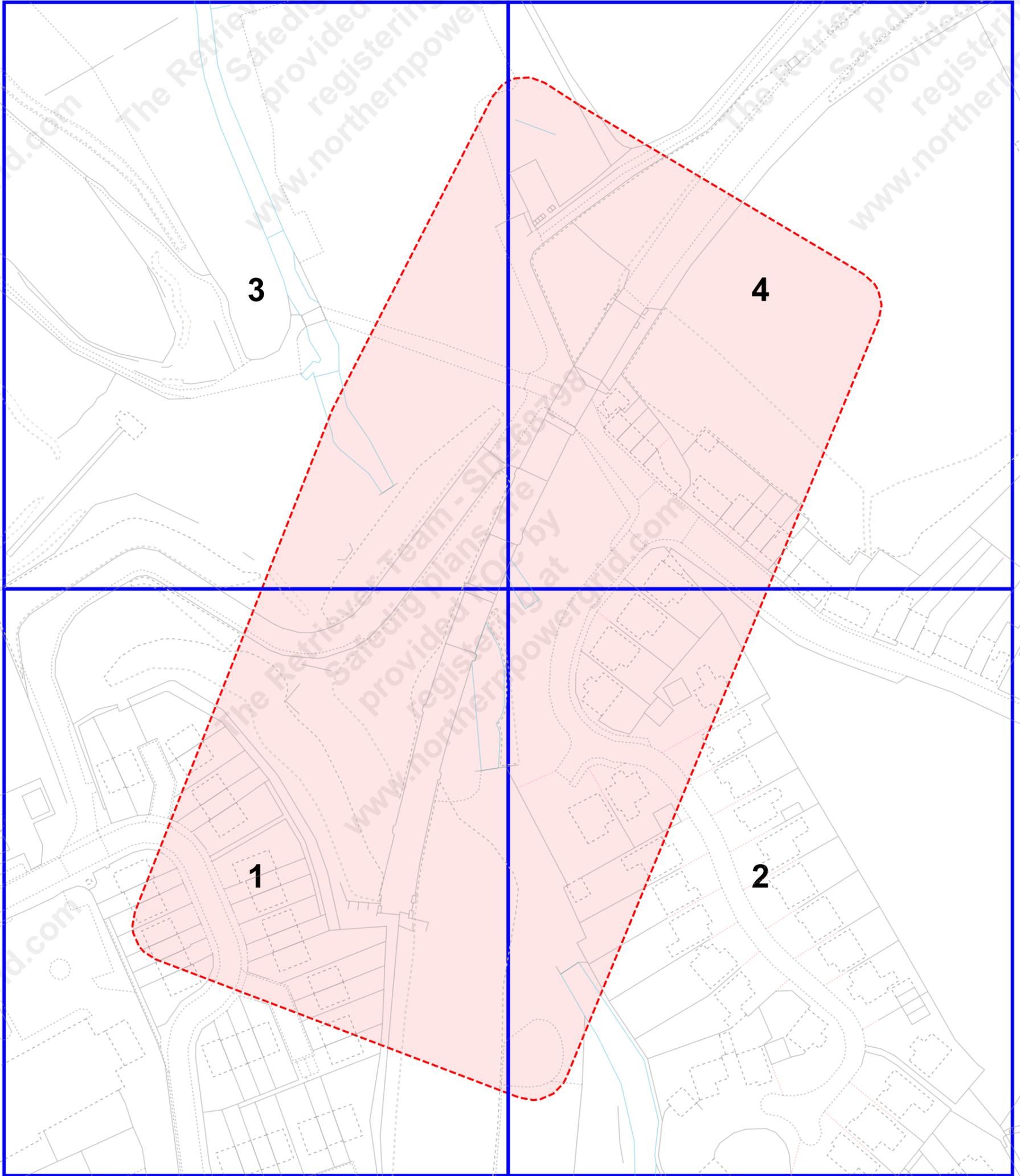
Tel:0800 0113433

Yours faithfully,

Safedig Team  
**Northern Powergrid**

NORTHERNPOWERGRID

is the trading name of Northern Powergrid(Northeast) limited(RegisteredNo:2906593) and Northern Powergrid(Yorkshire) pic(Registered No:4112320) Registered Office: lloydsCourt, 78 Grey Street, Newcastle upon Tyne NE1 6AF.Registered in England and Wales.



**Terms and Conditions**

Electric cables and/or overhead line information shown on the record plans are to be used in accordance with the Health & Safety Executive's Booklet HS(G)47, "Avoiding Danger from Underground Services" and Guidance Note GS 6, "Avoidance of Danger from Overhead Electric Lines". Record plans do not always show out of commission cables or service cables from Northern Powergrid's mains to adjoining or cross road properties. Plans do not show local authority owned public lighting or sign cables. The information is provided as a service by Northern Powergrid and does not impart any legal obligation on their part. Persons using it are reminded of their responsibility to execute works safely to avoid damaging Northern Powergrid's apparatus.

Further advice or assistance is available from the Records Information Centre on 0191 2294296  
 In an emergency or outside normal working hours contact our customer information centre on 0800 668877  
 Cable depths shown were correct at the time cables were laid however alterations to ground levels or cable disposition may have taken place.



**Legend:**

**Underground Cables:**

- |  |                               |  |            |
|--|-------------------------------|--|------------|
|  | 132kV                         |  | 20kV       |
|  | 66kV                          |  | 11kV       |
|  | 33kV                          |  | 6kV        |
|  | 25kV                          |  | 3kV        |
|  | Left In Situ                  |  | Aux        |
|  | LV Mains                      |  | LV Service |
|  | LV Service Assumed Route      |  |            |
|  | LV Service Logical Connection |  |            |
|  | Duct Route                    |  |            |

**Overhead Conductors:**

- |  |            |  |      |
|--|------------|--|------|
|  | 132kV      |  | 20kV |
|  | 66kV       |  | 11kV |
|  | 33kV       |  | 6kV  |
|  | 25kV       |  | 3kV  |
|  | LV Mains   |  | Aux  |
|  | LV Service |  |      |



Job Reference : SD268798

NOC/EOLKP819

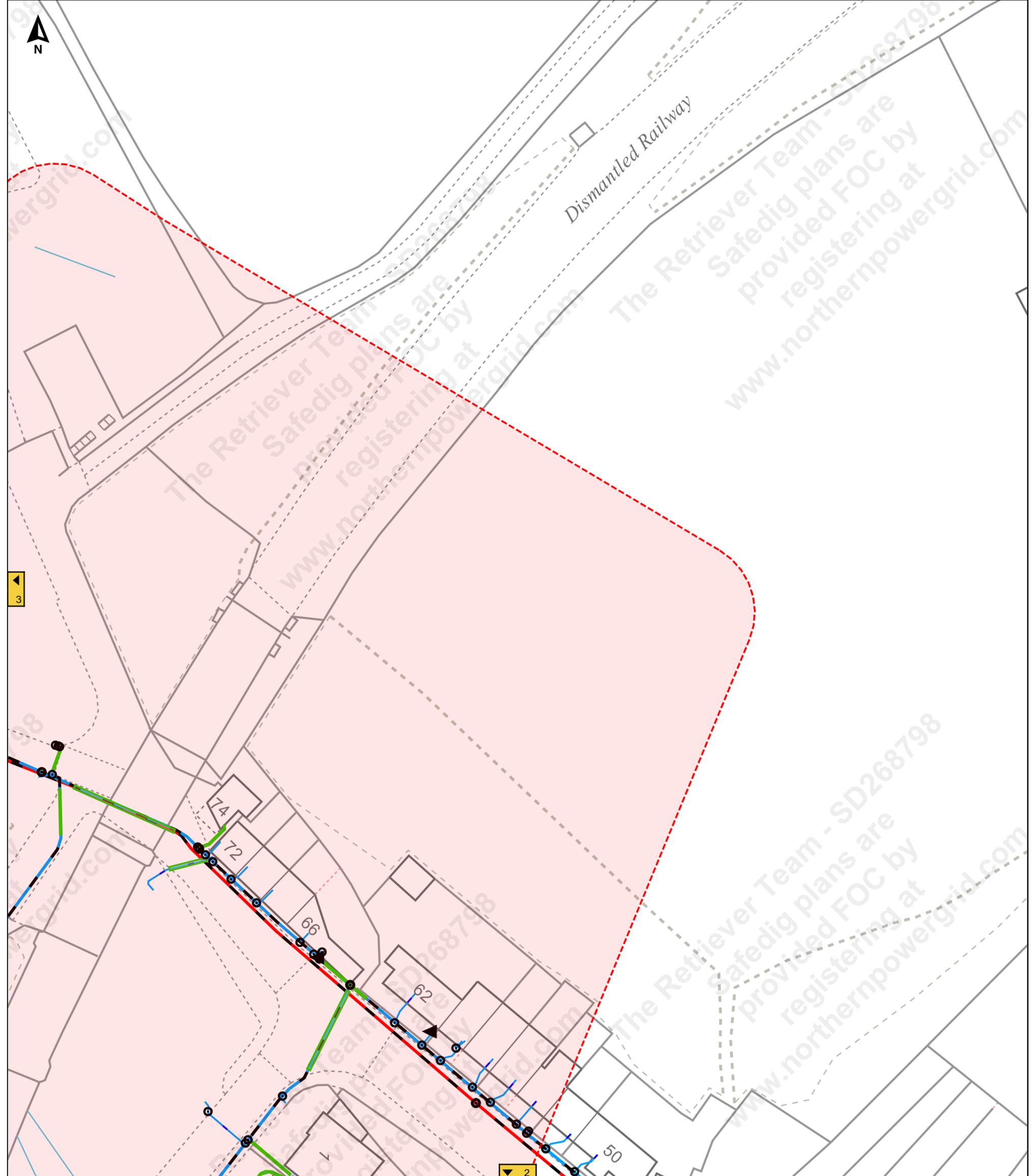
Scale : 1:1100

Date : 26/06/2020

Grid Coordinates : 406793 426949

Produced For : The Retriever Team

Overview Page



**Terms and Conditions**

Electric cables and/or overhead line information shown on the record plans are to be used in accordance with the Health & Safety Executive's Booklet HS(G)47, "Avoiding Danger from Underground Services" and Guidance Note GS 6, "Avoidance of Danger from Overhead Electric Lines". Record plans do not always show out of commission cables or service cables from Northern Powergrid's mains to adjoining or cross road properties. Plans do not show local authority owned public lighting or sign cables. The information is provided as a service by Northern Powergrid and does not impart any legal obligation on their part. Persons using it are reminded of their responsibility to execute works safely to avoid damaging Northern Powergrid's apparatus.

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**Legend:**

<b>Underground Cables:</b>	
<b>Overhead Conductors:</b>	



Job Reference : SD268798

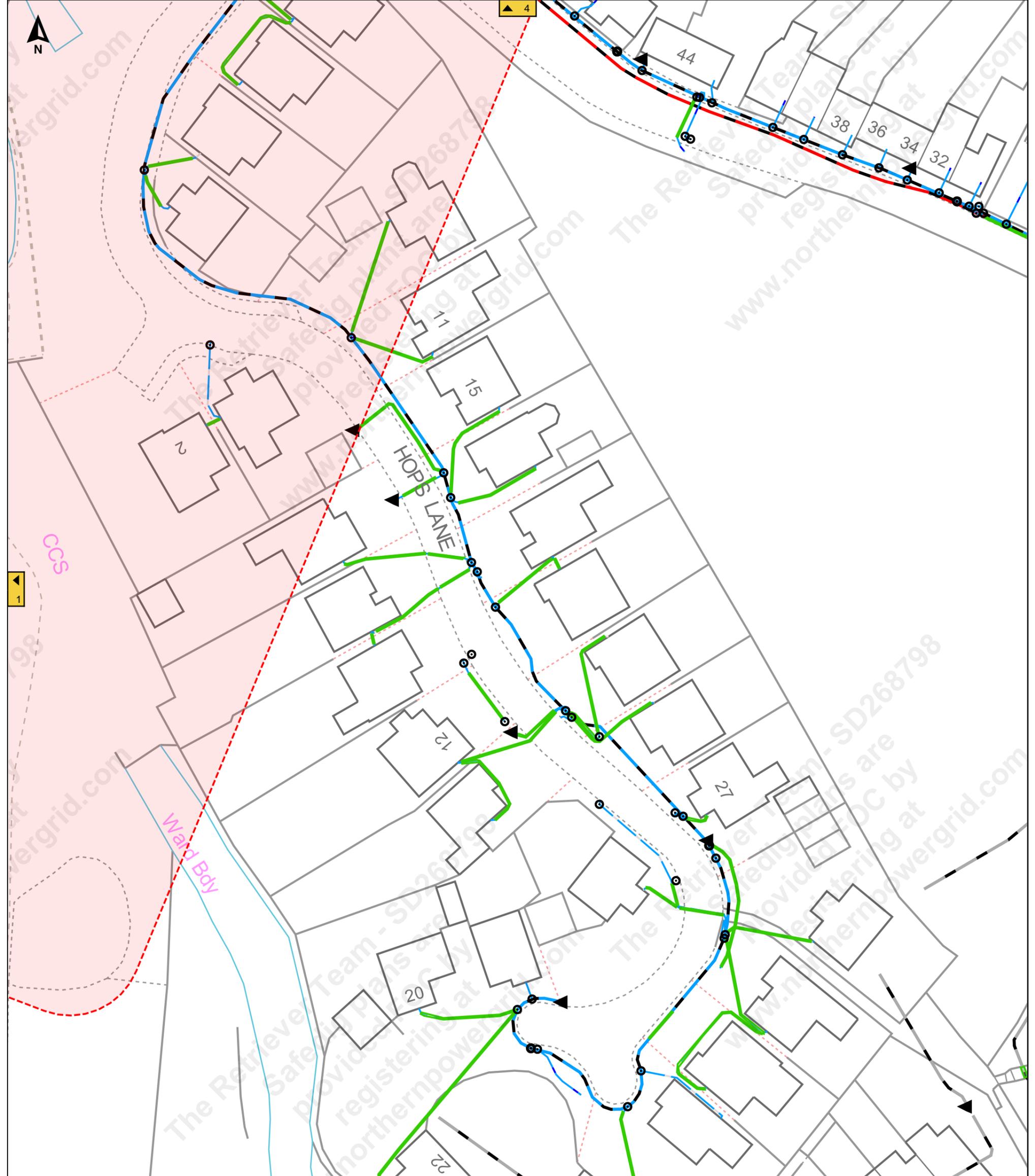
NOC/EOLKP819

Scale : 1:500

Date : 26/06/2020

Grid Coordinates : 406862 427029

Produced For : The Retriever Team



**Terms and Conditions**

Electric cables and/or overhead line information shown on the record plans are to be used in accordance with the Health & Safety Executive's Booklet HS(G)47, "Avoiding Danger from Underground Services" and Guidance Note GS 6, "Avoidance of Danger from Overhead Electric Lines". Record plans do not always show out of commission cables or service cables from Northern Powergrid's mains to adjoining or cross road properties. Plans do not show local authority owned public lighting or sign cables. The information is provided as a service by Northern Powergrid and does not impart any legal obligation on their part. Persons using it are reminded of their responsibility to execute works safely to avoid damaging Northern Powergrid's apparatus.

