

C254 – Archaeology West

Archaeological Watching Brief at Lord Hill's Bridge Interim Report

CRL Document Number: C254-OXF-T1-RGN-CRG03-50116

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Summary

During late August 2011 and continuing intermittently through to early January 2012, Oxford Archaeology/Gifford (now Oxford Archaeology/Ramboll) carried out a Targeted Watching Brief on the land beneath and adjacent to Lord Hill's Bridge, Paddington. The work was undertaken on behalf of Crossrail prior to stabilisation and tunnelling works. The excavations revealed two sets of 19th century brick foundations associated with an earlier phase of Lord Hill's Bridge. The 'Marcon' sewer was observed to be running east-west through the area of investigation. Pleistocene deposits were recorded at the western limit of the investigation area. Additional modern structures were identified during ground reduction work, including a suspected railways concrete utilities trench.

1 Introduction

1.1 Scope of work

- 1.1.1 Oxford Archaeology/Ramboll (hereafter OA/R) undertook an archaeological Watching Brief at Lord Hill's Bridge, Paddington, Westminster, London. The programme of work commenced in August 2011 and continued intermittently to early January 2012. The work was undertaken in advance of grouting operations intended to increase the stability of Lord Hill's Bridge prior to tunnelling during Crossrail construction.
- 1.1.2 A specification was produced by Crossrail for the archaeological works. This was set out in a Site Specific Written Scheme of Investigation (SSWSI) produced by Iain Williamson and Suzanna Pembroke (Document No: C122-OVE-T1-RGN-CR076_PT001-50001). OA/R produced an Archaeology Method Statement (C254-OXF-T1-GMS-CRG03-50005, OAG16188.R31) in response to the SSWSI. This was approved by the Crossrail Archaeologist in regard of archaeological content and by the Principal Contractor (BFK) in relation to H&S requirements.
- 1.1.3 This report is an Interim Statement, produced following the completion of site works in order to disseminate the outline results of the investigation. A Fieldwork Report will be produced for the works in due course.

1.2 Location, geology and topography

- 1.2.1 Information in this section is a brief summary. The WSI (C122-OVE-T1-RGN-CR076_PT001-50001) should be read for fuller detail.
- 1.2.2 The Lord Hill's Bridge spans the cutting for the GWR mainline into Paddington Station. Beneath the bridge the ground surface is relatively flat extending in a narrow corridor east to west along the northern side of the permanent way. The existing ground level is recorded at c. 121.90m ATD.
- 1.2.3 Bedrock is given as London Clay by the BGS. Overlying superficial deposits such as the locally present Langley Silts and Lynch Hill Gravels are not expected to be present because of truncation by the GWR cutting. Work to the west carried out by OA/R (see below) revealed water-lain and wind-blown sand and silt deposits of Pleistocene date in a hollow within the London Clay. In addition the line of the now culverted Westbourne

River lies to the east of the bridge. Either of these groups of deposits may be present in the works location.

