Archaeological watching brief at Compasses Bridge, Alfold, Surrey

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Introduction

An archaeological watching brief was carried out at a causeway at the site of the former Compasses Bridge across the Wey and Arun Canal at Alfold (TQ 03488 36067; Fig 1) at the request of Tony Forde of the Wey and Arun Canal Trust. This work was undertaken in compliance with a written scheme of investigation provided by Martin Cook BA MCIfA.

It was anticipated that the causeway, built in the 1930s, concealed the remains of a traditional canal bridge at this location (Fig 3.1). It was hoped that during the removal of this causeway the lower parts of the spandrel walls or the abutments of the former bridge would emerge and this would enable their recording and characterisation.

The programme of archaeological work was to comprise documentary research, a watching brief and a report.

Summary

An archaeological watching brief was carried out at a causeway at the site of the former Compasses Bridge across the Wey and Arun Canal at Alfold. The remains of the north-west and south-east abutments, the former tow path retaining wall and an internal buttress of the former bridge were identified. It was possible to make comparisons with building practice broadly contemporary with the construction of the canal.

The documentary material

Historic mapping

The earliest available mapping is the Alfold tithe map of 1841 (Fig 2.1). This shows Compasses Bridge, apparently, as a skew, accommodation bridge, carrying the road to Slitwells Farm across the canal. The Ordnance Survey map of 1871 (Fig 2.2) makes the situation a little clearer. From this map it is clear that a slight double kink was placed in the alignment of the canal to enable the bridge to cross perpendicular to the waterway. The reason for this is explained below (**Interpretation; the issue of a 'skew' bridge**).

The Ordnance Survey map of 1899 (Fig 2.3) shows no significant changes from the preceding map. The Ordnance Survey map of the 1920s (Fig 2.4) shows the canal as silted up and presumably disused and this would have been a prime consideration for the replacement of the bridge by the causeway.

The fieldwork

General

Fieldwork took place on the 16th April and 30th June 2016. It comprised monitoring of the excavations and a levelling traverse from the bridge a short distance to the north-east. Significant archaeological deposits identified were the abutments and tow path retaining wall of the original canal bridge. An internal buttress forming part of the south-east abutment and a substantial timber found across the channel, between the remains of the abutments were also recorded.

The above features were exposed by mechanical excavator and surveyed with records (drawing, written description and photographs) as appropriate (abutments etc: Figs 3.2, 4, 5, 6, 7, 8 and 9; timber: Figs 10, 11 and 12). A full description of the contexts is given in Appendix 1. Contexts are described in summary form below.

Description

The causeway (Figs 4 and 5) comprised two reinforced concrete retaining walls (contexts 001 and 002), a concrete culvert (context 003) running approximately on the centre-line of the canal channel in order to maintain the flow along the watercourse and the bulk fill of the causeway (context 004). These modern deposits were not recorded in detail.

After removal of context 004 it was apparent that the abutments, tow path retaining wall, an internal buttress of the bridge and a wing wall had survived (contexts 005, 006, 007, 008 and 009; Figs 3.2, 6, 7, 8 and 9). Further substantial excavation was undertaken to properly expose these remains for recording.

The bridge abutments and the buttress (contexts 005, 007 and 008) were of solid masonry construction in English bond. It became apparent that the south-eastern wing wall of the north-east fore bay (context 009) was not properly bonded with the rest of the abutment (Fig 3.2). Within the limits of the excavation, it could not be determined if this was due to a repair, a subsequent modification or just a simple mistake in the original build.

The purpose of the buttress is somewhat perplexing. Possible explanations include:

- it was a device to prevent water pressure building up behind the abutment. Rees (1819-20) stated that:

  Proper buttresses of close masonry should be made to the walls of the lock behind to give them greater strength, to tie them more effectively into the bank and to break the regularity behind. The purpose of this is, in the event of a leak through the walls at any particular point, such water may not collect together in a large mass to act by its hydrostatic pressure in overturning or bulging the walls of which so many instances have been seen.

  Some support for this is provided by a brick-built culvert, which could be broadly contemporary with the original bridge, which discharged (and still does discharge) behind or over the abutment. Such construction for preventing the build-up of water pressure is known from other waterway sites (Cook, 2007).

- it was the footing for the spandrel wall which would have joined the abutment at approximately this position. However, if the interpretation that this was once a skew bridge is correct (as suggested by the Ordnance Survey mapping; see above and below), then this is unlikely as the buttress appears to join the abutment at right angles. No certainty is possible here as the length of the buttress is so short. This makes its true angle with respect to the abutment difficult to accurately obtain.

The tow path retaining wall (context 006; Fig 3.2) was of slighter construction, comprising a brick-built wall with rubble infill. Only one course of this wall was exposed and it was not possible to determine its bond. Comparison of levels of the top of the tow path retaining wall beneath the bridge to the north-east (which has been rebuilt to its original height) and the top of the surviving tow path retaining wall at Compasses Bridge suggest that approximately three metres of construction has been lost.