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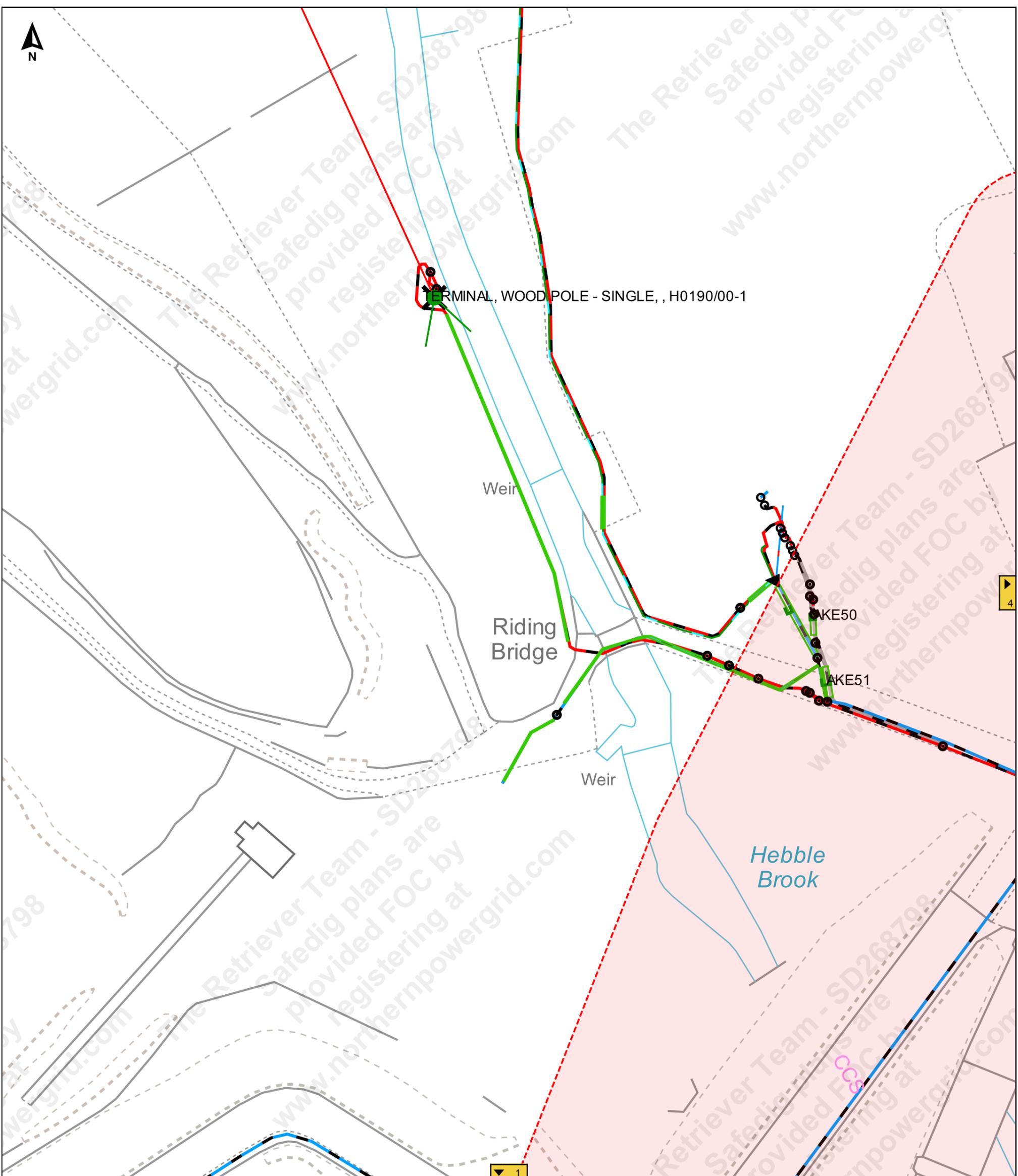


**Legend:**

<b>Underground Cables:</b>	
	132kV
	66kV
	33kV
	25kV
	Left In Situ
	LV Mains
	LV Service Assumed Route
	LV Service Logical Connection
	Duct Route
	20kV
	11kV
	6kV
	3kV
	Aux
	LV Service



Job Reference : SD268798
NOC/EOLKP819
Scale : 1:500
Date : 26/06/2020
Grid Coordinates : 406862 426868
Produced For : The Retriever Team
Page 2 of 4 (2,4)



**Terms and Conditions**

Electric cables and/or overhead line information shown on the record plans are to be used in accordance with the Health & Safety Executive's Booklet HS(G)47, "Avoiding Danger from Underground Services" and Guidance Note GS 6, "Avoidance of Danger from Overhead Electric Lines". Record plans do not always show out of commission cables or service cables from Northern Powergrid's mains to adjoining or cross road properties. Plans do not show local authority owned public lighting or sign cables. The information is provided as a service by Northern Powergrid and does not impart any legal obligation on their part. Persons using it are reminded of their responsibility to execute works safely to avoid damaging Northern Powergrid's apparatus.

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**Legend:**

**Underground Cables:**

- |  |                               |  |            |
|--|-------------------------------|--|------------|
|  | 132kV                         |  | 20kV       |
|  | 66kV                          |  | 11kV       |
|  | 33kV                          |  | 6kV        |
|  | 25kV                          |  | 3kV        |
|  | Left In Situ                  |  | Aux        |
|  | LV Mains                      |  | LV Service |
|  | LV Service Assumed Route      |  |            |
|  | LV Service Logical Connection |  |            |
|  | Duct Route                    |  |            |

**Overhead Conductors:**

- |  |            |  |      |
|--|------------|--|------|
|  | 132kV      |  | 20kV |
|  | 66kV       |  | 11kV |
|  | 33kV       |  | 6kV  |
|  | 25kV       |  | 3kV  |
|  | LV Mains   |  | Aux  |
|  | LV Service |  |      |



Job Reference : SD268798

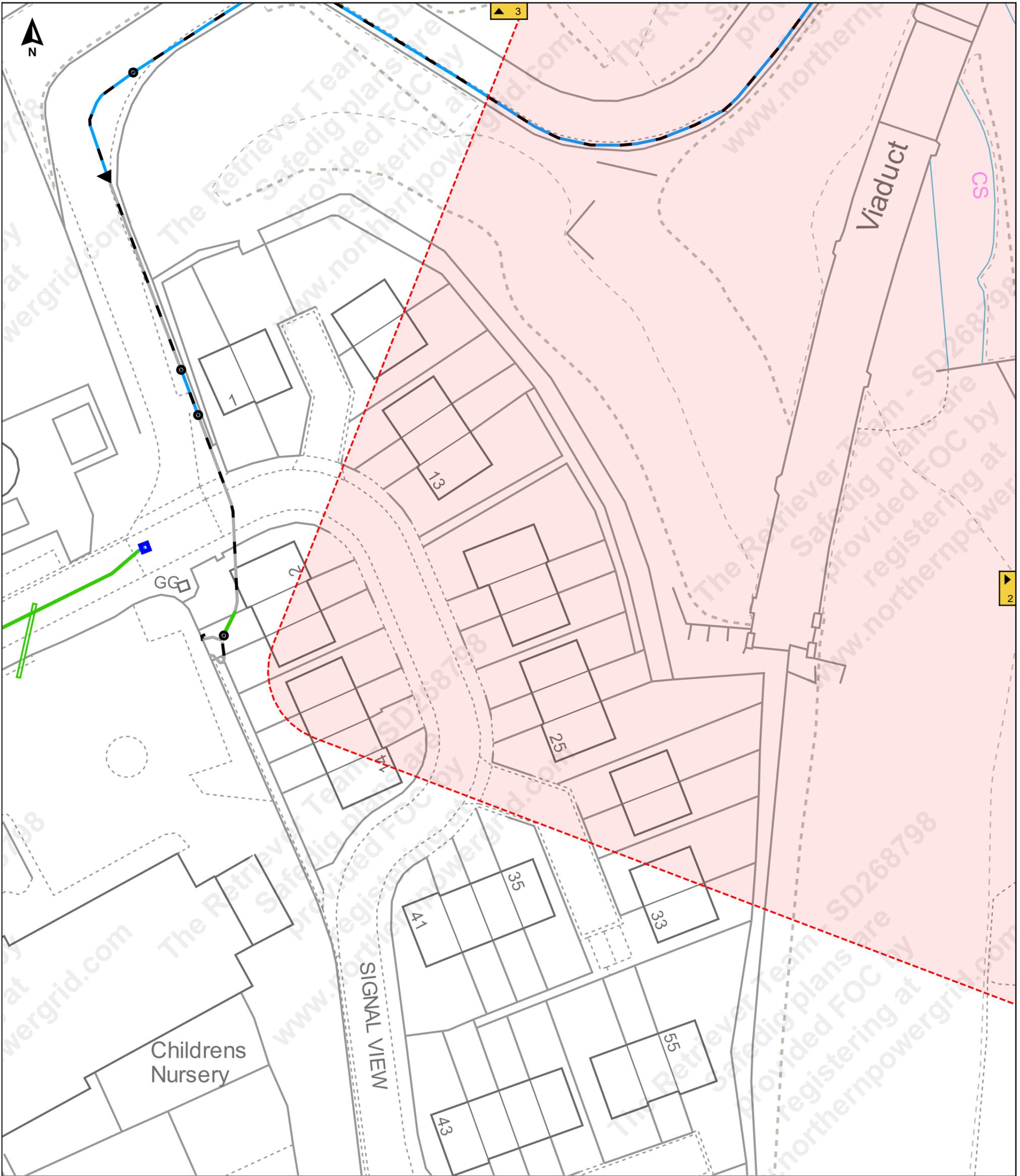
NOC/EOLKP819

Scale : 1:500

Date : 26/06/2020

Grid Coordinates : 406724 427029

Produced For : The Retriever Team



**Terms and Conditions**

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**Legend:**

<b>Underground Cables:</b>	
132kV	20kV
66kV	11kV
33kV	6kV
25kV	3kV
Left In Situ	Aux
LV Mains	LV Service
LV Service Assumed Route	
LV Service Logical Connection	
Duct Route	
<b>Overhead Conductors:</b>	
132kV	20kV
66kV	11kV
33kV	6kV
25kV	3kV
LV Mains	Aux
LV Service	

---

Job Reference : SD268798

NOC/EOLKP819

---

Scale : 1:500

---

Date : 26/06/2020

---

Grid Coordinates : 406724 426868

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Produced For : The Retriever Team

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Page 1 of 4 (1,4)



National One Call  
1 Mill Place  
Mill Road Industrial Estate  
West Lothian  
EH49 7TL

Virgin Media  
Field Services  
Units 1-12  
Broad Lane  
Mayfair Business Park  
Bradford  
Yorkshire  
BD4 8PW

Tel: 0870 888 3116 Opt 2

Plant Enquiry Ref: VM.1165332  
Letter Date 22.06.2020  
Your Ref: NOC/EOLKP819  
Date: 24.06.2020

Dear Sir/Madam,

Enquiry Location: Disused Railway Bridge Boy Lane, Hops Ln, Halifax, West Yorkshire, HX3 5AE.

Thank you for your enquiry regarding work at the above location.  
I enclose a copy of our above referenced drawing, marked to show the approximate position of plant owned and operated by Virgin Media.

You will be aware that you have a duty to ensure that no damage results to this equipment as a result of your proposed works. Please note that this apparatus may contain Fibre Optic, Coaxial and/or 240v Power Cables and as such, special care must be taken when excavating this area.

Should you require Virgin Media apparatus to be diverted we must agree a specification of works and provide a detailed estimate of costs. The costs are £720 (Business) or £240 (Residential) Inc VAT and the charge applies to each individual scheme requested. Both the estimate and specification will be sent to you within 25 working days of when the payment was received.

This initial payment will cover the following: -

- Detailed site visit by an experienced planning engineer.(Up to 10 hours planning time)
- Detailed specification of works.
- Detailed breakdown of costs.

Payment is required in advance for the estimated cost of detailed design work and the charge applies whether or not your works proceed. Please supply us with your payment and a copy of your plans or drawings and quote 'Our Ref' as above.

The address to send the cheque is:

Diversiory Works, Virgin Media, 1 Dove Wynd, Strathclyde Business Park Bellshill ML4 3AL

Or if you prefer to talk, please call the Diversiory Team on: 0800 408 0088 Option 1

Should your request be in relation to a Residential New Development, Virgin Media would like the opportunity to assist with your diversiory quote and serve your site free of charge, offering your customers the fastest widely available broadband speeds on the market up to 500Mbps.