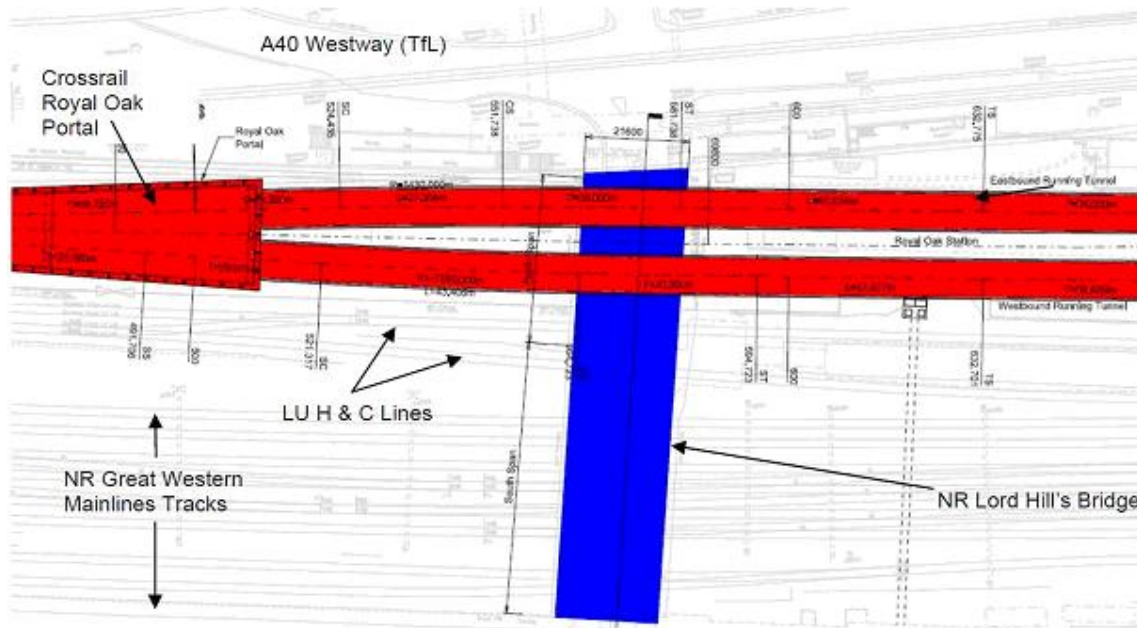


Figure 1 Lord Hill's Bridge works location

1.3 Archaeological background

- 1.3.1 The following information is taken from the WSI, which should be read for a detailed history, as with the geological and topographic discussion above.
- 1.3.2 The archaeological and historical development of the Royal Oak East and Paddington Central worksites, which includes the area of Lord Hill's Bridge, has been set out in the Detailed Desk-based Assessment (Document No. CR-SD-CT1-EN-SR-00002) and are summarised in the SS-WSI *Crossrail Design Consultant Framework C122 – Bored Tunnels SS-WSI Addendum for Archaeological Targeted and General Watching Brief during Investigative Trial Holes and Abandoned Foundation Removal at Lord Hill's Bridge C122-OVE-T1-RGN-CR076_PT001-50001- Revision 1.0*. These reports identify that until the construction of the Grand Union Canal (by 1805) and the Great Western Railway (GWR) between 1835 and 1838, the area remained open fields and had yet to be extensively developed.
- 1.3.3 Lord Hill's Bridge is named after General Sir Rowland Hill, the 1st Viscount Hill, who was one of the Duke of Wellington's most trusted commanders and who lived locally at Westbourne Place. It was designed by Brunel and originally constructed between 1835 and 1837 by the GWR to carry Black Lion Lane over the railway. The original bridge comprised five brick arches two of which were replaced with a steel girder structure in 1906-7.
- 1.3.4 The remains of four brick foundations for Brunel's bridge were identified during a programme of trial hole investigation conducted by Birse Rail in 2009 (Document No. CRL1-NRI-C-RGN-B071-00001). The top of the brick foundations were recorded at approximately 500mm below the existing ground surface, each measuring approximately

1200mm (L) x 700mm (W) spaced at 4.15m centres. What appeared to be London Clay was recorded in the base of the trial pits approximately 1.0m below the existing ground level (121.900m ATD).

- 1.3.5 A recent Targeted Watching Brief was carried out by OA/R on excavations related to the construction of the Crossrail Royal Oak Portal to the west of Lord Hill's Bridge (reported within Doc No. C254-OXF-T1-RGN-CRG03-50004). This revealed a sequence of deposits dating to the Pleistocene period, accumulated within a hollow in the London Clay. Faunal remains were retrieved from the deposits. A western limit to the topographical feature containing the deposits was recorded but no eastern extent as the deposits extended beyond the location of the portal construction.

1.4 Map Regression

- 1.4.1 A historic map regression exercise was undertaken as part of Detailed Desk Based Assessment for Royal Oak Portal and Westbourne Park partially including the area of Lord Hill's Bridge (document CR-SD-CT1-EN-SR-00002). This is summarised and included below.
- 1.4.2 Rocque's map of 1746 shows the study area located within a field system south of the Westbourne Green Village.
- 1.4.3 Greenwood's map of 1824 shows the early development of the area. The Grand Junction Canal running north of the site location is connected through to Paddington. In addition a wide road is shown running from Paddington Village north towards Harrow. The majority of the area is still rural in nature.
- 1.4.4 In Stanford's map of 1862 the rapid development of the railway in the area is shown with the majority of the site location being comprised of the railway lines. At the location of the present Lord Hill's Bridge Celbridge Place is shown crossing the railway lines.
- 1.4.5 The Ordnance Survey map of 1872 shows further development of the railway in the area with additional lines having been installed and the construction of the Royal Oak Station. This is the first map upon which Lord Hill's Bridge is reference; a much wider bridge is shown compared to that of the 1862 map.