The finds

The only find from the excavation was a substantial timber which was found lying across the line of the canal, between the abutments (Context 010; Figs 10, 11 and 12). This was about four metres long, had a tenon at one end (Fig 11) with its other end formed into a spade-like profile (Fig 12). It was not seen *in situ* but it seems unlikely that it formed part of the original bridge construction. Its original function, and/or its function with respect to Compasses Bridge, is unknown.

Interpretation

The excavations

The issue of a 'skew' bridge

Bridges of a 'skew' design (ie ones that crossed at an angle other than a right-angle) were generally avoided before the railway age as the construction principles involved were poorly understood. Such bridges as were built in this way tended to fall down! Certain underlying principles of arch construction, not fully appreciated in the early years of the canal age, were:

- that the forces acting through the arch, act perpendicularly to the joints in the masonry

- that it is important for the forces acting through the arch to remain within the section of the arch

A useful over-simplification is that an arch is in equilibrium (ie it stands up) when each part of one abutment pushes against an equivalent part in the opposing abutment. This state of equilibrium is easily attained when the bridge is symmetrical and its abutments are at right angles to its longitudinal axis. Examples of such bridges are commonplace across the canal system. An example of such a bridge may be seen at Tardebigge (SO 989 891) on the Worcester and Birmingham Canal. However, in the case of an oblique or skew bridge, the bridge's abutments are not at right angles to its longitudinal axis. The result of this is that the ends of the abutments on two of the opposing corners have nothing against which they can push. Effectively, in these positions, only half of the bridge has been built. The result is that the arch ring is forced away from the core of the arch on both sides of the bridge. This effect of this may be seen on a bridge at Hockley Heath (SO 146 729) on the North Stratford Canal.

A passing references to the solution to this problem is found in Rees (1819-20):

> ...wedge-like or arching bricks made on purpose to use after a certain number of courses

and an example of such construction may be seen on the Worcester and Birmingham Canal at Lower Bittell Reservoir (SP 020 738).

A fully satisfactory solution awaited the coming of the railway age and, after the construction of the Stockton and Darlington railway, and its various branches, the following article was published:

> *The construction of the* [Hagger Leases branch] *was supervised by the author in 1830. The Hagger Leases branch joins the Stockton and Darlington railway. This being the first public railway constructed in Great Britain, many of the works on it were of a novel character and among these were the bridges constructed in an oblique direction in order to avoid curves in the line of the railway. The building of oblique arches was at that time but little practiced and the author was considered very adventurous in attempting this construction at such an acute angle as 27 degrees. It was, however, very successful as, when the centres were struck the crown of the arch did not drop half an inch, although the centering was placed parallel with the abutments instead of being parallel with the faces of the arch as is customary at present* (Storey 1845).
>
> *The author is aware that since the erection of these oblique bridges, they have become, comparatively speaking, common, and that some of very great span have been built but he is not aware of any being previously constructed in England*

In a commentary Mr G Rennie said he believed that few, if any, examples of oblique bridges existed in England prior to those which had been mentioned. [thus they both ignored the work done, and experience gained, by the canal builders].

An alternative solution, and one that appears to have been adopted at Compasses Bridge, was to put a double kink in the canal where it passed under the bridge. This had the effect of turning the skew bridge into a conventional one that crossed at right-angles. The site of such a bridge may be seen at Lapworth on the Grand Union Canal (SP 198 722). The original bridge is long gone but the double kink in the canal remains. The disadvantage of this solution was that navigation was made a little more difficult.

Significance

The only significant archaeological features located during the watching brief were remains of the north-west and south-east abutments, the former tow path retaining wall and an internal buttress of the former bridge. It is apparent from the configuration of the bridge as shown on the Ordnance

Survey map of 1871 that it crossed the canal at an angle other than that of 90 degrees. Rather than construct a skew bridge, which was a poorly understood technical feat at the time, a double kink was inserted in the canal to enable the bridge, effectively, to cross at 90 degrees, thus avoiding the difficulty. Such arrangements are known elsewhere on the canal system and, whilst not a particularly common arrangement, neither are such examples rare.

These features, although of a little local interest, can only achieve a very low regional or national significance.

Bibliography

Cook, M, 2007 *Watching brief at locks 2, 3 and 4, Rushall Canal, Walsall*

Rees, A, 1819-20 *The cyclopaedia; or universal dictionary of arts, sciences and literature*.

Storey, J, 1845 Description of an oblique bridge over the river Gaunless on the Hagger Leases branch railway, Durham, *Proceedings of the Institute of Civil Engineers*, **4** p 59-61

Acknowledgements

The author would particularly like to thank Tony Forde and the other volunteers of the Wey and Arun Canal Trust for their kind cooperation.

