



**DOG KENNEL BRIDGE  
IVER  
BUCKINGHAMSHIRE**

**STRUCTURAL RECORDING**

Document: 2010/103

Version: 1.0

Project: DKB1722

January 2011

Compiled by	Approved by
Christiane Meckseper	Hester Cooper-Reade





---

## Contents

---

<b>1. INTRODUCTION .....</b>	<b>10</b>
1.1 Planning and Project Background .....	10
1.2 Previous Work (keywords) .....	10
1.3 Site Location and Description .....	11
1.4 Research Aims and Objectives .....	11
1.5 The Report .....	12
<b>2. HISTORICAL AND DOCUMENTARY BACKGROUND .....</b>	<b>13</b>
2.1 Introduction .....	13
2.2 Historical background of Dog Kennel Bridge .....	13
2.3 Sources consulted .....	14
<b>3. STRUCTURAL RECORDING: RESULTS OF THE SURVEY .....</b>	<b>15</b>
3.1 Methodology .....	15
3.2 Description and phasing .....	15
3.3 Synthesis .....	16
3.4 Publication and Dissemination Proposals .....	17
<b>4. BIBLIOGRAPHY .....</b>	<b>19</b>
<b>5. APPENDICES .....</b>	<b>20</b>
5.1 Appendix 1: Archive submitted .....	20
5.2 Appendix 2: Summary of Photographic Record .....	22
5.3 Appendix 3: Network Rail and bam Nuttall work package plan of controlled demolition of Dog Kennel Bridge .....	27





## **List of Figures**

- Figure 1 Site location
- Figure 2 Generic bridge design plan 1848
- Figure 2b Excerpt of 1848 plan showing generic bridge elevation.
- Figure 3 Dog Kennel Bridge widening. Cropped engineering plan 1878
- Figure 4 Results of Total Surveys Ltd 3D survey. Provisional elevations
- Figure 5 Dog Kennel Bridge east facing elevation, brickwork detail. Provisional survey drawing
- Figure 6 Dog Kennel Bridge east facing elevation. Northern extension arch
- Figure 7 Dog Kennel Bridge east facing elevation. Southern Brunel arch
- Figure 8 Dog Kennel Bridge under demolition. West facing elevation.
- Figure 9 Dog Kennel Bridge demolished. Southern abutment
- Figure 10 Western bridge parapet, internal view, brick detail.
- Figure 11 Original 1836-8 bridge brick samples



## **Preface**

*Every effort has been made in the preparation of this document to provide as complete a report as possible, within the terms of the specification. All statements and opinions in this document are offered in good faith. Albion Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party, or for any loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in this document.*

*The overall project for which this report is a component was managed by Total Surveys Ltd. Albion Archaeology was sub-contracted by Total Surveys Ltd to undertake the documentary and built history research and to carry out a watching brief during the demolition of Dog Kennel Bridge.*

*The project was managed on behalf of Albion Archaeology by Hester Cooper-Reade BA (hons), MIFA. The historical survey was undertaken by Christiane Meckseper MA, MSc, Alfa, who also put together this report. The demolition of Dog Kennel Bridge on Christmas Day 2010 was recorded by Dave Ingham (Project Officer). Joan Lightning BA(hons), Alfa, prepared the figures for this report.*

## **Acknowledgements**

Thank you goes to Joy Rutter of the Wiltshire and Swindon Record Office, John Walter, independent GWR expert and the staff at George Stephenson House and the Network Rail Archives in York.

*Albion Archaeology  
St Mary's Church  
St Mary's Street  
Bedford, MK42 0AS  
☎: 0300 300 8141  
Fax: 0300 300 8209  
e-mail: [office@albion-arch.com](mailto:office@albion-arch.com)  
Website: [www.albion-arch.com](http://www.albion-arch.com)*

*10 January 2011*

## **Structure of this report**

After the introductory Section 1, this report presents the results of the structural survey. The survey requirements were for a record to Level 3 standard (English Heritage 2006). Section 2 consists of background information to place Dog Kennel Bridge in context. Section 3 summarises the results of the surveys and discusses the date, chronology and extent of the surviving features. Section 4 provides a bibliography.

Two separate appendices contain information on content of archive. A selection of photographs and copies of the drawn plans are included to illustrate the text.

Plans are based on those provided by the client and the various archive plans that exist of the bridge.





## **Non-Technical Summary**

*Crossrail is a rail project that will combine new and improved transport routes for London, the South-East and beyond. It will run for 118km from Maidenhead and Heathrow in the west through newly bored tunnels underneath central London to Shenfield and Abbey Wood in the east. The line will be powered by overhead line electrification (OHLE) to European standard.*

*Dog Kennel Bridge was demolished on Christmas Day 2010 as the existing structure did not comply with the required clearance for overhead line equipment. The existing right of way will be rerouted along the northern sided of the railway and a new footpath provided to link the existing footpath with Thorney Lane footbridge.*

*In compliance with the requirements for archaeological work set out in the Environmental Minimum Requirements for Crossrail, which follow the principles of Planning Policy Guidance 16, now replaced by Planning Policy Statement 5, a programme of archaeological recording and reporting was implemented prior the demolition of the bridge.*

*The works undertaken were a 3d laser scan of the entire bridge, accommodated by a photographic survey (limited by safety considerations) and documentary research in order to compile a report to English Heritage Level 3 standard.*

*Dog Kennel Bridge was built in 1836-38 as an overbridge with a single 30-ft-span semi-elliptical arch, wide enough to accommodate Brunel's 7ft $\frac{1}{4}$  broad gauge track. In 1878 the bridge was extended to the north by a further 25ft-span arch anticipating the shift to the standardised narrow gauge track that was already common on Britain's other railways.*

*The bridge is constructed of London stock brick with white hydraulic mortar, brick string courses and dressed gritstone copings. It retains its original parapets. Apart from the very obvious smaller brick arch, the northern extension is virtually indistinguishable from the southern original structure. A subtle difference between the two sections is a change in brickwork from the original Flemish to the later English coursing of the extension.*

*Dog Kennel Bridge is a simple railway bridge built to a standardised design, the wide arch being a reminder of Brunel's broad gauge track. The bridge also reflects Brunel vision of a railway that was part of a grand design but nevertheless integrated with the landscape on a local level. It retains most of its original fabric and has not been altered since its extension in 1878.*







## 1. INTRODUCTION

---

### 1.1 *Planning and Project Background*

Crossrail is a rail project that will combine new and improved transport routes for London, the South-East and beyond. It will run for 118km from Maidenhead and Heathrow in the west through newly bored tunnels underneath central London to Shenfield and Abbey Wood in the east.

Part of the development are seven new stations within central London and the renewal and/or upgrade of existing stations outside London. The line will be powered by overhead line electrification (OHLE) to European standard.

Dog Kennel Bridge did not comply with the required clearance for overhead line equipment and the decision was taken to demolish it. The existing right of way will be rerouted along the northern sided of the railway and a new footpath provided to link the existing footpath with Thorney Lane footbridge.

The strategies governing mitigation works to above and below ground archaeological assets and listed buildings were set out in detail in the Environmental Statement (ES) submitted in conjunction with the Crossrail Bill. The framework within which any archaeological work is undertaken is set out in the Environmental Minimum Requirements (EMR) and also in the Crossrail Construction Code.

Dog Kennel Bridge is a Grade II listed building. Schedule 9 to the Crossrail Bill disapplies listed building consent in relation to Crossrail works. Instead heritage agreements have been prepared for the listed buildings affected by the Crossrail works between the Secretary of State for Transport, English Heritage and the relevant local authority as appropriate. Potential impacts from construction works on listed buildings which are not covered by a separate agreement are also controlled via mechanisms set out in the Crossrail Construction Code.

The requirements and mechanisms follow the principles of Planning Policy Guidance 16 (PPG16), which was replaced in March 2010 by Planning Policy Statement 5 (PPS5). According to the principles of both PPG15 and PPS5 any nominated undertaker or contractors will be required to implement certain control measures in relation to archaeology before construction – or demolition – work begins. In the case of Dog Kennel Bridge Crossrail Limited (CRL) is the nominated undertaker.

The general strategy for all archaeological works necessitated by the Crossrail scheme are set out in the Crossrail Generic Written Scheme of Investigation (WSI), CR-PN-LWS-EN-SY-00001. In addition a site specific WSI for Dog Kennel Bridge was prepared (Crossrail 2010).

