

Strood Riverside, Sustainable Transport Link, Strood, Kent: A Historic Building Record and Watching Brief

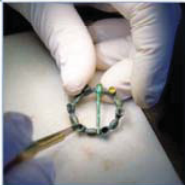
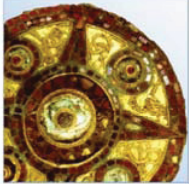
Planning Application Number: MC/09/0933

National Grid Reference Number: TQ 7427 6944

AOC Project No: 30927

Site Code: CWD11

Date: May 2011



ARCHAEOLOGY

HERITAGE

CONSERVATION

Strood Riverside, Sustainable Transport Link, Strood, Kent: A Historic Building Record and Watching Brief

On Behalf of: Interserve Project Services Ltd

Commissioned by: SKM Enviros
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Summary

A Historic Building Record was made of two sets of lock gates at the Strood end of the Thames and Medway Canal. The lock gates and associated basin are at the end of the Thames and Medway Canal as it joins the Medway and form the seaward end of a tidal lock; the main body of the lock chamber and landward gates were infilled in the 1980s. The lock basin was originally known as the Frindsbury Basin.

The short section of the Thames and Medway Canal, from Gravesend to Strood, including the gates and basin recorded here is a small remnant of the canal, which originally linked the Thames at Gravesend with the Medway at Strood. The canal was originally proposed to provide a route safe from predatory French Privateers for coastal trade and especially military ordnance lighters during the Revolutionary and Napoleonic Wars.

Work started at the Gravesend end of the cut in 1799 but rising costs and attendant delays meant that the canal was not completed to its Strood end until 1824, by which time its principal reason for existence had ended; soon afterwards the coming of the railways made the canal largely obsolete.

A more complete, although slightly smaller tidal lock still survives at the Gravesend end of the canal and is Grade II Listed. At the time of building, the locks at Gravesend and Strood were amongst the largest in the world; the Strood lock having the capacity to pass vessels of 300 tons.

The lock itself is constructed of brick, with stone coping and quoins, and has been variously filled with concrete and river silt. The two sets of gates date to the late 19th or early 20th century and therefore are not original. The inner pair is constructed around a timber frame, the outer around a steel frame, and is of a later date. Many fittings of the gates were in poor condition or absent. The record comprised a photographic, drawn and written survey. Early plans of the original lock design were also researched and included within the report.

The masonry of the lock is to be retained beneath fill added to level the site as part of the Sustainable Transport Link. The gates are to be removed. The canal walls and base are in good condition, with occasional patches of rebuild, which show that the canal was kept in a good condition of repair until its fall from use. The lock chamber is a relatively rare example of a barrel chambered lock in having been designed with a curved base to conform with the hulls of sea going vessels, a feature it shares with the tidal lock at the Gravesend end of the canal.

This is the last record of the basin and gates before the lock is infilled and the gates removed. Neither the gates nor any of the identified fixtures and fittings are deemed to be of sufficient interest or in a state of preservation that would allow reasonable conservation to be possible. No further work is therefore recommended beyond the publishing of the results in a suitable format to be agreed in consultation with Ben Found of Kent County Council.

1. INTRODUCTION

- 1.1 This document presents the results of an archaeological Watching Brief and a programme of Historic Building Recording associated with a historic canal basin and lock gates located adjacent to Canal Road/Wingrove Drive, Strood, Kent (Figure 1).
- 1.2 The site is centred on National Grid Reference (NGR) TQ 7427 6944 and is located to the south side of Canal Road/Wingrove Road, on a roughly rectangular parcel of land forming a canal basin. The lock gates separate the canal basin from the River Medway and therefore form the seaward end of a tidal lock, which was mainly filled in and built over during the 1980s. The site is bounded by The River Medway and associated tidal mud lie to the south, commercial properties to the east, residential properties to the north, and rough ground to the west (Figure 2). The site covers an area of approximately 470m².
- 1.3 Currently the site is occupied by a canal basin and lock gates of historic interest. The proposed development is for the extraction of sediment from the base of the canal basin and subsequent infilling of the canal basin and lock gates to enable the construction of new transport infrastructure.
- 1.4 The Historic Building record was carried out prior to infilling of the canal basin. This will be the last record taken of the structure prior to burial.

2. PLANNING BACKGROUND

- 2.1 The local planning authority is Medway Council. Archaeological advice to the council is provided by Ben Found of Kent County Council (KCC).
- 2.2 Planning consent (Planning Application No. MC/09/0933) has been granted, with an attached condition. Condition 18 states that:

'No development shall take place until the applicant, or their agents or successors in title, has secured the implementation of a programme of archaeological work in accordance with a written specification and timetable which must be submitted to and approved by the Local Planning Authority.

Reason: To ensure that features of archaeological interest are properly examined and recorded.'

- 2.3 The proposed development initially consists of the removal of mud and sediments from the base of the canal prior to the construction of a new river wall and the infilling of the canal basin. The lock gates will be buried as part of the infilling of the canal basin which will allow their preservation *in-situ*. The infilling of the canal basin is part of a development programme for the construction of a new highway connection between Commissioner's Road and Canal Road for a new bus link.
- 2.4 A brief record of the basin was made in 2010 (EH 2011) as part of the recommendation documentation when the structure was considered for Listing. This report concluded that the structure did not merit Listing as its survival was only partial and already severely removed from its historical context by the infilling of the cut on its landward side, with associated visual severance from the Higham Tunnel. The report also indicated that an almost identical lock survives at the Gravesend end of the canal, which is both more complete, earlier in date and retaining more of its original features.
- 2.5 Due to the presence of a historic structure on the site due for burial and deposits of potential archaeological significance a programme of archaeological investigation was required involving both an archaeological Watching Brief and Historic Building Recording. A Written Scheme of Investigation

(WSI) (AOC 2010) presented the methodology for the archaeological monitoring of sediment extraction and building recording of the surviving structures present to Level 3 of the published guidelines (English Heritage 2006).

2.6 The methodology outlined in the WSI and used in preparing this report conforms to the requirements of PPS 5 Planning and the Historic Environment Guidance and English Heritage guidance documents.; The investigation was undertaken in accordance with current best archaeological practice and local and national standards and guidelines:

- Department of Communities and Local Government - Planning Policy Statement 5: Planning and the Historic Environment (DCLG 2010).
- English Heritage – Management of Archaeological Projects (EH 1991).
- Institute for Archaeologists – Standards and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures (IfA 2008).
- Institute for Archaeologists – Code of Conduct (IfA 2010).

3. GEOLOGY AND TOPOGRAPHY

3.1 The solid geology of the area is Middle Chalk which is capped by Pleistocene gravels, and alluvium, between 9m and 12m thick. Made ground covers the entire development area (Mott Macdonald 2010).

3.2 A geo-archaeological watching brief recorded the following stratigraphy (Mott Macdonald 2010):

- Made Ground between 4.40m and -4.00m AOD.
- Alluvium between 2.80m and -8.60m AOD.
- River Gravel between -6.20m and -12.30m AOD.
- Chalk between -9.60m and 16.00m AOD.

3.3 The localised topography is relatively flat due to its position on the bank of the River Medway and lies at a height of 4m Above Ordnance Datum (AOD) (Mott Macdonald 2010).

4. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Before 1800

4.1 The alluvial layers under the site have the potential to contain waterlogged environmental evidence which can be used for reconstructing past environments. It is unlikely that these deposits relate to settlement activity in the prehistoric period, as there is little recorded archaeology in the region before the Roman period (Mott Macdonald 2010).

4.2 Rochester was a Roman town, and it is thought that there was a river crossing, along the route of Watling Street in the vicinity of the present bridge, directly to the west of the site. The area is thought to have been marshland during the Roman period; however Roman remains have been found in peat elsewhere along the Medway (Scott Wilson 2005).

4.3 The site is likely to have been marshland throughout the medieval and post-medieval periods, until the 19th century when the area was industrialised (Mott Macdonald 2010).

The Thames and Medway Canal

4.4 The Thames and Medway Canal was first proposed in a pamphlet of 1799 (Dodd 1799) as a response to the predation on coastal trade in the Thames Estuary by French Privateers during the French Revolutionary Wars; of particular concern was the threat to the movement of important

- military victuals and ordnance between the Royal dockyards and arsenals of Woolwich/Deptford and Chatham. The canal would also reduce the distance to be travelled around the Isle of Grain from forty-seven miles to only six. To be viable the canal would have to be built to accommodate the typical coastal merchantman of the day, the Thames Spritsail Barge.
- 4.5 The engineer who made the proposal was Ralph Dodd who had previously made a name for himself in the coal mining industry and who had also proposed a tunnel under the Thames between Gravesend and Tilbury (Chrimes 2010). Dodd argued that aside from protecting military traffic, the canal would also attract commercial use. Dodd's proposal was for a six mile cut across the Hoo Peninsular, thereby linking Gravesend on the Thames with Strood on the Medway. Dodd's original estimate was that the canal would only take two years to build at the relatively respectable cost of £24,576, with parts of the cost being recouped by the sale of extracted chalk for agricultural and industrial lime (Dodd 1799). Dodd, however revised his estimate upwards the following year to between £33,819 and £45,972 dependent on the angles of slope that may be required in the necessary cuttings (Priestley 1831).
- 4.6 The Thames and Medway Canal Company was instituted by Act of Parliament in 1800 and construction was immediately commenced at Gravesend with a four mile section between Gravesend and Higham being complete by the following year. The Parliamentary Act decided the amount of landtake and associated compensation that would be allowed for the construction; this effectively set the canal corridor at 40 yards width. Despite the rapid progress, it was already evident that the costs had been grossly underestimated with £57,433 already spent and the most expensive section through the chalk ridge between Higham and Strood still to be attempted (Priestley 1831).
- 4.7 Crossing this chalk ridge led to very significant delay and grossly increased cost; this was first indicated in 1801 by the engineer Ralph Walker who by 1804, with the project stalled, appears to have taken over the scheme from Dodd (EH 2011). Walker proposed a number of designs between 1804 and 1810 to take the cut on to Strood. The final agreed scheme was the construction of a tunnel linking Higham with Strood, for which the necessary Acts of Parliament were negotiated and financial backing acquired; this had been estimated at an additional £37,715 for construction of the tunnel and £16,989 for other works, which principally meant the lock and basin at the Strood end of the navigation (Priestley 1831). This basin could hold a 300 ton vessel.
- 4.8 The Higham tunnel was a remarkable engineering feat, being the second longest canal tunnel constructed in Britain at 3946 Yards length (topped only by the Standedge on the Huddersfield Canal at 5,500 yards) (Hadfield 1969). The Higham Tunnel did however hold the record for the largest cross section of any canal tunnel in Britain at 26 feet width by 35 feet height; the height being required to accommodate the mast of a Thames spritsail barge. The Higham Tunnel was designed between 1817 and 1819 by William Tierney Clark and required the use of an astronomical transit telescope mounted in an observatory to survey in its alignment (EH 2011). Clark now estimated that completion of the canal would require an additional £97,755 to be spent (Priestley 1831); advice as to whether the canal could be completed was sought and gained in 1822 from Thomas Telford, which allowed the final raising of funds through loans to complete the project (Shead 2011).
- 4.9 The canal was finally completed and opened fully to traffic on October 14th 1824 at a total cost of £260,000 and requiring the enactment of five Acts of Parliament (EH 2011). Unfortunately the Thames and Medway Canal was never a commercial success; completed almost a decade after the end of the Napoleonic Wars its original reason for existence was only a memory and although it did attract some traffic in the form of agricultural produce, beer and cement, this was never enough to make it truly viable.
- 4.10 After opening it soon became clear that the inability of boats to pass within the Higham Tunnel led to severe delays transiting the canal; to try to rectify this in 1830 a passing place was opened up at no little cost half way along dividing the tunnel into two; the Higham and Strood Tunnels (Hadfield 1969).

