

**An Archaeological Watching Brief during
Reconstruction of the Bottom Basin Walkway
at Foxton Inclined Plane, Leicestershire
(SP 69230 89590, Centre).**

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For British Waterways

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Summary	3
1. Introduction.....	4
2. Background.....	4
2. Aims and Methodology.....	6
3. Results.....	6
4. Conclusion	8
6. Archive and Publication.....	9
6. Bibliography	9
7. Appendices.....	18

Figures

Figure 1: Site location Scale 1:50000.....	5
Figure 2: Surviving structure recorded during watching-brief	10
Figure 3: Elevation of Walkway (Black Actual, Grey Conjecture).....	11
Figure 4: Walkway following initial silt removal (from north).....	12
Figure 5: Initial silt removal from south.....	12
Figure 6: Condition of post 3. The timber has been badly damaged after being shortened. Part of the brick rubble and concrete plinth is visible.	13
Figure 7: Custom steel collar in position above existing post. The base of the collar has been located over the existing post and a flange tied down with studding in a concrete bed (Photo: Stuart Johnson, Morrison Construction).	13
Figure 8: Collars and extensions in place on eastern row.....	14
Figure 9: Western row prior to sleeving from north. Note granite faced wall and doubled horizontal brace	14
Figure 10: Reconstructed diagonal braces.....	15
Figure 11: Reconstruction of superstructure.....	15
Figure 13: Completed structural restoration from south. The vertical iron wheel sits to the north of the wheel pit.	16
Table 1: Condition of eastern post row timbers.....	17
Figure 14: Gordon Cale Thomas sat within the wheel-pit.	17
Figure 1: Location of Foxton, Leicestershire. (Appendix 1).	23
Figure 2: 1904 Ordnance Survey map showing the inclined plane. Timber walkway within bottom basin arrowed. (Appendix 1).	24
Figure 3: Plan and elevation of proposed reconstructed walkway (from WNCAAX-091-16). (Appendix 1).....	25
Figure 4: Sections showing intended reuse of assumed extant piles (from WNCAAX-091-16) (Appendix 1).....	26
Figure 5: Gordon Cale Thomas poses on the walkway under construction in the late nineteenth century. Detail of the walkway foundations are visible (Appendix 1)	27
Figure 6: The bottom basin re-watered soon after construction (1899). The close planked timber walkway is central. (Appendix 1).....	28
Figure 7: Plan of the Inclined Plane (after Gardner and Foden 1978, Fig 4). Timber walkway shaded grey. (Appendix 1).....	29
Figure 8: DCMS letter. (Appendix 1).....	30

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Timber Walkway at Foxton Inclined Plane, Leicestershire
(SP 69230 89590, Centre).**

Summary

University of Leicester Archaeological Services were commissioned by British Waterways to undertake an archaeological watching brief during the reconstruction of the timber walkway within the bottom basin of Foxton Inclined Plane. As part of a general programme of restoration and remediation work within the area of the inclined plane, the walkway was to be rebuilt to its original dimensions. The structure is within the Scheduled Monument

The original eastern line of timbers was found to have been previously sawn down to around ground level and the diagonal brace beams had also been reduced in length. The restoration involved the making good and subsequent extension of the existing timbers and rebuilding of the decking to its original dimensions, using original photographs as reference.

The restoration was accomplished with minimal further damage to the monuments' fabric whilst new information regarding the structure and operation of the inclined plane was gleaned. It was revealed that the bottom basin structures have mostly survived intact, and that the structure on which the walkway and dock was based also served the working of the caissons on the inclined plane.

1. Introduction

University of Leicester Archaeological Services were commissioned by British Waterways to undertake an archaeological watching brief during the reconstruction of the bottom basin timber walkway at Foxton Inclined Plane, Leicestershire (SP 69230 89590, Centre). The proposed works included the dewatering of the bottom basin exposing the timber piles and cross braces, the assessment of their condition and the carrying out of restoration work sensitive to the condition of the monument.

The site is within a Scheduled Monument (Monument Number 30248). Scheduled Monument Consent was given for the restoration work by the Department of Culture Media and Sport (hereafter DCMS), subject to the specification of the restoration and the meeting of archaeological conditions as requested by English Heritage, advisors to DCMS. The final design of the walkway supports was to be agreed following the exposure of the surviving walkway timbers (DCMS ref HSD 9/2/8310, Appendix 1, Figure 8).

2. Background

Foxton Inclined Plane was opened in 1900 and is an exceptionally rare and near complete example of late Victorian canal engineering. Despite being closed in 1911 and mostly scrapped in the 1920s, the site has remained largely undeveloped. The timber walkway is located within the northern bottom basin, parallel with the northernmost incline and was originally constructed as a dock for boats entering and leaving the northern caisson. The walkway was constructed on timber piles which permitted water to flow underneath and allowed space for the submerged hawsers.

The original walkway was approximately 2800mm wide, but was reduced to c.1400mm in the later 20th Century when the eastern line of piles were cut down to near the level of the basin bottom and the diagonal bracing beams also cut back (Mr A.W. Matts *pers. Comm.*) A replacement structure of 50mm (2 inch) steel tubes sitting on the trimmed tops of the western piles and the cut back diagonal braces (which effectively became cantilevers) carried the reduced width of a new walkway (Figure 5).



Figure 1: Site location Scale 1:50000

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2. Aims and Methodology

The aim of the archaeological work, as defined by the Design Specification (ULAS Specification 06/914, Beamish 2006, included as Appendix 1) was to:-

- Identify the presence/absence of any archaeological deposits (including identified and unidentified structural features).
- Establish the character, extent and date range for any archaeological deposits to be affected.
- To record any archaeological deposits to be affected by the ground works prior to their deconstruction.

The basin was dewatered and some limited silt removal carried out prior to archaeological involvement (Figure 4 and Figure 5). Further silt was removed by back actor with ditching bucket and by hand in the area of the timbers; any structural features were then pressure washed with clean water and recorded.

The project involved the monitoring of works carried out by the site contractors, Morrison Construction Services Ltd, during the exposure of the original walkway structure. Once the surviving elements of the structure were fully visible an assessment of the specific conditions of the timbers and the feasibility and detail of their repair was made by British Waterways engineers, English Heritage, ULAS, and Morrison Construction Services Ltd.

All archaeological work followed the Institute of Field Archaeologist's (IFA) *Code of Conduct and Standard and Guidance for Archaeological Watching Briefs*.

3. Results

The Timbers

The eastern timbers (numbered 1 to 8, Figure 2), had all been sawn down to around the current silt level within the basin (Table 1) and some had been subsequently damaged further. The western uprights had also been slightly reduced in height and the diagonal brace beams sawn down to approximately half their original length. Pairs of horizontal beams run across the structure and tied together each set of posts. A profile was recorded across the northernmost timbers (Figure 3).

Pressure washing and excavation indicated that the eastern timbers were set into a lightweight concrete and brick rubble (“brickcrete”) footing that ran between a northern group and southern group each of three timbers (Figure 2); limited test pitting adjacent to timbers 3 and 7 revealed this to be at least 300mm deep.

The restoration plan involved the bolting of generic steel collars to the exposed portions of the timbers rows, into which the new timbers would be inserted (Appendix

1, Figure 4). It was clear that some of the eastern timbers were too badly damaged and insufficiently exposed to securely attach the collars as designed, and that the use of the generic collar on even some of the better timbers would require the excavation of sound areas of the concrete footing in order to seat the collar.

It was decided in consultation with English Heritage that the planned steel collars should be modified where necessary by the addition of an external flange on the base (Figure 7) so that they could be bolted directly over the footing thus making unnecessary any excavation into existing fabric of the monument.

Repair work to the western timbers required the removal of rotted timber prior to the attaching of the collars. Similar work was carried out on the diagonal brace beams. This along with the reconstructed deck resulted in a structure nearly identical to the original (Figures 10-15).