### 1.2 *Previous Work (keywords)*

Dog Kennel Bridge has been the subject of several studies and assessments as part of the Crossrail project. These are listed in the following:



- Crossrail Environmental Statement 2005 (Volume 3, Paragraphs 9.14.24-9.14.25).
- Molas 2005. Crossrail Line 1. Assessment of Archaeology Impacts Technical Report. Part 5 of 6, Western Route Section.
- RPS 2005. Crossrail. Technical Assessment of Historic Railway Bridges. RPS Planning & Environment in association with MoLAS.
- Alan Baxter & Associates. 2006. Crossrail. Brunel Overbridges. Report on their historic significance and the impact on them of the Crossrail proposals. Document not actually consulted.

### 1.3 Site Location and Description

#### *Figure 1*

Dog Kennel Bridge is located on the First Great Western line, in between the Iver and Langley rail stations at grid reference TQ 02937 79810. An unmetalled farmtrack (permissive footpath) runs across the bridge. The track connects the Bison Concrete Works Site immediately to the north of the line with Parlaunt Road, a main road some distance to the south that connects Riching Park to the east with outskirts of Slough to the west.

To the south of Dog Kennel Bridge are arable fields and a small quarry site. The railway line is bordered on both sides by a narrow hedgeline of mature trees and shrubs.

The topography of the area is level ground at c. 30m OD. At Dog Kennel Bridge the line sits in a very shallow cutting with an embankment only on its southern side.

The underlying geology of the area is London Clay Formation.

### 1.4 Research Aims and Objectives

The purpose of the work as outlined in the Written Scheme of Investigation (Crossrail 2010) is as follows:

To produce a built heritage record of Dog Kennel Bridge to Level 3 standard as defined by EH's *Understanding Historic Buildings: A Guide to Good Practice* (2006). This comprises:

- Documentary research
- A 3D laser survey
- A photographic record (limited due to safety considerations)
- Identification and record of any significant structural features or relationships. Investigation of the chronology, construction, form, fabric and development of the bridge
- Dissemination of the results in a suitable form.

Due to health and safety considerations, ie. unrestricted access to Dog Kennel Bridge was not possible because of the live nature of the railway track, the photographic record did have to be limited to access from the trackside. Some



detailed photography of the central components of the bridge were therefore not possible.

For this reason the 3D laser survey forms the main component of the Level 3 survey and provides a detailed and brick-by-brick record of the entire bridge.

### **1.5 The Report**

This report is intended to give an overview of the site, its historical background and context. It draws on primary and secondary documentary and cartographic sources, and a detailed photographic record.



## 2. HISTORICAL AND DOCUMENTARY BACKGROUND

---

### 2.1 *Introduction*

Dog Kennel Bridge is part of the Great Western Railway (GWR), envisaged, designed and realised by Isambard Kingdom Brunel from 1835 to 1841.

The GWR was built in eight separate sections over a period of six years from 1835 to 1841. The first section completed was near the London terminus and led from London Bishop's Road to Maidenhead Riverside. This is the section that is now directly affected by the Crossrail project. Dog Kennel Bridge is part of a group of nine original railway bridges that lie between the London terminus and Maidenhead Riverside station.

The infrastructure of the GWR, the stations, bridges, etc. were designed to reflect the local and changing geology from London to Bristol. This was partially due to the availability of local materials, but also part of a specific intention to let the railway blend in well with its surroundings.

Selected parts of the GWR have been put on the United Kingdom's Tentative List of World Heritage Sites (Ref. no. 1319, UNESCO 2010) on the basis that the line represents not only one of the first railway passenger lines in the country incorporating many magnificent works of engineering, architecture and a very well thought-out conceptual design, but also one of the most complete lines surviving to this day with most of its original infrastructure intact and in daily use.

The London-Maidenhead GWR section has not been included in one of the six sections selected for World Heritage status application but in 2006 Dog Kennel Bridge was given a Grade II listed status (LB no. 494864).

### 2.2 *Historical background of Dog Kennel Bridge*

Dog Kennel Bridge was built in 1836-8 to plans designed by Isambard Kingdom Brunel. It was named Dog Kennel Bridge in 1838 after the nearby fox hound kennels of the Right Honourable John Sullivan who was Under Secretary of State and Commissioner for India and High Sheriff of Buckinghamshire at the time (Crossrail Bill Minutes of Evidence 2008, Question 1743).

The bridge was built of London stock brick, reflecting the clay geology and brickworks ubiquitous in London's western region and counties (see 2.1 above). It originally consisted of one 30ft semi-elliptical arch, designed to accommodate two of Brunel's 7¼ ft broad gauge tracks (Figures 2 and 2b).

The semi-elliptical arch was chosen for its structural ability to bridge over a wider span, needed to accommodate Brunel's broad gauge track, whilst not putting too much pressure outwards onto the cutting sides. The landscape to the west of London is very flat, so only gentle cuttings and embankments were needed to keep the railway track on a level contour.

In 1878 the northern abutment was largely demolished and the bridge was extended in order to accommodate the Southall to Slough quadrupling (Figure 3). The new arch has a 25ft span, as by 1878 Brunel's broad gauge track was



in decline and the new span already took into account the laying of the more narrow 4ft 8½ in. standard gauge track.

Dog Kennel Bridge has remained unaltered since the latter part of the 19th century. It still carries an unmarked, metalled track which was part of a permissive footpath. Access across the bridge has now been revoked due to the impending works.

### **2.3 Sources consulted**

Several previous studies have been undertaken and commissioned by Crossrail, concentrating on the architectural, archaeological and historical assets of and along the GWR (in particular RPS 2005, Alan Baxter & Associates 2006, also see 1.2). These reports provide a good summary of the historical setting and architectural and structural background for Dog Kennel Bridge.

The archive of the GWR, consisting of thousands of documents including administrative records, engineering papers and architectural plans of buildings and tracks was transferred from the British Rail Records Centre at Paddington in London to the Wiltshire and Swindon Record Office in 2003. An enquiry to the record office established that no original survey plans of Dog Kennel Bridge were being held there.

Drawings of railway bridges still in use are held by Network Rail in their archives in George Stephenson House in York. A request to the archives provided several drawings of generic bridge designs of the Great Western Railway, dating from 1848. This is several years after the construction of Dog Kennel Bridge. Figure 2 shows the standard bridge design that is very similar to Dog Kennel Bridge and it is reasonable to assume that it gives a good representation of the original design of the bridge before its extension.

The archives also held two historical architectural drawings of Dog Kennel Bridge itself. These consisted of two plans showing the widening of the bridge, most likely dating from around 1878 (no precise date is given on the drawings themselves). Figure 3 shows the elevation of the extended part of the bridge.



### 3. STRUCTURAL RECORDING: RESULTS OF THE SURVEY

---

#### 3.1 Methodology

Throughout the project the standards set in the IFA *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings and Structures* and English Heritage's *Understanding Historic Buildings* (2006) have been adhered to. All work has been done in accordance with the IFA Code of Conduct. The requirement was for a survey at English Heritage Level 3 standard (2006).

A 3D laser survey and full photographic survey was undertaken by Total Surveys Ltd (Figures 4 and 5). A site visit was undertaken on 18 November 2010 by an Albion Archaeology Project Officer. This included a small-scale photographic survey and an on-site assessment of the form and phasing of the bridge.

An Albion Archaeology Project Officer was on site during the demolition of the bridge on Christmas Day 2010. The methodology of the bridge demolition is detailed in Appendix 3.

#### 3.2 Description and phasing

Dog Kennel Bridge was built in 1836-38 and extended to the north in 1878 (see 2.2 above). It is a standard 13ft 6in wide square overbridge for unclassified lanes, one of four bridge types provided during the railway's construction (RPS 2005, 32).

The bridge is constructed of London stock brick with white hydraulic mortar, brick string courses and dressed gritstone copings. It has two arches on limestone imposts: the original 30ft-span arch in the south and the later 25ft-span arch in the north. The bridge has retained its original approaches, parapet with gritstone copings and terminal pilasters.

The approach road to the bridge has also remained in its original form as an unmetalled track and is carried over the bridge using inclined approach embankments. Dog Kennel Bridge has gently splayed abutments at each end and a raking buttress between the arched spans on both sides.

When the bridge was extended in 1878 the northern abutment was dismantled. Its fabric has been partially retained in the central raked buttress whose angle reflects that of the splayed abutments.

Apart from the more narrow northern arch, the original 1838 and later 1878 extension are virtually indistinguishable. Every effort was undertaken during the extension to retain the original form and character of the bridge. Only on closer inspection can subtle differences be noticed.

Brick samples were taken from the southern and northern section of the bridge during its demolition. Both were made of a near identical type of dark red to brown London Stock Brick.

Samples from the early part of the bridge show two sizes and types of brick employed (Figure 11). A yellowish, grog tempered brick of 225 x 105 x 58mm



measurements, which is the standard measurement of an early 19th century brick (Harley 1974). The majority of bricks seems to be slightly larger and made of a dark red/brown fabric. Their average measurements are 225 x 115 x 65-70mm. Bricks from the new part of the bridge are a more uniform dark reddish brown with a size of 225 x 100 x 65mm.