For Commercial New Developments our team can also be reached through the below link, ensuring future businesses to your site are connected to our fibre network.

Simply head over to [www.virginmedia.com/developer](http://www.virginmedia.com/developer) to fill in the enquiry form, and a member of our New Developments team will be in touch within 48 hours.

You will also find useful information about additional benefits to you and your site, plus a handy 'developers guide' can be downloaded with detailed installation requirements.

Or if you prefer to talk, please call the Diversiory Team on: 0800 408 0088 Option 2

Yours faithfully

National Plant Enquiries Team,



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Date: 24/06/20

Scale: 1:2011

Map Centre: 406796,426968

Data updated: 01/06/20

Telecoms Plan A4

Important Information - please read The purpose of this plan is to identify Virgin Media apparatus. We have tried to make it as accurate as possible but we cannot warrant its accuracy. In addition, we caution that within Virgin Media apparatus there may be instances where mains voltage power cables have been placed inside green, rather than black ducting. Further details can be found using the "Affected Postcodes.pdf", which can be downloaded from this website. Therefore, you must not rely solely on this plan if you are carrying out any excavation or other works in the vicinity of Virgin Media apparatus. The actual position of any underground service must be verified by cable detection equipment, etc. and established on site before any mechanical plant is used. Accordingly, unless it is due to the negligence of Virgin Media, its employees or agents, Virgin Media will not have any liability for any omissions or inaccuracies in the plan or for any loss or damage caused or arising from the use of and/or any reliance on this plan. This plan is produced by Virgin Media Limited (c) Crown copyright and database rights 2020 Ordnance Survey 100019209.

Duct, Trench



Chamber



Cabinet



bharath.gowda@virginmedia.co.uk

VM.1165332



## YORKSHIRE WATER PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the **general** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.
2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.
3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will **generally** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will **generally** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.
4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.
5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter (*see illustration below*). Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.
6. All excavation works near to YW apparatus should be by hand digging only.
7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.
8. Adequate support must be provided where any works pass under YW apparatus.
9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.
10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.
11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.
12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.
13. **Under no circumstances** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.
14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).
15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.
16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.
17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.
18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

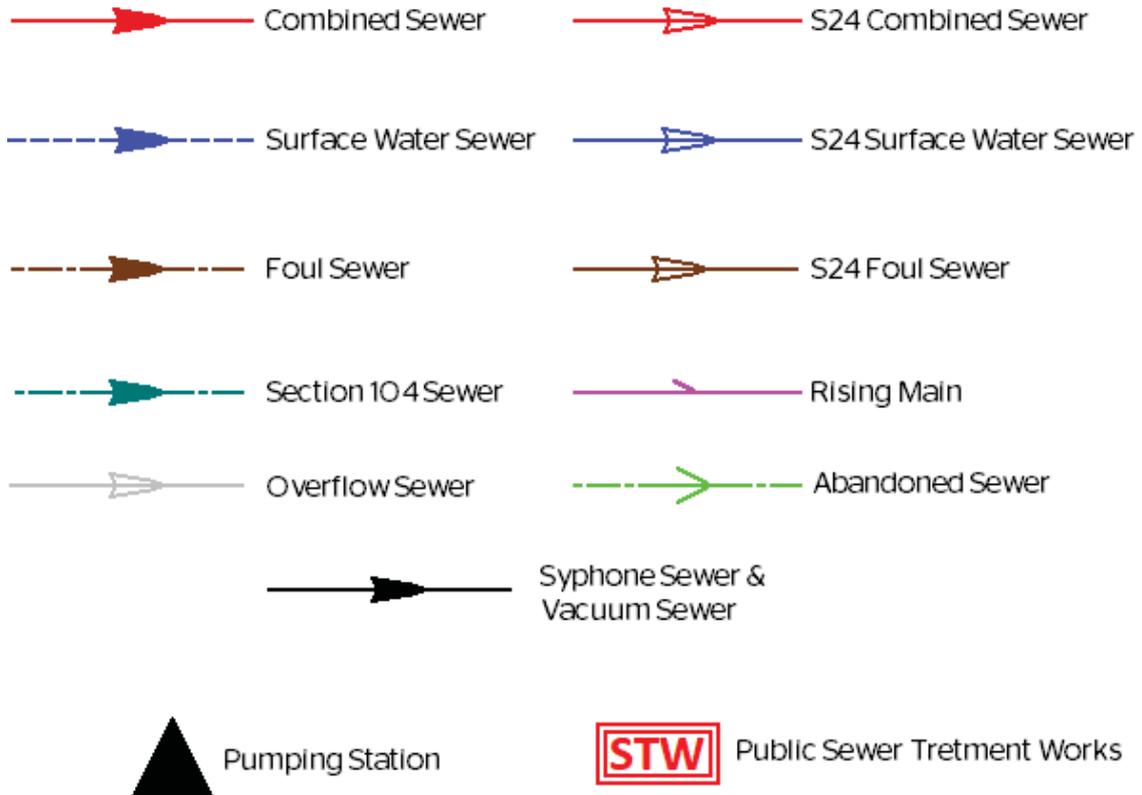
Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trial holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

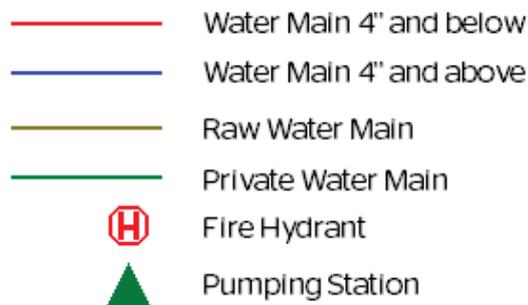
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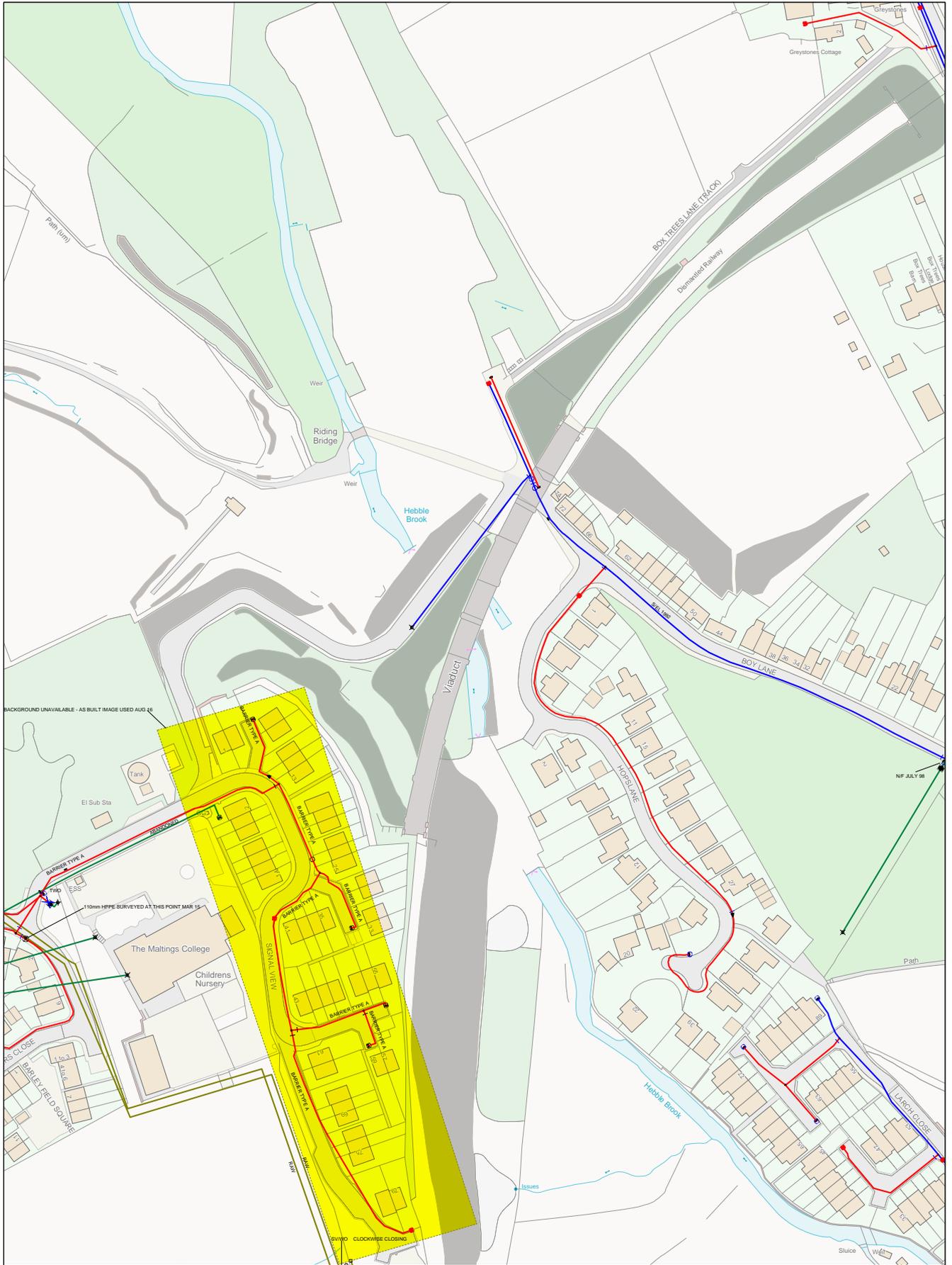


## Sewer Legend



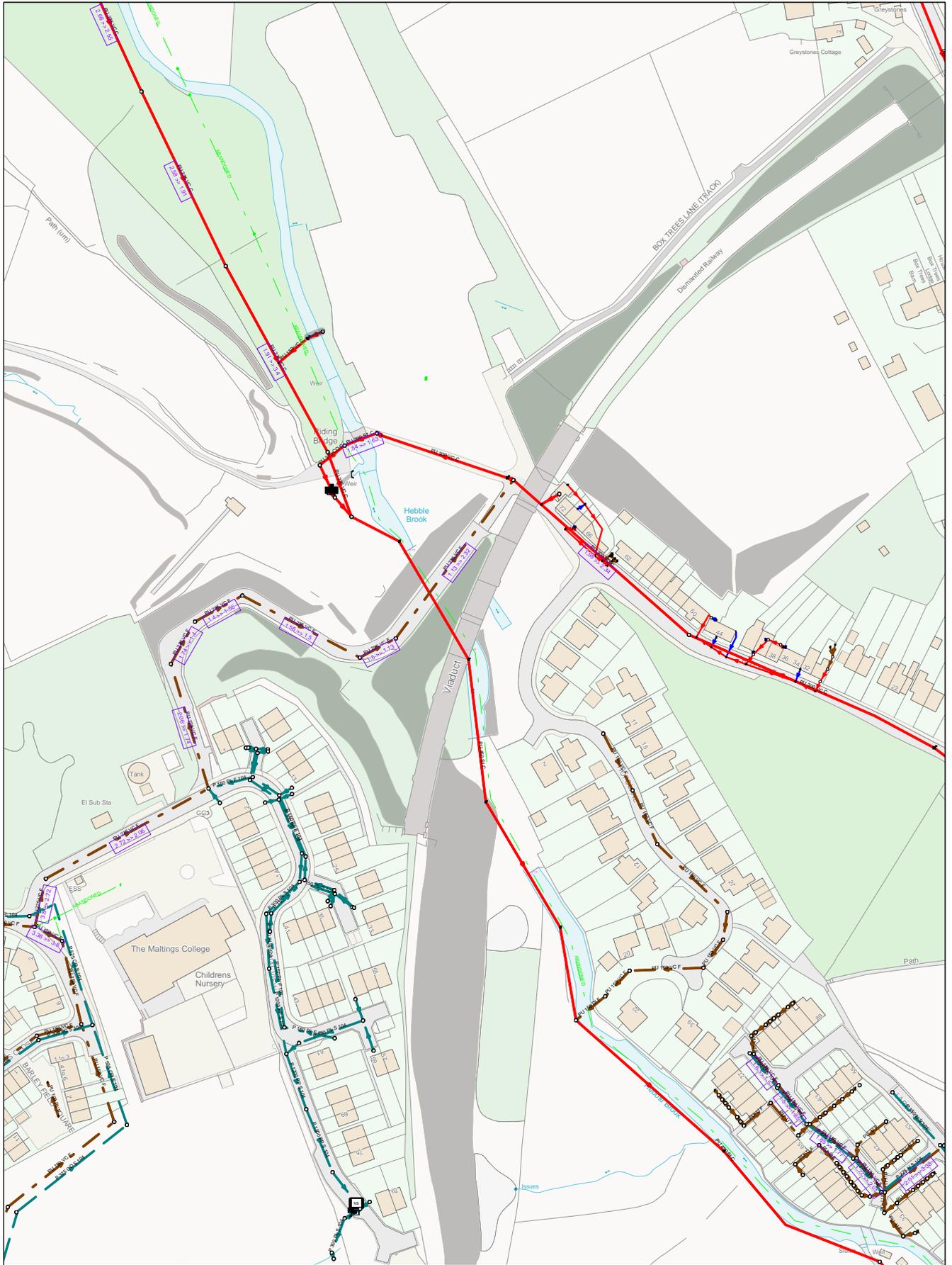
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Date Requested : 24/06/2020, 13:20:50  
 Date Generated : 24/06/2020 13:20:52

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Date Requested : 24/06/2020, 13:19:48  
 Date Generated : 24/06/2020 13:19:50

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**CENTRAL ALLIANCE**  
GROUND ENGINEERING TECHNICAL SERVICES

Site Name: HXH/4a - Halifax  
Site Address: Boy Lane, Halifax

## Underground Utility Mapping Survey Report

Reference Number: 2382104

Issue Date: February 2023

Revision: -

Revision Date: -

Client Name: AmcoGiffen

Client Address: Whaley Road, Barugh, Barnsley

Author: Anthony Radley

Signature:

A handwritten signature in black ink, appearing to read 'A.J. Radley', written over a light grey rectangular background.