Archive

The physical archive consists of:

10	Context sheets
1	Drawing
1	Hard copy of the report
1	Hard copy of the written scheme of investigation

The digital archive consists of:

1	Digital copy of the report (.doc format)
12	Illustrations (.bmp format)

Since this project produced no significant archaeological results it is considered that inclusion on the OASIS database will be sufficient and no submission will be made to a local museum or the Archaeology Data Service.

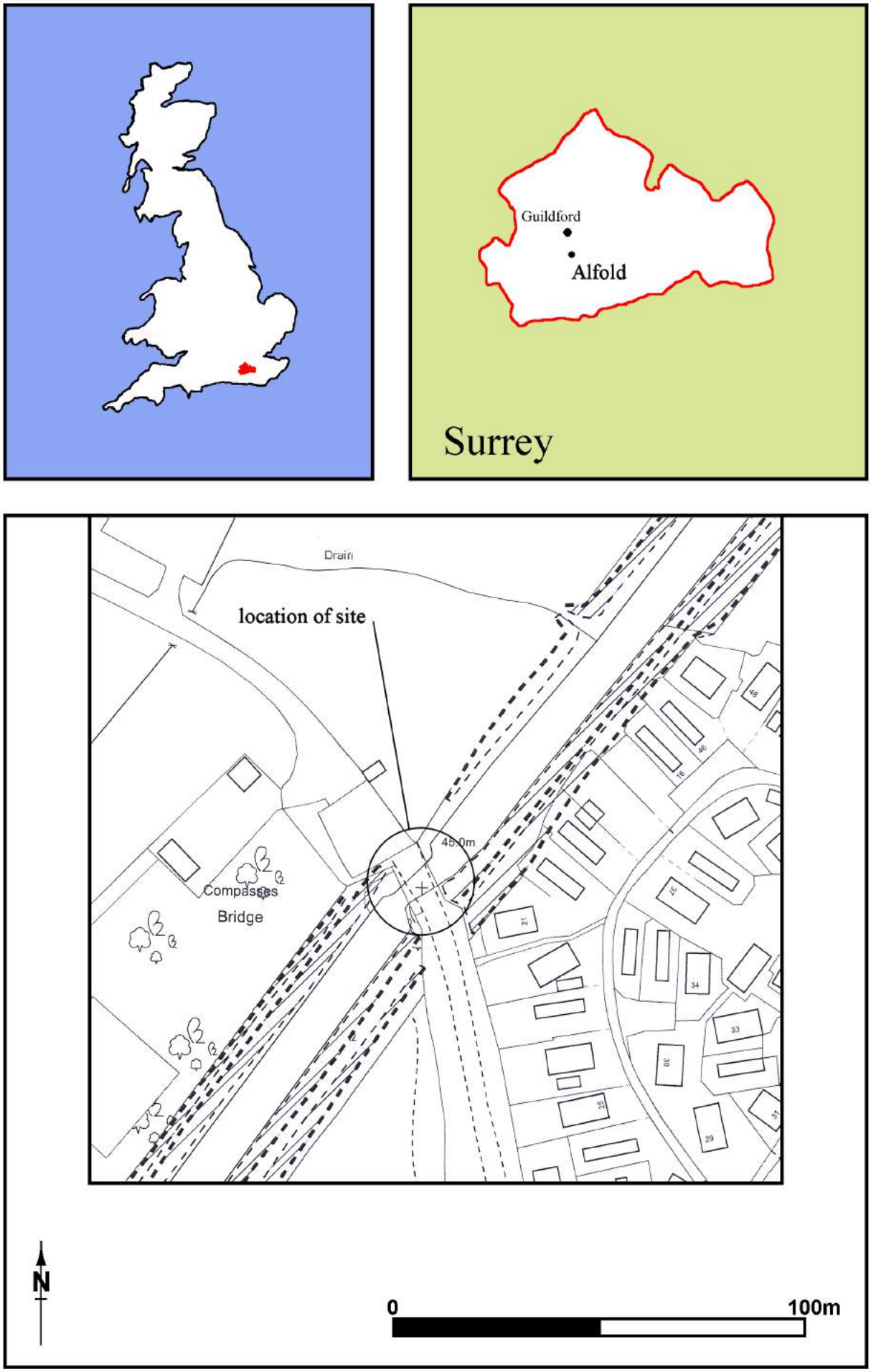
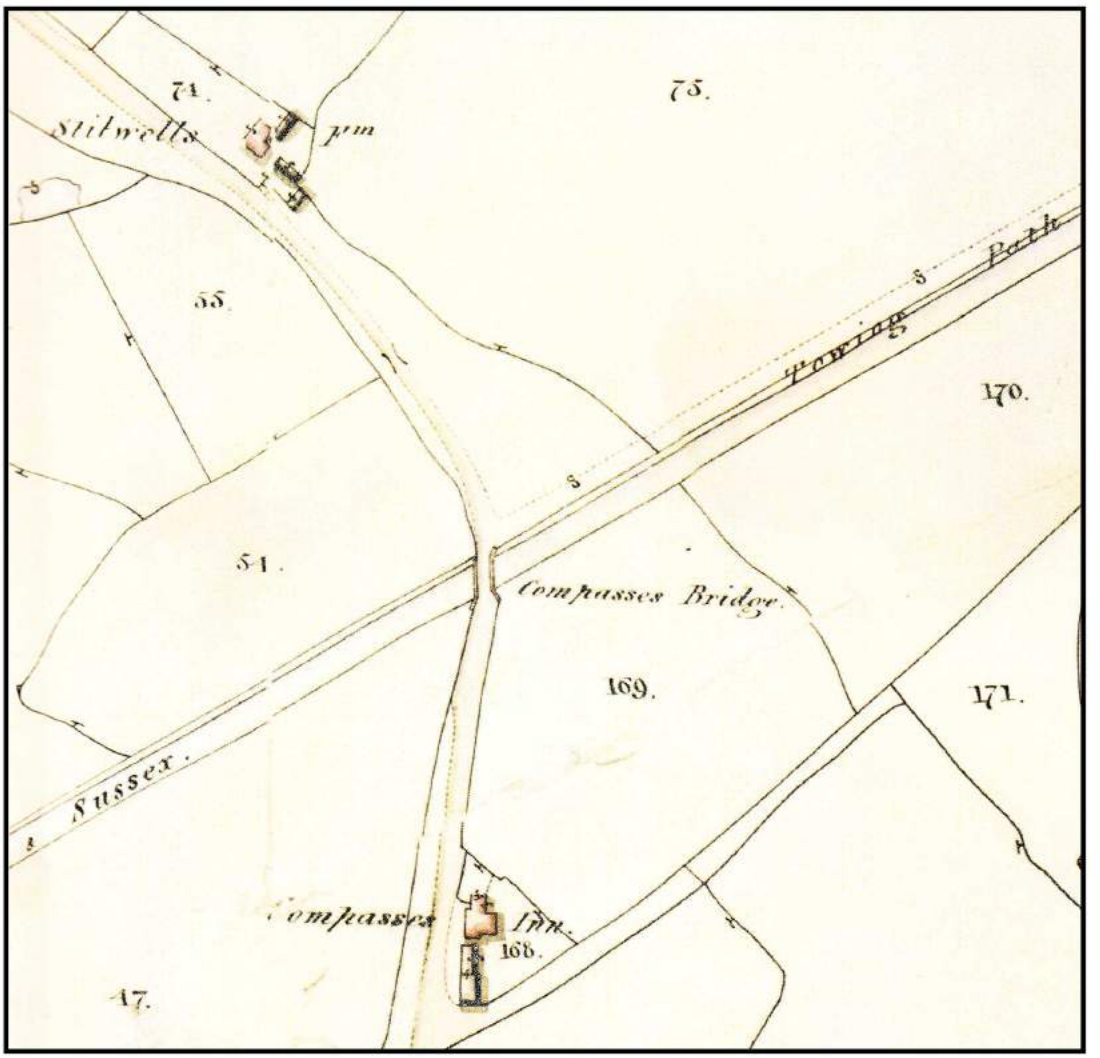