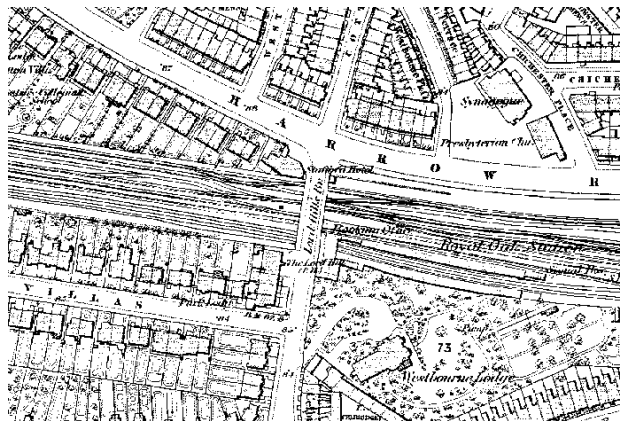


Figure 2: 1872 Ordnance Survey map

- 1.4.6 Further development of the railway is shown on the 1914 Ordnance Survey Map. All houses north of Westbourne Park Villas have been removed and a wider railway cutting and longer bridge indicated.

1.5 Aims and Objectives

- 1.5.1 The SSWSI (Document No: C122-OVE-T1-RGN-CR076_PT001-50001) contained a number of distinct research and work objectives.
- The principal aim of the work was to identify and record the original Brunel foundations of Lord Hills Bridge prior to their removal.
 - In addition the presence or absence of Pleistocene deposits identified during previous excavations undertaken by OAG to west of Lord Hill Bridge at Royal Oak Portal should be confirmed.
 - To monitor the excavation and removal of the Marcon sewer as defined in previous work at Westbourne Park and Royal Oak Portal.

1.6 Investigation Methodology

- 1.6.1 The initial phase of works was the excavation of new service trench, running approximately 30m to the west and continuing under the present bridge. Excavation was carried out by mechanical excavator and hand, this methodology being dictated by the Principal Contractors method statement. During the excavation of this trench the northern abutments associated with an earlier phase of the bridge were exposed. This element of work did not require constant archaeological supervision. Subsequent to the initial identification of the abutments a greater archaeological presence was maintained.
- 1.6.2 A constant archaeological presence was maintained during the exposure of the abutments. Every effort was made to ensure any archaeological work was done in a timely manner which caused minimal distribution to the Principal Contractors program of works. The removal of the foundations was carried out using a 12 ton excavator using both bucket and breaker. This work was carried out under intermittent archaeological supervision. In addition to the exposure of the foundations the surrounding area was reduce to allow for the construction of a piling mat, this work was also carried out under archaeological supervision.



Plate 1: Exposure of northern abutments

- 1.6.3 The proposed excavation of 12 No. trial trenches at 15m intervals to locate buried services in the area surrounding the bridge was not undertaken. This decision was made by the Principal Contractor. It was deemed there was a low risk of services being an issue in the further works on the site as they would be largely limited to piling and tunnelling.
- 1.6.4 The removal of the Marcon sewer was carried out under archaeological supervision, with the program of works being dictated by the Principal Contractors method statement. To maintain a safe working environment archaeological access had to be limited to supervision from above, with a safe method of access and egress to the sewer being unavailable. The removal of the sewer was undertaken by 12 ton excavator done in 4m stages with each stage being back-filled before further excavation.
- 1.6.5 All structures, deposits and finds were recorded by OA/R according to current best practice and accepted professional standards (see OA Fieldwork Manual 1992, Museum of London Archaeological Site Manual 1990), and as outlined in:
- SS-WSI addendum for Archaeological Targeted and General Watching Brief during Investigative Trial Holes and Abandoned Foundations Removal at Lord Hill's Bridge, Document No. C122-OVE-T1-RGN-CR076_PT001-50001
 - Archaeological Generic Written Scheme of Investigation, Document No: CR-PN-LWS-EN-SY-00001, 7 July 2009 (AWSI)
 - Archaeology Specification for Evaluation and Mitigation (including Watching Brief), Document No: CR-PN-LWS-EN-SP-00001, 26 June 2009, (ASEM)
 - Works Information (Volume 1 - General), Document No: CR-SD-PRW-X-RT-00151, 5 June 2009 (WIV1)
 - Works Information (Volume 2 - Particular), Document No: CR-SD-PRW-X-ITT-00001, 13 July 2009 (WIV2)
 - Crossrail standards and specifications;

- Institute for Archaeologists – Standard and Guidance for archaeological excavation, 2008 (revised);
- Institute for Archaeologists – Standard and Guidance for an archaeological watching brief, 2008 (revised);
- Museum of London collections and archive policies and guidance;
- English Heritage – Geoarchaeology, 2007;
- English Heritage - Archaeological Science at PPG16 interventions: Best Practice Guidance for Curators and Commissioning Archaeologists, 2003;
- GLAAS Archaeological Guidance Papers 1999;
- Corporation of London archaeology guidance – Planning Advice Note 3, 2004; and
Museum of London Archaeology Service site recording manual (MOLA 1994).