During the late Victorian period the majority of soft wood used in British construction was either Nordic or Baltic pine; however, at Foxton, Oregon Pine (Douglas Fir *Psuedotsuga menziesii*) was used for the track sleepers (Gardner and Foden 1978 p.24). It is likely, therefore, that it also would have been used in the construction of the walkway. The original walkway timbers appeared of similar type, and were clearly not of oak. Timber 4 of the eastern post row (Figure 2) was sampled and the species was identified as softwood but not pine, and quite feasibly Douglas Fir, by Dr. G. Morgan (*pers. comm.*).

Structural interpretation

Without further cleaning it was possible to locate the outline of a rectangular timber structure to the east of the walkway (Figure 2). This was the wheel-pit which originally transferred the cable through ninety degrees; photographic evidence (Figure 14) indicates the pit is brick built, approximately 700mm deep with a timber sill on top.

Timbers 4 and 5 were not set in concrete, but tied into a timber frame. The paired timbers running between eastern and western rows at this point were strengthened with the addition of a third timber. Within the strengthened area was a substantial iron pulley wheel over which a 60mm diameter hawser cable would have run (Figure 13, at left hand end of “Tail Rope” on Appendix 1, Figure 7, and Gardner and Foden 1978 p.16). A second pulley wheel or some other mechanism for guiding the hawser onto the horizontal wheel in the wheel-pit to the north-east (Figure 14) probably survives but was not exposed. The design of the walkway appears to have been an integral part of the inclined plane and not simply a wharf structure sitting above the running gear.

Although not visible, an examination of the remaining timbers suggests that the horizontal brace beams are continuous and tie the paired uprights together below ground level (Figure 3). This, along with the diagonal brace, would produce a very strong structure, capable of supporting the weight of the fully loaded caisson. Each caisson has been calculated to have weighed in excess of 240 tons when loaded, effectively reduced to 60 tons when immersed (Gardner and Foden 1978 p.13), and although each caisson effectively counter-balanced the other, the potential impact of

the northern caisson against the walkway was clearly mitigated for in the original design.

The wheel-pit survived the original scrapping in 1928 but the wheel was lifted in the 1970's and is currently on display nearby; there are plans to relocate this sole remaining wheel to the top of the inclined plane in order to aid interpretation by locating it where one of the original wheels stood.

It is not clear whether the second bottom wheel, which was originally housed in a chamber below the towpath at the bottom of the northern incline, is intact as access to that part of the basin is not possible. Elements of iron hawser gear were just visible above the silt in the southern chamber and it is possible that the horizontal wheel is still *in situ*. In places it was possible to trace an iron pipe that connected the two wheel-pits. It is quite possible, therefore, that the mechanism survives largely intact; the limitations of this phase of work, however, did not allow for more detailed recording.

4. Conclusion

The watching-brief was successful in the identification of surviving elements of the original structure and in the redesign of the restoration collars in sympathy with the surviving archaeology. Hitherto undocumented and unforeseen elements of the structure were also recorded, and the restoration of the walkway was accomplished with minimal further damage to the existing structure.

Although limited to work directly related to the restoration of the walkway, the watching brief has also revealed some further detail of the monuments' construction and operation. There is clearly further complexity in the design of winding gear that is for the most part unrecorded and partially buried within the puddle clay of the basin floor. It is unfortunate that, due to the limitations of the watching brief, further recording work was not possible which would have added considerably to our knowledge of the Scheduled Monument.

It appears that far from being a simple wharf, the walkway was an integral part of the of the inclined plane with the structure providing both a dock for boats entering and leaving the northern caisson, and also mechanical functionality at the foot of the incline. The robustness of the structure should perhaps not be unexpected, as the designers clearly anticipated the potential damage caused by an uncontrolled impact from the northern caisson against the walkway.

5. Acknowledgements

The field-work was supervised by Gerwyn Richards and the Project Managed by Matthew Beamish. Thanks to Peter Chowns of British Waterways for his enthusiasm and help and Angela Simco of English Heritage for her assistance, and also to Stuart Johnson of Morrison Construction for photos of the reconstruction that ULAS were unable to record.

6. Archive and Publication

The site archive consists of

A2 permatrace sheets containing trench locations and plans & sections of trench 1
Black and white negatives with contact sheets
1x CD of Digital Colour Images and A4 contact sheet
1x A4 Photo Index Sheet

The archive will be held at Leicestershire County Council, under accession number X.A82.2006

A version of the summary (above) will be published in *Transactions of Leicestershire Archaeological and Historical Society* in due course.

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Report approved by British Waterways 5.11.2007