Approver: Milen Charov

Signature:

A handwritten signature in black ink, appearing to read 'M. Charov', written over a light grey rectangular background.

## CONTENTS:

---

1. Title Page
2. Survey Details & Equipment Used
3. Specification Notes
4. Survey Area
5. Survey Equipment
6. PAS128 Information
7. List of Expected Utility Services
8. Existing Service / Desktop Records
9. Survey Results and Summary of Findings
10. Site Notes
11. Site Photographs

## SURVEY DETAILS & EQUIPMENT USED

---

### **SURVEY DETAILS**

**Type of Survey:** Underground Utility Mapping & Topographical Survey

**Utility Surveyor:** Jason Wilkin

**Topographical Surveyor:** Tim Hodson / Marc Keeley / Alberto Gonzalaz

**Assistant Surveyor:** N/A

**Date of Survey:** January 2023

### **SURVEY ORIGINS**

**Survey Grid:** ORDNANCE SURVEY – Related to OS Pseudo 1:1 Grid with origin at Station HXH02.

**Survey Datum:** ORDNANCE SURVEY – Related to OS Datum by GPS observations.

### **SURVEY INFORMATION ISSUED**

**Drawings:** 2382104\_P.dwg

**Reports:** 2382104 – Utility Survey Report.pdf

## SURVEY EQUIPMENT USED

Type	Make	Model	Operator
Electromagnetic location Instrument	Vivax	V-loc Pro 3	JW
Ground Penetrating Radar	GSSI	Sir 4000	JW
FlexiTrace with built in 33khz Sonde	Dart Systems	PipeDart 6mm x 100m	JW
33khz Sonde (8m depth)	Radiodetection	Standard Sonde	JW
Total Station	Trimble	S9	TH/MK/AG
GNSS / GPS Receivers	Trimble	R10	TH/MK/AG

### MANUFACTURERS STATED LOCATION ACCURACIES

Depth by Electromagnetic Detection: +/- 15% of Depth

Plan position by Electromagnetic Detection: +/- 15% of Depth

Depth by GPR: +/- 15% of depth (in Normal Ground Conditions)

Plan position by GPR: +/- 15% of Depth

Some of the items below may influence the results of GPR and therefore 100% accuracy cannot be guaranteed.

- Ground Conditions
- Saturated Areas
- Areas of high-level soil conductivity
- Overgrown or uneven sites
- The proximity to parked cars or other metallic solid objects

	Service found by Electro Magnetic / Radio Frequency Location eg: Any metallic pipe or power carrying cable
	Service found by Electro Magnetic Location using a Sonde eg: Drainage / empty duct
	Service found by Ground Penetrating Radar eg: Any pipe or any service that could not be located by other means

## SPECIFICATION NOTES

---

- Survey works undertaken in accordance with PAS128 (Survey Type B).
- All survey works to be carried out in the areas defined by the client AmcoGiffen for part of the carriageway along Boy Lane and the track running alongside of the viaduct.
- Central Alliance have provided statutory authority information (Survey Type D) for BT, Electric and Gas only and cannot be held responsible for any inaccuracies or out of date information.
- All drawings must be read in conjunction with available record information.
- All services to be surveyed robustly using a combination of Electromagnetic Detection & Ground Penetrating Radar (GPR). All utility findings to be mapped using Electronic Total Station & GPS receiver were possible to create a final composite digital AutoCAD drawing.

## SURVEY AREA

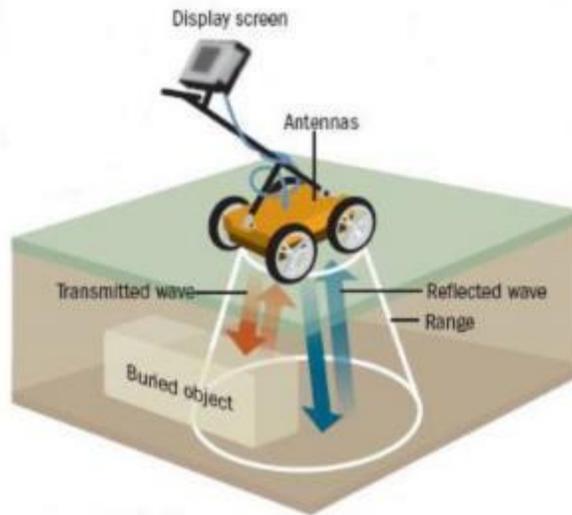
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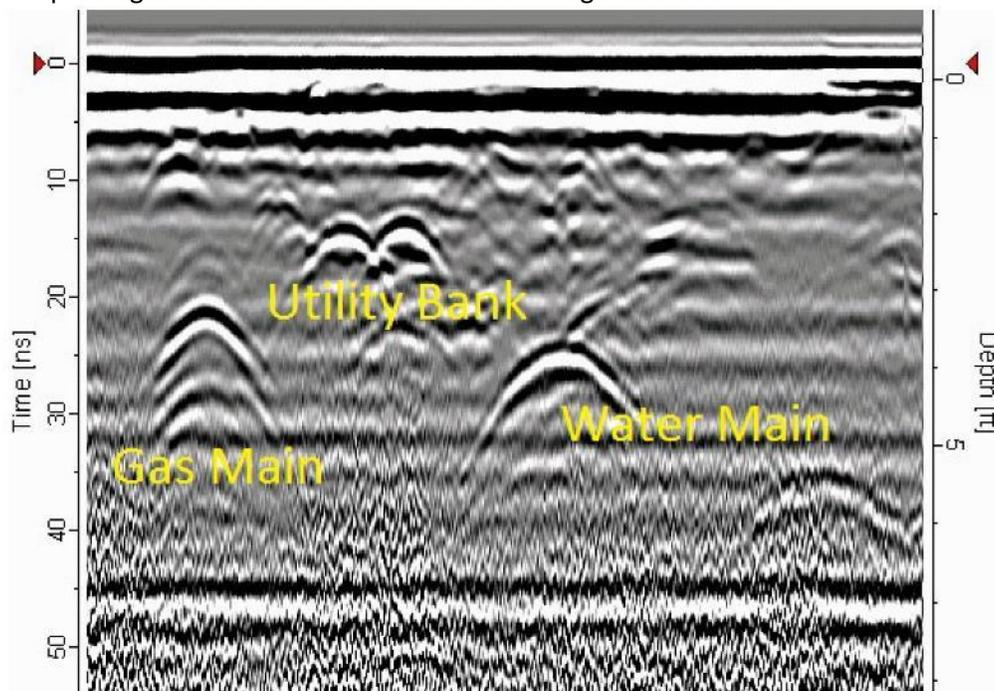
**GROUND PENETRATING RADAR (GPR) DETECTION**

Ground Penetrating Radar (GPR) is an ultrahigh frequency (UHF) electromagnetic method that detects interfaces between subsurface materials with differing dielectric constants (a term that describes an electrical parameter of a material.) The GPR system consists of an antenna, which houses the transmitter and receiver and a profiling recorder, which processes the received signal and produces a graphic display of the data. The transmitter radiates repetitive short-duration EM signals into the earth from an antenna moving across the ground surface. Electromagnetic waves are reflected back to the receiver by interfaces between materials with differing dielectric constants. The intensity of the reflected signal is a function of the contrast in the dielectric constant at the interface, the conductivity of the material, which the wave is travelling through and the frequency of the signal.

Below is an example diagram of the GPR unit travelling along the ground.



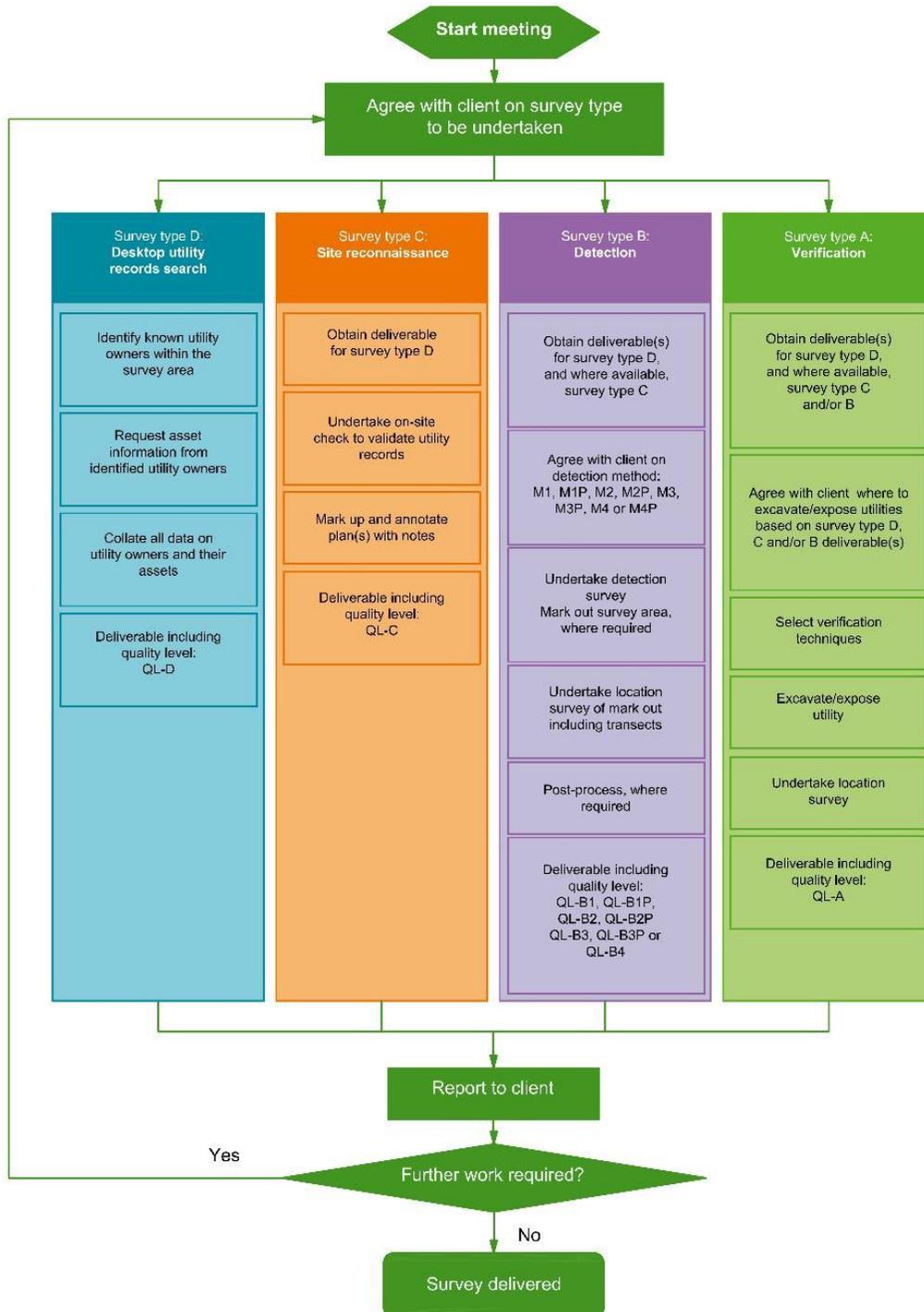
Below is an example diagram of a standard GPR data scan image recorded.



# PAS128 INFORMATION

PAS 128 applies to the detection, verification and location of active, abandoned, redundant or unknown underground utilities and associated surface features that facilitate the location and identification of underground utility infrastructure. It sets out the accuracy to which the data are captured for specific purposes, the quality expected of that data and a means by which to assess and indicate the confidence that can be placed in those data.

As shown below, there are four quality levels within PAS 128;



Central Alliance were instructed to undertake a Survey type B – Detection

**Table 1 – Quality level of survey outputs (normative)**

Survey type (Establish with client prior to survey)		Quality level (Practitioner to determine post survey)	Post-processing	Location accuracy		Supporting data
				Horizontal <sup>1)</sup>	Vertical <sup>2)</sup>	
D	Desktop utility records search	QL-D	—	Undefined	Undefined	—
C	Site reconnaissance	QL-C	—	Undefined	Undefined	A segment of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works (reinstatement scar).
B	Detection <sup>3)</sup>	QL-B4	No	Undefined	Undefined	A utility segment which is suspected to exist but has not been detected and is therefore shown as an assumed route.
		QL-B3	No	±500 mm	Undefined (No reliable depth measurement possible)	Horizontal location only of the utility detected by one of the geophysical techniques used.
		QL-B3P	Yes			
		QL-B2	No	±250 mm or ±40% of detected depth whichever is greater	±40% of detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used. <sup>4)</sup>
		QL-B2P	Yes			
		QL-B1	No	±150 mm or ±15% of detected depth whichever is greater	±15% of detected depth	Horizontal and vertical location of the utility detected by multiple <sup>5)</sup> geophysical techniques used.
		QL-B1P	Yes			
A	Verification	QL-A	—	±50 mm	±25 mm	Horizontal and vertical location of the top and/or bottom of the utility. Additional attribution is recorded as specified in 9.2.5.

<sup>1)</sup> Horizontal location is to the centreline of the utility.  
<sup>2)</sup> Vertical location is to the top of the utility.  
<sup>3)</sup> For detection, it is a requirement that a minimum of GPR and EML techniques are used (see 8.2.1.1.2).  
<sup>4)</sup> Electronic depth readings using EML equipment are not normally sufficient to achieve a QL-B2 or higher.  
<sup>5)</sup> Some utilities can only be detected by one of the existing detection techniques. As a consequence, such utilities cannot be classified as a QL-B1.