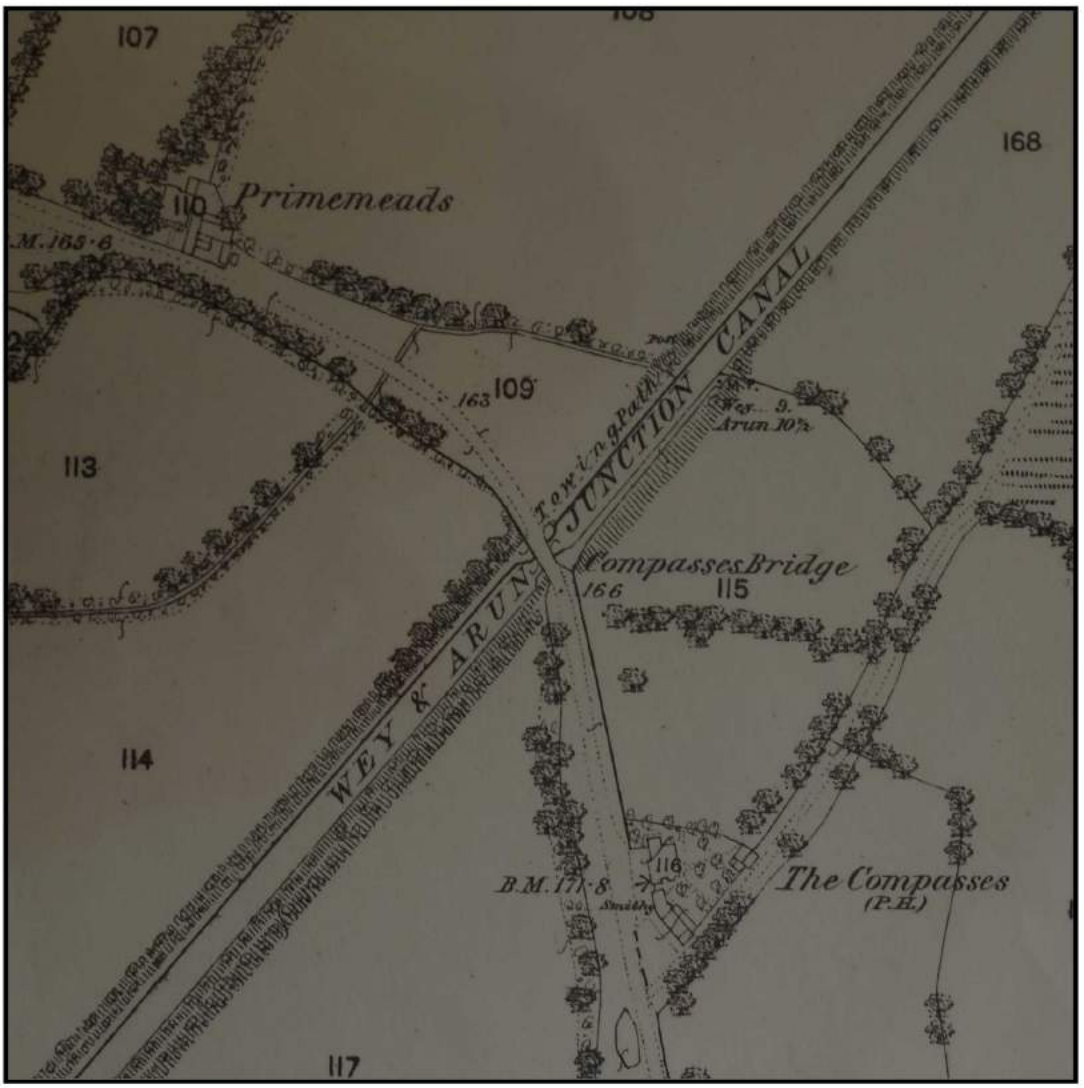
Fig 1: Location of site



not to scale

Fig 2.1: Alfold Tithe map; 1841

1871

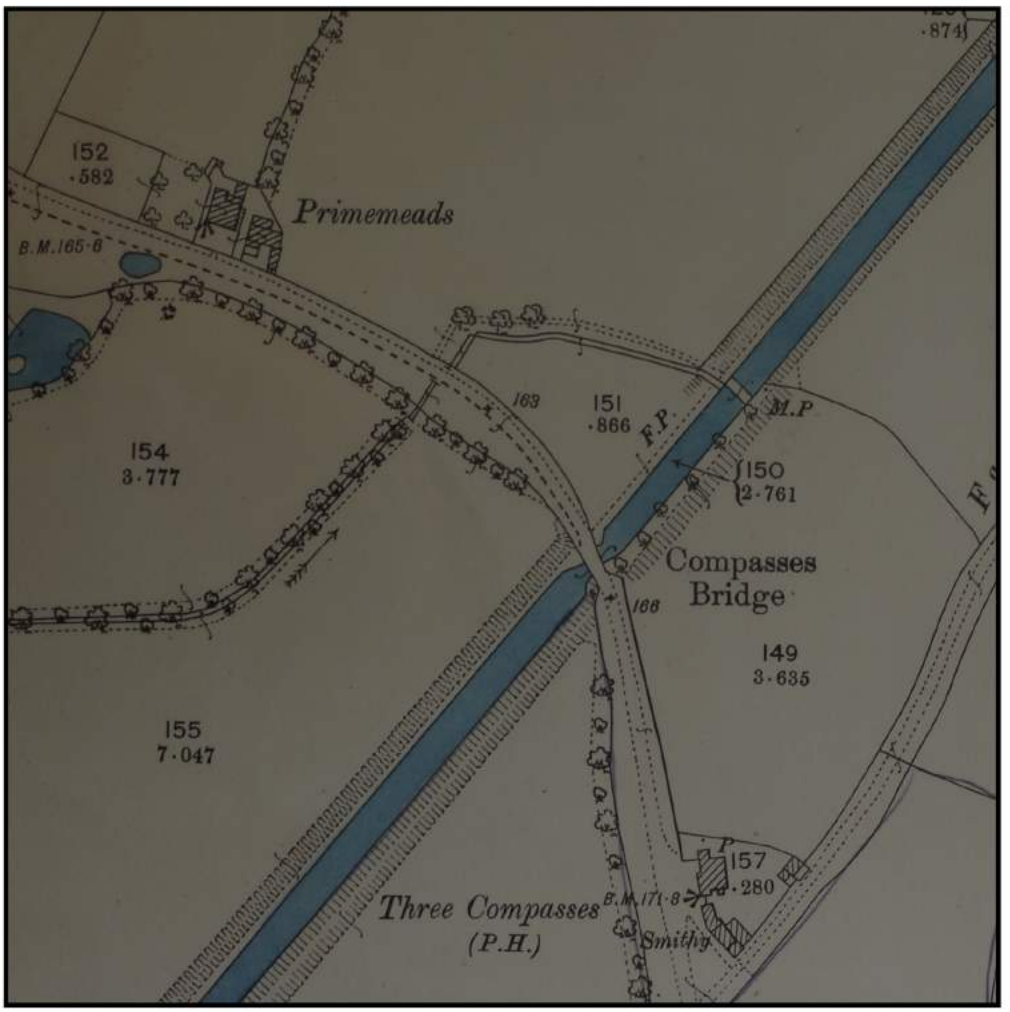