- 4.11 The canal also suffered the usual problems for a canal cut through porous rock in that it lost water through seepage into the country rock; this was exacerbated by having both ends linked to tidal waters resulting in water loss during low tides. Even the fitting of a double set of gates on the two locks at Gravesend and Frindsbury (Strood) and the installation of steam pumps could not fully compensate for this tidal water loss. Another serious problem was that the locks at both ends could only be used at High tide, which meant that it was often quicker to sail around the Hoo peninsular, rather than await the next accommodating tide (Hadfield 1969). The combination of these unfortunate circumstances led to the canal earning the sobriquet “Dodd’s Folly” (Medway Lines 2011).
- 4.12 The canal’s fate was finally sealed in 1844, when it was decided to replace the canal with a railway, which originally balanced precariously on timber supports over the edge of the canal (Medway Lines 2011). This railway was bought in 1846 by the South Eastern Railway resulting in the immediate infilling of the canal from Higham to provide a safer working arrangement, through the Higham tunnel to the Frindsbury Basin to take the new railway.
- 4.13 The Gravesend to Higham stretch remained an active canal up until 1934 before being abandoned and filled in, partly with rubble from bombed areas of London. The Gravesend basin was damaged by Luftwaffe bombing, including the destruction of the outer gates (EH 2010). Before being infilled the canal inland from Gravesend was also used as a seasoning pond for Canadian lumber destined for use in the construction of DeHavilland Mosquitos (Rayner 2010).
- 4.14 Despite the closure of the Higham tunnel to canal traffic in 1844, the Frindsbury basin remained in use as a wharf until 1963 before its final abandonment. Frindsbury Basin and the landward end of the lock at Strood was finally infilled 1986 and built over for a new housing estate; this left only a small section of the seaward end of the lock chamber exposed along with its paired gates and access with seawall to the Medway (EH 2011).

The Frindsbury Lock and Basin 1822 to 1963

- 4.15 The basin and lock at the Medway end of the canal was actually completed in 1822 and was known as the Frindsbury Basin. In design the lock was almost identical to the earlier lock constructed 1799 – 1801 at the Gravesend junction of the canal with the Thames. The principal difference was that the Frindsbury Lock was larger and could accommodate vessels of up to 300 tons compared with only 200 tons for the Gravesend Lock. Strickland’s report of 1826 claimed that the Frindsbury Lock was one of the largest lock chambers in England and offered “accommodation for loading and ballasting vessels of every description, with the greatest despatch.” The earliest available drawings of the lock are to be found in Strickland’s report on the canals and railways of England (Strickland 1826); these are reproduced as Figures 10 – 12 of this report.
- 4.16 The original gates were curved and comprised of wooden planking framed by cast iron; these had been removed by the turn of the 20th century when the existing gates were fitted. As a tidal lock the Frindsbury Lock, like that at Gravesend, required two sets of gates on the seaward end of the lock chamber. During a rising tide, the outer set of gates, which projected seaward would prevent the inflow of tidal water. During the ebb tide the innermost (landward) gates which projected inland sought to reduce water loss from the canal. The curved) profile of the original gates pointed into the oncoming head of water ensuring that they would remain closed. The later gates that now survive by contrast have the more usual > profile pointing into the oncoming stream. Each set of original gates at the lock was originally furnished with four capstans to open and close the gates through a windlass in a chain pit attached to chains to the base of the gates (Fig 10). The gate paddles were opened by a screw mechanism that opened a double shuttered valve (Fig 11).
- 4.17 The principal structure of the lock comprised the curving seawall leading to the mouth of the lock chamber and the lock chamber (Figs 10 and 11). These were built in red brick, laid in English bond with coping stones and quoins provided by large blocks of York Stone. Rounded blocks of York Stone were also used to provide a rubbing fender; a feature that is not present in the earlier design

of the lock at Gravesend; this fender appears to have been further improved at a later date by the addition of timber uprights.

- 4.18 The base of the lock chamber was curved in section to conform with the shape of seagoing vessels hulls and again fashioned from red brick. The lock base rested on log decking which itself was laid over a dense piling of timber uprights sunk 16' into the underlying alluvium (Fig. 11); the lock and basin at Frindsbury was fully 10' deeper than the canal itself, which had a maximum depth of 7' (Figure 10).
- 4.19 Between the lock and the Higham tunnel was the Frindsbury Basin. Even after the closure of the Higham tunnel to canal traffic this basin continued in use for the Southeastern Railway as a Wharf and railhead called Victoria Wharf. As such the basin was furnished with sidings, goods sheds, cattle pens and associated cranes. To seaward of the lock at Strood, wooden jetties were built in the Medway for ships to await the tide so that they could transit the lock. As well as lime and agricultural produce, the basin was also involved in the handling of timber and cement.



Plate A: The Strood Lock, Looking Towards the River Medway.

Photograph taken c. 1910.

- 4.20 The canal inlet with curving brick seawall is still present leading into the outermost portion of the lock chamber with the much decayed twin sets of outer lock gates. The majority of the landward section of the lock chamber has now been infilled and lies under 1980s housing. In addition to the lock chamber and gates, various fixtures and fittings including chains, ladders, shackles and a capstan were present.
- 4.21 There are a number of other heritage features close to the route of the new link road, including Strood pier and 19 WWII pimples (anti-vehicle obstacles); however these will not be affected by the development (Mott Macdonald 2010).

5. AIMS OF THE INVESTIGATION

- 5.1 The aims of the Watching Brief and Historic Building Record were defined as being:
- To establish the presence/absence of archaeological remains within the site.
 - To determine the extent, condition, nature, character, quality and date of any archaeological remains encountered.

- To record and sample excavate any archaeological remains encountered.
 - To assess the ecofactual and environmental potential of any archaeological features and deposits.
 - To determine the extent of previous truncations of the archaeological deposits.
 - To enable the archaeology advisor to the Medway Council, to make an informed decision on the status of the condition, and any possible requirement for further work in order to satisfy that condition.
- 5.2 The specific aims of the Watching Brief were defined as being:
- Determine the presence of any features which may relate to the 19th century use of the canal basin.
- 5.3 The aim of the Historic Building Recording was to make a permanent record of the structure and form of the canal basin, incorporating the basin wall, lock gates and any fittings and fixtures present, through a photographic, drawn and written record. Particular attention was paid to any evidence for functional details or machinery associated with the use of the canal basin. Understanding of the construction of the canal, its use and any alterations was also to be closely considered.
- 5.2 The aim is also to make public the results of the investigation, subject to any confidentiality restrictions.

6. STRATEGY

- 6.1 The initial phase of the project involved the archaeological monitoring, by means of a Watching Brief, of the removal of mud and sediment from within the canal basin. Once the canal basin sediment had been removed exposing as much of the canal basin wall and lock gates as was possible, and a safe working environment established, a programme of Level 3 Historic Building Recording within the canal basin took place.
- 6.2 The recording and reporting conformed with current best archaeological practice and local and national standards and guidelines:
- Department of Communities and Local Government - Planning Policy Statement 5: Planning and the Historic Environment (DCLG 2010).
 - English Heritage – Management of Archaeological Projects (EH 1991).
 - English Heritage – Archaeological Guidance Paper 3: Standards and Practices in Archaeological Fieldwork (EH 1998).
 - English Heritage - Understanding Historic Buildings: a guide to good recording practice (EH 2006).
 - Institute of Field Archaeologists – Code of Conduct (IFA 1997).
 - Institute for Archaeologists - Standards and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures (IFA 2008).
 - Museum of London – Archaeological Site Manual (Third Edition) (MoL 1994).
 - United Kingdom Institute for Conservation – Conservation Guidelines No.2 (UKIC 1983).
 - United Kingdom Institute for Conservation – Guidance for Archaeological Conservation Practice (UKIC 1990).

- 6.5 Insurances, copyright and confidentiality and standards are defined in Appendix A.
- 6.6 A unique site code was created (**CWD11**) as the site identifier, and will be used on all records.
- 6.7 The fieldwork was monitored by Ben Found of KCC on behalf of the Medway Council and Alan Ford for AOC Archaeology.

7. METHODOLOGY

Watching Brief Methodology

- 7.1 An archaeologist was present to observe removal of the silt from the canal basin, positioned outside the working area of the mechanical excavator, in the normal working arrangement. No access to the basin was possible due to it being an active tidal environment with severe implications for health and safety.
- 7.2 Archaeological recording, consisted of:
 - The inspection of spoil for material associated with the basin and dating evidence.
 - A photographic recording of representative exposed sections and surfaces, along with sufficient photographs to establish the setting and scale of the silt removal operations.
- 7.3 Records were produced using either *pro-forma* context or trench record sheets and by the single context planning method and were compatible with those published by the Museum of London (MoL 1994).
- 7.4 Upon completion of the project the landowner and the relevant museum will be contacted regarding the preparation, ownership and deposition of the archive.