**Table 2 – Detection methods (normative)**

Method <sup>1)</sup> (to be determined in consultation with the client)	Survey grid/search resolution <sup>2)</sup>				Quality levels achievable	Typical application (informative)
	EML <sup>3)</sup>	GPR		Other techniques <sup>4)</sup>		
		General	Post-processing			
M1	Orthogonal search transect at ≤10 m intervals and when following a utility trace, search transects at ≤5 m intervals	Use as applicable	No	≤5 m survey grid	B1, B2, B3, B4	Used where the density of services is typical of an undeveloped area
M1P			Yes		B1P, B2P, B3P	
M2	Orthogonal search transect at ≤5 m intervals and when following a utility trace, search transects at ≤2 m intervals	Either: a) ≤2 m orthogonal; or b) high density array <sup>5)</sup>	No	≤2 m survey grid	B1, B2, B3, B4	Used where the density of services is typical of a suburban area or where the utility services cross a boundary of a survey area
M2P			Yes		B1P, B2P, B3P	
M3	Orthogonal search transect at ≤2 m intervals and when following a utility trace, search transects at ≤1 m intervals	Either: a) ≤1 m orthogonal; or b) high density array <sup>5)</sup>	No	≤1 m survey grid	B1, B2, B3, B4	Used where the density of services is typical of a busy urban area or for clearance surveys prior to operations such as borehole/drilling/ fencing/tree planting
M3P			Yes		B1P, B2P, B3P	
M4	Orthogonal search transect at ≤2 m intervals and when following a utility trace, search transects at ≤0.5 m intervals	Either: a) ≤0.5 m orthogonal; or b) high density array <sup>5)</sup>	No	≤0.5 m survey grid	B1, B2, B3, B4	Used where the density of services is typical of a congested city area
M4P			Yes		B1P, B2P, B3P	

**NOTE 1** In general the effort increases from M1 to M4 and the addition of post-processing. For areas with a greater density of utilities or areas considered high risk by the client, a detection method that has a higher level of effort should be selected.  
**NOTE 2** "P" indicates off-site post-processing has been included.

<sup>1)</sup> It is a requirement that a minimum of GPR and EML techniques are used (see 8.2.1.1.2).  
<sup>2)</sup> The tolerance for orthogonal transect centres and survey grids shall be ±0.1 m.  
<sup>3)</sup> It is a requirement that passive EML is deployed over the whole survey area and that where an active EML method can be used, it is used (see 8.2.1.3.2).  
<sup>4)</sup> The transect centre depends on technique used.  
<sup>5)</sup> A high density array comprises 100 mm or closer antenna separation.

## LIST OF UTILITIES EXPECTED TO BE PRESENT

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Service Type	Function	Expected on site
Cable TV	Virgin Media / Vodafone	✓
Drainage / Sewers	Foul / Surface or Combined	✓
Electric	High & Low Voltage	✓
Gas	Main supply feeds	✓
Telecom	BT / Fibre Optics	✓
Water	Main supply feeds	✓
Other	Earth routing / traffic lighting / CCTV etc..	✓

## EXISTING SERVICES / DESKTOP INFORMATION

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Available information, provided by Central Alliance:

Service	Provider	Responded	Affected or Not	Number of Plans / Comments
BT	Openreach	✓	✓	One plan received showing BT cables present
Electric	Northern PowerGrid	✓	✓	Two plans received showing Electric cables present
Gas	Northern Gas Networks	✓	✓	Eleven plans received showing Low Pressure Gas mains present
Gas	ESP Utilities	✓	✘	Two plans received showing Low Pressure Gas mains outside of the survey area

## SURVEY RESULTS & SUMMARY OF FINDINGS

Service	Comment Number	PAS128 Quality Level	Successes / Problems Differences between survey & "Stats"
Drainage	1	N/A	Partial results in places due to: UTS gullies – chambers pipes blocked with silt or debris / no pipes visible or no access to the outgoing pipe to sonde.
	2	QL-B4	Unable to locate the position of the sewer main running down Boy Lane to the downstream Manhole located near the track entrance, approximate position only shown on the drawing for this sewer due to, pipe being too deep to sonde to the upstream Manhole which is situated a fair distance outside of the survey area. GPR also proved inconclusive for the location of this sewer main – show caution.
	3	QL-B2	Unable to fully confirm some connections. Located to point where no further trace possible due to stuck line threader / sonde. Possible result of blockages / obstructions / bends in pipe.
Electric	1	QL-B1	Multiple electric cables have been detected within the survey area.
	2	QL-D	Electric routes that couldn't be proven / completed have been shown from records in approximate positions only.
Gas	1	QL-B2	Two unknown routes partially detected along Boy Lane and the track side of the Viaduct are assumed to be 6" Cast-Iron & 4" Spun Iron Low-Pressure gas mains, as both routes correspond with the existing Northern Gas Networks record plan. Unable to fully locate these two routes, shown from records in approximate position after the last locatable points.
	2	QL-D	Pipe sizes and materials have been shown from existing records as unable to ascertain on site through non- intrusive surveying techniques.
	3	QL-D	Routes that could not be completed / proven have been transferred from records where necessary in approximate positions only.
Telecom	1	QL-B1	BT's policy does not allow the lifting of covers, which has therefore restricted the effective use of electromagnetic surveying techniques.
	2	QL-B1	BT cables have been located below ground, two routes only partially until a loss of signal, show caution after these last locatable points as routes may continue.
	3	QL-A	Overhead BT cables are present within the survey area feeding the properties on Boy Lane.
	4	QL-D	Routes that could not be completed / proven have been transferred from records where necessary in approximate position only.
Cable TV	1	QL-B1	One cable TV route has been detected within the footpath side of Boy Lane, unable to fully locate – show caution as route may possibly continue beyond the last locatable point.
CCTV	1	QL-B1	No closed circuit television (CCTV) routes were detected within the survey extents.

Service	Comment Number	PAS128 Quality Level	Successes / Problems Differences between survey & "Stats"
Water	1	QL-B2	One water main has been detected within the survey area but only partially due to a loss of reflection – show caution as water main possible continues beyond this last locatable point.
	2	QL-B1	Unable to trace water to / from several features (ie valves, hydrants, stop taps, meters and risers) – GPR proved inconclusive – show caution as water mains are possibly present within the vicinity of these features.
Other	1	QL-B1	No other services to the ones already located were detected within the survey area.
	2	QL-A	Heavy visible scarring is present within the survey area.
GPR Scans	1	QL-B2	A GPR survey has been carried out across the site where possible over an orthogonal grid with search transects at 2m intervals.
	2	QL-B2	No subsurface anomalies, building footprints or any additional services were detected by GPR.

## SITE NOTES

- Survey was undertaken in the areas defined by AmcoGiffen.
- All areas were accessible and safe with some vegetated areas.
- Ground conditions at time of survey were wet / damp asphalt, unmade ground.
- GPR scans were carried out within the survey area over an orthogonal grid with search transects at 2m intervals were possible, due to certain limitations on varying sites GPR data could be limited for areas such as slopes / banking / uneven ground and heavily saturated ground conditions.
- Various utilities on site could not be proven or completed and the appropriate comments have been added to the drawing.
- Visual awareness of scarring and ground deformation can often prove valuable to the survey team in locating underground utilities.
- Services plotted outside survey extents should not be considered to be exhaustive.
- Through non-intrusive surveying techniques it always remains possible that there are additional services within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all service providers records be checked prior to any works being carried out.

# SITE PHOTOGRAPHS

PHOTO 1 – View of surface Manhole in Boy Lane



PHOTO 2 – View of Manhole in the track



PHOTO 3 – View of Boy Lane



PHOTO 4 – View water features in Boy Lane



PHOTO 5 – View of track entrance at Boy Lane



PHOTO 6 – View along the track



## 6. LANDOWNERSHIP DETAILS

The conveyance documents for the surrounding land states that the HRE retain the right to access the structure, *“with workmen materials and plant for the purposes of inspecting and maintaining repairing rebuilding demolishing or filling in the said tunnel or viaduct and also full right of access to and over the hatched blue area (below) such as may be necessary to maintain or construct such embankments as the Board may consider necessary for the support of the said tunnel and viaduct”*.

A records search of the current landowners was undertaken; please see the extracted executive summary below:



(09.04.2010) PROPRIETOR: JOHN ANTHONY STANSFIELD and DIANNE ELIZABETH REITH of 72 Boy Lane, Wheatley, Halifax HX3 5AE and of 8 Stile Moor Rise, Todmorden OL14 5NS.

(15.7.1999) PROPRIETOR: GLENN MARK HOLDSWORTH and DEBORAH ANNE HOLDSWORTH of 1 Hops Lane, Wheatley, Halifax, West Yorkshire HX3 5FB.

(02.08.1999) PROPRIETOR: KEVIN JOHNSON STAFFORD and VALERIE POWELL of 3 Hops Lane, Wheatley, Halifax, West Yorkshire HX3 5FB.

(19.01.2000) PROPRIETOR: MICHAEL JOHN ALBROW of 5 Hops Lane, Wheatley, Halifax, West Yorkshire HX3 5FB.

(25.7.2014) PROPRIETOR: SOUTHDALE LIMITED (Co. Regn. No. 03618913) of Southdale House, Westholme Road, Halifax HX1 4JF.

## 7. ECOLOGICAL MEMO

# Jacobs

HXH4/A

HXH4a Preliminary Ecological Appraisal

1 | 0

August 2020

Highways England Historic Railways Estate



HXH4/A

Project No: B28280DA  
 Document Title: HXH4a Preliminary Ecological Appraisal  
 Document No.: 1  
 Revision: 0  
 Document Status: <DocSuitability>  
 Date: August 2020  
 Client Name: Highways England Historic Railways Estate  
 Client No: 0  
 Project Manager: Nigel Robson  
 Author: Sarah Unsworth  
 File Name: HXH4a PEA

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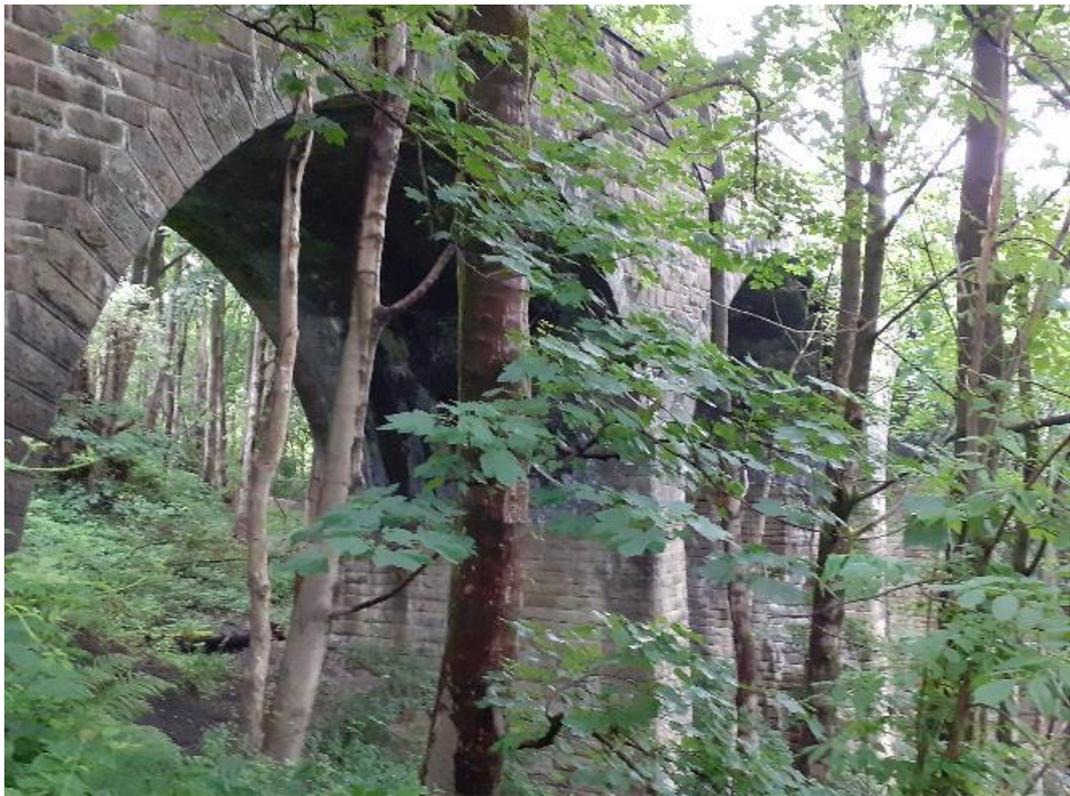
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Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
0	August 2020	HXH4a Preliminary Ecological Appraisal	SU	AS	SM	NR

## 1. Ecological walkover details

Structure Information	
Name of structure	HXH4a
Grid reference	SE 06785 26955
Nearest postcode	HX3 5FB
Photograph of structure viewed from the east	
Scope of works	De-vegetation and repair
Planning required?	No
Methods	
Date of walkover	2 <sup>nd</sup> July 2020
Surveyor names	Sarah Unsworth and Stefanie Pearse
Desk study	
Name of Local Records Centre	West Yorkshire Ecology Service
Link to data saved on the server	\\carfil01\Projects\Ben\Ecology\Jobs\BRB rail property framework\Current Structures\HXH4a\004 Desk study\20200701 C640 MT
Data requested	
SAC within 30km (excluding Scotland)	<input checked="" type="checkbox"/> Designated sites within 2km. <input checked="" type="checkbox"/>
Protected species within 2km	<input checked="" type="checkbox"/> Maximum age of records requested 10 years <input checked="" type="checkbox"/>