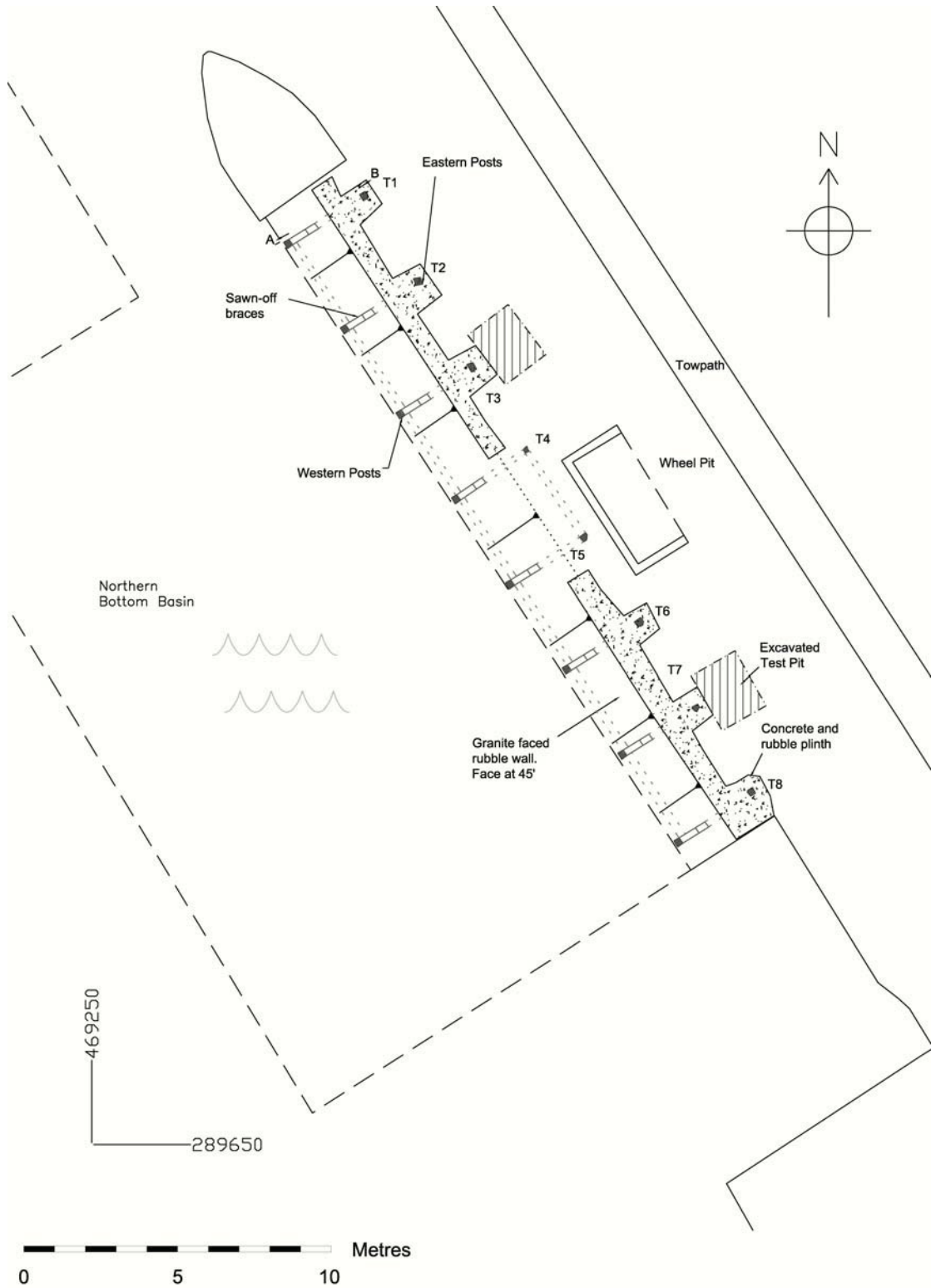


Figure 2: Surviving structure recorded during watching-brief

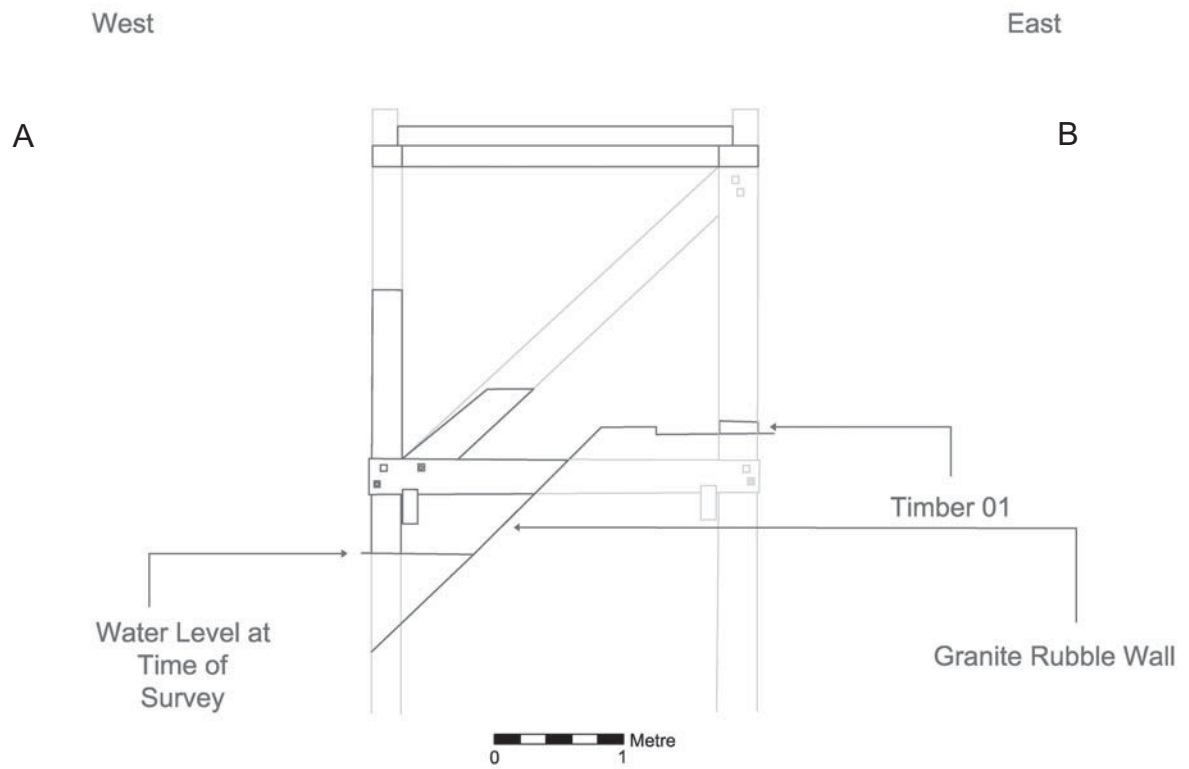


Figure 3: Elevation of Walkway (Black Actual, Grey Conjecture).



Figure 4: Walkway following initial silt removal (from north)



Figure 5: Initial silt removal from south



Figure 6: Condition of post 3. The timber has been badly damaged after being shortened. Part of the brick rubble and concrete plinth is visible.



Figure 7: Custom steel collar in position above existing post. The base of the collar has been located over the existing post and a flange tied down with studding in a concrete bed (Photo: Stuart Johnson, Morrison Construction).



Figure 8: Collars and extensions in place on eastern row.



Figure 9: Western row prior to sleeving from north. Note granite faced wall and doubled horizontal brace



Figure 10: Reconstructed diagonal braces



Figure 11: Reconstruction of superstructure



Figure 12: Completed structural restoration from south-east.

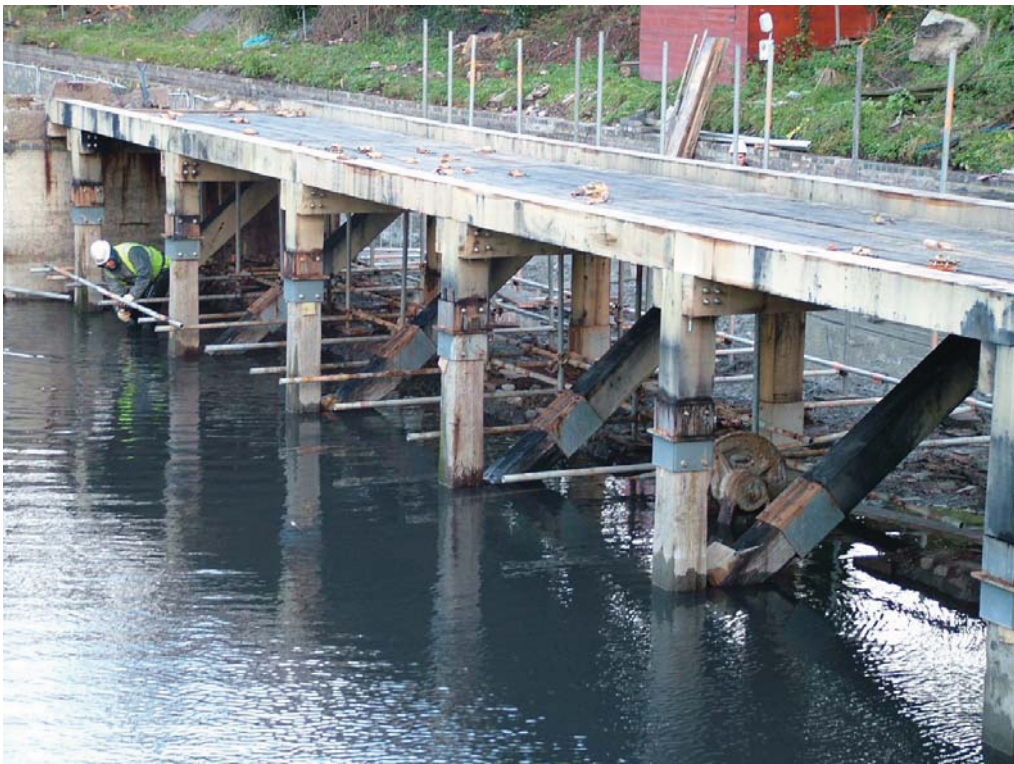


Figure 13: Completed structural restoration from south. The vertical iron wheel sits to the north of the wheel pit.

Table 1: Condition of eastern post row timbers.

Timber no	Length of exposed timber	Timber Base
01	200mm	Lightweight concrete
02	170mm	Lightweight concrete
03	170mm, cut timber badly damaged.	Lightweight concrete
04	450mm	Tied into wheel-pit timbers, no concrete.
05	480mm	Tied into wheel-pit timbers, no concrete.
06	300mm	Lightweight concrete
07	180mm	Lightweight concrete
08	180mm	Lightweight concrete



Figure 14: Gordon Cale Thomas sat within the wheel-pit.