Historic Building Record Methodology

- 7.5 The Historic Building Record took place once the majority of the mud and silts within the canal basin had been removed exposing the fullest practicable extent of the canal basin walls and lock gates for recording. In addition to this, safe entry to the canal basin was established by use of a crane deployed man basket to allow the archaeologists to access the fullest practicable height of the basin wall and lock gates.
- 7.6 The Survey work and resultant report corresponded to Level 3 of the guidelines published by English Heritage (EH 2006). The scope of recording was based upon these guidelines. The Record was made for the structure, with attention paid to evidence for alterations and repairs.
- 7.19 Level 3 is an analytical record, and comprises an introductory description followed by a systematic account of the structures origins, development and use. The record includes an account of the evidence on which the analysis has been based, allowing the validity of the record to be re-examined in detail. A drawn and photographic records was also made to illustrate the structure and to support the historical analysis.
- 7.20 The information contained in the record was for the most part obtained through an examination of the structure itself. The record does not discuss the building's broader stylistic or historical context and importance at any length.
- 7.21 This Level 3 record consists of drawings, written descriptions and photography:

Drawings:

- Measured plans (to scale or fully dimensioned) as existing. These extended to all areas, to fully understand the development of the structure. Plans show the form and location of any structural features of historic significance, such as blocked openings and any evidence for fixtures of significance, including former machinery.
- Measured drawings recording the form or location of other significant structural detail, such as timber or metal framing.
- A site plan was made using a total station to record all elements of the structure in plan.
- Measured cross-sections, long-sections or elevational sections illustrating the vertical relationships of the structure.
- Measured drawings showing the form of any architectural decoration. These included the small-scale functional detail not more readily captured by photography. A measured detail drawing is particularly valuable when the feature in question is an aid to dating.
- A site plan, typically at 1:500 or 1:1250, relating to the structure and to related topographical and landscape features.
- A plan or plans identifying the location and direction of accompanying photographs.

Photography:

- A general view and views of the structure in its wider setting or landscape.
- The structure's external appearance. A series of oblique views to illustrate all external elevations of the structure, and give an overall impression of its size and shape.
- Any external detail, structural or decorative, which was relevant to the structure's design, development or use and which did not show adequately on general photographs. These were undertaken using a clearly marked and suitably sized scale next to the subject and parallel to one edge of the photograph.
- Any machinery or other plant, or evidence for its former existence.
- Any dates or other inscriptions, any signage, makers' plates or graffiti which contribute to an understanding of the structure or its fixtures or machinery, if not adequately captured by transcription.

Written account:

- The structure's precise location, as a National Grid reference and in address form.
- A note of any statutory designation (listing, scheduling or conservation area).
- The date of the record, the names of the recorders and, if an archive has been created, its location.
- A summary of the structure's form, function, date and sequence of development. The names of architects, builders, patrons and owners will be given if known. The purpose of such an expansion is to serve as an introduction to the more detailed body of the record that will follow, and to satisfy those users who may need no more than a summary of the report's findings.

- An introduction, setting out the circumstances in which the record was made, its objectives, methods, scope and limitations, and any constraints which limited the achievement of objectives.
 - Acknowledgements to all those who made significant contributions – practical, intellectual or financial – to the record or its analysis, or who gave permission for copyright items to be reproduced.
 - A discussion of published sources relating to the structure and its setting, an account of its history as given in published sources, an analysis of historic map evidence (map regression) and a critical evaluation of previous records of the structure, where they exist.
 - An account of the structure's overall form (structure, materials, layout) and its successive phases of development, together with the evidence supporting this analysis.
 - An account of the past and present uses of the structure and its parts, with the evidence for these interpretations. An account of any fixtures, fittings, plant or machinery associated with the structure, and their purposes.
 - Any evidence for the former existence of demolished structures or removed plant associated with the building.
 - Full bibliographic and other references, or a list of the sources consulted.
- 7.5 On completion of the project the landowner and the relevant museum will be contacted regarding the preparation, ownership and deposition of the archive.

8. RESULTS

General

- 8.1 The features that are the subject of this report are located at the Medway end of the Thames and Medway Canal at the point that the walls of the canal open onto the river Medway. At this point the canal is oriented northwest-southeast, with the Medway to the southeast as it curves around Rochester. The canal walls are topped with blocks of granite, and are furnished with long, worn rubbing fenders. One ladder survives, and one bollard is present on the southwest side. The northwest end of the lock area is sealed by steel plates, and concrete poured on the outside, cementing the inner gates in closed position. The top of the lock wall is at +4.15mOD. The report by Strickland records that it is 'not customary to give the base a greater descent than four inches to the mile...canals are generally formed on a dead level from lock to lock'(Strickland 1826, p2).
- 8.2 The inner pair of gates would have opened inland, and are constructed of planks upon a metal frame. Part of one sluice paddle and control survives. The outer gates open towards the river Medway and are constructed of planking over an iron frame. The hinges of both gates are in varying condition and survival. The inner gates are here defined as A1 and A2, the outer gates B1 and B2 where necessary for clarity. The hinges of the gates are 4.94m apart, the width of the basin is 9.16m.

Watching Brief

- 8.3 A watching brief on removal of the silt from the base of the basin was undertaken between the 1st and 3rd March 2011. During this watching brief the basin remained tidal and there was no access to its interior.
- 8.4 The watching brief served to help develop the strategy for the follow on HBR element of the work.

Canal Structure

- 8.5 The walls of the canal basin as it opens into the Medway comprise curving walls of brick with large blocks of York Stone coping. The bricks are generally red brick, measuring 222mm by 106mm by 65mm, set in English bond with 10mm width of mortar between. Repairs were apparent, of more recent date, comprising red brick. The largest area of repair lies to the south of the area recorded, a 10-course section some 2.5m wide below the coping as the walls curve outwards.
- 8.6 The canal basin comprises several sections. To the northwest is a short area between the modern steel plating and the inner gates, which has vertical walls, dropping to a base sealed by concrete. Two hollows in the brickwork mark the location of sluice equipment that is no longer present. The two sets of gates stand either side of an area slightly set in, by 0.25m, with stone quoins. One of the stones on the northeast side next to the outer gate is inscribed with the number '16'. Between the gates is a second pair of square hollows, also once the settings for equipment related to the working of the gates. Outside of the second pair of gates, the canal has a flat base within their area of swing and has vertical sides that are slightly concave in plan. Beyond this a principal brick buttress with an inverted arch at the base rises to each side of the canal, the buttress having stone quoins. The coping is formed of regular rectangular blocks with a bullnose curve and are 0.48m thick. The base of the buttress is at -3.14mOD.
- 8.7 Strickland reports generally on lock walls that they are 'generally founded on a hard natural bottom, but frequently on a system of piles well-driven and bound together. A flat segment or inverted arch, is sometimes laid on the wooden bottom.' (Strickland 1826, p8). This arch is present at Strood. Strickland also describes the lock chamber at the Thames and Medway Canal as 'a beautiful and substantial piece of work', and the inverted arch as a 'stone torus...which serves as a fender and protection to the brickwork (Strickland, 1826, p8).



Plate B: Basin walling and buttress curving into base

- 8.7 Outside the buttress towards the river, the canal does not have a masonry base. The base of the canal entrance is formed of rammed dark brown silty clay and chalk rubble to a depth of over 0.6m. This lies within timber compartments that span the base at intervals of 2.43m. The canal entrance is 7.4m deep from the coping stones to the base of rammed chalk in its base at -3.25mOD. This is 0.1m lower than the buttress.



Plate C: Base of basin showing timber compartmentalisation

- 8.8 Rubbing fenders along the curved entrance to the basin are rectangular in profile, made of box halved pine, and are eroded below -0.85mOD. The outer curve also features a course of projecting rounded stone blocks at 3.40mOD. This corresponds to the high water mark. One ladder is present, made in short sections and attached to the wall just outside the buttress. This is the only fitting of this nature that is present within the basin.



Plate D: Basin wall showing coping, rubbing fender and ladder

Inner Lock Gates, A1 and A2

- 8.9 Strickland's report of 1826 records the lock gates as cast iron with hollow coins and mitres, the ribs eighteen inches apart (Strickland 1826, p9). The gates are also recorded as curved. Neither pairs of gates correspond to this description, indicating both are replacement features. The inner pair of lock gates are constructed in the same way as each other and are therefore probably contemporary in

date. These gates are faced with regular planking on the northwest, landward, face, the planks 0.22m (8½") wide and 0.05m (2") thick. These are nailed to the frame with what were originally square headed nails, which are now heavily corroded to shapelessness.

- 8.10 The frame of each gate is formed of large boxed beams 0.40m square. The visible part of each of the gates had six cross members between uprights, 0.61m apart. Three lower cross members were also visible, which lie directly upon one another with no spaces in between; this conjoined planking contained the gate sluice. On the planked side, the sluice lies below the level of modern concrete. The beams are assumed to be attached to the uprights with mortice and tenon joints. Additional support is given by large L-straps on the corners and T-straps below, bolted on with hexagonal nuts passing directly through the beams to twin straps on the opposite side. The straps were added after the planking and clearly continues behind the strapwork.



Plate E: Inner Lock Gates

- 8.11 The seaward side of the gates have occasional surviving planking, to the level of the fourth beam at +0.55mOD. The uppermost beam of both gates is in poor condition, with much timber rotted, and many fixings absent. This erosion is also apparent on the planking, which is in good condition at its lower levels, but largely eroded away above the second beam. The tips of each gate have new closing stiles, chamfered and nailed onto the outer edges.
- 8.12 The furniture and equipment associated with these gates is largely missing. The surviving equipment includes iron rings, one walkway strut from the top of Gate A1, hinges, and one partial paddle rod, also on gate A1. Two iron rings are bolted to the top beams of each gate. These may have held chains to help close the gates. The walkway strut is cast iron, and has fallen from its original position, but is the only survival of a walkway across the gates. This strut has a T-shaped profile, and appears to be a later addition. The paddle rod on gate A1 has an upper and lower housing bolted onto the planked surface. A section of the rod at the top has a screw thread, and engages with the upper housing. The paddle itself is missing, as is the bottom end of the rod. The paddle sluices have iron frames. Two square plates with hoops at low level on the landward side contain chains that disappear into the concrete below. Strickland describes these as valves, and offers a similar description of the original paddle mechanism as that used here, although the gates are not original (Strickland 1826, p.10). These may have once held chains that helped open the gates. However, so much of the basin furniture is missing or sealed below more recent concrete that the exact

mechanics of operation were unclear. Strickland illustrates runners at the base of the gates, affixed by chains to capstans on the lock side (Strickland, 1826, Plate 12).



Plate F: Detail of sluice mechanism on inner lock gate

- 8.13 The hanging stiles of the gates are attached to iron hinge plates at the top, which encircle an iron rod on the quayside. Each side of the plate has a socket housing with an angled iron strap running from the bottom of the closing stile. The quayside rod is cast with an iron sheet that appears to be bolted into the stone coping.