Closer inspection also revealed that the bricks of the 1836-8 Brunel bridge were made from a finer more even fabric, while the later 1878 bricks had more frequent white calcite inclusions. It is not clear whether the bricks came from separate clay pits or whether simply a slightly different process in their manufacture was utilised.

The main difference between the Brunel arch and the 1878 extension of the bridge is in the bonding of the brickwork. This was recorded during the site visit on November 18th 2010. The original southern part of Dog Kennel bridge is built entirely in Flemish bond, while the later, northern part is built in English bond (Figures 5, 6 and 10). This difference in brickwork is also noticeable on the parapet, even though here the bonding is sometimes more random.

The other telltale sign that speaks of the longer life span of the southern arch is the more intensive sooting visible near the crown of the arch on both sides (Figure 7). Here the steam trains passing beneath the arch from 1838 onwards, 40 years longer than underneath the northern arch, clearly have left their mark.

Observation of the bridge during its demolition on Christmas Day 2010 (Figures 8 and 9) did not reveal any concealed structural anomalies or significant information on phasing and construction that had not been recognised previously.

### 3.3 **Synthesis**

The significance of the bridge as part of a group of nine railway bridges between the London terminal and Maidenhead Riverside station has been assessed in a technical appraisal to inform the impact of their partial or complete removal by the Crossrail project (RPS 2006).

This came to the conclusion that while the bridge is of a standardised and fairly simple industrial design it still forms an important part of the technical, architectural and historical setting of the Great Western Railway itself, a cultural heritage feature of national and international importance.

Dog Kennel Bridge is unaltered since its extension in 1878 and therefore a good example of a standard Brunel Overbridge. The 30ft-span arch of Brunel's overbridges, surviving side-by-side with the later more narrow 25ft-span arch, is one of the last reminders of his technological vision of a broad gauge track – and its ultimate failure.

Brunel's vision of the Great Western Railway being one complete and coherent work of engineering and design and therefore the particular care and attention brought by him on even minor elements of the railway's infrastructure are also in evidence at Dog Kennel Bridge.

Dog Kennel Bridge carried a minor, unclassified route but it was still





“smartly built of London stock brick with limestone imposts and gritstone copings, reflecting the environment of the West End and clay-lands of rural Middlesex. No other section of the London to Bristol route had bridges matching in both form and material” (RPS 2006, 2).

The use of Flemish Bond, traditionally a bond used more readily for domestic buildings due to its more decorative appearance, also bears witness of this desire to erect a high-quality structure that was pleasing to the eye. Forty years later, when the bridge was extended, the emphasis had obviously changed to more structural concerns and the more common and industrial English bond was utilised.

The original design of Dog Kennel Bridge, its extension and now its ultimate demolition reflect the changing nature, values and concerns of railway planning and technology in Britain coupled with a setting in a European context which brings with it a new vision and design for Britain's railways.

### **3.4 Publication and Dissemination Proposals**

Dog Kennel Bridge is one of a number of bridges proposed for demolition along the cross rail route. In line with the Buckinghamshire County Archaeologist's recommendations, it is not felt that each individual bridge warrants a separate post-excavation assessment and publication. Future post-excavation assessment may be required on completion of bridge recording along the Crossrail route, however this is beyond the scope of this project which is solely concerned with Dog Kennel Bridge.

A note summarising the results of the present work will be provided to the editor of Records of Buckinghamshire for inclusion in the 'Archaeological Notes' section. This report will be uploaded onto OASIS.





## 4. BIBLIOGRAPHY

---

- Alan Baxter & Associates. 2006. *Crossrail. Brunel Overbridges. Report on their historic significance and the impact on them of the Crossrail proposals.*
- Crossrail. 2010. *Dog Kennel Bridge Worksites, Iver, Bucks. Site-Specific Archaeological Written Scheme of Investigation.* Document Number: CR-NR1-T1-QCP-CR042\_1519-00001.
- Crossrail 2009. *Crossrail Context Report.* Prepared for South Buckinghamshire District Council.
- Crossrail Bill Minutes of Evidence 2008. *Examination of Witnesses. Questions 1740-1759.* [Online]. Available at: <http://www.publications.parliament.uk/pa/ld200708/ldselect/ldcross/112/8030304.htm> [accessed: 29/11/2010].
- English Heritage. 2006, *Understanding Historic Buildings: A Guide to Good Practice.*
- Harley, L. S. 1974. "A Typology of Brick: With Numerical coding of Brick Characteristics." *JBAA 3rd Series*, 38.
- Molas 2005. *Crossrail Line 1. Assessment of Archaeology Impacts Technical Report. Part 5 of 6, Western Route Section.* [Online]. Available at: <http://www.crossrail.co.uk/assets/library/document/0/original/0007-r-western.pdf>. [Accessed 26.11.10].
- RPS 2005. *Crossrail. Technical Assessment of Historic Railway Bridges.* RPS Planning & Environment in association with MoLAS.
- UNESCO 2010. *The Great Western Railway: Paddington – Bristol (selected parts).* [Online]. Available at: <http://whc.unesco.org/en/tentativelists/1319/>. [Accessed: 15/11/2010].



## 5. APPENDICES

### 5.1 Appendix 1: Archive submitted

#### 5.1.1 Summary of Archive Contents

- Report (hard and pdf digital copy)
- Set of bridge plans and elevations as provided (digital, see Table 1)
- CAD drawings – digital and hard copy.
- Digital photographs – saved on CD in .tiff format. For a summary of the photographic record see Appendix 2.
- Prints of photographs on archival quality paper

File name	Description	Source
MF43006.tif	Standard bridge design drawing 1848	Network Rail Archives, York
MF43007.tif	Standard bridge design drawing 1848	Network Rail Archives, York
MF33968.tif	Dog Kennel Bridge extension elevations c. 1878	Network Rail Archives, York
MF45122.tif	Dog Kennel Bridge extension area plan c. 1878	Network Rail Archives, York
BN-107000-1-PROVISIONAL.dwg	3D survey drawing 2010	Total Surveys Ltd.
BN-107000-2-PROVISIONAL.dwg	3D survey drawing 2010	Total Surveys Ltd.
BN-107000-3-PROVISIONAL.dwg	3D survey drawing 2010	Total Surveys Ltd.

Table 1: Drawings submitted in electronic format on DVD

#### 5.1.2 Arrangements for Long-Term Deposition

A copy of the project archive will be submitted to the Project Archaeologist at Crossrail.

Curation of the archive will be agreed with the Buckinghamshire County Museum. Copies of the report will be deposited with the relevant Historic Environment Record and with the National Monuments Record: Buildings.

As advised by the Buckinghamshire County Council Archaeology Officer a copy of the Total Surveys Ltd laser survey should be archived with the Archaeology Data Service (ADS) in York.

Project details have been entered on the OASIS online index of archaeological investigations (<http://oasis.ac.uk/>), ref no: [albionar1-90682 \(1\)](#) .





## 5.2 Appendix 2: Summary of Photographic Record

### 5.2.1 Total Surveys Ltd. Level 3 structural survey

Image	Description
DSCF1207.tif	Eastern Face Northern Arch
DSCF1208.tif	Eastern Face Northern Arch
DSCF1209.tif	Eastern Face
DSCF1210.tif	Eastern Face Southern Arch
DSCF1211.tif	Eastern Face
DSCF1212.tif	Eastern Face Southern Wing Wall
DSCF1213.tif	Eastern Face Southern Wing Wall
DSCF1214.tif	Eastern Face Southern Wing Wall
DSCF1216.tif	Eastern Face Southern Wing Wall
DSCF1217.tif	Eastern Face Southern Wing Wall
DSCF1218.tif	Eastern Face Southern Wing Wall
DSCF1219.tif	Eastern Face Southern Wing Wall
DSCF1220.tif	Eastern Face Southern Arch
DSCF1221.tif	Eastern Face Northern Arch
DSCF1222.tif	Western Face Northern Wing Wall
DSCF1223.tif	Western Face Northern Arch
DSCF1224.tif	Western Face Northern Wing Wall
DSCF1225.tif	Western Face
DSCF1226.tif	Western Face Northern Arch
DSCF1227.tif	Western Face Southern Arch
DSCF1228.tif	Western Face Southern Wing Wall
DSCF1229.tif	Western Face Southern Wing Wall
DSCF1230.tif	Western Face Southern Wing Wall
DSCF1231.tif	Western Face Southern Wing Wall
DSCF1232.tif	Western Face Southern Wing Wall
DSCF1233.tif	Western Face Southern Wing Wall
DSCF1234.tif	Western Face Southern Wing Wall
DSCF1235.tif	Western Face Southern Wing Wall
DSCF1237.tif	Eastern Face Northern Arch
DSCF1239.tif	Western Face
DSCF1240.tif	Western Face Northern Arch
DSCF1241.tif	Western Face Northern Wing Wall
DSCF1243.tif	Western Face
DSCF1244.tif	Western Face Northern Wing Wall
DSCF1245.tif	Western Face Northern Wing Wall
DSCF1246.tif	Western Face Northern Wing Wall
DSCF1248.tif	Western Face Northern Wing Wall
DSCF1249.tif	Western Face Northern Wing Wall
DSCF1250.tif	Western Face Northern Wing Wall
DSCF1251.tif	Western Face Northern Wing Wall
DSCF1252.tif	Western Face Northern Wing Wall
DSCF1253.tif	Western Face Southern Arch
DSCF1254.tif	Inside Face Eastern Parapet Wall