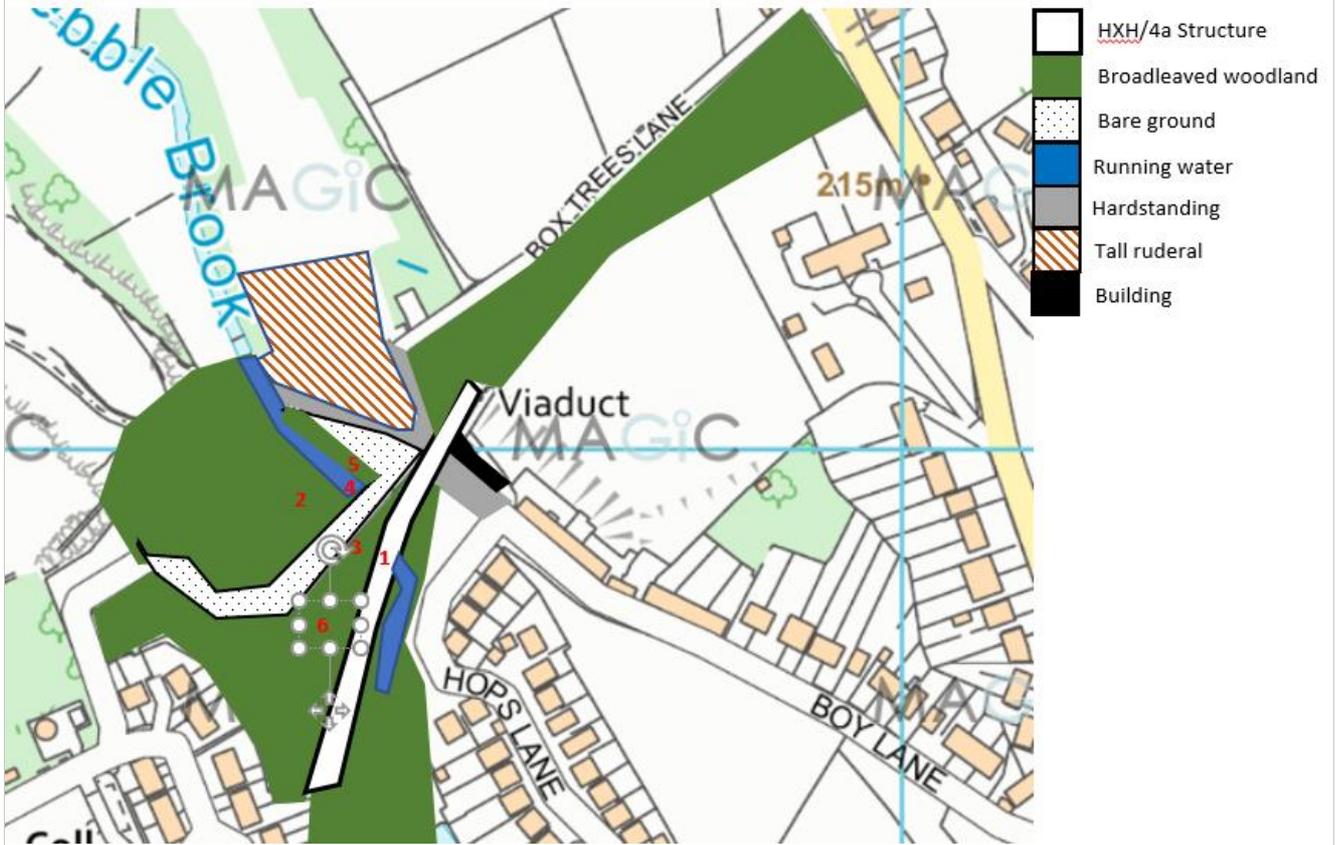
Structure Information			
Reason for deviation from data request above	N/A		
Search of MAGIC and google maps			
Ponds within 250m	<input checked="" type="checkbox"/>	Licence applications within 2km (England only).	<input checked="" type="checkbox"/>
Field survey			
Survey type	Surveyed?	Distance from structure (m)	Limitations e.g. access.
Phase 1 habitat survey	Yes	20	Limited access around structure and no access to top of structure.
Potential for species below to be on site (details in target notes)			
	Surveyed?	Distance from structure (m)	Limitations e.g. access.
Invasive species	Yes	20	No access to top of structure.
Bat roosting potential structure	Yes	N/A	N/A
Bat roosting potential trees	Yes	20	N/A
Badger	Yes	20	Limited access around structure.
Breeding birds	Yes	20	N/A
Reptiles	Yes	20	Limited access around structure.
GCN	Potential assessed using desk study results – desk study records & pond numbers.		
Dormouse	No	N/A	Structure not within species known range.
Otter	Yes	20	Limited access around structure.
Water vole	Yes	20	Limited access around structure.
Results			
Desk study			
SAC within 30km	No SAC designated for bats are present within 30km of the structure.		
Statutory sites within 2km	Beechwood Park LNR/LWS 1.2 km north-east.		
Non-statutory sites within 2km	Beechwood Park LWS /LNR 1.2 km north-east.		
Any protected sites within site boundary	Site lies within the Calderdale Wildlife Habitat Network.		
Licence applications within 2km	Common pipistrelle ( <i>Pipistrellus pipistrellus</i> ) (2014) located 1.9 km west. Common pipistrelle (2012-2014) 1.4 km north-west.		

Structure Information		
Ponds within 250m	None.	
Nearest record and date of important species		
Species	Year of record	Distance and direction from structure
Palmate newt <i>Triturus helveticus</i>	2013	190 m south.
Common toad <i>Bufo bufo</i>	2013	190 m south.
Common frog <i>Rana temporaria</i>	2013	190m south.
Common pipistrelle <i>Pipistrellus pipistrellus</i>	2013	124 m south-west.
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	2019	1.2 km north-east.
Noctule <i>Nyctalus noctula</i>	2019	Four records from 2019. One 1 km south of the structure, and three approximately 1.14 km north-east of the structure.
Leisler's bat <i>Nyctalus lesleri</i>	2018	1.4 km south.
Western European hedgehog <i>Erinaceus europaeus</i>	2018	1.1 km north.
Signal crayfish <i>Pacifastacus leniusculus</i>	2013	500 m south-east.
Sea trout <i>Salmo trutta</i>	2015	500 m south-east.
Common sandpiper <i>Actitis hypoleucos</i>	2015	1.9 km north-west.
Skylark <i>Alauda arvensis</i>	2015	Eighteen records 900m to 1.2 km located to the northwest and south of the structure.
Mallard <i>Anas platyrhynchos</i>	2012	900 m west.
Meadow pipit <i>Anthus pratensis</i>	2015	Fifteen records located between 1.2 km and 1.7 km to the northwest and south of the structure.
Swift <i>Apus apus</i>	2011	Seventeen records located between 500 m and 1.6 km to the north, east, and south of the structure.

Structure Information		
Linnet <i>Carduelis cannabina</i>	2015	Eighteen records located between 680 m and 1.9 km north, west, and south of the structure.
Dipper <i>Cinclus cinclus</i>	2015	1.9 km north.
Stock dove <i>Columba oenas</i>	2015	Four records 1.1 km to 1.8 km west of the structure.
House martin <i>Delichon urbica</i>	2015	1.4 km north-west.
Kestrel <i>Falco tinnunculus</i>	2015	1.1 km west.
Swallow <i>Hirundo rustica</i>	2011	Seven records located 1 to 1.9 km north, west, and south of the structure.
Common gull <i>Larus canus</i>	2013	600 m south-west.
Grey wagtail <i>Motacilla cinerea</i>	2015	1.2 km north
Curlew <i>Numenius arquata</i>	2015	Six records approximately 1.8 km north, west and south of the structure.
Wheatear <i>Oenanthe oenanthe</i>	2015	Three records between 1.5 km and 1.8 km north-west of the structure.
House sparrow <i>Passer domesticus</i>	2015	Twelve records predominantly located west of the structure, between 900m and 1.8 km.
Willow warbler <i>Phylloscopus trochilus</i>	2015	1.2 km north.
Green woodpecker <i>Picus viridis</i>	2015	1.1 km west.
Golden plover <i>Pluvialis apricaria</i>	2015	1.4 km west.
Starling <i>Sturnus vulgaris</i>	2015	Sixteen records mostly located to the north-west of the structure, between 700 m and 1.9 km.
Whitethroat <i>Sylvia communis</i>	2015	1.7 km north.
Redshank <i>Tringa totanus</i>	2019	1.7 km north.
Song thrush <i>Turdus philomelos</i>	2013	700 m south-west.
Lapwing <i>Vanellus vanellus</i>	2015	1.1 km north-west.
<b>Field survey</b>		

Structure Information

Annotated Extended Phase 1 Plan with target note labels



Structure Information	
TN description	Photograph
<p>TN1: HXH/4a is a 10-span viaduct constructed of stone and brick. The structure has high bat roost potential. Features with bat roost potential include fractures behind voussoirs (arch 10 pictured top), gaps in the stonework of the piers (pictured below left), and sections of missing bricks in arch barrels (pictured below, right) or missing stones within piers. A bee's nest was recorded within a gap in stonework of the 3<sup>rd</sup> span.</p>	  

**Structure Information**

TN2: Broadleaved woodland habitat is present around the structure and to the west. Species include sycamore (*Acer pseudoplatanus*), elder (*Sambucus nigra*), ash (*Fraxinus excelsior*), ivy (*Hedera helix*), wood avens (*Geum urbanum*), hart's-tongue fern (*Asplenium scolopendrium*).



TN3: Himalayan balsam (*Impatiens glandulifera*) scattered in the woodland.



Structure Information

TN4: Hebble Brook. Enters culvert to west of structure and flows underneath structure to east. Culvert not fully inspected for bat roost potential.



TN5: Woodpecker hole in oak (*Quercus robur*) tree to west of structure beyond Maltings Road track. Appeared occluded from ground (low bat roost potential).



TN6: Small rock outcrop with horizontal and vertical fissures that may support roosting bats (moderate potential).



## **2. Risk rating**

Ecological Feature	Risk Rating	Justification for rating	Recommended Action	Timescales
Potential bat roost High potential- structure	High	Structure to be repaired has high potential to support roosting bats. If a bat roost is present, work could destroy a bat roost and could disturb, injure or kill bats. An offence would be triggered under the Wildlife and Countryside Act 1981 (as amended) (WCA) and The Conservation of Habitats and Species Regulations 2017 (as amended) (Habs Regs).	<p>Visual inspections of the structure should be made in winter.</p> <p>Consideration to be given to using roped access to allow inspection of features given the height of the structure.</p> <p>Three spring/summer emergence re-entry surveys should be carried out.</p> <p>If bats are found to be present, then a derogation licence from NE would be required before any works could proceed.</p>	<p>3x Spring/summer emergence surveys: May – September (Jacobs)</p> <p>2 x winter endoscope inspections – 1x January – 1x February (Jacobs)</p> <p>Licence preparation 2 weeks (Jacobs),</p> <p>Licence approval / issue c.30 working days (NE)</p>
Badger	Moderate	No signs of badger were recorded during the survey underneath the structure. No records of badger were found within 2km of the structure in the desk study. It was not possible to survey the deck of the structure or potential access routes to the deck.	If works access is likely from deck and associated access routes a survey to check for badger setts will be required	Any time of year, easier in the winter when less vegetation cover
Reptiles	Moderate	No reptile records within 2km of the structure were returned in the desk study. The area under the structure was disturbed by humans and heavily shaded by the woodland. While Hebble Brook and the woodland areas provides some suitable habitat for grass snake the level of disturbance and lack of records makes reptile presence	A survey of the deck and access areas to the deck will be required if works are likely in this area.	Habitat suitability survey any time of year. If suitable habitat a two stage veg clearance method will be required under PWMS and ECoW supervision.

		unlikely. A survey of the deck and access areas to the deck will be required if works are likely in this area.		
Potential bat roost moderate potential – natural feature	Low	No works to rocky outcrop anticipated.	If any works are required directly involving the rocky outcrop then 2 summer surveys and possible winter surveys will be required	Spring/summer emergence surveys: May – September (Jacobs) 2 x winter endoscope inspections – 1x January – 1x February (Jacobs) Licence preparation 2 weeks (Jacobs), Licence approval / issue c.30 working days (NE)
Potential bat roost low potential- tree	Low	One tree with low bat roost potential was identified. It was located approximately 30-40m from the structure and is therefore unlikely to be affected by works. <b>Access routes to if required deck have not been surveyed – no access at the time of PEA</b>	Should the tree need to be felled a Precautionary Working Method Statement (PWMS) should be followed. <b>Should access to the deck be required a survey for bat trees will be required.</b>	If felling of tree required: Preparation of PWMS (Jacobs) 1 day
Breeding Bird habitat surrounding the structure	Low	The viaduct, and surrounding woodland provide suitable breeding habitat for numerous bird species.	No vegetation clearance during the breeding bird survey. If vegetation clearance is required during the breeding bird season a pre- works checks of any suitable nesting vegetation must be conducted by an ecologist. Create exclusion zones around active nests if any works is undertaken during the breeding season.	Avoid vegetation clearance during the breeding bird season (March to August inclusive). If clearance is required during the breeding bird season, vegetation must be fully inspected by an ecologist prior to removal.

Hedgehog	Low	Records of hedgehog are present in the area and habitats are suitable for the species.	Check any areas of dense scrub that could conceal a hedgehog prior to vegetation clearance.	Checks by an ECoW prior to vegetation clearance.
Amphibians including great crested newt	Low	There are no ponds within 250m of the structure and no records of great crested newt within 2km. Great crested newt are therefore not considered to be a constraint. Common frog and common toad have potential to be present in habitats under the structure given the presence of Hebble Brook and the woodland habitat	Pre-works check of areas underneath the structure should be carried out to ensure amphibians are not present.	Prior to works commencing.
Invasive species	Low	Himalayan balsam is present in habitats around the structure and a record of signal crayfish was returned from Hebble Brook	Contractor to work under appropriate invasive species management plan to control spread of Himalayan Balsam, compiled by the contractor. Brook not expected to be impacted by the works.	Best practice to avoid works when Himalayan balsam is in seed in July-October.
Otter and water vole	Low	No records of otter or water vole were returned. No otter or water vole signs were recorded during the survey. The area around Hebble Brook and the culvert under the structure itself were subject to disturbance by members of the public. Water vole are not considered to be present in the area. Otter may pass through the area infrequently but due to the level of disturbance the area is not suitable for otter holts or lay ups.	Avoid working at night and if night works cannot be avoided avoid directing lights at the watercourse.	During works.