N

0 200m

Fig 2.2: Historic Ordnance Survey mapping

1897



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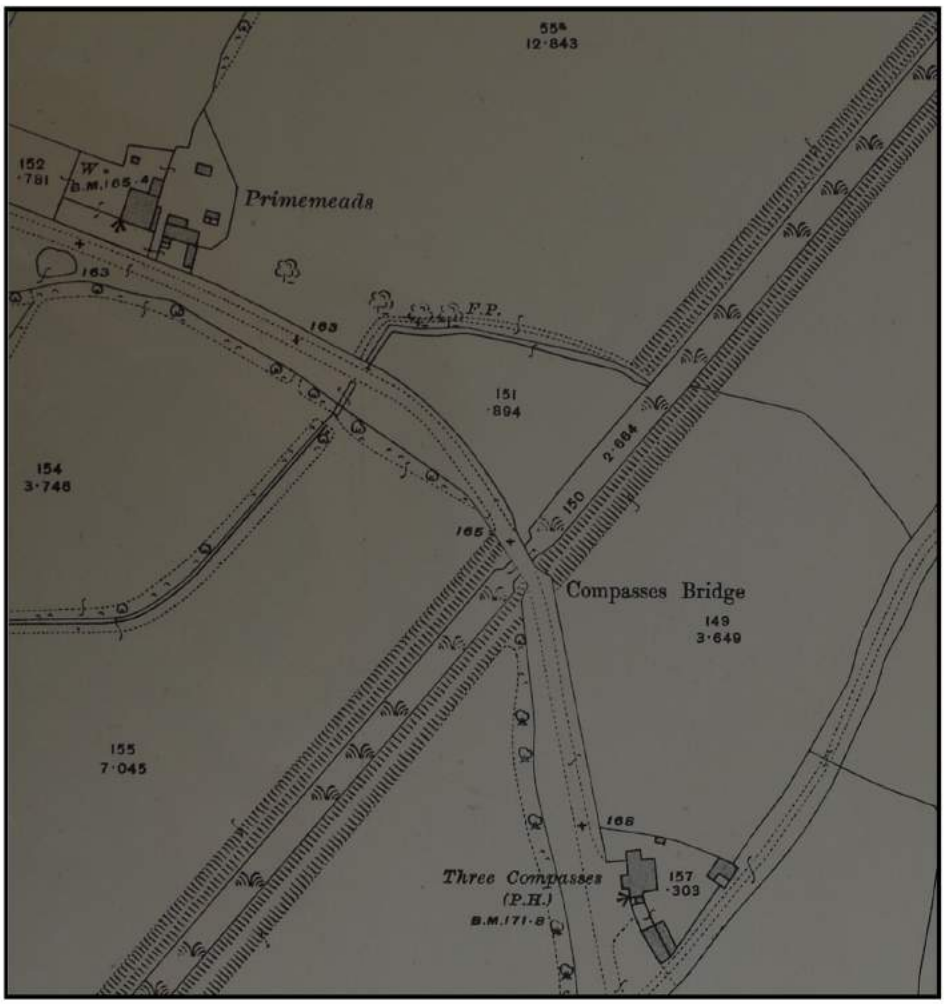
0 200m