Image	Description
DSCF1255.tif	Inside Face Eastern Parapet Wall
DSCF1256.tif	Inside Face Eastern Parapet Wall
DSCF1257.tif	Inside Face Eastern Parapet Wall
DSCF1258.tif	Inside Face Eastern Parapet Wall
DSCF1259.tif	Inside Face Eastern Parapet Wall
DSCF1260.tif	Inside Face Eastern Parapet Wall
DSCF1261.tif	Inside Face Eastern Parapet Wall
DSCF1262.tif	Inside Face Eastern Parapet Wall
DSCF1263.tif	Inside Face Eastern Parapet Wall
DSCF1264.tif	Inside Face Eastern Parapet Wall
DSCF1265.tif	Inside Face Eastern Parapet Wall
DSCF1266.tif	Inside Face Eastern Parapet Wall
DSCF1267.tif	Inside Face Eastern Parapet Wall
DSCF1268.tif	Inside Face Eastern Parapet Wall
DSCF1270.tif	Inside Face Western Parapet Wall
DSCF1271.tif	Inside Face Western Parapet Wall
DSCF1272.tif	Inside Face Western Parapet Wall
DSCF1273.tif	Inside Face Western Parapet Wall
DSCF1274.tif	Inside Face Western Parapet Wall
DSCF1275.tif	Inside Face Western Parapet Wall
DSCF1276.tif	Inside Face Western Parapet Wall
DSCF1277.tif	Inside Face Western Parapet Wall
DSCF1278.tif	Inside Face Western Parapet Wall
DSCF1279.tif	Inside Face Western Parapet Wall
DSCF1280.tif	Inside Face Western Parapet Wall
DSCF1281.tif	Inside Face Western Parapet Wall
DSCF1282.tif	Inside Face Western Parapet Wall
DSCF1283.tif	Inside Face Western Parapet Wall
DSCF1284.tif	Inside Face Western Parapet Wall
DSCF1285.tif	Inside Face Western Parapet Wall

### 5.2.2 Albion Archaeology site visit 18 November 2010

Image	Description
dkb1722_1_001.tif	Looking towards Dog Kennel Bridge from Iver Rail Station
dkb1722_1_002.tif	Looking towards Dog Kennel Bridge from Iver Rail Station
dkb1722_1_003.tif	Looking towards Dog Kennel Bridge from Iver Rail Station
dkb1722_1_004.tif	Looking towards Dog Kennel Bridge from Iver Rail Station
dkb1722_1_005.tif	Thorney Lane Bridge from Iver Rail Station
dkb1722_1_006.tif	Looking towards Dog Kennel Bridge from Iver Rail Station



Image	Description
dkb1722_1_007.tif	Eastern parapet, inside.
dkb1722_1_008.tif	Looking north across bridge deck
dkb1722_1_009.tif	Looking north-west, western parapet internal
dkb1722_1_010.tif	Looking east, eastern parapet internal
dkb1722_1_011.tif	Looking north-east
dkb1722_1_012.tif	Western parapet inside
dkb1722_1_013.tif	Western parapet inside
dkb1722_1_014.tif	Western parapet inside
dkb1722_1_015.tif	Western parapet inside
dkb1722_1_016.tif	West facing bridge elevation
dkb1722_1_017.tif	West facing bridge elevation, Brunel southern arch
dkb1722_1_018.tif	West facing bridge elevation
dkb1722_1_018.tif	West facing bridge elevation
dkb1722_1_020.tif	West facing bridge elevation
dkb1722_1_021.tif	West facing bridge elevation
dkb1722_1_022.tif	Detail
dkb1722_1_023.tif	Eastern parapet internal
dkb1722_1_024.tif	West facing bridge elevation
dkb1722_1_025.tif	East facing bridge elevation
dkb1722_1_026.tif	East facing bridge elevation
dkb1722_1_027.tif	East facing bridge elevation
dkb1722_1_028.tif	East facing bridge elevation
dkb1722_1_029.tif	West facing bridge elevation
dkb1722_1_030.tif	Looking north towards bridge

### 5.2.3 Albion Archaeology site visit 25 December 2010 (bridge demolition).

Image	Description
dkb1722_2_001.tif	East facing bridge elevation, 7.00am
dkb1722_2_002.tif	East facing bridge elevation, 8.00am
dkb1722_2_003.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_004.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_005.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_006.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_007.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_008.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_009.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_010.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_011.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_012.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_013.tif	Looking west at east-facing Dog





Image	Description
	Kennel Bridge elevation
dkb1722_2_014.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_015.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_016.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_017.tif	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_2_018.tif	Looking east at western elevation
dkb1722_2_019.tif	Looking east at western elevation
dkb1722_2_020.tif	Looking east at western elevation
dkb1722_2_021.tif	Looking east at western elevation
dkb1722_2_022.tif	Looking west, remains of Dog Kennel Bridge
dkb1722_2_023.tif	Looking west, remains of Dog Kennel Bridge
dkb1722_2_024.tif	Looking west, remains of Dog Kennel Bridge
dkb1722_2_025.tif	Looking south-west, southern wing wall and abutment remains
dkb1722_2_026.tif	Looking west, remains of Dog Kennel Bridge
dkb1722_2_027.tif	Looking south-west, southern wing wall and abutment remains
dkb1722_2_028.tif	Looking west, remains of Dog Kennel Bridge
dkb1722_2_029.tif	Looking west, remains of Dog Kennel Bridge, central buttress
dkb1722_2_030.tif	Looking west, remains of Dog Kennel Bridge
dkb1722_2_031.tif	Looking west, northern abutment
dkb1722_2_032.tif	Looking west, northern abutment
dkb1722_2_033.tif	Looking south-west
dkb1722_2_034.tif	Looking south-west
dkb1722_2_035.tif	Looking south-west
dkb1722_2_036.tif	Looking south-west, southern abutment
dkb1722_2_037.tif	Looking south-west, southern abutment
dkb1722_2_038.tif	Looking south-west, southern abutment
dkb1722_2_039.tif	Looking south-west, southern abutment
dkb1722_2_040.tif	Brick sample of 1836-8 bridge
dkb1722_2_041.tif	Brick sample of 1836-8 bridge
dkb1722_2_042.tif	Brick sample of 1836-8 bridge
dkb1722_2_043.tif	Brick sample of 1836-8 bridge
dkb1722_2_044.tif	Brick sample of 1836-8 bridge
dkb1722_2_045.tif	Brick sample of 1836-8 bridge



#### 5.2.4 Albion Archaeology site visit 25 December 2010 (bridge demolition). Black & white 35mm film

Image	Description
dkb1722_3_001	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_002	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_003	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_004	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_005	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_006	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_007	***Looking east at west-facing Dog Kennel Bridge elevation***
dkb1722_3_008	***Looking east at west-facing Dog Kennel Bridge elevation***
dkb1722_3_009	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_010	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_011	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_012	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_013	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_014	Looking west at east-facing Dog Kennel Bridge elevation
dkb1722_3_015	Looking west at east-facing Dog Kennel Bridge elevation



## 5.3 Appendix 3: Network Rail and bam Nuttall work package plan of controlled demolition of Dog Kennel Bridge

### 5.3.1 Introduction

The following is an extract of BAM Nuttall's Work Package Plan of Christmas Possession Works at Dog Kennel Bridge (document ref: WDK1B-EST-WPP-BNA-100038 C01Multi Asset Framework Agreement – Dog Kennel Bridge BAF 1070: WPP №005 Rev01).