## 8. SITE INVESTIGATION REPORT AND SURVEY DATA



## Waste Classification Assessment Report for Soils

**AMCO**

Boy Lane, Halifax, HX3 5AE



[www.ecoefficiency.co.uk](http://www.ecoefficiency.co.uk) | [enquiries@ecoefficiency.co.uk](mailto:enquiries@ecoefficiency.co.uk)

Ecofficiency Ltd | Armstrong House | First Avenue | Finningley Estate | DN9 3GA

Report Reference:	118601
Date of Report:	09/02/2023
Client:	AMCO
Site Address:	Boy Lane, Halifax, HX3 5AE
Customer Contact:	Neil Thompson
Customer Job Reference:	580529
Date Samples Received:	07/02/2023
Date Report Completed:	09/02/2023

## Limitations and Uncertainties

The information reported herein is based on the interpretation of data collected during the site visit only, pertaining specifically to the soil samples retained from the identified locations.

This report has been prepared by Ecofficiency Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client.

The evaluation and conclusions do not preclude the existence of other waste classifications, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential waste streams.

This report has been prepared solely for the use of the above client, and may not be relied upon by other parties without written consent from Ecofficiency Ltd.

Ecofficiency Ltd disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

## Section A: Sample and Testing Information

Material type:	<b>Sample id</b>	<b>Depth (m)</b>	<b>Sample description</b>
	SPAN 1	-	Sandy Loam with Gravel & Roots
	SPAN 3-4	-	Sandy Loam with Gravel
	SPAN 8	-	Sandy Clayey Loam with Gravel
Material Volume:	TBC		
Number of representation samples:	3		
Evidence of Contamination:	Historic: Information not supplied		
Sample by:	Neil Thompson		

### Objective:

Classification of waste soil for removal from site.

## Section B: Waste Classification

Image	Sample ID	Waste Classification	EWC Code	Contaminants
View	Span 1	Hazardous	17 05 03*	TPH
View	Span 4-3	Non-Hazardous (No Elevated Contamination)	17 05 04	No contamination
View	Span 8	Non-Hazardous (No Elevated Contamination)	17 05 04	No contamination

## Section C: Conclusion and Recommendations

Removal of Non-Hazardous samples with no elevated contamination can potentially be removed to licensed recovery and restoration sites to avoid landfill tax costs and the need for further WAC Testing.

Further WAC Testing may be necessary if this material is intended for removal to Inert Landfill.

Removal of Hazardous sample Span 1 can potentially be removed to a range of off-site treatment facilities to avoid landfill tax costs or the need for further WAC Testing.

Further WAC Testing is required in the event this material is removed to Hazardous Landfill to identify if this material is suitable.

## Section D: List of Appendices

Sample and Testing Information

Waste Classification

Laboratory Results

UKAS & MCERTs Accredited Report

## Classification Test Suite

Lab number			118601-2	118601-3	118601-4
Sample id			SPAN 1	SPAN 3-4	SPAN 8
Depth (m)			-	-	-
Date sampled			-	-	-
Test	Method	Units			
Moisture Content	CE001	% w/w	0.9	17	8.1
Arsenic (total)	CE127 M	mg/kg As	29.535	33.71	11.495
Cadmium (total)	CE127 M	mg/kg Cd	0.501	0.434	0.334
Chromium (total)	CE127 M	mg/kg Cr	41.358	43.859	29.893
Chromium (III)	CE208	mg/kg CrIII	41	44	30
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	125.292	126.778	55.505
Lead (total)	CE127 M	mg/kg Pb	41.411	60.219	57.391
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	54.998	50.785	30.805
Selenium (total)	CE127 M	mg/kg Se	1.713	1.936	1.034
Zinc (total)	CE127 M	mg/kg Zn	100.743	74.557	64.205
pH	CE004 M	units	6.4	6.5	6.7
PAH					
Naphthalene	CE087 M	mg/kg	3.05	0.32	0.19
Acenaphthylene	CE087 M	mg/kg	0.10	<0.02	<0.02
Acenaphthene	CE087 M	mg/kg	1.87	<0.02	<0.02
Fluorene	CE087 U	mg/kg	1.46	<0.02	<0.02
Phenanthrene	CE087 M	mg/kg	12.23	0.27	0.19
Anthracene	CE087 U	mg/kg	1.71	0.07	0.03
Fluoranthene	CE087 M	mg/kg	19.88	0.63	0.18
Pyrene	CE087 M	mg/kg	22.31	0.57	0.18
Benzo(a)anthracene	CE087 U	mg/kg	8.15	0.30	0.09
Chrysene	CE087 M	mg/kg	10.28	0.30	0.10
Benzo(b)fluoranthene	CE087 M	mg/kg	5.05	0.25	0.11
Benzo(k)fluoranthene	CE087 M	mg/kg	1.41	0.10	0.04
Benzo(a)pyrene	CE087 U	mg/kg	3.76	0.15	0.07
Indeno(123cd)pyrene	CE087 M	mg/kg	1.09	0.11	0.05
Dibenz(ah)anthracene	CE087 M	mg/kg	0.31	0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	0.92	0.09	0.04
PAH (total of USEPA 16)	CE087	mg/kg	93.57	3.19	1.25
TPH					
VPH (>C5-C10)	CE067	mg/kg	<0.1	<0.1	<0.1
EPH (>C10-C25)	CE033 M	mg/kg	646	27	24
EPH (>C25-C40)	CE033 M	mg/kg	381	79	58
Subcontracted analysis					
Asbestos (qualitative)	\$	-	NAD	NAD	NAD

## UKAS & MCERTs Accredited Report





### CHEMTECH ENVIRONMENTAL LIMITED

#### SAMPLE INFORMATION

### ANALYTICAL TEST REPORT

**Contract no:** 118601

**Contract name:** AMCO, Bay Lane, Halifax, HD3 5AE

**Client reference:** SR0529

**Client name:** EcoEfficiency

**Client address:** US18 Armstrong House  
Frimleyway  
DN9 3GA

**Samples received:** 02 February 2023

**Analysis started:** 02 February 2023

**Analysis completed:** 09 February 2023

**Report issued:** 09 February 2023

**Key**

- U UKAS accredited test
- M MCERTS & UKAS accredited test
- § Test carried out by an approved subcontractor
- I/S Insufficient sample to carry out test
- N/S Sample not suitable for testing
- NAD No Asbestos Detected

**Approved by:**   
Rachael Burton  
Reporting Manager

Unit 6 Parkway, Greencroft Industrial Park, Stanley, County Durham, DH9 7YB  
Tel: 0207 288788 Email: customers@chemtechenv.com  
Vat No: 915 772 5703 18 Registered in England number: 4284653

118601  
AMCO, Bay Lane, Halifax, HD3 5AE  
SR0529

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### Chemtech Environmental Limited

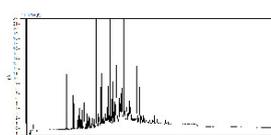
#### SOILS

Lab number	Sample id	Depth (m)	Date as reported	118601-2 SPAN 1	118601-3 SPAN 3-4	118601-4 SPAN 8
<b>Trace Metals</b>						
Antimony (Sb)	CE127**	mg/kg Sb	30	34	11	
Barium (Ba)	CE127**	mg/kg Ba	0.5	0.4	0.3	
Chromium (Cr)	CE127**	mg/kg Cr	41	44	30	
Chromium (Cr)	CE208	mg/kg Cr(VI)	41	44	30	
Chromium (Cr)	CE146	mg/kg Cr(VI)	<1	<1	<1	
Copper (Cu)	CE127**	mg/kg Cu	120	127	86	
Lead (Pb)	CE127**	mg/kg Pb	41	40	37	
Mercury (Hg)	CE127**	mg/kg Hg	<0.3	<0.3	<0.3	
Nickel (Ni)	CE127**	mg/kg Ni	53	51	31	
Selenium (Se)	CE127**	mg/kg Se	1.7	1.9	1.0	
Zinc (Zn)	CE127**	mg/kg Zn	101	76	64	
pH	CE0047**	units	6.4	6.5	6.7	
<b>PAHs</b>						
Acenaphthene	CE087**	mg/kg	3.05	0.22	0.19	
Acenaphthylene	CE087**	mg/kg	0.10	<0.02	<0.02	
Acenaphthene	CE087**	mg/kg	1.87	<0.02	<0.02	
Fluorene	CE087**	mg/kg	1.46	<0.02	<0.02	
Phenanthrene	CE087**	mg/kg	12.23	0.27	0.19	
Anthracene	CE087**	mg/kg	1.71	0.07	0.03	
Fluoranthene	CE087**	mg/kg	19.88	0.63	0.18	
Pyrene	CE087**	mg/kg	22.31	0.17	0.18	
Benzo(a)anthracene	CE087**	mg/kg	6.15	0.30	0.09	
Chrysene	CE087**	mg/kg	10.28	0.30	0.10	
Benzo(b)fluoranthene	CE087**	mg/kg	6.05	0.29	0.11	
Benzo(k)fluoranthene	CE087**	mg/kg	1.41	0.10	0.04	
Benzo(a)pyrene	CE087**	mg/kg	3.76	0.15	0.07	
Indeno(1,2,3-cd)pyrene	CE087**	mg/kg	1.05	0.11	0.05	
Dibenz(a,h)anthracene	CE087**	mg/kg	0.31	0.02	<0.02	
Benzo(g,h,i)perylene	CE087**	mg/kg	0.50	0.09	0.04	
PAH (total of USEPA 16)	CE087**	mg/kg	93.6	3.19	1.25	
<b>TPH</b>						
TPH (C15-C20)	CE067**	mg/kg	<0.1	<0.1	<0.1	
TPH (C10-C25)	CE093**	mg/kg	646	27	24	
TPH (C10-C40)	CE093**	mg/kg	330	79	38	
<b>Subsistence analysis</b>						
Asbestos (Qualitative)	§	-	NAD	NAD	NAD	

### Chemtech Environmental Limited

#### CHROMATOGRAMS

Lab number: 118601-2  
Sample id: SRN 1  
Depth (m): -  
Date sampled: 02/02  
HWPCIS-C18 (mg/kg): C18-C64  
Chromatographic: Unknown Oil



118601  
AMCO, Bay Lane, Halifax, HD3 5AE  
SR0529

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**Chemtech Environmental Limited**  
**METHOD DETAILS**

METHOD	SOILS	METHOD SUMMARY	SAMPLE	ST AT US	LOD	UNITS
CE001	Moisture Content	Gravimetry	As received		0.1	% w/w
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE128	Chromium (VI)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg Cr(VI)
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg Cr(VI)
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	U	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Indeno(1,2,3-cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(a,h)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(g)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Hex(5a,b)perylene (SPM, SE)	Solvent extraction, GC-MS	As received		0.04	mg/kg
CE087	HPH (+Cl-C10)	Headspace, GC-FID	As received		0.1	mg/kg
CE033	HPH (+Cl-C10-C15)	Solvent extraction, GC-FID	As received	M	12	mg/kg
CE033	HPH (+Cl-C10-C40)	Solvent extraction, GC-FID	As received	M	16	mg/kg
§	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

11800-1  
AMSD, Bay Lane, Holford, HD3 5AE  
SH5229  
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**DEVIATING SAMPLE INFORMATION**

**Comments**  
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials. For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling. Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

**Key**  
N No (not deviating sample)  
Y Yes (deviating sample)  
NSD Sampling date not provided  
NST Sampling time not provided (waters only)  
EHT Sample exceed holding time(s)  
IC Sample not received in appropriate containers  
HP Headspace present in sample container  
NCF Sample not chemically fixed (where appropriate)  
OR Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
118001-2	SPAN 1	-	Y	All (NSD)
118001-3	SPAN 3-4	-	Y	All (NSD)
118001-4	SPAN 6	-	Y	All (NSD)

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**ADDITIONAL INFORMATION**

**Notes**

Opinions and interpretations expressed herein are outside the UKAS accreditation scope. Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling. All testing carried out at Unit 6 Porthhead, Stanley, DH9 7TB, except for subcontracted testing. Methods, procedures and performance data are available on request. Results reported herein relate only to the material supplied to the laboratory. This report shall not be reproduced except in full, without prior written approval. Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed. All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet. Analytical results are inclusive of stones, where applicable.

11800-1  
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**QUICK COLLECTION**  
Our soil testing kits reduce  
Sample collection times.



**FAST RESULTS**  
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**ACCURATE CLASSIFICATION**  
Waste classification reporting with  
Assured accuracy supported by.