Fig 2.3: Historic Ordnance Survey mapping

1915



N

0 200m

Fig 2.4: Historic Ordnance Survey mapping

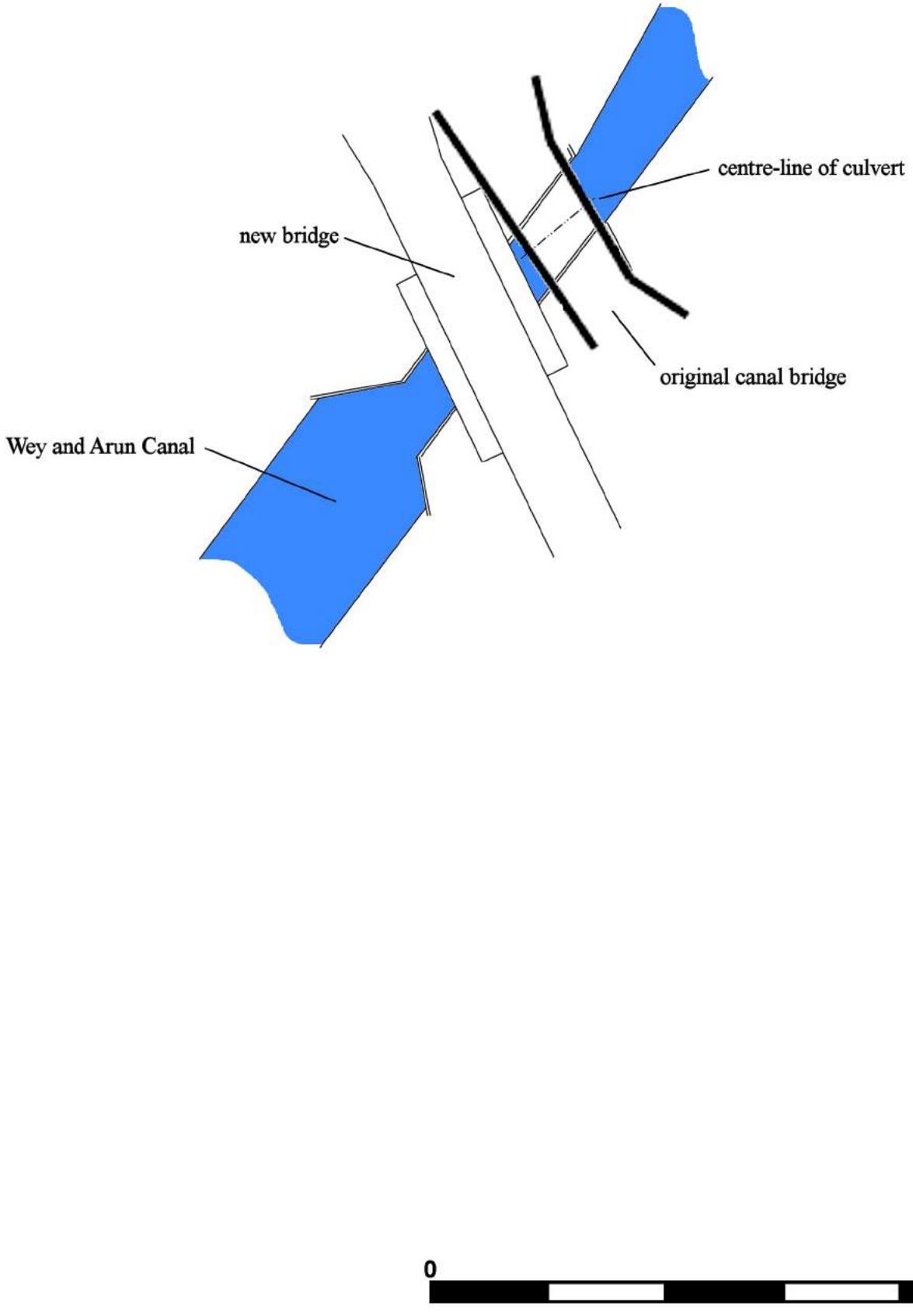


Fig 3.1: Postulated position of original canal bridge derived from Ordnance Survey map of 1915, located with respect to culvert