Outer Lock Gates, B1 and B2

- 8.14 The outer pair of gates have a planked external face bolted to an iron frame. The iron frame is made of I-beams 0.38m wide with 0.08m wide flanges at intervals of 0.92m near the top, narrower to the base, where remains of paddle housings remain. It is assumed that the iron frame is bolted together. The paddle rods and paddles themselves are missing. The planking on these gates is wider than that on the inner pair: in this instance each plank is 0.075m thick (3") and 0.28m wide (11"). Both gates have paddle frames near the base, formed of a cast iron frame with two bars. Part of a rod rises for 1.5m from gate B2.



Plate G: Landward side of outer lock gates showing framing



Plate H: Seaward face of outer lock gate showing planking and sluice

- 8.15 The gates' hinges are strapped to the coping blocks on the side of the quay, and are clearly later additions. The different form of these gates to that of the inner pair is particularly noticeably in their

opening technology: a pair of I-beams are bolted with a curved bar to the top beam with a trapezoidal plate holding an inner pair of struts. This strongly resembles the beginnings of a balance beam for manual opening. The struts are attached to a lower beam by an iron bar. The metalwork on Gate B2 is heavily corroded and less well preserved than Gate B1

- 8.16 The inner face of the gates have four planks, the bottom of the planks is at 4.92m below the dock edge, at -0.77mOD. All planks are bolted onto the metal frame. In common with the inner pair of gates, an angled strut is affixed to the inner side, giving structural support to the frame.

9. CONCLUSIONS

- 9.1 The short section of the Thames and Medway Canal, from Gravesend to Strood, including the gates and basin recorded here is a small remnant of the canal, which was originally established in the early 19th century. The masonry of the basin is to be retained beneath fill added to level the site as part of the Sustainable Transport Link. The gates are to be removed. Their fragile, derelict condition and general weight makes it seem unlikely that the gates could be retrieved in any condition other than fragmentary.
- 9.2 The canal walls and base are in good condition, with occasional patches of rebuild, which show that the canal was kept in a good condition of repair until its fall from use. The original condition has been much altered by the addition of a metal wall at the landward end of the site and the addition of a concrete base. The stonework and yellow stock bricks that form the basin walls are all original. The two sets of gates hang from a block that projects slightly from the mainline of the wall. The end of the masonry at the base of the basin is marked by a large buttress. There is no brickwork base to the riverside of this buttress, just rammed chalk and retaining beams.
- 9.3 The use of rounded stones near to high water level is likely to be a measure to prevent barges or boats from catching and tipping with the rise or fall of the tide. The use of rubbing fenders prevented some damage to the lock walls, but scars and dents were still clearly apparent.
- 9.4 The two sets of gates are clearly of different dates, as shown by their construction method, The inner gates are probably the earlier of the pair, using a simple technology of a timber frame with supporting brackets. The later pair, with the I-beam frame is more likely to be of early 20th century date. The two sets of hinges also display different technology, although both appear to be bolted to the coping of the lock area. Neither of the paired gates are original: Strickland (1826) records the gates as curved, the ribs 18" apart. Neither of these descriptions fits the gates hanging in 2011.
- 9.5 The workings of the sluices and paddles are mostly missing from the gates. This does not enhance the archaeological record, or an understanding of the technology. However, the location of the paddles is present, so the potential height difference for raising and lowering the water level is revealed. The exact method for opening and closing the gates will in part have been eased by water pressure. The inner gates may have used chains, the outer gates may have had balance beams. Stricklands report (1826) mentions that the gates were operated by chains attached to wharfside capstans, and the low level chains may be a remnant of this technology. However, the loss of the capstans has removed evidence for whether this method was used for the later gates. Possibly, the motors failed. The balance beams may be additions to the tops of the gates following failure of the chain method.

10. Further Work and Archive

Further Work

- 10.1 This is the last record of the basin and gates before the basin is infilled and the gates removed. Neither the gates nor any of the identified fixtures and fittings are deemed to be of sufficient interest or in a state of preservation that would allow reasonable conservation to be possible. No further work is therefore recommended beyond the publishing of the results in a suitable format to be agreed in consultation with Ben Found of Kent County Council.

Archive

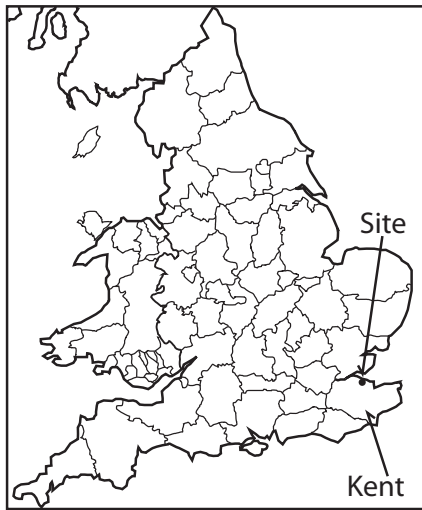
- 10.2 On completion of the project the developer/landowner will discuss arrangements for the archive to be deposited with an appropriate local museum. The archive will be security copied and a copy deposited with the National Archaeological Record (NAR) before post-excavation analysis begins or as soon after as can be arranged.
- 10.3 The site archive will comprise of the written, photographic and drawn records. It is to be consolidated after completion of the whole project and ordered as a permanent record. The archive will be prepared in accordance with guidelines for the preparation of excavation archives for long-term storage (UKIC 1990) and (Brown & AAF 2007).

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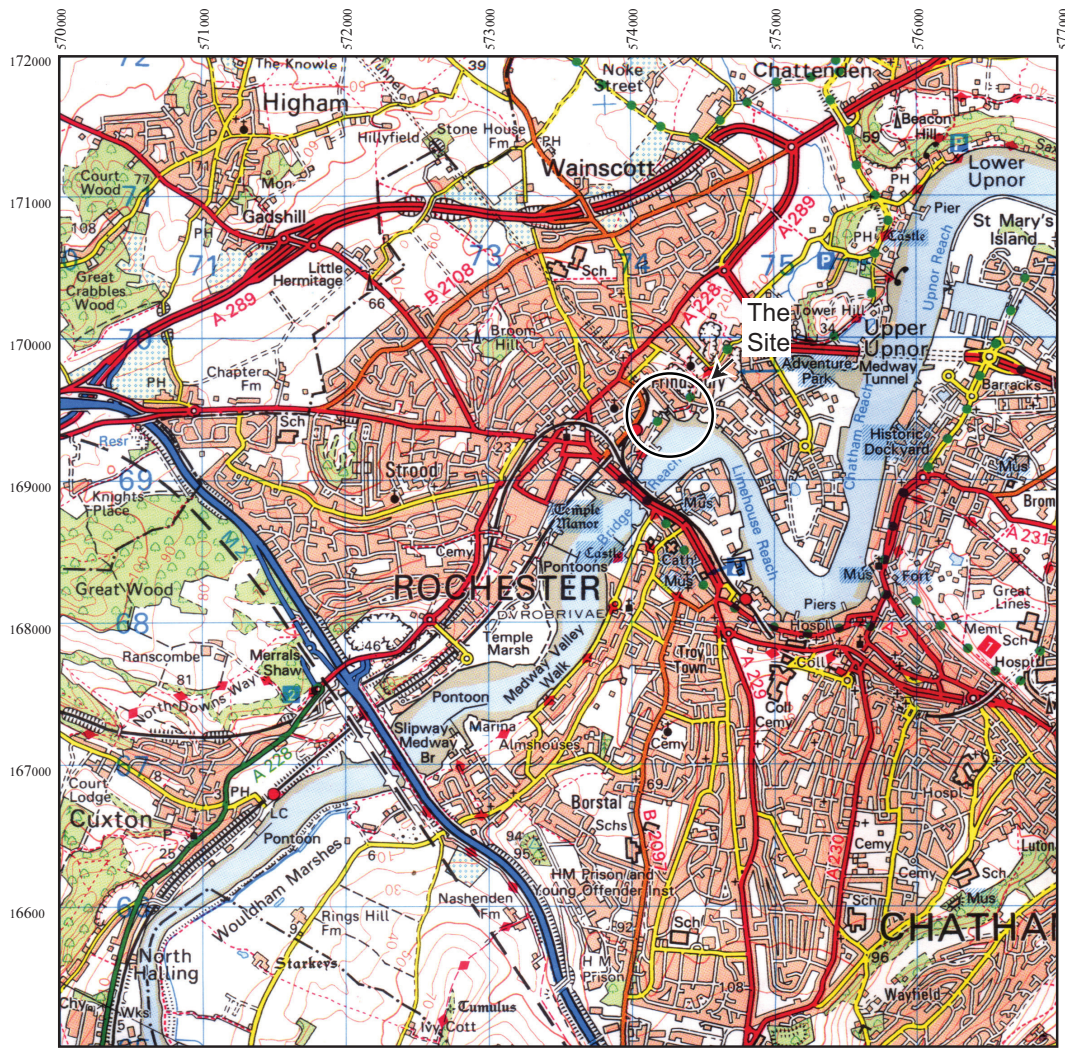
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Approximate Site Location
Within England & Wales