1.7 Finds

1.7.1 No finds were recovered during the program of works.

2 Results

2.1 Excavation Results

- 2.1.1 Initial works required the removal of a dark grey black silt ballast (context number 2000) from across the entire site; this layer was in part overlain by a tarmac road.
- 2.1.2 Two sets of historic bridge foundation abutments (see Figure 4) were identified consisting of coursed brick built on a concrete base; both abutments were cut into the alluvial clay.
- 2.1.3 The southern set of abutments comprised four independent rectangular structures running east - west along the southern edge of site and measuring 3.1 x 2.7x 0.6 m. These were formed of eight courses of shallow frogged red bricks with a white lime mortar. Each course was offset from the course above with an additional course, creating a series of steps toward the base. A single light grey sandy concrete foundation block was observed running underneath all four abutments and was approximately 16 x 4.5 x 1.1m in size. On the surface of each abutment a band of white mortar ran along the outside edge. A partially surviving wall on one abutment suggests the mortar indicates that further upstanding elements of the abutments have been truncated.



Plate 2: Southern brick abutments

- 2.1.4 The northern abutments were similar in nature. These were four independent brick rectangular structures which were observed running east to west and built upon a single pale grey concrete base. The abutments were constructed of red shallow frogged bricks with a pale white grey lime mortar using an English bond. The structures measured 3.05 x 1.7 m at the top and stepped out towards the base. Connecting walls between each abutment had been constructed of red frogged bricks with a soft light white sandy lime mortar.
- 2.1.5 Four attached structures had been built at right angles to each abutment. These were built from the same red shallow frogged bricks. The additional structures had not been keyed in with the east-west foundations and there was a gap of 10-30mm between the two structural phases.
- 2.1.6 Both the additional attached structures and the connecting walls had been constructed on a concrete base that could not be distinguished from that underlying the east-west foundations. No evidence of the bricks being keyed in and the small 10-30mm gap suggest these are later additions rather than contemporary structures. The use of similar bricks and mortar along with no identifiable change in the concrete base suggest that these additional abutments were constructed within a short period of the original structures. These additional structures are likely to be reinforcements to the initial foundations. The smaller nature of the northern foundations compared to the southern may be the reason why only the northern set was amended.



Plate 3: Additional brick abutment

- 2.1.7 Both sets of foundations were surrounded by a redeposited yellowish brown clay. This was in turn overlain by a mixed brown dark grey silt ash ballast. This is a deliberate dumped deposit placed during the construction of a later bridge in the early 20th century.
- 2.1.8 During site reduction a black grey ash silt layer, was observed overlying a crushed red brick and gravel deposit, which in-turn overlay a yellow sand gravel. All three deposits have been observed throughout the area and were identified during Archaeological monitoring at Royal Oak Portal.
- 2.1.9 While reducing the area to the west of the present bridge a circular brick structure (see Plate 4 below) was recorded. This comprised three courses of bricks (9 x 11 x 11mm) and measured 1.24 m diameter x 0.28 m depth. The structure was cut into redeposited clay and sealed by a further clay layer. This structure appeared have been heavily truncated. It is likely to be the remains of circular brick drain/soakaway dating to an earlier phase of activity associated with the railway.



Plate 4: Circular drain/soakaway

- 2.1.10 The Marcon sewer was observed running east - west through (and continuing beyond) the work area. The top of sewer was observed at a depth of 119.15m ATD and the base approximately 118.09m ATD. The sewer was formed of two courses of un-frogged red brick with a pale grey white lime mortar in a circular formation, with approximate dimensions of 1.5 x 1m. The construction trench for the sewer was cut through the redeposited clay; the excavated clay had been used over the top of sewer as a backfill and was recognisable by the presence of brick inclusions. Approximately every 20m a rectangular manhole associated with the sewer was observed. .
- 2.1.11 At the northern limit of site, to the west of the existing Lord Hill's Bridge, a brick and concrete structure was observed. This was built of dark red frogged bricks with yellow sand mortar overlain by a concrete slab. Adjacent to this was a brick structure constructed upon a concrete base with frequent brick inclusions. This structure appeared to be contemporary. As observed the structure measured 4.6m x 2.4m, the full original extent was unknown due to heavy truncation along the western edge. The structure formed what appeared to be the foot print of a building with two sides visible; the south and east.
- 2.1.12 An additional structure was located 13m to the east of the Royal Oak Portal tunnel face (see Plate 5). This was uncovered during ground reduction. It comprised of two parallel walls, running north-south and constructed upon a base of concrete. The walls were bonded with a pale grey-yellow sand mortar. Steel bolts c.0.5m long were built into the wall, spaced 1.6m apart. The bolts ran the length of both walls. This structure had been heavily truncated at both its northern and southern end, thus its full original extent is unknown. As recorded the structure measured 12m north - south with two walls c 0.3m wide and 0.7m apart and standing 0.54m high. Two cast iron service pipes ran through the structure at its southern limit, the nature of construction suggest a contemporary date. Running perpendicular to the course of the former tracks this structure is likely to have functioned as utilities trench running under the rails, with the steel bolts being used to hold railway sleepers in place.