### 5.3.2 Document extract

#### WORK PACKAGE DETAILS

##### A1 Description of Work

Dog Kennel Bridge was originally built in 1836-8 to a design by Isambard Kingdom Brunel and retains its original 30ft-span semi-elliptical arch, parapets, and other architectural details. It is located to the west of London, 15m 19c from London Paddington on the Great Western Main Line (MLN1) which runs from Paddington to Wales and the West Country. The bridge comprises two brick arches with brick parapets. The north span crosses the Relief Lines and the south span the Main Lines. Dog Kennel Bridge carries a footpath/farm track in a north to south alignment over the Great Western Main Line.

The planned electrification of the line as part of the Crossrail Project requires the structure is to be demolished as the height of the bridge prevents the electrification standard clearance being met.

Dog Kennel Bridge will be demolished during a 53 hour full four line possession on 25<sup>th</sup> December 2010 (beginning 00:01am).

##### A1.1 Scope of Work (Brief) This WPP will detail the following works

###### Dilapidation Survey

Prior to works commencing and to supplement the previous track condition surveys a re check of the track dimensions will be undertaken. In addition a full photographic survey of the area around the structure will be completed. This will be undertaken during Friday 24<sup>th</sup> Dec 2010 for the photographic with any trackside checks undertaken during the first hour of the possession before installing track protection.

An exclusion zone will also be marked around the existing Oak tree that could be affected by the works and this will be demarked at the extent of the canopy/roots with netlon fencing. This will be in line with the sketch included in Appendix C.

###### Installation of Track & Service Protection

Prior to the track protection installation the existing 4no ASTER track circuit boxes are to be removed. These will be placed within the site secure store unit until re-installation at the completion of the works. Any cables will be coiled and taped to prevent potential damage.

The scaffold protection to location boxes will be installed, this will consist of a tubular scaffold frame clad with scaffold boards to sides and over then polythene sheeting tacked to the outside. This will both prevent the unlikely scenario of debris striking the location boxes or any risk of dust ingress. When demolition works are completed this protection can be removed.

Crane matting will be placed to span over the existing ditch adjacent to the boundary fencing. This will ensure that the ditch is not affected by any of the works and will allow the plant to pass over the top and access the worksite. This will be removed on works completion. Netlon fencing will be placed at the side to demarcate the edges for vehicle movements.

The track protection will be installed to the footprint of the structure and extended past to both allow for debris fall and plant access/movements. The extent of the track protection will be as detailed in the approved Form C. The ballast will first be levelled between the sleepers then polythene sheeting/or terram placed over. The polythene sheeting/terram is to prevent contamination of the ballast. Over this will be placed the dense polystyrene, ply clad units. These will be lifted in place with either the excavator or telehandler and then moved to the exact location by hand. Bulk timber mats will then be placed over the polystyrene blocks to span the track, trackside services and troughing. The troughing shall be protected with steel plates inserted between the brickwork abutment face and the edge of the trough held in place by the timber track protection mats placed against them, this will prevent any unnecessary pressure being exerted upon the troughing.

On completion a netlon exclusion zone will be marked out on the matting for exclusion of staff/operatives/banksmen during main machine demolition.

#### Controlled Demolition of Structure Including Removal of Debris



Basic principle of demolition in sequence as follows:-

- Excavators mobilised to required positions.
  - Excavate out soil and coping stones and separate for removal into dumptrucks.
  - Breakdown brickwork from sides to centres of arch after walls removed first
  - Continue breaking from centre of arch back to abutments
  - Machines below pull out debris and load into dumptrucks for removal
  - Reduce down abutments
  - At 1.0m above track level introduce banksmen and break abutments away from toughts
  - Complete with breakdown below ground level.
- Detailed demolition

2no 21ton excavators will be tracked up the bank and used topside of the structure. Below 2no 35ton excavators will be used to both demolish the parapets and pier and also remove all arisings. Arisings will be loaded into 30ton dumper and taken to a pre-determined area within the adjacent Quattro Yard.

Demolition will commence at the topside of the structure with the removal of coping stones. These will be lifted clear with the excavator and scissor grab attachment and placed into the dumper for removal to the compound.

The demolition itself will commence with the breaking down of the parapets these will be deposited below onto the track protection. The structure itself will be demolished starting with the 21ton excavators located on the topside breaking down the arches working from side to the centre. Design calculations confirm that a maximum 400kg weight of masonry can fall onto the track protection. This equates to a dimensional block of masonry 600mm x 1000mm x 300mm which shall be instructed to the machine operators at commencement briefing.

Once the arch is down the excavators below will take over demolishing the pier and abutments. Absolute care is to be taken to ensure the troughing located up close to the abutments is not affected, the troughing shall be protected with steel plates inserted between the brickwork abutment face and the edge of the trough held in place by the timber track protection mats placed against them, this will prevent any unnecessary pressure being exerted upon the troughing. No banksmen will be allowed within the demolition exclusion zone until the bridge has been demolished to within 1.0m of the track protection. Then demolition to abutments where troughing and services are located will be completed with a banksman in attendance.

When breaking out the last 1.0m of the abutments where troughing is located the machines shall break the back of the abutments first therefore allowing the breaker points to always be pointing away from the front of the abutment allowing all broken material to shear into the voids at the back ensuring no pressure is placed on the front steel plate or trough. Hydraulic hand breaker shall remain on site for use by operatives in case steel plates obstruct machine breakers from completing the works. Joint assessment will be made on site by BAM and NR supervisors.

The pier will be broken down to 500mm below underside of sleeper and abutments to 300mm below.

The demolition arisings will be excavated/grabbed and placed into the 30ton dumper and removed to the stockpile area, a banksman will be situated at the site access point ensuring the dumper movements are fully managed.