7. Appendices

Appendix 1:

UNIVERSITY OF LEICESTER ARCHAEOLOGICAL SERVICES

Design Specification for
**An Archaeological watching brief during
Reconstruction of the Bottom Basin Timber Walkway
at
Foxton Inclined Plane, Leicestershire**

<i>Client:</i>	British Waterways
<i>Site:</i>	Foxton Inclined Plane, Leicestershire
<i>NGR:</i>	(SP) 469230,289590 (centre)
<i>SAM:</i>	Monument No. 30248: Inclined plane immediately east of Foxton Locks
<i>Development:</i>	Reconstruction of timber walkway utilising original timber piles (Drawing WNCAAX-091-016)
<i>Project:</i>	Archaeological Watching Brief
<i>Planning Authority:</i>	Leicestershire County Council/English Heritage/DCMS

1 Definition and scope of the specification

1.1 This document constitutes a written scheme of archaeological investigation which ULAS proposes to implement on behalf of the Client in mitigation of any potential damage to buried archaeological deposits which may be caused by the restoration of the timber walkway that lay below the northern inclined plane, along original lines. This specification has been prepared in accordance with Planning Policy Guidelines 16 (PPG16, Archaeology and Planning), para.30, and the requirements of Scheduled Monument Consent (DCMS HSD 9/2/8310 see Figure 8 p30).

1.2 The proposed works are to reconstruct the timber walkway that lay below the northern inclined plane, along original lines.

1.3 The degree of survival of the walkway was assessed during an inspection by Halcrow and British Waterways engineers in November 2005 (Halcrow 2005) (Appendix 1, below p.33)

2 Background

2.1 The Inclined Plane is a Scheduled Ancient Monument (National Monument Number 30248).

2.2 Scheduled Monument Consent has been requested by British Waterways to undertake the Restoration of the timber walkway within the bottom basin below the Inclined Plane at Foxton (DCMS HSD 9/2/9310).

2.3 In the late 19th Century flights of narrow beam (7') locks at Foxton and Watford (some 10 miles southwest) effectively joined waterways running north to the cities of the East Midlands with those from the South Midlands and South East. At Foxton the locks rose 23m from bottom to top level, and it took a single boat 45 minutes to pass through. The advent of motorised boats as steamers and

subsequently with diesel engines in the late 19th Century, and the ability of the carriers to subsequently operate boats in pairs (a motor and butty) rather than singly as horse-boats, led in places to the widening of many locks to 14' to allow breasted narrow boats and wide beam boats to pass. Foxton Inclined Plane allowed two pairs of boats to ascend and descend simultaneously, with a greatly improved time of just 8 minutes. Foxton Inclined Plane was opened in 1900, but was closed by 1911. It was not until the late 1920s that major phases of demolition occurred.

3. Archaeological Background and Potential

3.1 Foxton Inclined Plane is located between the villages of Foxton and Gumley, Leicestershire, (Figure 1) and was opened in 1900. Foxton Inclined Plane is an exceptionally rare and relatively complete example of late Victorian canal engineering that has remained undeveloped. A full description and assessment of the Monument from the Scheduled Monument Register is appended to this document (Appendix 2 p.31)

3.2 The bottom basin included a timber walkway that was parallel with the more northern incline and served as a dock for boats entering and leaving the northern caisson. The walkway was founded on timber piles which permitted water flow underneath and the passing of a submersed hawser (see Figure 7 below p.30).

3.3 The walkway was partly inspected in 2005. The western (or southern) line of piles was thought to be in generally good condition with some rot limited to the tops of the piles, but the eastern (or northern) line is thought to have been cut off at bed level (below p.33). Therefore the full extent of survival will not be ascertainable until the basin is pumped clear of water.

3. Aims

3.1 Through archaeological control and supervision of works undertaken in the deconstruction and reconstruction of the timber walkway:

1. To identify the presence/absence of any archaeological deposits (including identified and unidentified structural features).
2. To establish the character, extent and date range for any archaeological deposits to be affected by the proposed ground works.
3. To record any archaeological deposits to be affected by the ground works prior to their deconstruction
4. To produce an archive and report of any results.

4 Methodology

4.1 Archaeological Supervision and Recording

4.1.1 The project will involve the presence on site of an experienced professional archaeologist during the dismantling and exposure of the timber walkway.

4.1.2 Prior to the commencement of work on the walkway and following dewatering of the bottom basin, the timber walkway foundations should be inspected by an archaeologist to assess the extent of preservation of original timbers, and the necessary extent of recording prior to deconstruction. The archaeologist will co-operate at all times with the contractors on site to ensure the minimum interruption to the work. Potentially a second archaeologist may be required dependant upon the size and nature of the archaeological remains.

4.1.3 Archaeological deposits will be excavated and recorded as appropriate to establishing the stratigraphic and chronological sequence of deposits, recognising and excavating structural evidence and recovering economic, artefactual and environmental evidence.

4.1.4 Any human remains encountered will be initially left *in situ* and only be removed under a Home Office Licence and in compliance with relevant environmental health regulations. The Client, Leicestershire County Council, English Heritage and the coroner will be informed immediately on their discovery.

4.1.5 Internal monitoring procedures will be undertaken including visits to the site from the project manager. These will ensure that professional standards are being maintained. Provision will be made for monitoring visits with representatives of the Client, Leicestershire County Council and English Heritage.

4.1.6 In the event of significant unforeseen archaeological remains being located during the watching brief which will be affected by the proposals, the archaeologist will have the power to halt the works. The Client, the County Archaeologist and English Heritage will be informed immediately in order that discussions can take place with a view to securing the preservation of such remains *in situ*, or for the implementation of an appropriate programme of archaeological work to mitigate any damage that will take place.

4.1.7 All archaeological work will adhere to the Institute of Field Archaeologists' (IFA) *Code of Conduct and Standard and Guidance for Archaeological Watching Briefs*.

5 Recording Systems

5.1 Individual descriptions of all archaeological strata and features excavated or exposed will be entered onto pro-forma recording sheets.

5.2 A site location plan based on the current Ordnance Survey 1:1250 map, (reproduced with the permission of the Controller of HMSO) will be prepared. This will be supplemented by a plan at 1:200 (or 1:100), which will show the location of the areas investigated.

5.3 Any archaeological deposits located will be recorded as appropriate. Measured drawings of all archaeological features will be prepared at scales of 1:5, 1:10, 1:20 or 1:50 as appropriate and tied into an overall site plan of 1:100. All plans will be tied into the National Grid using an Electronic Distance Measurer (EDM) where appropriate.

5.4 An adequate photographic record of the investigations will be prepared. This will include black and white prints and colour transparencies illustrating in both detail and general context the principal features and finds discovered. The photographic record will also include 'working shots' to illustrate more generally the nature of the archaeological operation mounted.

5.5 This record will be compiled and fully checked during the course of the watching brief.

5.6 All site records and finds will be kept securely.

6 Report and Archive

6.1 A report on the watching brief will be provided following the ground works.

6.2 Copies will be provided for the Client, English Heritage, the Sites and Monuments Record and Planning Authority. The copyright of all original finished documents shall remain vested in ULAS and ULAS will be entitled as of right to publish any material in any form produced as a result of its investigations.

6.3 A full copy of the archive as defined in the 'Guidelines for the preparation of excavation archives for long-term storage' (UKIC 1990), and Standards in the Museum care of archaeological collections (MGC 1992) and 'Guidelines for the preparation of site archives and assessments for all finds (other than fired clay objects) (Roman Finds Group and Finds Research Group AD 700-1700 1993) will be presented to Leicestershire County Council, Heritage Services normally within six months of the completion of analysis. This archive will include all written, drawn and photographic records relating directly to the investigations undertaken.

6.4 Any disk-based data will be provided for the Leicester City SMR.

7 Publication

7.1 The evaluation and watching brief report will be submitted to Leicestershire County Council for inclusion in the Sites and Monuments Record. A summary of the work will be submitted to the

Transactions of the Leicestershire Archaeological and Historical Society. A larger report will be submitted for inclusion if the results of the works warrant it.