Plate 5 - Utilities trench

2.1.13 During the removal of the Macron sewer adjacent to the Royal Oak Portal tunnel face, Pleistocene deposits were observed. These consisted of laminated yellow sands overlying what appeared to be a brick-earth deposit; due to limited access this could not be confirmed. The deposits were approximately 1.5-2m below ground level and sealed by deposit 2012. The Pleistocene strata was observed again 13m east of the tunnel face approximately 0.85m below ground level. At this point the deposit was observed directly underlying made ground, showing the deposit rising towards the east, until it reaches the point at which the deposit has been truncated away by development of the railway.

2.2 Discussion and Interpretation

2.2.1 The watching brief works have provided evidence of bridge footings pre-dating the existing structure. The concrete base observed under both sets of the recorded brick bridge foundations would be unusual for the primary Lord Hill's Bridge (1835-37) although the stepped brick foundation is characteristic of Brunel's early GWR structures. It is therefore likely that the foundations date to the (northward) widening of the tracks in the late 19th century and the need to increase the span of the bridge.

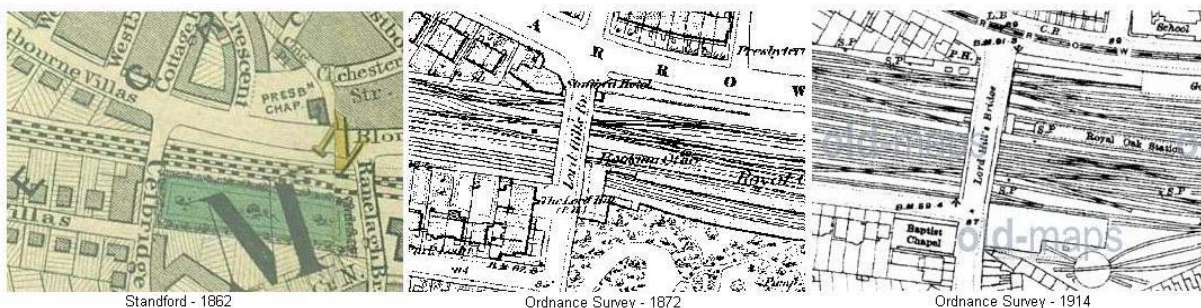


Figure 3: The evolution of Lord Hill's Bridge



2.2.2 Due to the nature of work only the course of laminated sand deposits, believed to be Pleistocene in date, could be followed. Formed through predominantly fluvial action the rise towards present ground level may indicate the end of the channel observed during excavations by OAG at Royal Oak Portal. The limited depth of the excavation restricted the variation in deposits exposed, and limited our understanding of those that were exposed. Monitoring of any future excavation or bore-hole samples may provide further information on the stratigraphic sequencing.

Appendix 1 Bibliography and References

- Crossrail 2008 Westbourne Park and Royal Oak Portal Site Specific Archaeological Detailed Desk-Based Assessment, Document No. CR-SD-CT1-EN-SR-00002
- Crossrail 2011 SS-WSI addendum for Archaeological Targeted and General Watching Brief during Investigative Trial Holes and Abandoned Foundations Removal at Lord Hill's Bridge, Document No. C122-OVE-T1-RGN-CR076_PT001-50001
- Oxford Archaeology / Gifford 2011 Archaeological Targeted Watching Brief during Investigative Trial Holes and Abandoned Foundation Removal at Lord Hill's Bridge Archaeology Method Statement, Document No. C254-OXF-T1-GMS-CRG03-50005

Appendix 2 Summary of Site Details

Client name: Crossrail Ltd

Site name: Lord Hill's Bridge

Site code: XSI10

Grid reference: TQ 257 815

Type of investigation: Targeted Watching Brief

Date and duration of project: 25th August – 16th January, 21 Weeks

Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with the Museum of London in due course.