#### Placing & Compaction of Ballast to Voids

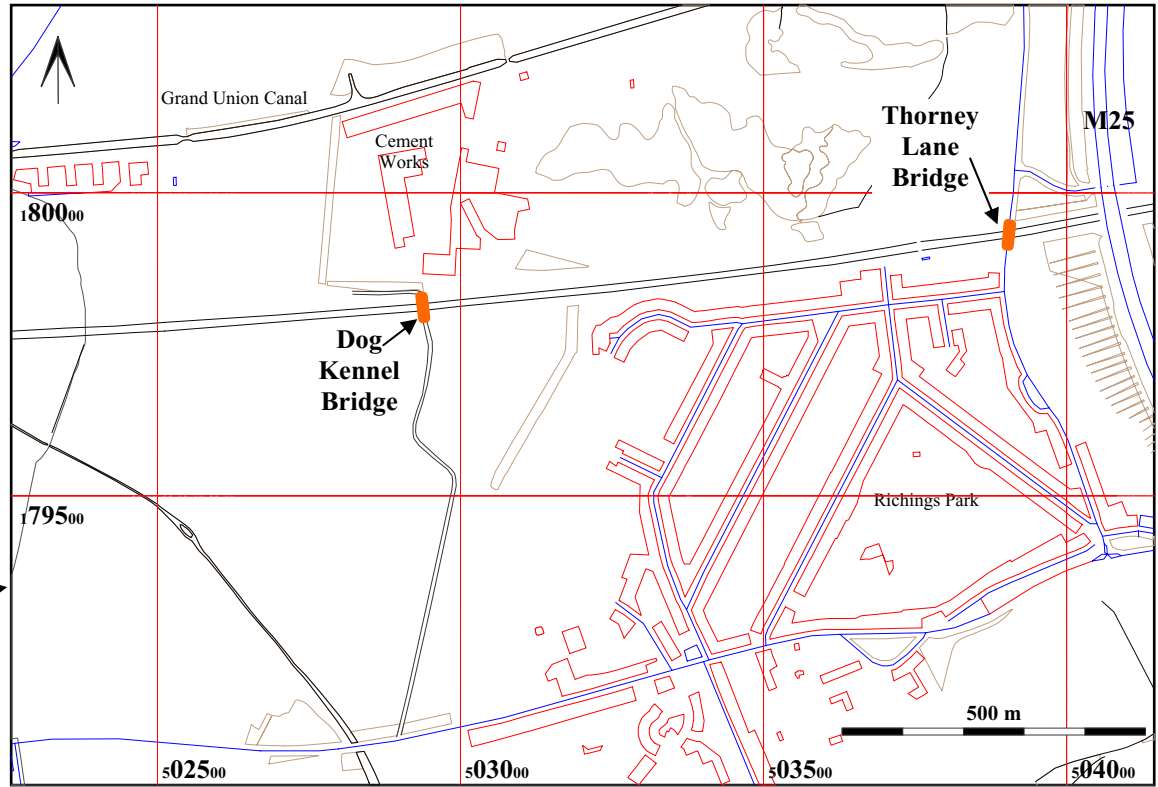
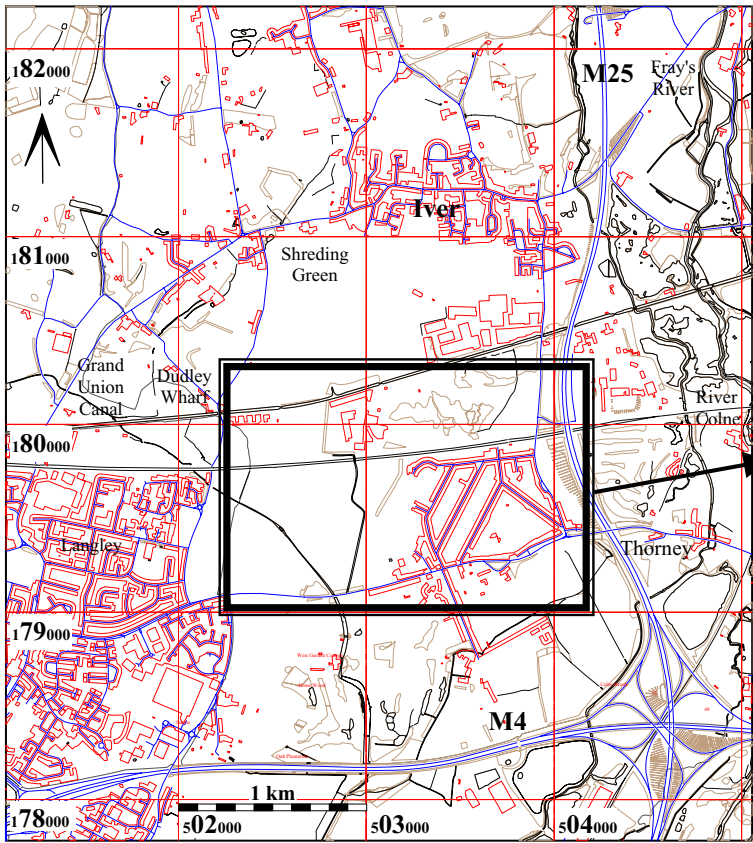
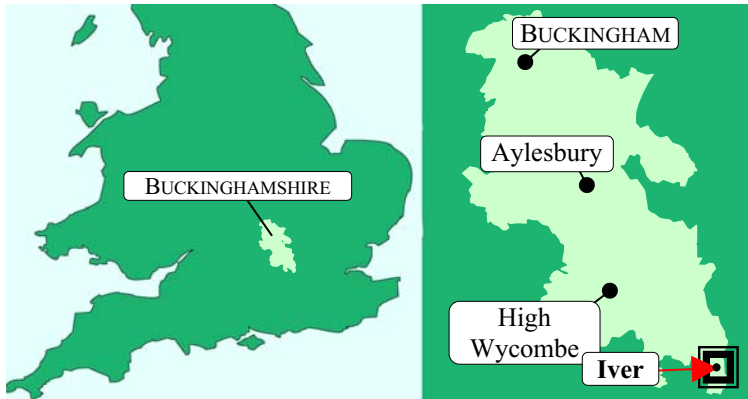
Ballast will be placed and spread from bulk ton bags in accordance with NR/L2/TRK/2102 – Design and construction of track. The ballast will be placed in maximum 200mm layers with a minimum of 3 passes using NR approved vibrating plates

#### Forming of Embankment Slope

Once all the demo arisings are clear from the south abutment foot the machine shall commence the grading works to the embankment slope. The north abutment re-grade will follow again when arisings have been removed. (before the re-grade the excavators located topside shall track down the slope and move to the compound)

The embankments shall be graded at a 1 in 2 slope maintaining the current profile. Once graded erosion netting will be placed and secured with 250mm pins at 1 meter intervals. At each joint the netting shall be overlapped a minimum of 200mm. Over this shall be placed and spread a 50mm layer of seeded topsoil.

On completion of the works to the south side the excavator at the top of the cutting shall leave site with the agreement of the landowner along the southern access track. Should this not be agreed in advance of the possession the machine will need to leave down tracking down the abutment where a further TBS will be required to detail exit with surrounded services and Pway protected.



**Figure 1: Site location**  
Contains Open Source Ordnance Survey data © Crown copyright and database right 2010

Dog Kennel Bridge, Iver, Buckinghamshire:  
Structural Recording

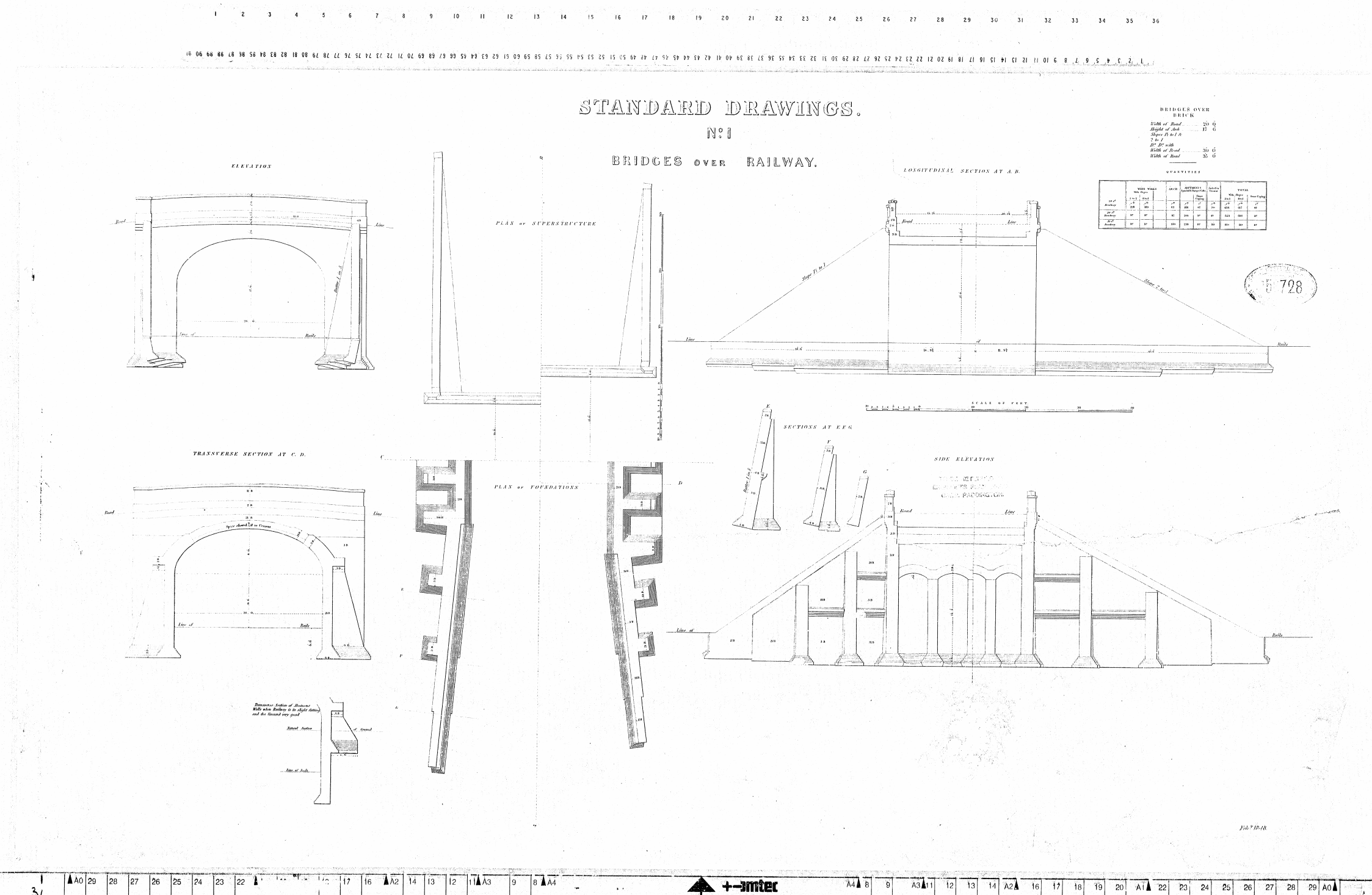


Figure 2: Generic bridge design plan 1848 (file reference MF43006.tif)