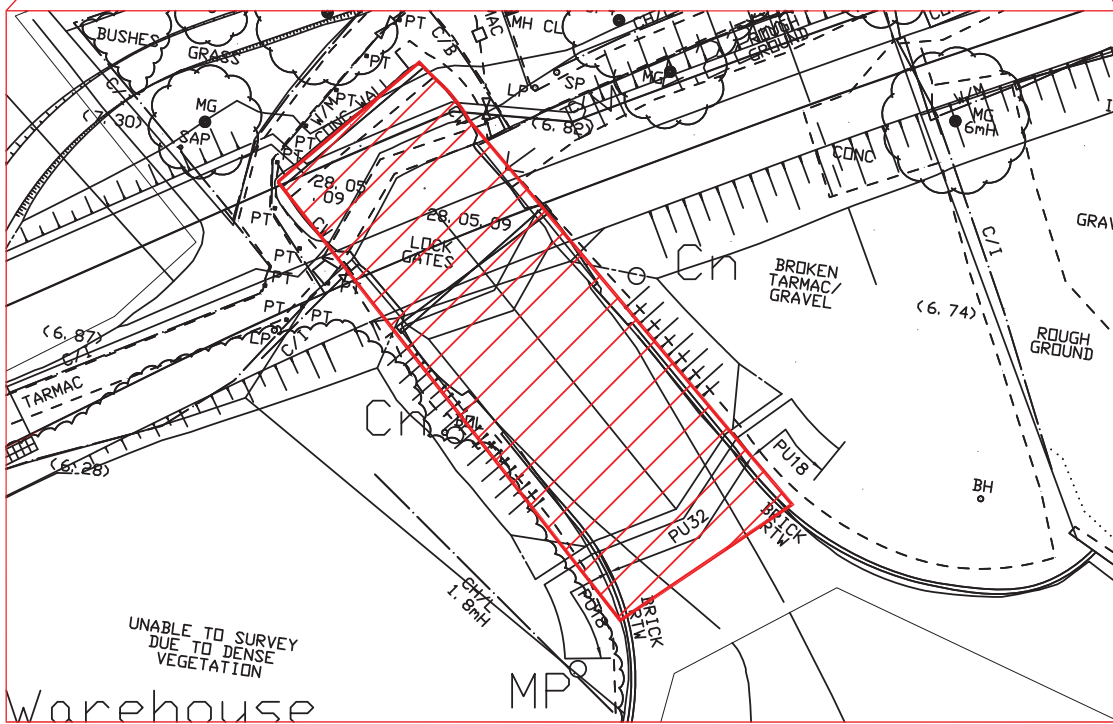
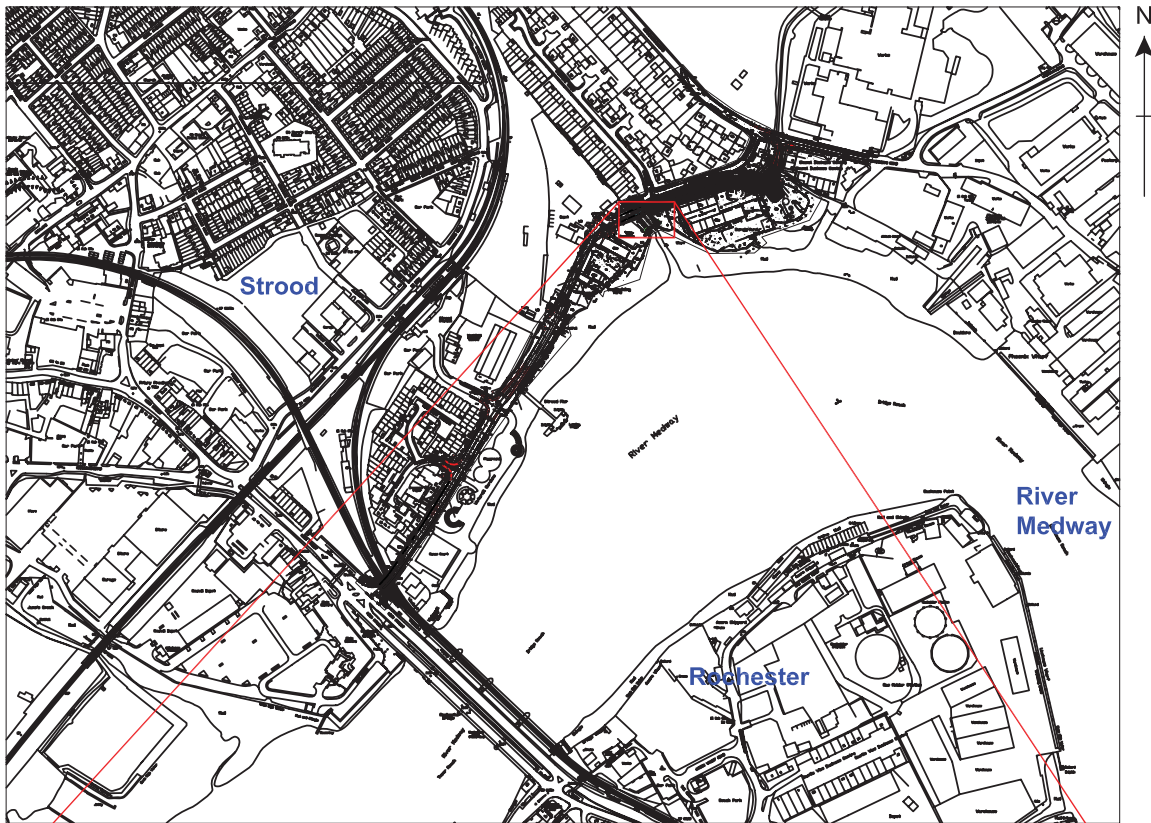


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Figure 1: Site Location



Based on the Plan Provided by Mott Macdonald



1:400

Watching Brief and Historic Building Record Location

Figure 2: Detailed Site Location

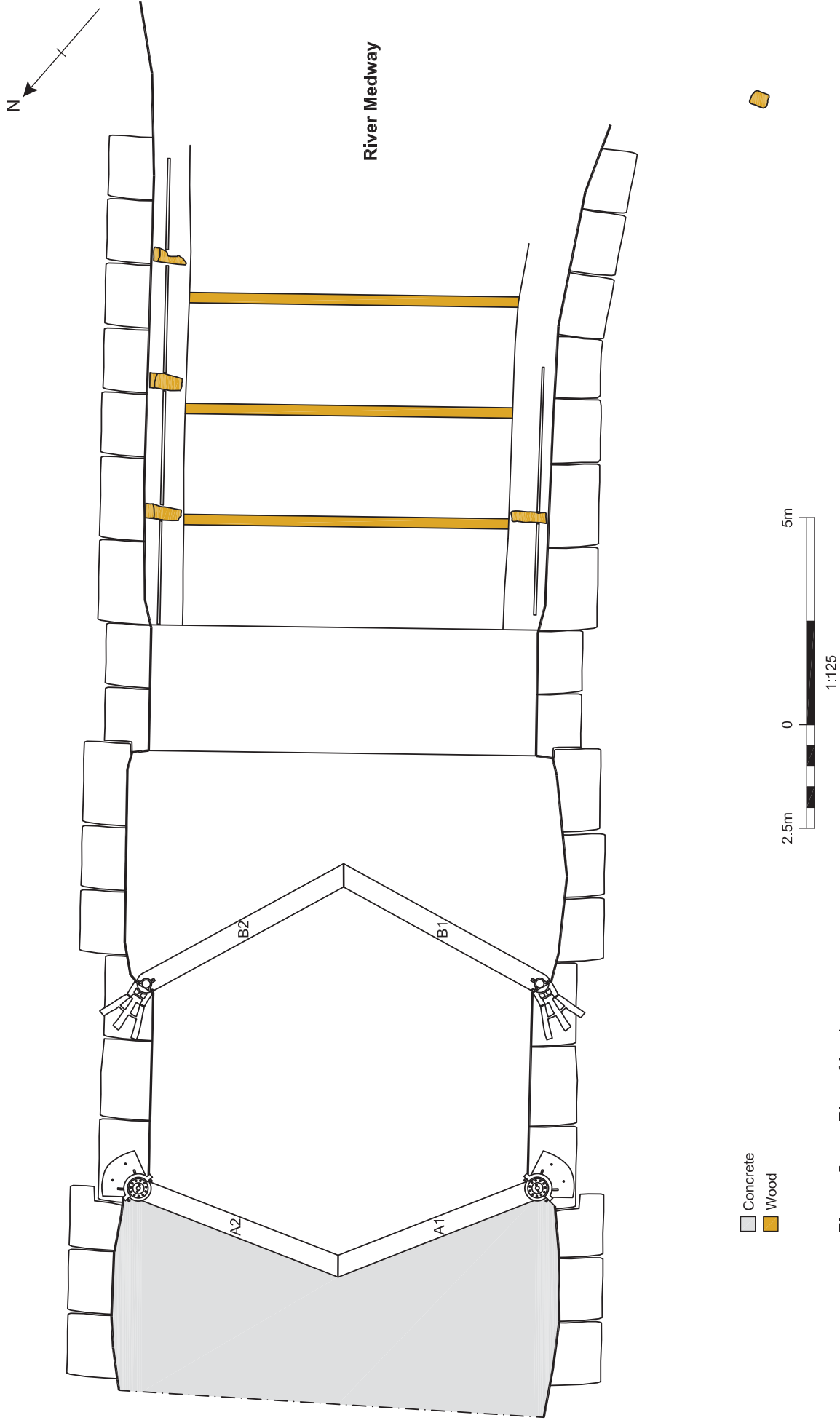
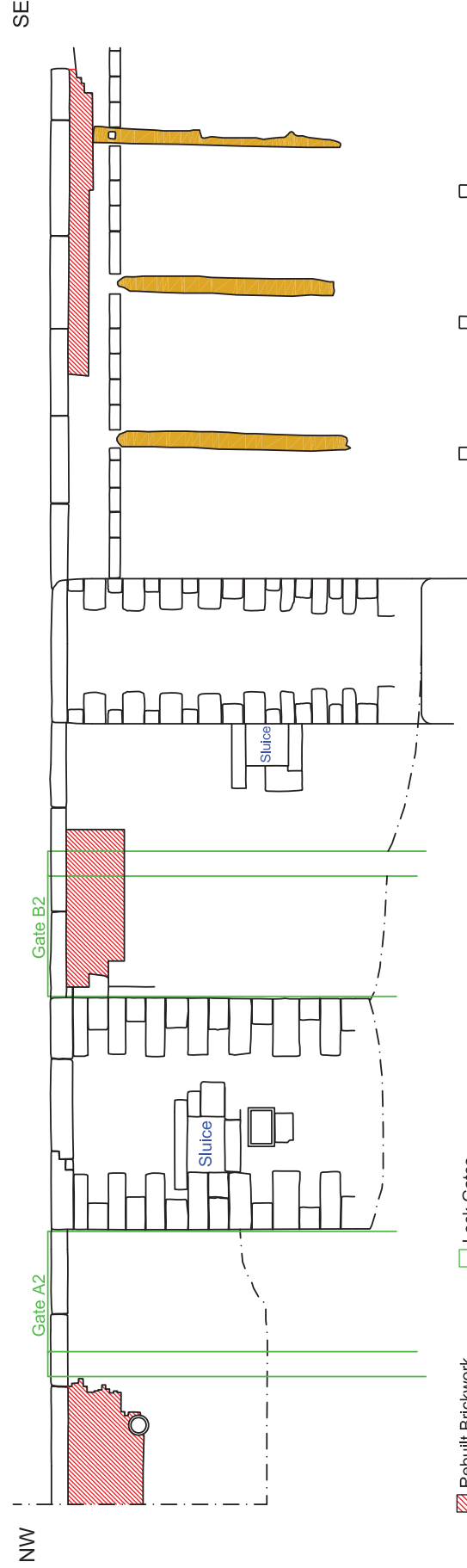
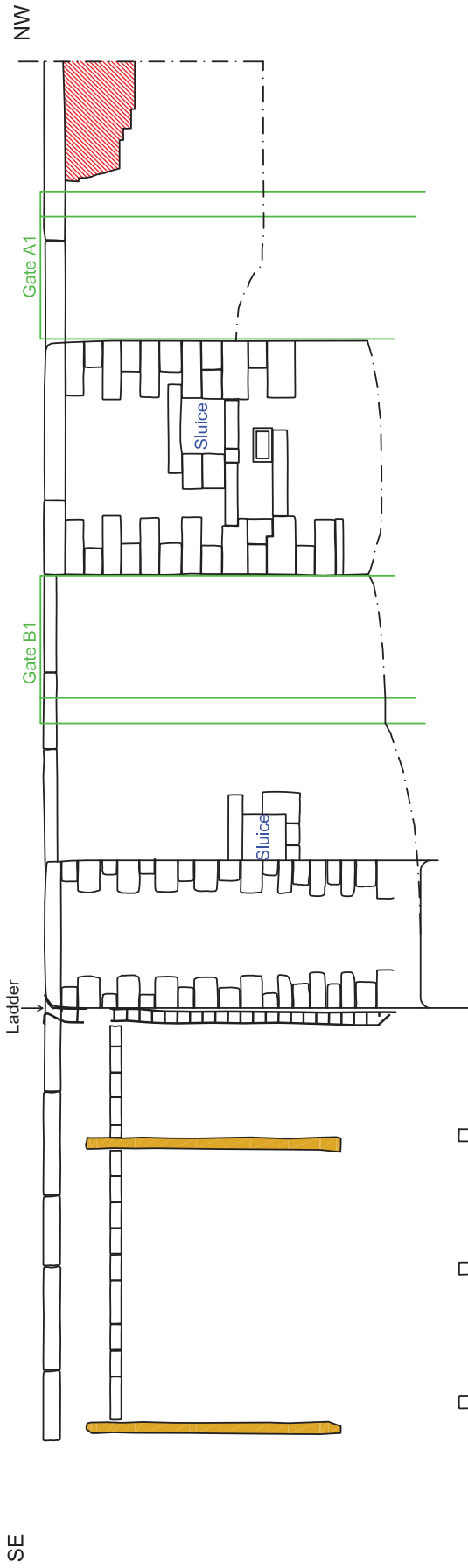