7.2 ULAS and the Leicestershire County SMR support the Online Access to the Index of Archaeological Investigations (OASIS) project. ULAS will complete the online OASIS form at <http://ads.ac.uk/project/oasis> on completion of the project and report. ULAS will contact Leicestershire County Council SMR prior to completing the form. Once a report has become a public document following its incorporation into Leicestershire County Council SMR it may be placed on a web-site. The Client should agree to this procedure in writing as part of the process of submitting the report to Leicestershire County Council SMR.

8 Timetable and Staffing

8.1 It is intended that the work start as soon as it possible. The duration of the watching brief will be dependant upon the degree of preservation of the walkway foundations, and the time necessary for the recording of such.

9 Health and Safety

9.1 ULAS is covered by and adheres to the University of Leicester Statement of Safety Policy and uses the ULAS Health and Safety Manual (2001) with appropriate risks assessments for all archaeological work. A draft Health and Safety statement for this project is in the Appendix. The relevant Health and Safety Executive guidelines will be adhered to as appropriate.

10 Insurance

10.1 All employees, consultants and volunteers are covered by the University of Leicester public liability insurance, £20m cover with St. Paul Travellers (policy no. UCPOP3651237). Professional indemnity insurance is with Lloyds Underwriters 50% and Brit Insurance 50%, £10m cover (policy no. PUNIO3605). Employer's Liability Insurance is with St. Paul Travellers, cover £10m (policy no. UCPOP3651237).

11 Bibliography

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Figure 1: Location of Foxton, Leicestershire. (Appendix 1).

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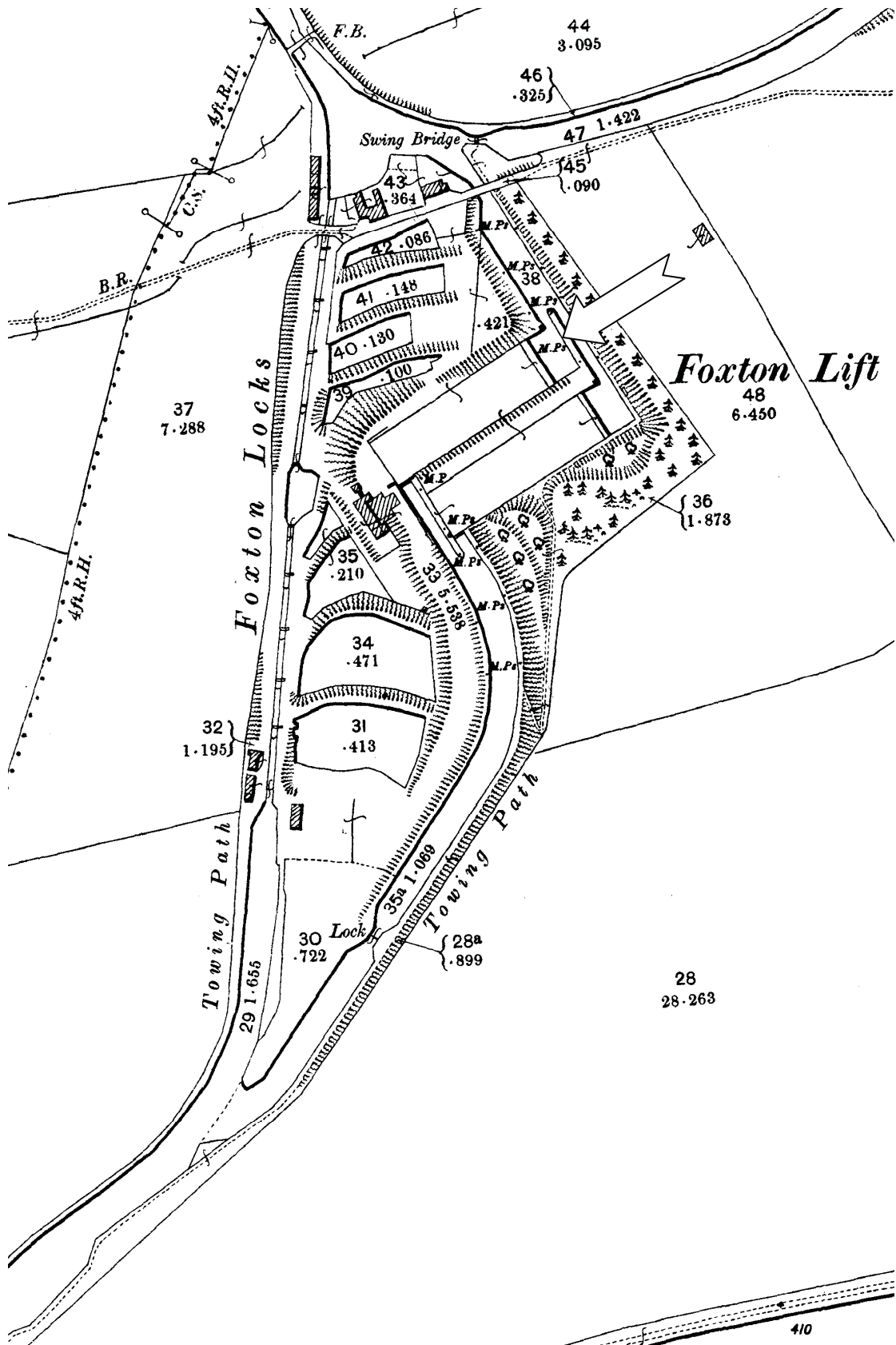


Figure 2: 1904 Ordnance Survey map showing the inclined plane. Timber walkway within bottom basin arrowed. (Appendix 1).

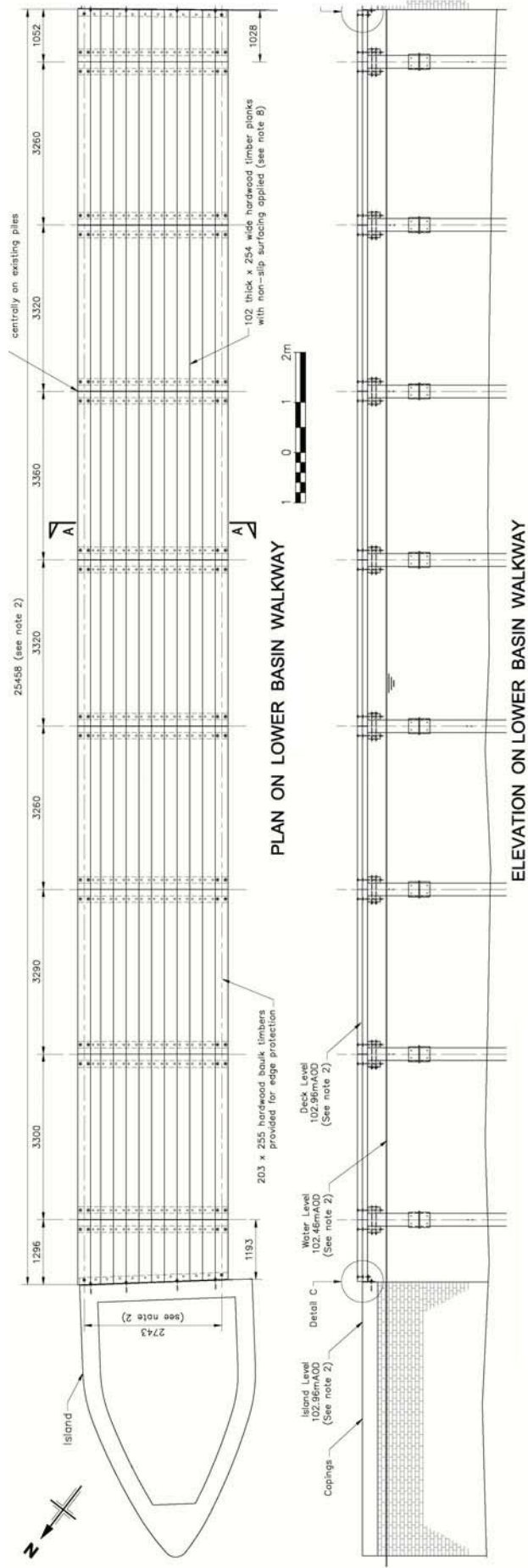


Figure 3: Plan and elevation of proposed reconstructed walkway (from WNCAX-091-16). (Appendix 1)