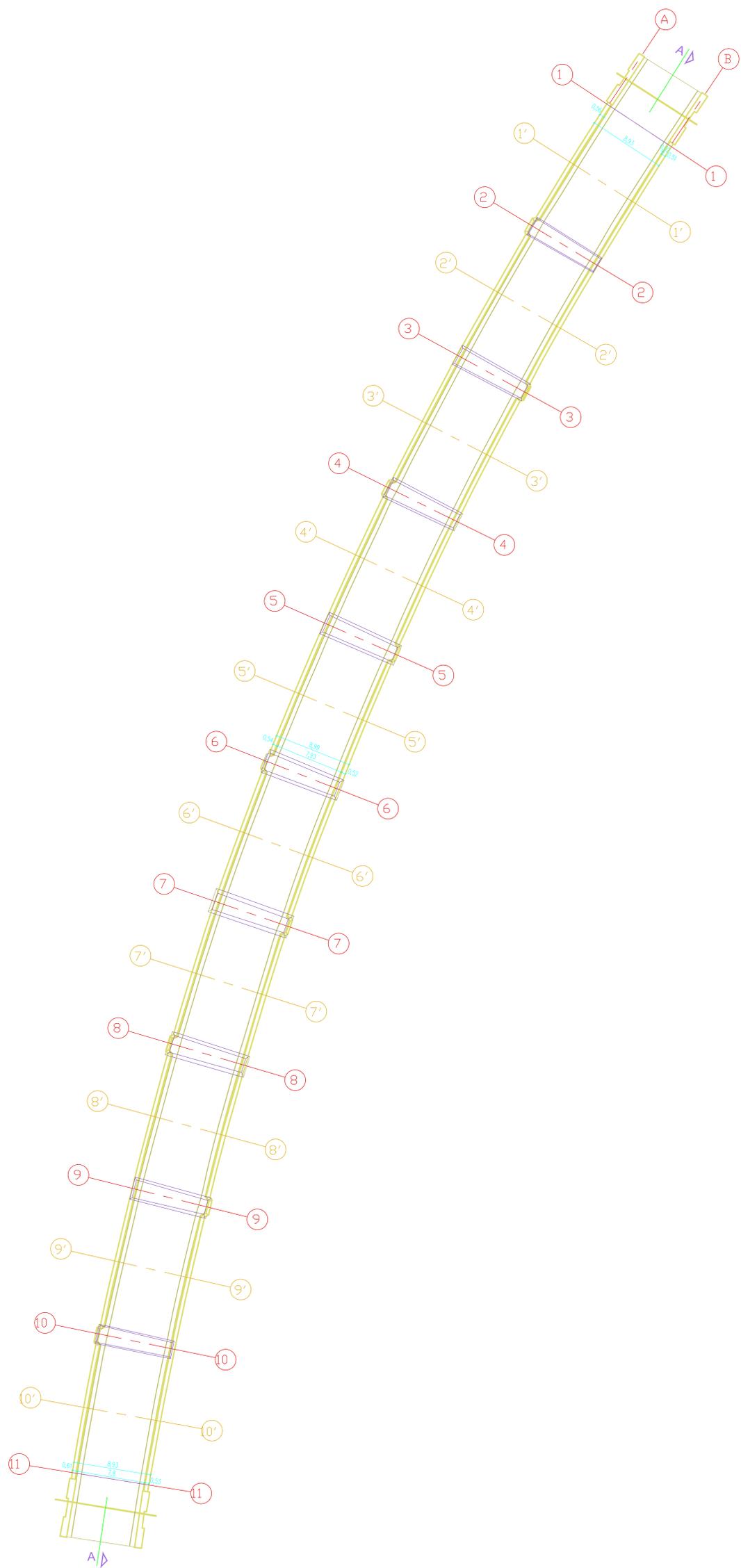


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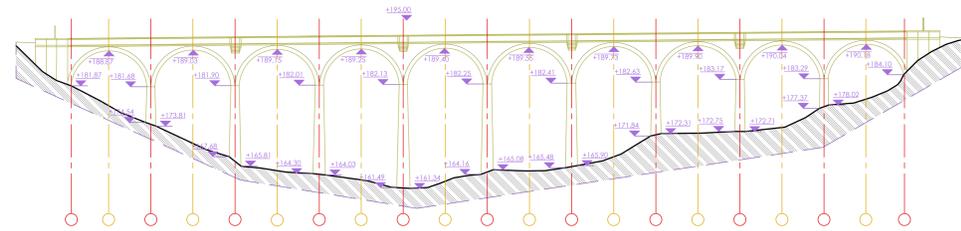
ORIGIN: DISTANCE SURVEY Prepared by: CH Parsons 11 Colindale Avenue Stevenage SG1 1NR	DATUM: DISTANCE SURVEY Related to OS Datum by GPS observations
CLIENT: AmcoGiffen Whalley Road Barnsley	
SITE LOCATION: HX744s - Halifax Boy Lane, Halifax	
SURVEY TITLE: Cross Section Locations	
DESIGNED BY: TH / MK / AG / JW DRAWN BY: MC APPROVED BY: MC	DATE: Jan 23 DATE: Feb 23 DATE: Feb 23
DRAWING NUMBER: 2382104 - Cross Sections SCALE: 1:200 @ A0 SHEET NUMBER: Plan View A0	REV:


**CENTRAL ALLIANCE**  
 GEOTECHNICAL ENGINEERING TECHNICAL SERVICES  

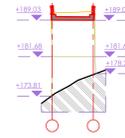

Tel: 01274 228889  
 Email: info@central-alliance.co.uk  
 Web: www.central-alliance.co.uk

Alliance House, South Park Way  
 Wakefield WF1 2JQ

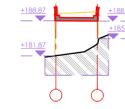
# EAST ELEVATION PROJECTION



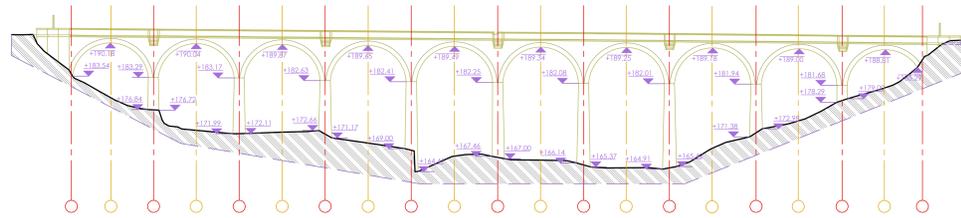
SECTION AXIS 9'



SECTION AXIS 10'



# WEST ELEVATION PROJECTION



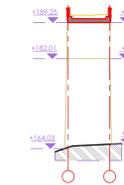
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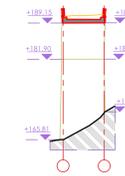
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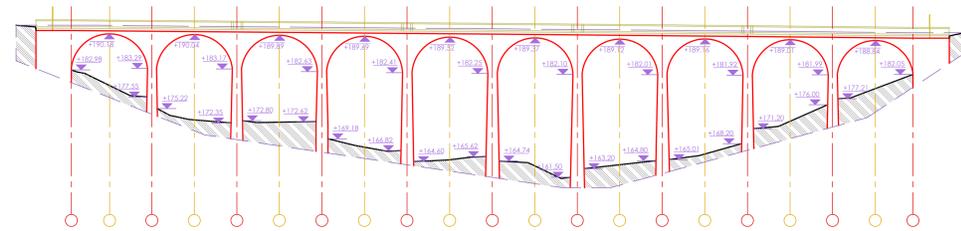
SECTION AXIS 7'



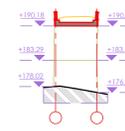
SECTION AXIS 8'



# SECTION A



SECTION AXIS 1'



SECTION AXIS 2'



SECTION AXIS 3'



SECTION AXIS 4'



REV	DETAILS	BY	DATE

GRID: OPERATIONAL SURVEY  
 DATUM: OPERATIONAL SURVEY  
 RELATED TO: DC POINTS  
 1 TO LOCAL SURVEY STATION +0000

**CENTRAL ALLIANCE**  
 GROUND ENGINEERING TECHNICAL SERVICES  
**RSK**

File: 01104 20080  
 Email: info@centralalliance.co.uk  
 Web: www.centralalliance.co.uk

Alliance House, South Park Way  
 Wakefield 11 Business Park,  
 Wakefield, WF2 0LJ

CLIENT: AmcoGiffen  
 Whitley Road  
 Barnsley  
 Barnsley

SITE LOCATION: H2014a - Halifax  
 Boy Lane, Halifax

SURVEY TITLE: Cross Sections

DRAWN BY	DATE	DESIGN NUMBER
TH / MK / AG	Jan 23	2382104 - Cross Sections

APPROVED BY	DATE	SCALE
MC	Feb 23	1:20 @ A0

APPROVED BY	DATE	SHEET NUMBER	REV
MC	Feb 23	Sections A0	



GRID	ORDNANCE SURVEY Related to OS Points 1:1 Contour Interval Datum: 1948	DATUM	ORDNANCE SURVEY Related to OS Datum by GPS observations
CLIENT	AmcoGiffen Whalley Road Barnsley		
SITE LOCATION	HX744s - Halifax Boy Lane, Halifax		
SURVEY TITLE	3D Model of Viaduct		
DRAWN BY	TH / MK / AG / JW	DATE	Jan 23
APPROVED BY	MC	DATE	Feb 23
DRAWING NUMBER	2382104 - 3D Viaduct		
SCALE	1:200 @ A0		
SHEET NUMBER	Plan View AD Port		

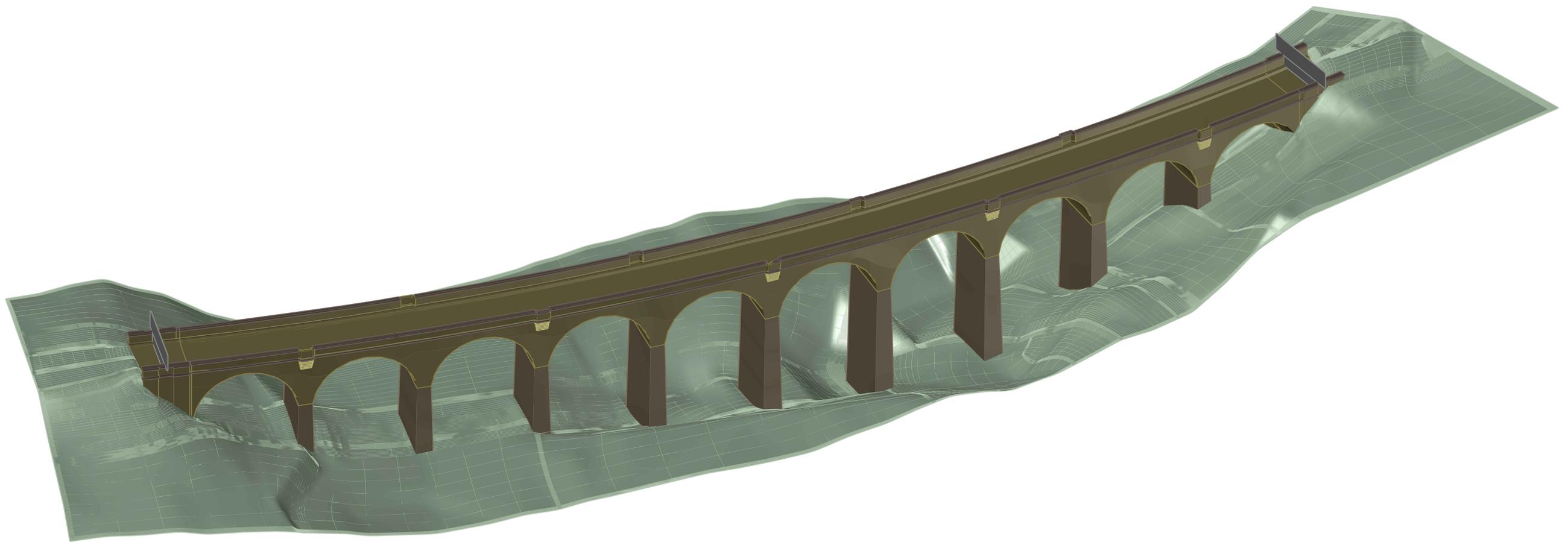
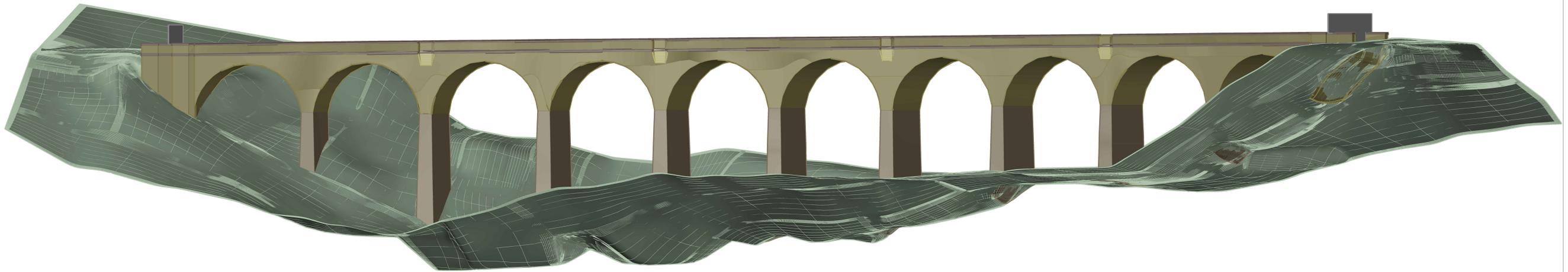
REV	DETAILS	BY	DATE

 **CENTRAL ALLIANCE**  
GROUND ENGINEERING TECHNICAL SERVICES

 **RSK**

Tel: 01204 229889  
Email: info@centralalliance.co.uk  
Web: www.centralalliance.co.uk

Altona House, South Park Way  
Widfield 45 Business Park,  
Widfield, WF2 2JZ



REV	DETAILS	BY	DATE
01	3D Model Viaduct	TH	23/01/23
02	Right Side View & North West Isometric View	MC	23/02/23

GPC ORIGINATOR'S SURVEY Derived to DCP Property 11/06/2018 Station 110625	DATUM ORIGINATOR'S SURVEY Related to DCP Data by GPS observations
---	---

 <b>CENTRAL ALLIANCE</b> GROUND ENGINEERING TECHNICAL SERVICES	
--	---

Tel: 011824 229988 Email: info@centralalliance.co.uk Web: www.centralalliance.co.uk	Alliance House, South Park Way Wharfedale Business Park, Wakefield, WF2 0LJ
---	---

CLIENT <b>AmcoGiffen</b> Whitley Road Barnsley Barnsley				
SITE LOCATION H2014a - Halifax Boy Lane, Halifax				
SURVEY TITLE 3D Model Viaduct Right Side View & North West Isometric View				
DRAWN BY TH / MK / AG	DATE Jan 23	CHECKED BY MC	DATE Feb 23	SCALE Not to Scale @ A0
APPROVED BY MC	DATE Feb 23	SHEET NUMBER 3D Views A0	REV	