Figure 3: Plan of Lock

STROOD RIVERSIDE, SUSTAINABLE TRANSPORT LINK: RESULTS OF ARCHAEOLOGICAL RECORDING



-  Rebuilt Brickwork
-  Lock Gates
-  Wood
-  Water



Figure 4: Lock Wall Elevations

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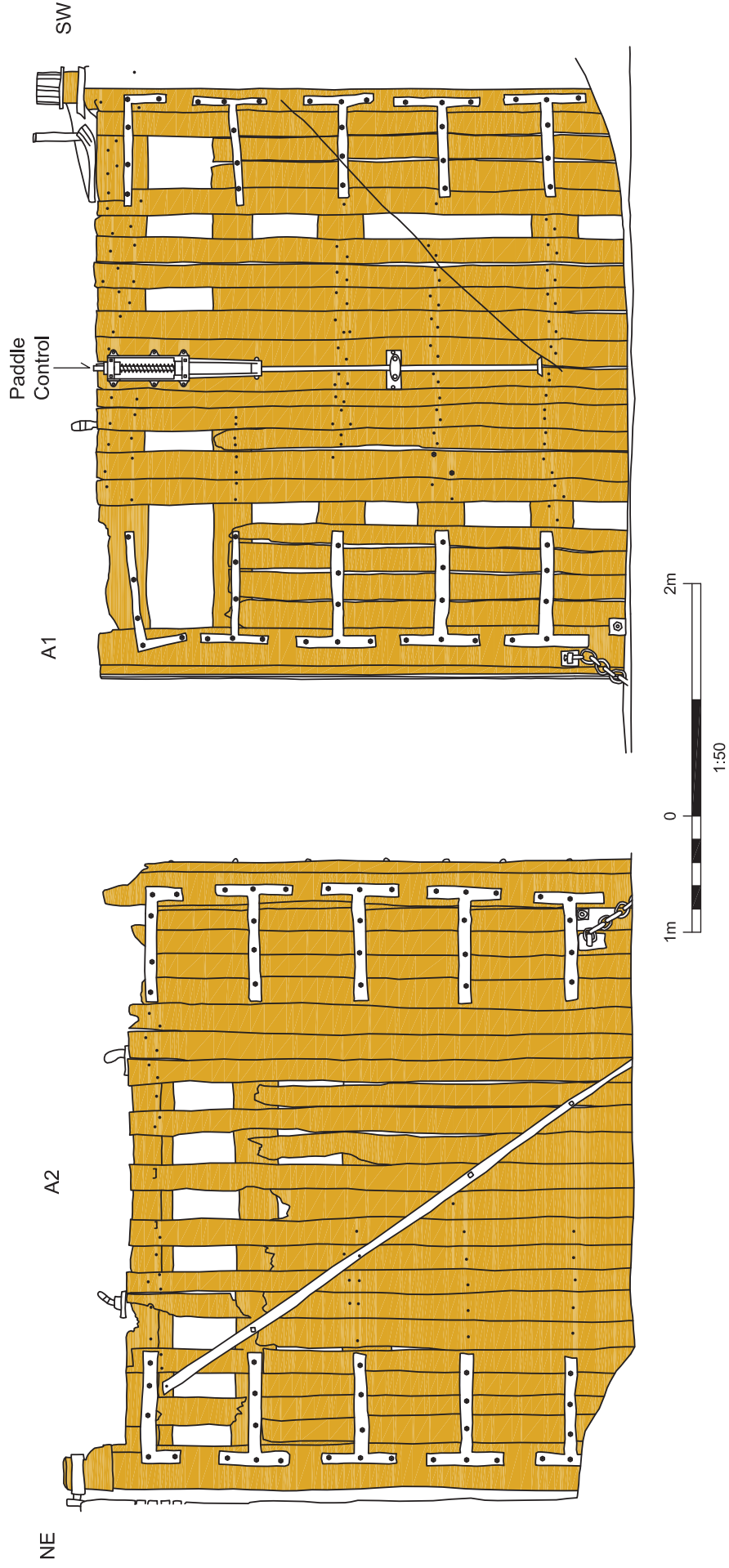