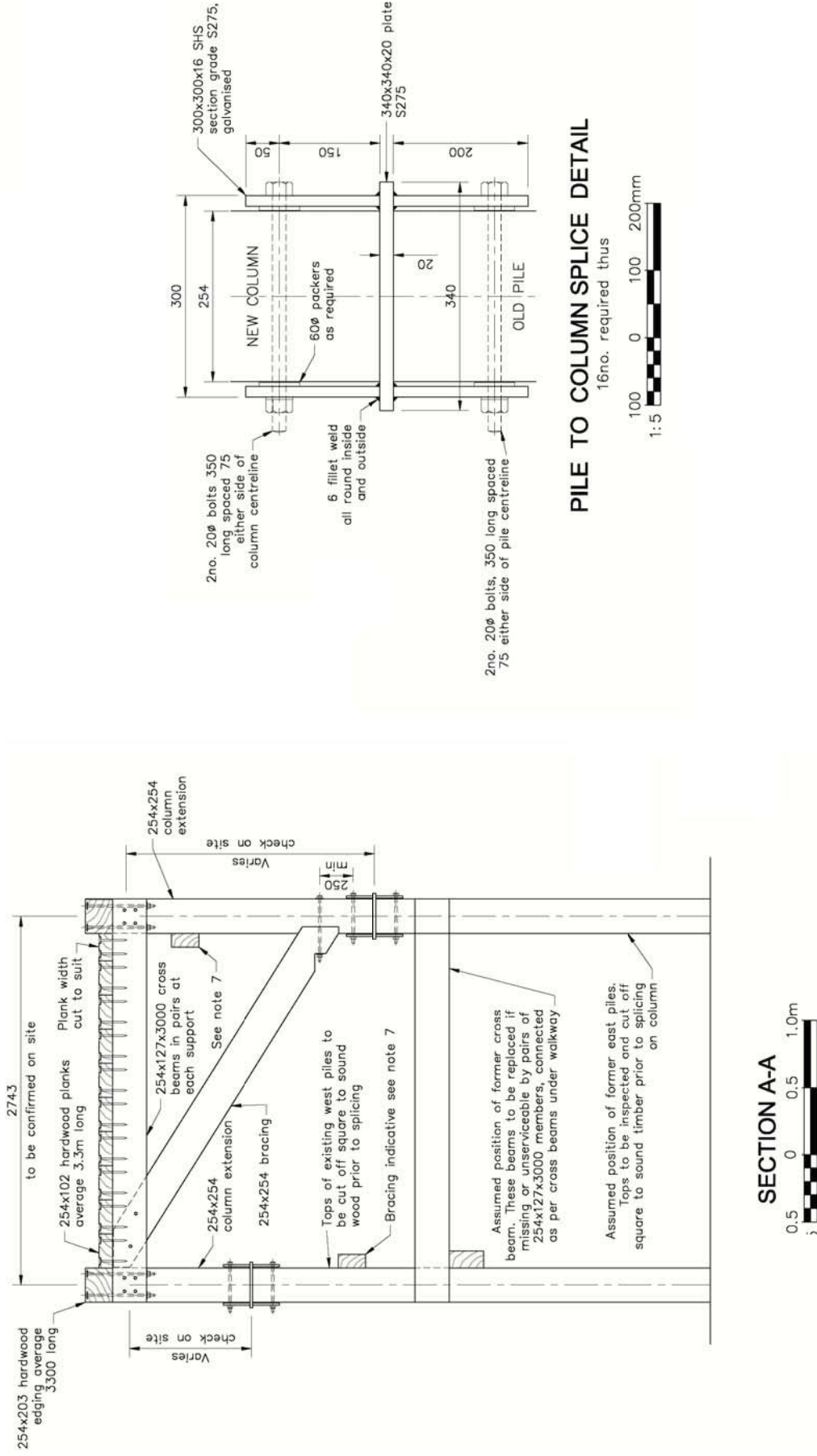


Figure 4: Sections showing intended reuse of assumed extant piles (from WNCAAX-091-16) (Appendix 1).

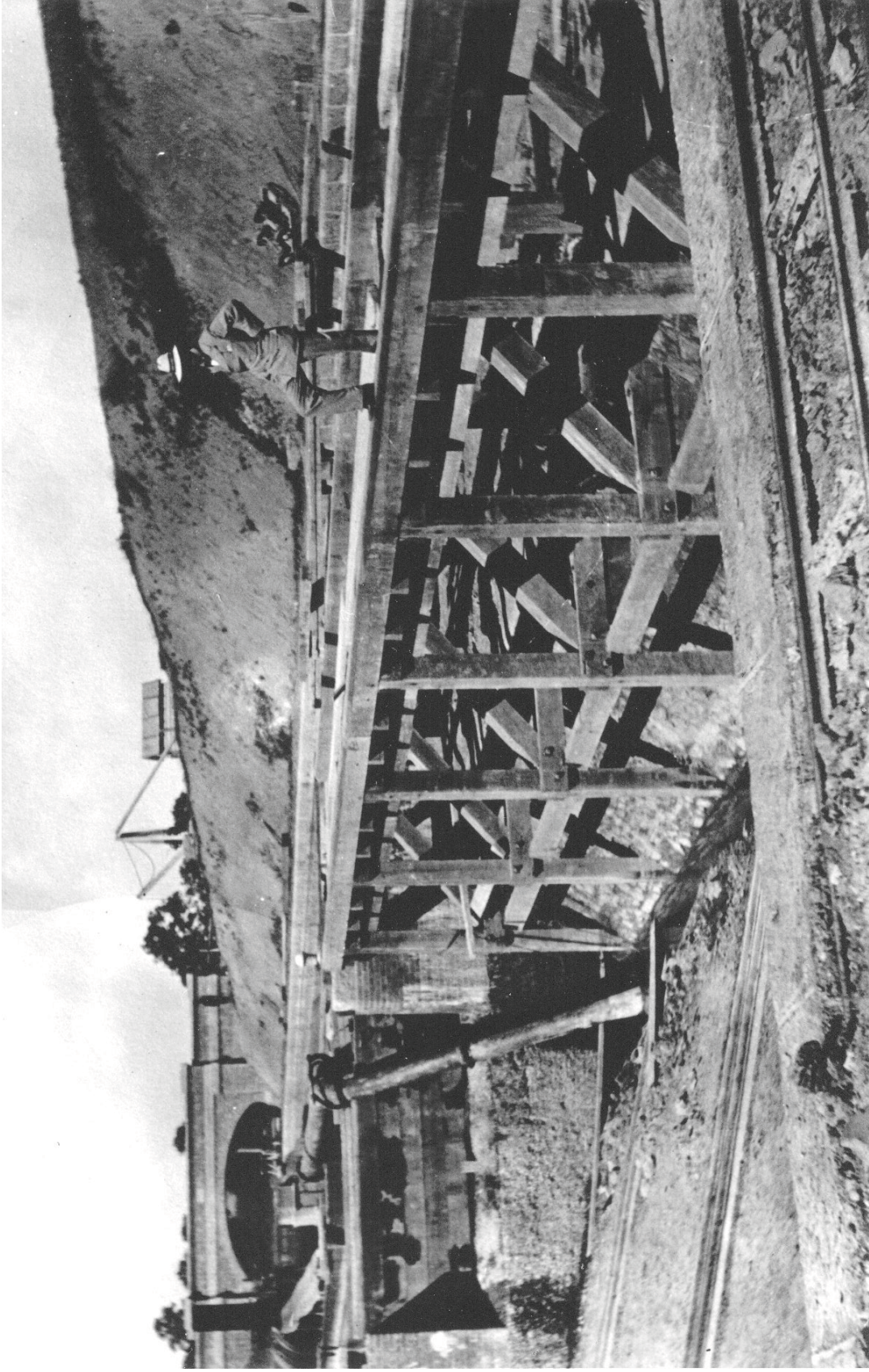


Figure 5: Gordon Cale Thomas poses on the walkway under construction in the late nineteenth century. Detail of the walkway foundations are visible (Appendix 1)