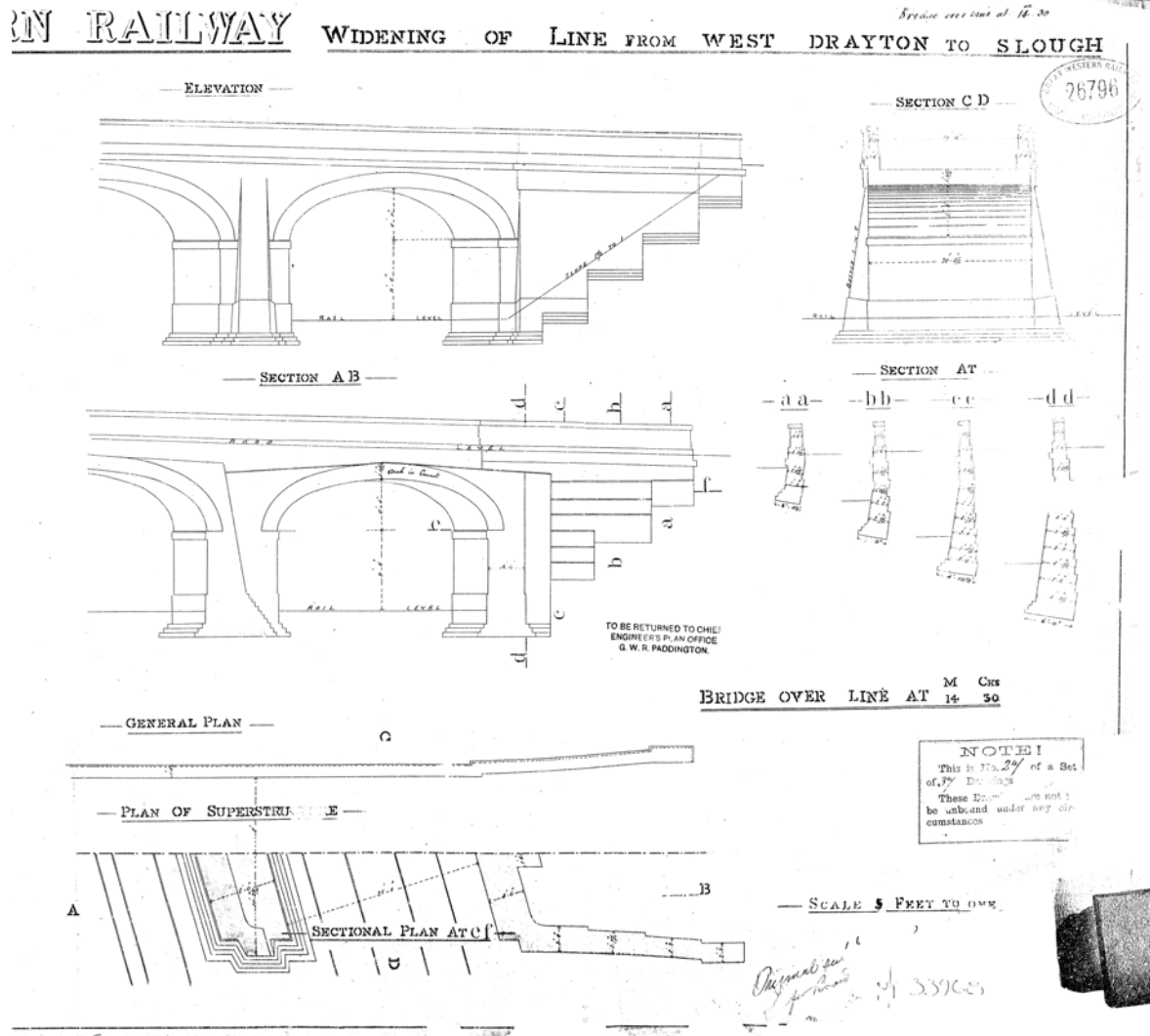
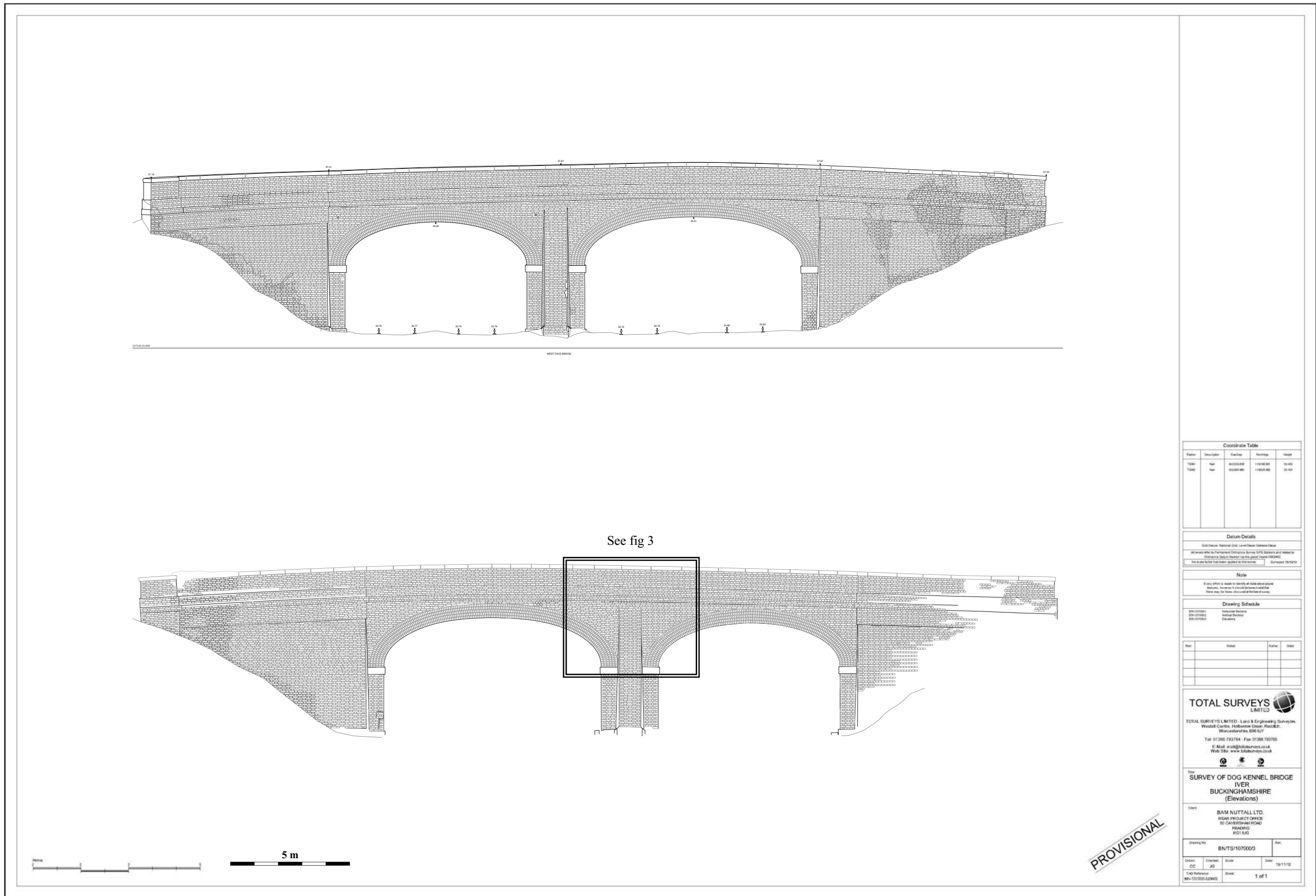


Figure 3: Dog Kennel Bridge widening. Northern new arch built in 1878. Cropped engineering plan (file reference: MF33968.jpg).



Coordinate Table				
Station	Description	Easting	Northing	Height
TBM	Ref	492200.00	112100.00	10.45
TBM	Ref	492200.00	112100.00	10.45

**Datum Details**  
 2011 British National Grid, Sea Level Mean High Water  
 All measurements taken using a Leica Total Station and a Leica Leveling Staff. All measurements were taken in accordance with BS 5400:1979.  
 No scale reduction has been applied to this drawing. Date: 18/11/10

**Note**  
 Every effort is made to identify all objects shown. However, it is not possible to guarantee that all objects shown are correct. The drawings are for information only and should not be used for any other purpose without the written consent of the surveyor.