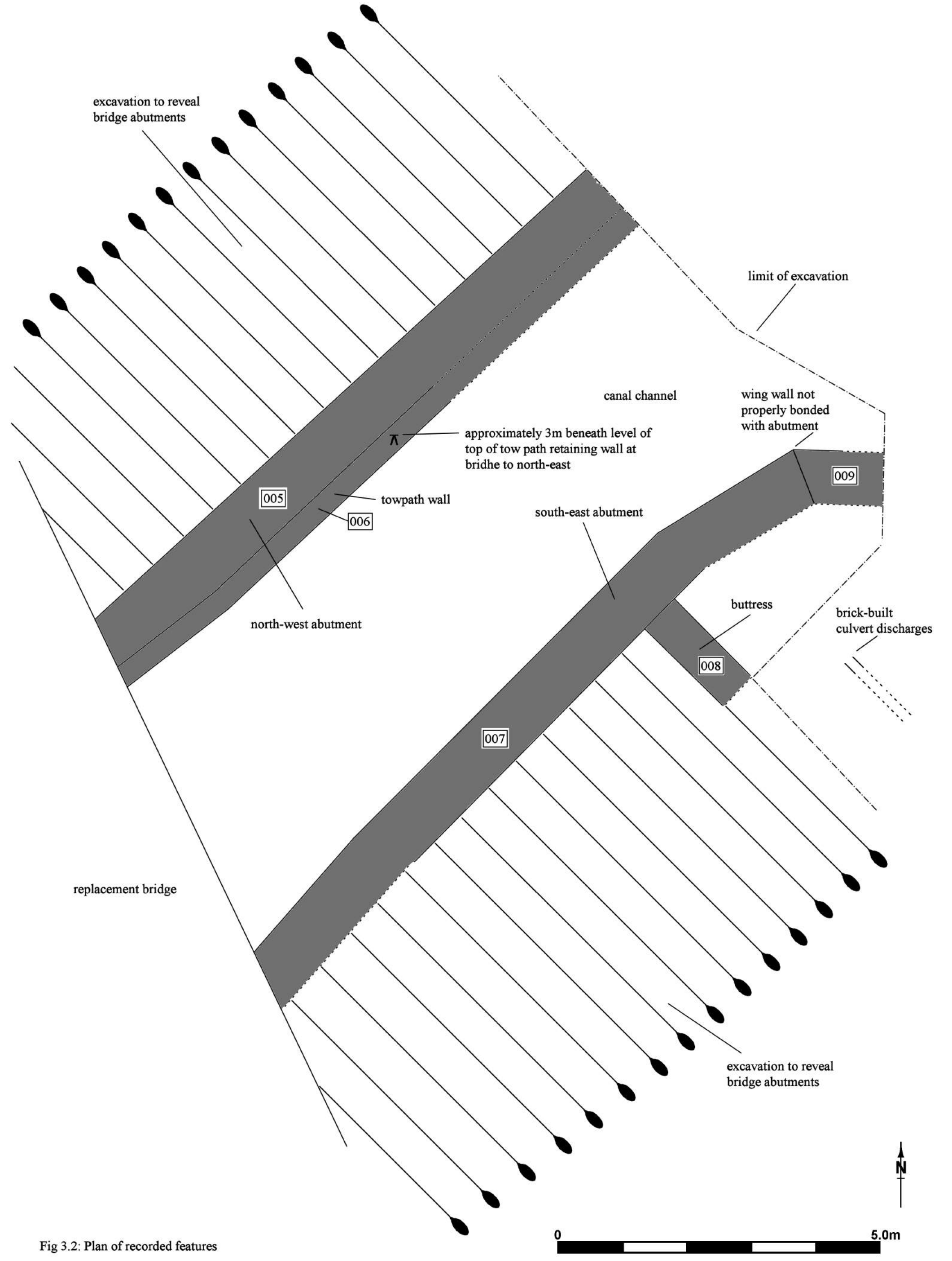


Fig 3.2: Plan of recorded features

Fig 4: General view of north-east side of causeway showing culvert

Fig 5: General view of excavation of causeway from south-east

Fig 6: South-east abutment wall

Fig 7: North-west abutment wall

Fig 8: South-east abutment wall showing buttress

Fig 9: Rear of south-east abutment wall showing English bond brickwork

Fig 10: Timber found between abutment walls

Fig 11: Timber found between abutment walls showing detail of tenon

Fig 12: Timber found between abutment walls showing detail of 'spade' end

Appendix 1: List of the contexts

Context number	Description	Interpretation
001	Reinforced concrete	Causeway retaining wall
002	Reinforced concrete	Causeway retaining wall
003	Concrete pipe	Culvert maintaining connection of water levels on both sides of 001 and 002
004	Angular stone material	Bulk fill of causeway
005	English bond brickwork	North-east abutment wall
006	Brickwork	Tow path retaining wall
007	English bond brickwork	South-west abutment wall
008	English bond brickwork	Buttress
009	Brickwork	Wing wall
010	Timber (essentially a whole tree with branches removed) with a tenon at one end and a 'spade' like profile at the other	Function unknown but it is unlikely to have formed part of the original bridge

Appendix 2: The OASIS form

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: martinco1-252323

Project details

Project name	Compasses Bridhe, Alfold, Surrey
Short description of the project	Watching brief at a former canal bridge on the Wey and Arun Canal
Project dates	Start: 15-04-2016 End: 20-05-2016
Previous/future work	No / No
Any associated project reference codes	martinco 1- 1252323 - OASIS form ID
Type of project	Recording project
Site status	Local Authority Designated Archaeological Area
Current Land use	Transport and Utilities 2 - Other transport infrastructure
Monument type	BRIDGE Post Medieval
Significant Finds	NONE None
Investigation type	"Watching Brief"
Prompt	National Planning Policy Framework - NPPF

Project location

Country	England
Site location	SURREY WAVERLEY ALFOLD Compasses Bridge, Alfold, Surrey
Study area	200 Square metres
Site coordinates	TQ 03488 36067 51.11400474945 -0.521370341877 51 06 50 N 000 31 16 W Point

Project creators

Name of Organisation	Martin Cook BA MCIfA
Project brief originator	Self (i.e. landowner, developer, etc.)
Project design originator	Martin Cook BA MCIfA
Project director/manager	Martin Cook BA MCIfA

Project supervisor	Martin Cook BA MCIfA
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive recipient	ADS
Digital Contents	"other"
Digital Media available	"Text","Images raster / digital photography"
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Archaeological watching brief at Compasses Bridge, Alfold, Surrey
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