Figure 6: The bottom basin re-watered soon after construction (1899). The close planked timber walkway is central. (Appendix 1)

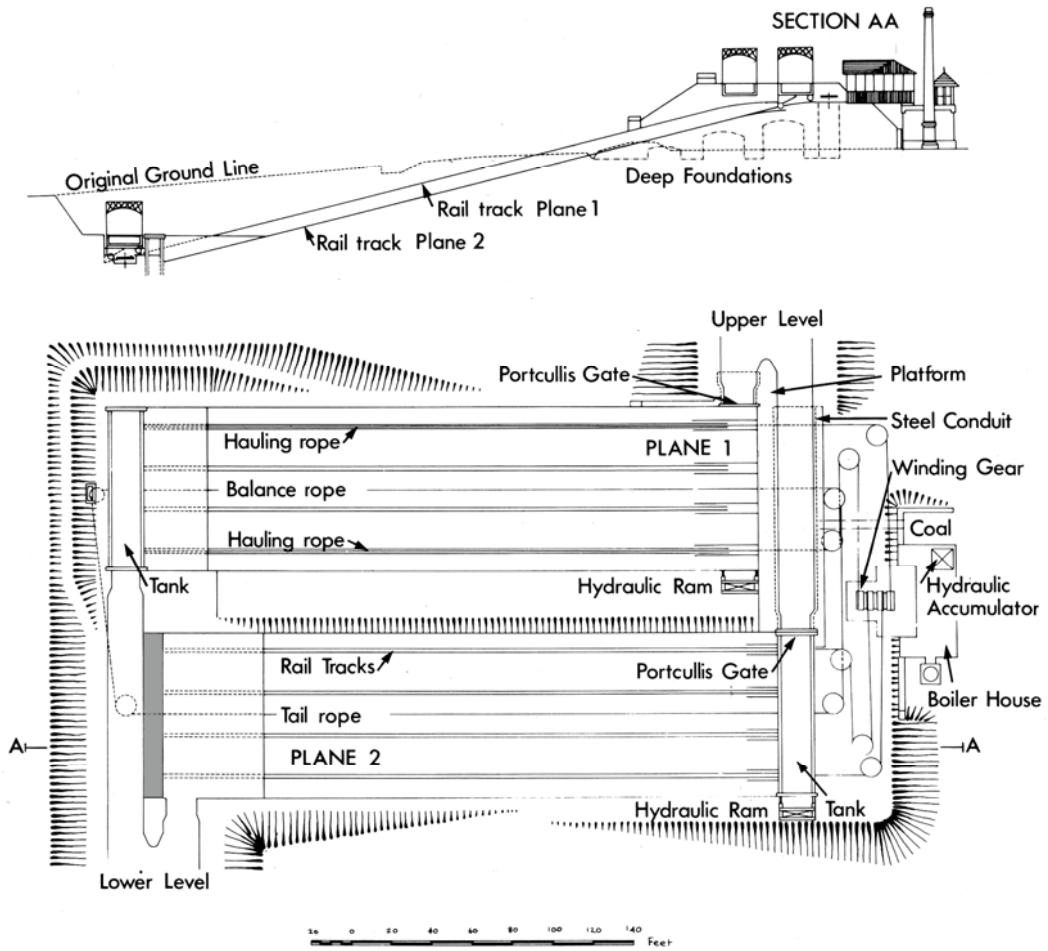


Figure 7: Plan of the Incline Plane (after Gardner and Foden 1978, Fig 4). Timber walkway shaded grey. (Appendix 1)

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Your Ref

Our Ref HSD 9/2/8310

6 July 2006



Dear Sir,

**ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 (AS AMENDED) –
SECTION 2 ANCIENT MONUMENTS (CLASS CONSENTS) ORDER 1994
PROPOSED WORKS AT FOXTON LOCKS, LEICESTERSHIRE
NATIONAL MONUMENT 30248**

1. I refer to your application for scheduled monument consent for works to the inclined plane, bottom basin and upper arm at Foxton Locks. The works include the installation of service ducts along both sides of the bottom basin, to service the moorings in this area (drawing WN/CAAX/091/05); and the reconstruction of the bottom basin walkway, utilising the bases of the original timber piles (drawing WN/CAAX-091-16).
2. As you know the Secretary of State is required to consult with English Heritage before determining whether to grant consent. You also know that English Heritage have been considering the proposed works. They have advised the Secretary of State that further evaluation is required in order to assess the potential impact of the service ducts on buried deposits and structures; and to clarify the condition and extent of survival of the timber walkway piles. Such evaluation will inform the advice that English Heritage provides for the Secretary of State.
3. Having considered English Heritage's advice, the Secretary of State accepts the need for an archaeological evaluation before making a decision on your proposals. In accordance with the terms of Class 7 of the Ancient Monuments (Class Consents) Order 1994, she therefore requests that you discuss and agree arrangements with English Heritage for such an evaluation. This should include a draft written specification, together with the name of the person(s) who will be responsible for carrying it out.
4. I am sending a copy of this letter to Angela Simco, Inspector of Ancient Monuments, English Heritage, East Midlands Region, 44 Derngate, Northampton NN1 1UH.



INVESTOR IN PEOPLE



Figure 8: DCMS letter. (Appendix 1)

Appendix 2: EXTRACT FROM ENGLISH HERITAGE'S RECORD OF SCHEDULED MONUMENTS

MONUMENT: Inclined plane immediately east of Foxton Locks

PARISH: FOXTON

DISTRICT: HARBOROUGH

COUNTY: LEICESTERSHIRE

NATIONAL MONUMENT NO: 30248

NATIONAL GRID REFERENCE(S): SP69238959

DESCRIPTION OF THE MONUMENT

The monument includes the standing, earthwork and buried remains of the inclined plane, the canal arm linking the plane with the canal summit and the bottom lift basin, situated immediately east of Foxton Locks. The bottom lift basin survives as a water-filled cutting up to 30m in width and 150m in length orientated on a NNW-SSE axis. Within the basin are the remains of the bottom docks which originally provided access to the northern and southern inclines. The docks survive as two sections of brick pier connected by a modern wooden walkway. The northern end of the dock consists of a semicircular island measuring approximately 4m in length and 3m in width. The southern end of the dock is rectangular in shape, measuring approximately 19m by 12m, and projects from the base between the inclines. The inclined planes survive as two adjacent earthwork ramps on a gradient of approximately 1:4. The ramps are slightly staggered east to west but each measures approximately 100m in length and 28m in width with their long axes orientated ENE-WSW. The southern incline includes a blue brick revetting wall approximately 20m in length and a maximum of 2m in height along its south western edge at the junction with the earthwork bank forming the eastern side of the upper canal arm. Further sections of blue and red brick revetting wall and support piers immediately to the north and west originally provided the base for a steel aqueduct giving access to the northern incline. Eight parallel lengths of fragmentary concrete bases running the length of the inclines, four to each incline, mark the position of track beds for rails. Immediately south of the upper docks is the dry bed of the upper canal arm linking the plane with the canal summit. The canal arm survives as a waterlogged embanked depression up to 2m in depth and 13m in width, the banks of which are a maximum of 10m in width at their base. The banks are constructed of burnt clay and continue curving southwards for 250m up to the stoplock. The stoplock is constructed of brick with stone coping, the jaws or entry to which have been infilled with earth. Documentary records show the inclined plane to have been constructed by the Grand Junction Canal Company between 1898-1900 to a design patented by the Company's engineer, Gordon Cale Thomas. Copies of original blueprints for the design still survive. The incline was intended to offer a more efficient and flexible means of moving barges up the 23m between the upper and lower canals than the staircase flight of ten locks built by the Grand Union Canal in 1810 immediately to the west, which it temporarily replaced. Foxton provided an important junction between canals built by the Leicestershire and Northamptonshire Union and the Grand Union. Contemporary photographic records show barges being transported up the lift in two water-filled steel tanks, each mounted on wheels which in turn rested on guide rails. A steam engine situated in an engine house at the top of the plane provided the power via a system of pulleys and cables attached to the tanks. Contemporary documents indicate that by 1910 the incline had been deemed uneconomic, although this was due to less than expected traffic rather than any faults in the design. The incline was closed in 1911, the majority of demolition taking place between 1927 and 1928. Repair work on the lower basin in the 1980s indicated that the pulley wheels still remained in situ below water level. All fences, the surfaces of pathways and the dam within the stoplock are excluded from the scheduling, although the ground beneath these features is included.