Drawing Schedule	
01/10/10	Initial Design
02/10/10	Final Design
03/10/10	As Built

No.	Name	Date

**TOTAL SURVEYS LIMITED**  
 TOTAL SURVEYS LIMITED - Land & Engineering Surveyors  
 Woodall Court, 1 Holcombe Green, Rickmansworth, Herts, SG8 5LJ  
 Tel: 01280 722764 - Fax: 01280 720765  
 E-Mail: [enquiries@totalsurveys.co.uk](mailto:enquiries@totalsurveys.co.uk)  
 Web Site: [www.totalsurveys.co.uk](http://www.totalsurveys.co.uk)

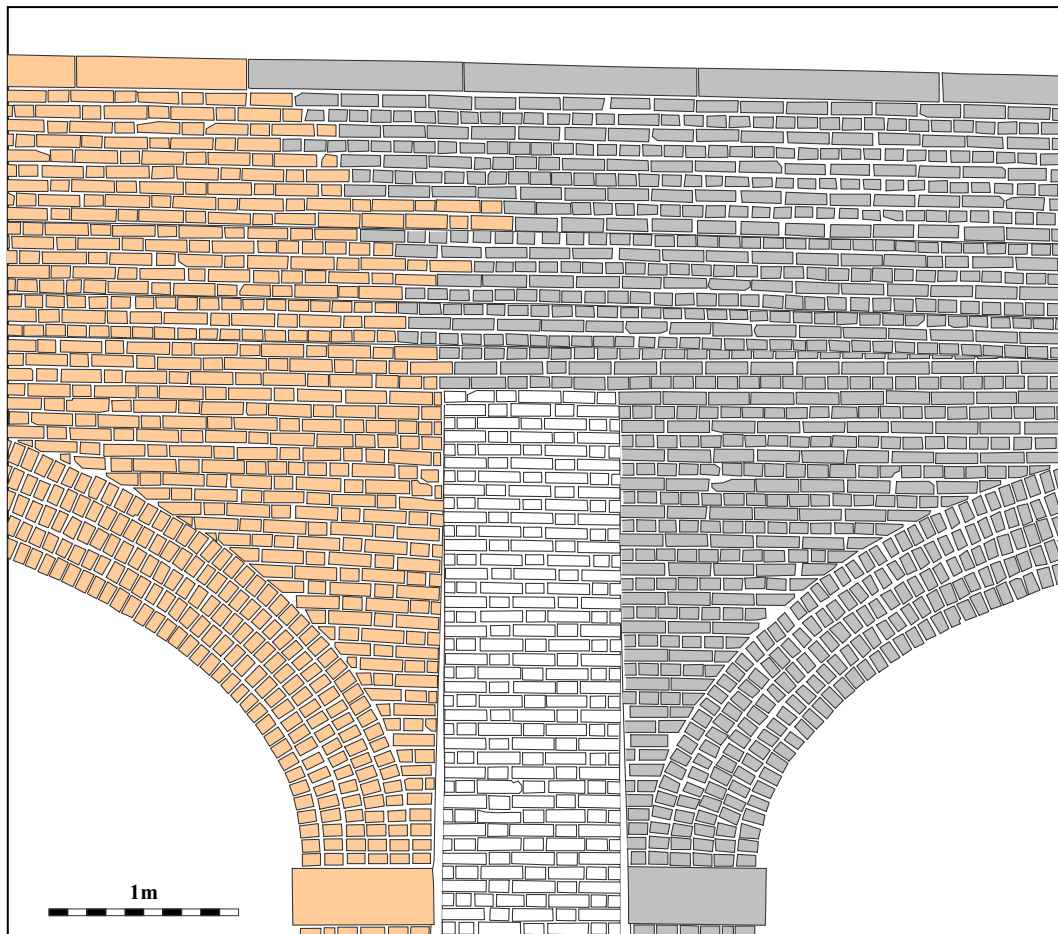
**SURVEY OF DOG KENNEL BRIDGE  
 IVER  
 BUCKINGHAMSHIRE  
 (Elevations)**

Client: **BAM NUTTALL LTD.**  
 BSM PROJECT OFFICE  
 55 CANNONWAY FORD  
 READING  
 RG1 5AG

Drawing No:	BN/TS/1070003	Rev:	
Drawn:	CS	Scale:	
Checked:	JS	Date:	18/11/10
CD Ref:	BN-107000-3-ENWG	Sheet:	1 of 1

Figure 2: Results of Total Surveys Ltd 3D survey. Provisional elevations.





- 1836-8 original Brunel bridge
- 1878 extension

**Figure 3:** Dog Kennel Bridge east facing elevation, brickwork detail



**Figure 6:** Dog Kennel Bridge east facing elevation. Northern extension arch and central buttress with changeover in brickwork. (Photo: Total Surveys Ltd.)



**Figure 7:** Dog Kennel Bridge east facing elevation. Southern Brunel arch with sooting in foreground of photograph. (Photo: Albion Archaeology)



**Figure 8:** Dog Kennel Bridge under demolition. West facing elevation.  
(Photo: Albion Archaeology).



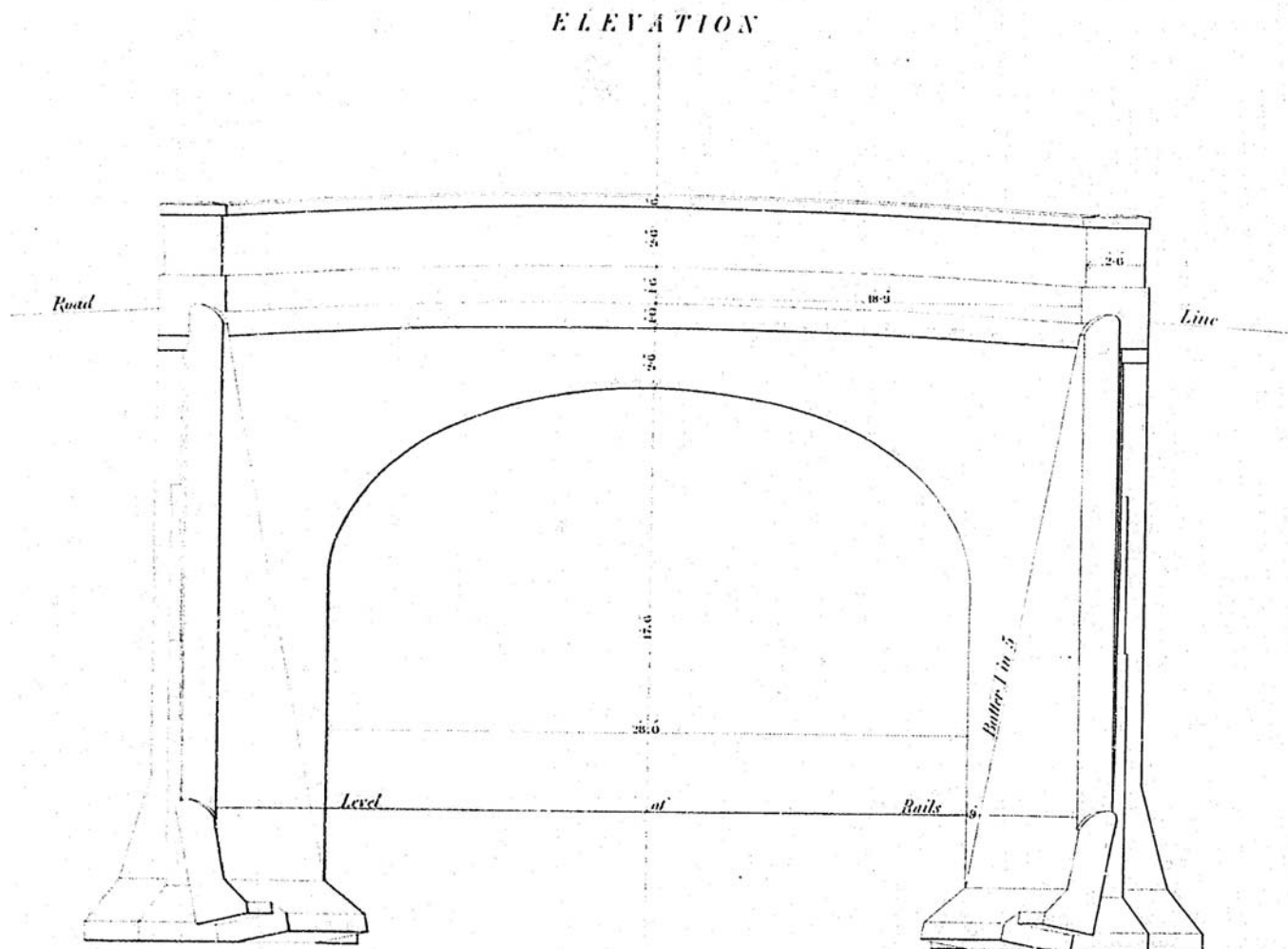
**Figure 9:** Dog Kennel Bridge demolished. Southern abutment.  
(Photo: Albion Archaeology)



**Figure 10:** Western bridge parapet, internal view, brick detail. Change from old Flemish coursing (left) to English coursing of extension (right).  
(Photo: Albion Archaeology)



**Figure 11:** Original 1836-8 bridge brick samples, showing varying fabrics and sizes.  
(Photos: Albion Archaeology)



**Figure 2b:** Excerpt of 1848 plan showing generic bridge elevation.  
 Note: span here is 28 feet, rather than the 30 feet span of Brunel's arch of Dog Kennel Bridge.