Figure 5: Landward/NW Side, Gates A1 & A2

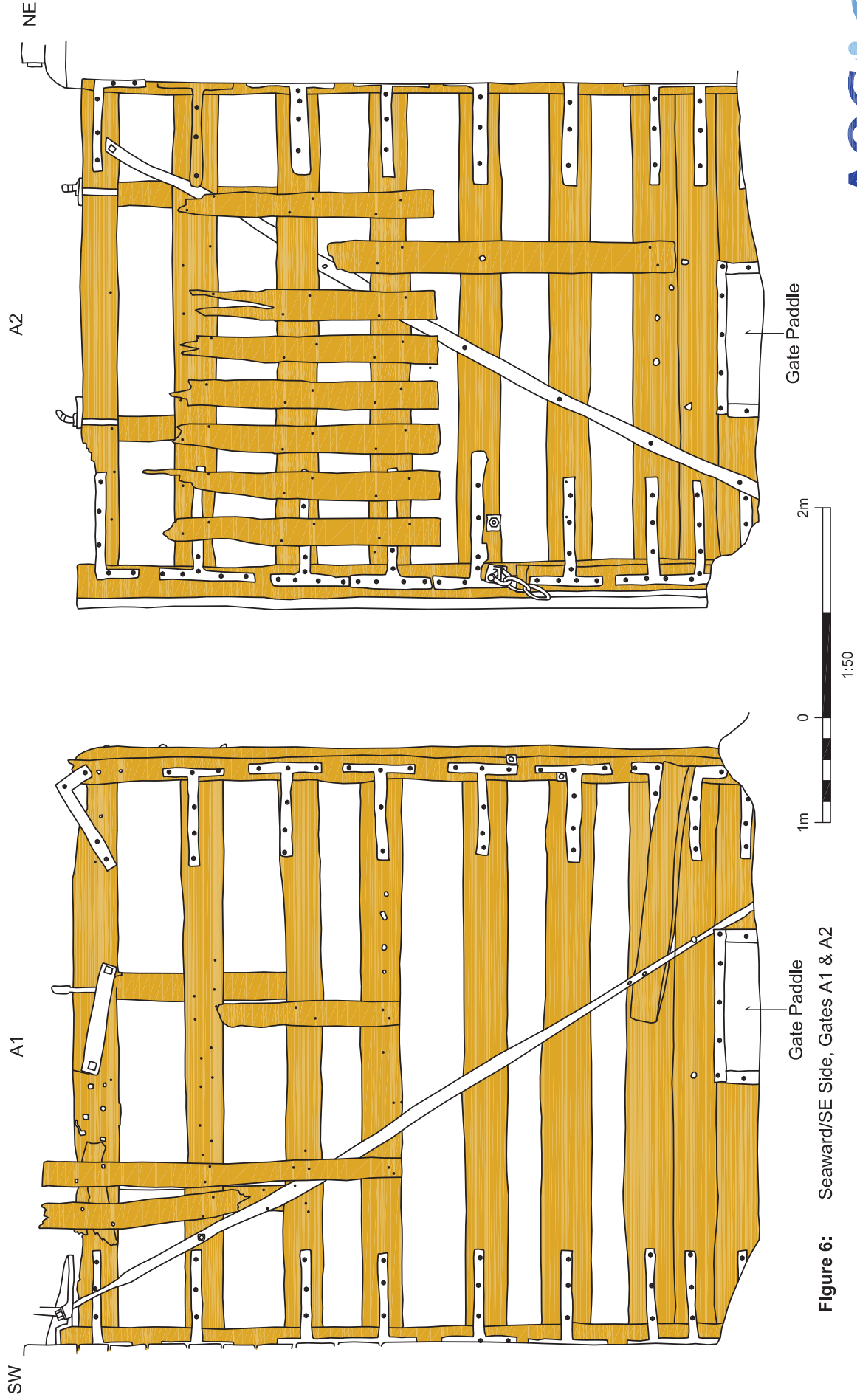


Figure 6: Seaward/SE Side, Gates A1 & A2

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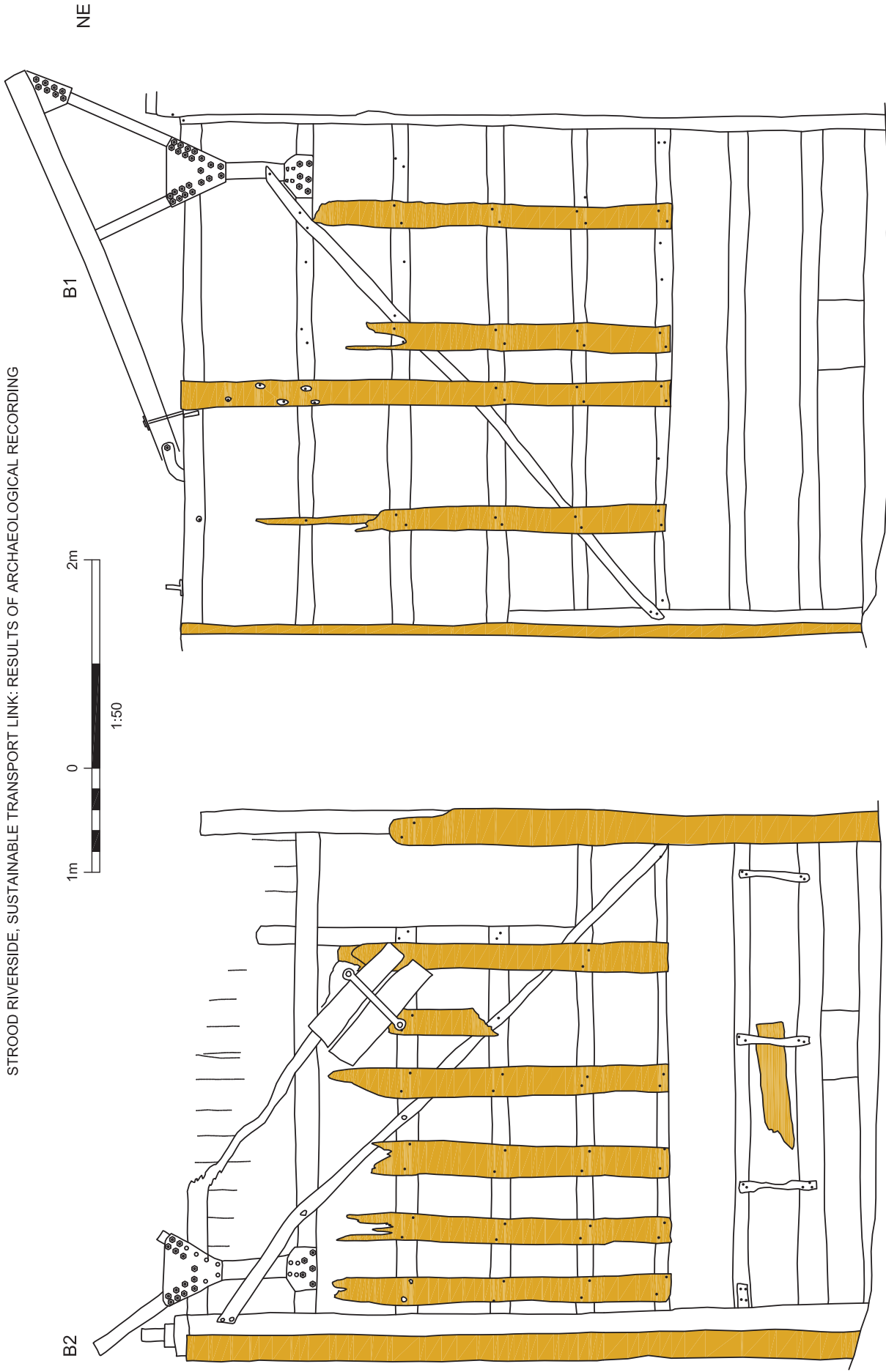


Figure 7: Landward/NW Side, Gates B1 & B2

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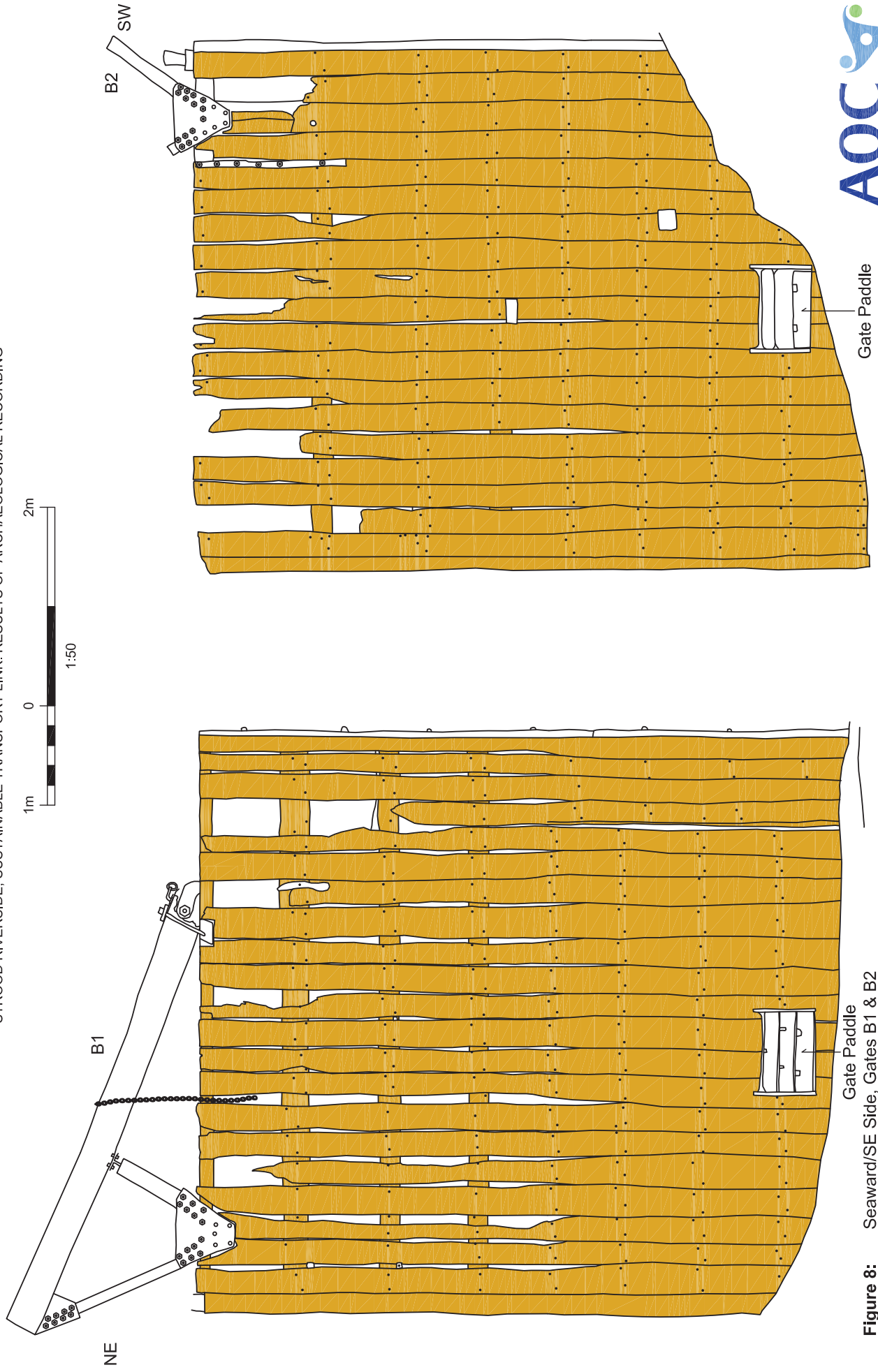
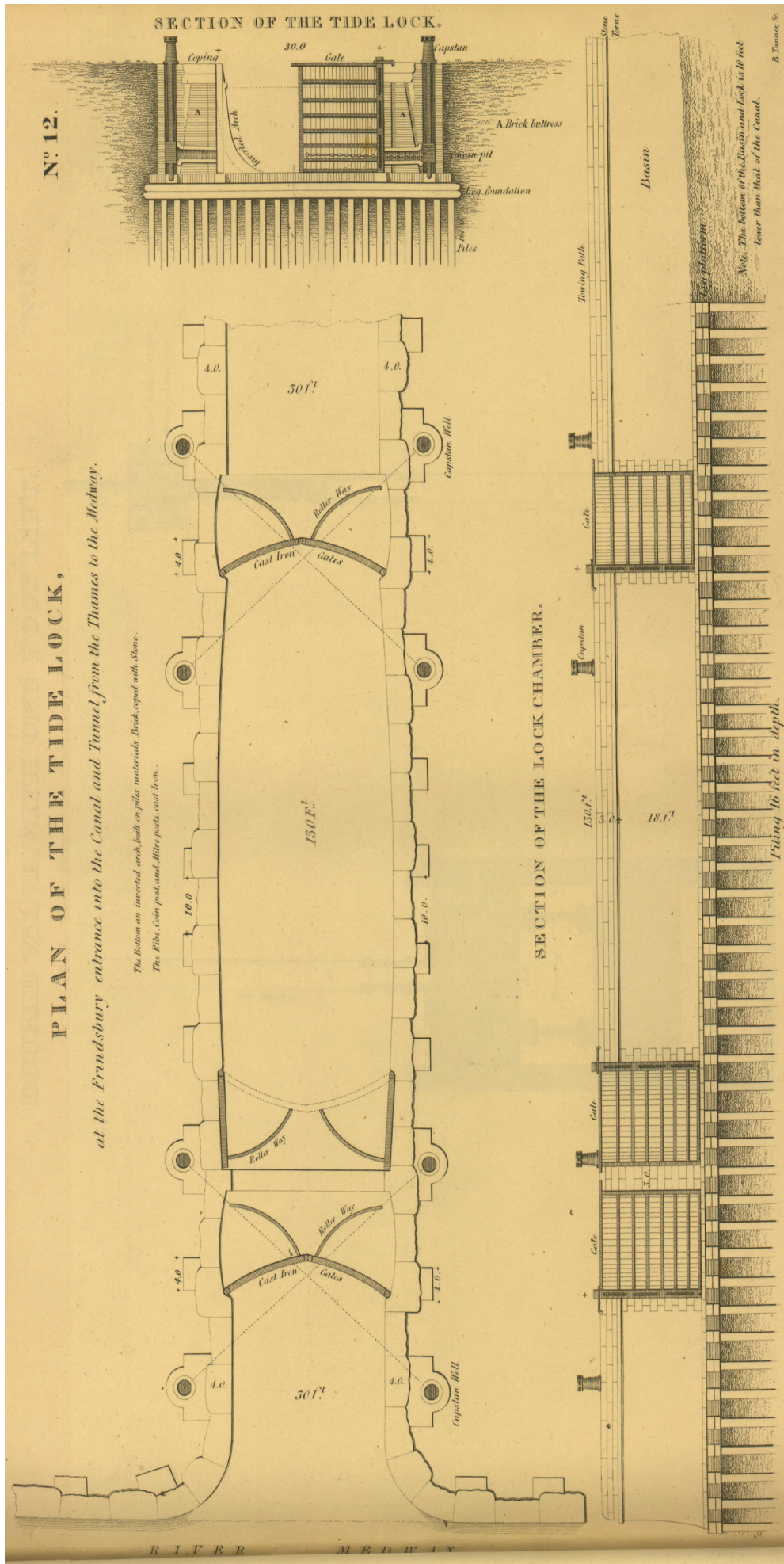