ASSESSMENT OF IMPORTANCE

From the mid-18th century onwards the increasing need for the transport of heavy goods could not be entirely met by rivers. The road system was improving and being greatly extended, but a horse could draw only two tons in a cart, and between 50 to 100 tons in a barge, making water transport more economic. The requirement was fulfilled by the construction of a system of artificial waterways or canals, with canal construction reaching its peak in the period between 1790 and

1810. Differences of level were overcome by locks. Sometimes flights of locks had to be built, and in a few places particular problems in transporting canal traffic from one level to another necessitated the construction of either vertical boat lifts or inclined planes. Lifts and inclines differed in that with the former, boats were hoisted vertically, whereas with the latter they were hauled up ramps. Documentary sources indicate that around 20 inclined planes were constructed in England, the first being built at Ketley in Shropshire in 1788. The largest was at Morwellham on the Tavistock Canal where barges were hauled up a slope of 72m. Few inclines functioned for any great length of time, the exception being that at Trench on the Shrewsbury Canal which was in use for 124 years and was the last to close in 1921. The Grand Union Canal between Foxton and Daventry was opened in stages between 1812 and 1814 and provided the final link in a chain connecting Leicester and London. From the 1830s onwards railways began to supplant canals as the principle means of goods transportation. The Grand Junction, the new owners of the Grand Union Canal from 1894, tried to compete but were hampered by their locks at Foxton and Watford, the width of which severely limited the cargo-carrying capacity of craft passing through. Anticipating increased revenue from the passage of coal between Nottingham and London, the incline at Foxton was constructed between 1898 and 1900. Foxton was the last and most sophisticated incline to be built in England. It was constructed utilizing steel rather than the cast or wrought iron employed on earlier designs and could lift weights of up to 240 tons, three times that of any of its predecessors. The remains of the inclined plane at Foxton represent an exceptionally rare and complete example of late Victorian canal engineering which have remained free of subsequent development. The location of the inclined plane in close proximity to the staircase flight of locks, themselves a tourist attraction, considerably enhances its potential as a public amenity. Opportunities for the interpretation of the site are further supplemented by the large amount of contemporary documentary and photographic material relating to its construction and use.

SCHEDULING HISTORY

Monument included in the Schedule on 24th January 1973 as:

COUNTY/NUMBER: Leicestershire 153

NAME: Foxton inclined plane

The reference of this monument is now:

NATIONAL MONUMENT NUMBER: 30248

NAME: Inclined plane immediately east of Foxton Locks

SCHEDULING REVISED ON 19th March 1999

Appendix 3 : Excerpts from “Lower Basin Inspection Report” (Halcrow Group 2005)

2. Description

2.3 Mid-basin walkway in lower pound.

The existing walkway is supported on the west side by short scaffolding struts with feet bearing onto the tops of timber piles that have been cut off approximately 0.6m below the walkway. The piles are nominally 10” x 10” in cross section. The east side of the walkway is supported by longer scaffold tubes that appear to be driven directly into the bed of the basin.

Diagonal bracing ensures lateral stability. The walkway is 25.25m long and has eight rows of supports at approximately 3.3m centres.

Historical photos taken around the time of construction clearly show two lines of timber piles supporting the former walkway with diagonal transverse bracing below deck level. It is evident that currently only the west piles remain, albeit in cut down form to support the present lightweight walkway; the east piles having been cut off lower down at bed level to avoid obstruction to mooring areas.

3. Inspection

3.3 Walkway and Island.

The tops of the timber piles that were exposed to view during inspection were mostly in sound condition, having been kept submerged for most of the life of the structure (photo 29). However the 3rd and 4th piles from the south are soft or rotten at the top and would require 100mm and 200mm respectively to be cut off at the top in order to regain sound timber, if they were to be reused to support a new walkway. Pile no 7 has 50mm rot at the top.

A similar line of piles is known to exist about one metre to the east of the existing walkway, but these have been cut off at basin bed level to avoid obstructing the keels of moored barges (photo 28 *see Figure 5*). The east line of piles had been revealed during dredging operations the previous week, but the condition of these could not be ascertained as the water was too deep and muddy to enable inspection. The walkway longitudinal timbers are in poor condition with a prominent split over the second support from the south end (photo 31). The surface planks are also very slippery when wet over two thirds of the length where wire mesh has not been attached

**Foxton HLF Inspection of Lower Basin
7-8 November 2005**



Photo 29 Typical walkway support arrangement



Photo 30 General view of timber walkway and island, looking north

**Foxton HLF Inspection of Lower Basin
7-8 November 2005**



Photo 31 The timber walkway is in poor condition over the second support from the south

**Appendix 4: ULAS Draft Project Health and Safety Policy Statement
Ground works at The Foxton Inclined Plane, Leicestershire**

For: British Waterways

1 Nature of the work

1.1 This statement is for an archaeological watching brief.

1.2 The work will involve observation of ground works, namely the exposure of timber foundations within a canal basin during daylight hours and recording of any underlying archaeological deposits revealed. Where archaeological deposits are revealed they will be examined and excavated or cleaned with hand tools (shovels, trowels etc). All work will adhere to the University of Leicester Health and Safety Policy and follow the guidance in the Standing Committee of Archaeological Unit Managers manual, as revised in 1997, together with the following relevant Health and Safety guidelines.

1.3 HSE Construction Information Sheet CS8 Safety in excavations.

HSE Industry Advisory leaflet IND (G)143 (L): Getting to grips with manual handling.

HSE Industry Advisory leaflet IND (G)145 (L): Watch Your back.

CIRIA R97 Trenching practice.

CIRIA TN95 Proprietary Trench Support Systems.

HSE Guidance Note HS(G) 47 Avoiding danger to underground services. HSE Guidance Note GS7 Accidents to children on construction sites

1.4 The Health and Safety policy on site will be reassessed during the evaluation .

1.5 All work will adhere to the contractors' health and safety policy.

2 Risks Assessment

2.1 Working adjacent to a building in a public area

Precautions. The site area will be fenced to prevent access from the public. The effect of excavations of the stability of adjacent standing structures will be assessed. Hard hats should be worn when working in the trenches in case of falling debris from the building. Loose spoil heaps will not be walked on. Protective footwear will be worn at all times. First aid kit, vehicle and mobile phone to be kept on site in case of emergency.

2.2 Working with chemicals.

If chemicals are used to conserve or help lift archaeological material these will only be used by qualified personnel with protective clothing (i.e. a trained conservator) and will be removed from site immediately after use.

2.3 Working in wet or stagnant conditions

Working in shallow water, waterlogged or stagnant conditions can present risks for access, mobility, life (drowning) and present hazards such as Weil's disease (Leptospirosis).

- If working near still water or rats copies of Leptospirosis: Are you at risk? should be available
- Protective clothing should be worn when dealing with areas of stagnant water

2.3 Other risks

Precautions. If there is any suspicion of unforeseen hazards being encountered e.g. chemical contaminants, unexploded bombs, hazardous gases work will cease immediately. The client and relevant public authorities will be informed immediately.

Matthew Beamish

July 2006-07-26