Figure 8: Seaward/SE Side, Gates B1 & B2

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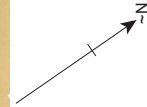


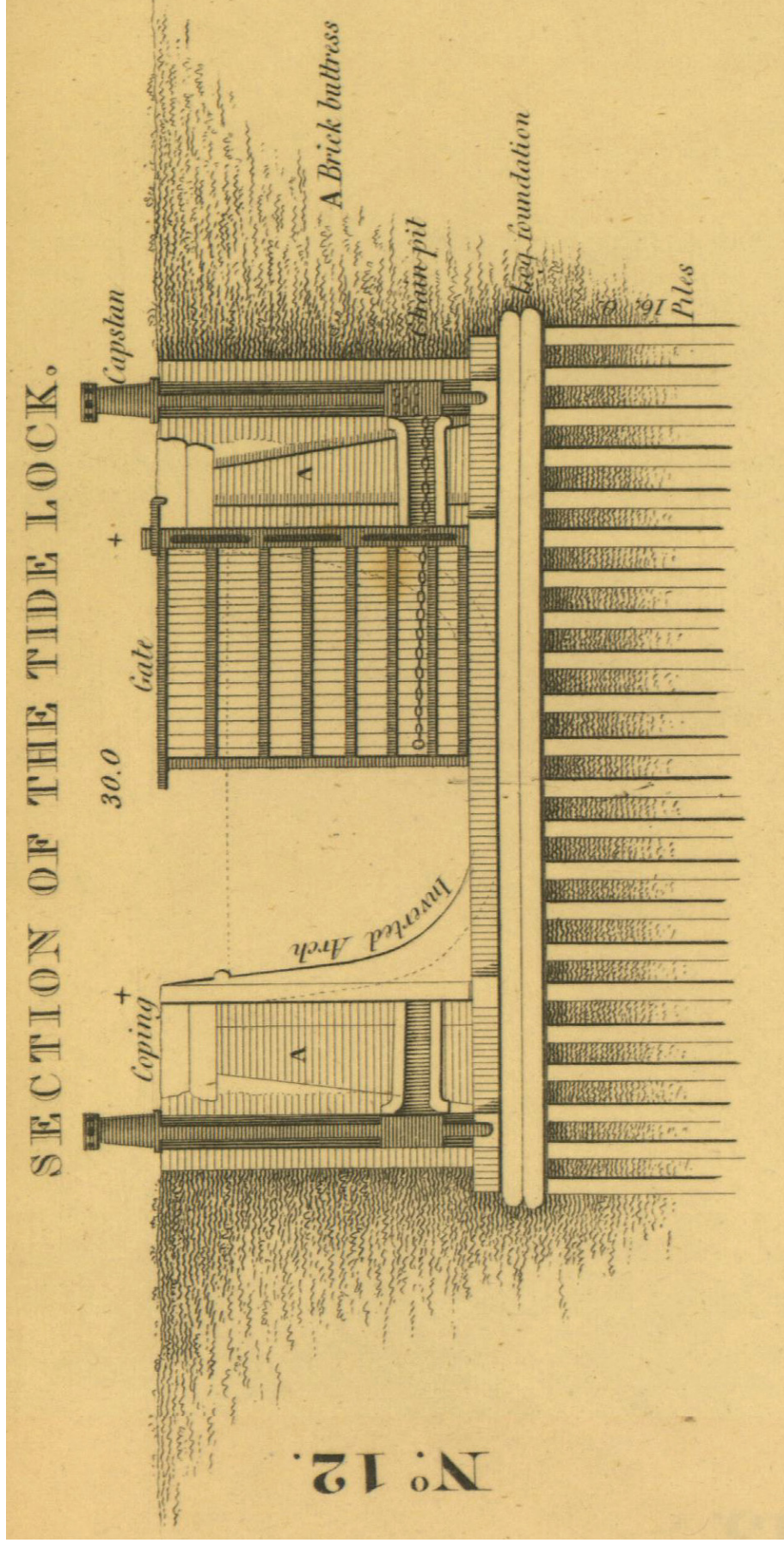
Figure 9: Gate Profiles



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Figure 10: Plan and Sections Showing Lock Design





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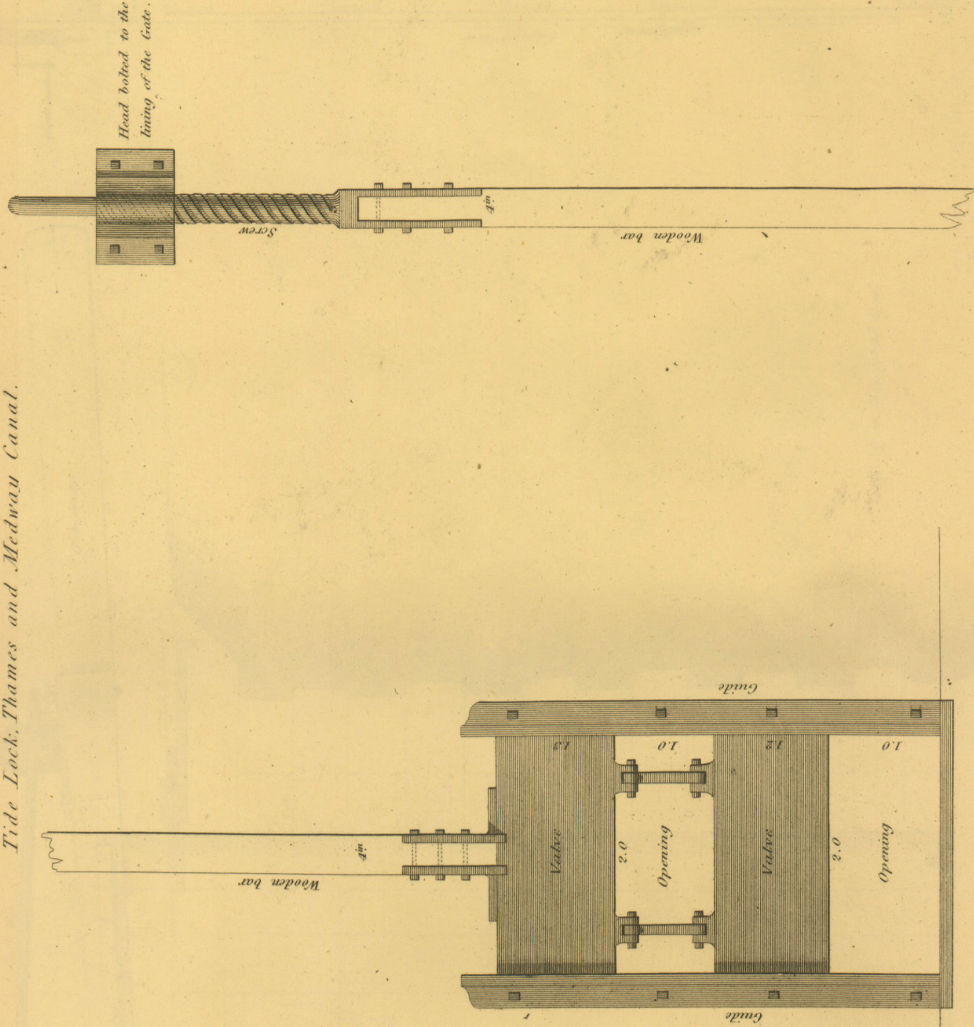
Figure 11: Section Showing Lock Design

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DOUBLE VALVE, WITH ONE FOOT LIFT.

N^o 15.

Tide Lock, Thames and Medway Canal.



Scale 1 inch to the foot.

J. Droyton Sc.

Wm. Strickland Eng'r.

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Figure 12: Lock Valve Design

Appendices

Appendix A – OASIS Form

OASIS ID: aocarcha1-92822

Project details

Project name	Strood Riverside, Sustainable Transport Link
Short description of the project	A watching brief and historic building record on a canal basin and associated lock gates.
Previous/future work	No / No
Any associated project reference codes	30927 - Contracting Unit No.
Any associated project reference codes	CWD11 - Sitecode
Type of project	Building Recording
Site status	None
Current Land use	Transport and Utilities 2 - Other transport infrastructure
Methods & techniques	'Measured Survey','Photographic Survey','Survey/Recording Of Fabric/Structure'
Prompt	Direction from Local Planning Authority - PPS

Project location

Country	England
Site location	KENT MEDWAY ROCHESTER Strood Riverside, Sustainable Transport Link, Strood, Kent
Postcode	ME2 4QT
Study area	470.00 Square metres

Site coordinates TQ 7427 6944 51.3966466101 0.505392928484 51 23 47 N 000 30 19 E
Point

Project creators

Name of Organisation AOC Archaeology

Project brief originator AOC Archaeology

Project design AOC Archaeology
originator

Project director/manager Alan Ford

Project supervisor Les Capon

Project bibliography

1

Grey literature (unpublished document/manuscript)

Publication type

Title STROOD RIVERSIDE, SUSTAINABLE TRANSPORT LINK, STROOD,
KENT: A WRITTEN SCHEME OF INVESTIGATION FOR AN
ARCHAEOLOGICAL WATCHING BRIEF AND HISTORIC BUILDING
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Author(s)/Editor(s) Clarke, C.

Date 2011

Issuer or publisher AOC Archaeology

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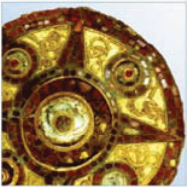
Description A4 text, 2 illustrations, 20 pages bound between plastic covers.

Entered by Alan Ford (alan.ford@aocarchaeology.com)

Entered on

25 March 2011

Appendix B – Written Scheme of Investigation



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