# BUILDING RECORDING WATCHING BRIEF AT THE BROAD ARROW TOWER, HM TOWER OF LONDON, LONDON BOROUGH OF TOWER HAMLETS

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PRE-CONSTRUCT ARCHAEOLOGY

**Building Recording Watching Brief at the Broad Arrow Tower, HM Tower of London, London Borough of Tower Hamlets**

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# Site Name

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# 1 NON-TECHNICAL SUMMARY

1.1.1 Pre-Construct Archaeology Limited was commissioned by Historic Royal Palaces to undertake an Historic England Level 2 building recording watching brief during drainage and minor repair work at the Broad Arrow Tower, HM Tower of London, London Borough of Tower Hamlets. The recording was undertaken in accordance with a Brief prepared by Historic Royal Palaces.

1.1.2 The repair work was undertaken to the paved wall walk in front of the north doorway of the Broad Arrow Tower in order to prevent surface run-off (rainwater) from entering and seeping into the stairwell below leading down to the first floor chamber. In addition, a badly decayed roofing joist, uncovered during works to the roof of the Broad Arrow tower, was also recorded.

1.1.3 The Tower of London is a UNESCO World Heritage Site, a Scheduled Monument and lies in a Conservation Area. The Broad Arrow Tower and Inner Curtain Wall are Grade I listed and are described in their listing citation as 'Inner curtain wall and towers…from Devereaux Tower in north-west corner to Salt Tower in south-east corner built 1238-75…Broad Arrow Tower: 1238-75; restored by Salvin 1855-7. D-shaped plan with rectangular turrets to north and south. 2 storeys, with second floor added in late C19. Restored loops; mid C19 two-light windows; restored west window of one trefoil light; Caernarvon-arched west doorway to north turrets; pointed-arched doorway and ancient door to south wall walk; late C19 pointed-arched doorway to north wall walk. Interior: ground-floor room with pointed embrasures and timbered ceilings; C13 dog-leg stair in north turret. First floor has hooded C20 fireplace (in place of original), pointed-arched mural passage and 3 embrasures'.

1.1.4 The recording during drainage and minor repair work at the Broad Arrow Tower was carried out as a condition of Scheduled Monument Consent. The survey works revealed, following the removal of a large machine-cut Yorkstone flagstone adjacent to the north first floor door threshold, the structure of a modern brick-built drain. It was constructed re-using a selection of modern/post-war bricks built onto a Yorkstone base. Given the character of the bricks forming the gulley and the smooth machine-cut Yorkstone used for the overlying flagstones and the contemporary flight of steps to the wall walk, the drain was most certainly built or improved within the recent past, at most within the last 35 years. No evidence of a former historic drain was observed. It was not clear if the underlying Yorkstone flagstones were re-used to form the base to the drain or if the drain was constructed onto a pre-existing former Yorkstone floor surface to the wall walk because no further intrusive works were carried out. No Yorkstone flagstones were archaeologically recorded when the wall walk surface between the Bowyer Tower and Brick Tower was removed in 2015. Here, asphalt overlay a levelling layer of packed mortar over a thin sand layer, which covered a peg roof tile surface, which in turn overlay a brick surface (OA, 2015).

1.1.5 It is very unlikely that the Broad Arrow drain is associated with repairs made to the steps by the towers entrance, completed in March 1924 but could well have formed part of the improvements made to the tower as part of its integration into visitor attractions in 1982.

1.1.6 The observation of a small area of the leaded flat roof structure of the Broad Arrow Tower revealed that it was constructed using modern timber and plasterboard. This repair work was possibly an attempt to improve surface drainage. Both this roof repair and the construction of the drain by the north door of the Broad Arrow Tower may have been part of the same work completed at the tower during the early 1980s.

# 2 INTRODUCTION

## 2.1 Background

2.1.1 Pre-Construct Archaeology Limited was commissioned by Historic Royal Palaces to undertake an Historic England Level 2 building recording watching brief during drainage and minor repair work at the Broad Arrow Tower, HM Tower of London, London Borough of Tower Hamlets (**Figures 1** and **2**). The recording was undertaken in accordance with a Brief prepared by George Roberts, Tower Future Projects Curator and with the agreement of Historic England (Roberts, 2017).

2.1.2 The repair work was undertaken to the paved wall walk in front of the north doorway of the Broad Arrow Tower in order to prevent surface run-off (rainwater) from entering and seeping into the stairwell below leading down to the first floor chamber (Carden & Godfrey, 2017; **Figure 5**). In addition, a badly decayed roofing joist, uncovered during works to the roof of the Broad Arrow tower, was also recorded.

2.1.3 The Tower of London is a UNESCO World Heritage Site (No. 488) and a Scheduled Monument (Greater London SM No. 10). The Broad Arrow Tower lies within the boundaries of these designations. Designations of this level recognise that the Tower of London and its buildings are of international significance. The Tower of London also lies in the Tower of London Conservation Area. The Broad Arrow Tower is of exceptional significance because it forms part of the defence of the east side of the Tower. The Broad Arrow Tower forms part of the Grade I listed *Inner Curtain Wall, with Mural Towers, The Queen's House, Nos 1, 2, 4, 5 and 7 Tower Green and the New Armouries,* which are described in their listing citation as follows:

'Inner curtain wall and towers. Bell Tower and curtain wall (of which lower courses remain) to Bloody Tower built *c.*1170; Wakefield Tower, Lanthorn (demolished and rebuilt in C19) and curtain wall and postern between them built *c.*1220-40 for Henry III; Watergate, later incorporated into Bloody Tower, also built *c.*1220-40; curtain wall and towers from Devereaux Tower in north-west corner to Salt Tower in south-east corner built 1238-75; west side of curtain wall, including Beauchamp Tower, built 1275-85 for Edward I; southern side of curtain wall heightened and crenellated 1339; Bloody Tower remodelled 1360-1362. Restored in C19, principally by A Salvin in 1840s to 1860s. Squared and coursed ragstone with ashlar dressings; lead and copper roofs to towers. Curtain Walls: gunports, loops and crenellation reworked in C19; west side of curtain wall has fine continuous line of embrasures, built in late C13 brick, to loops…

Broad Arrow Tower: 1238-75; restored by Salvin 1855-7. D-shaped plan with rectangular turrets to north and south. 2 storeys, with second floor added in late C19. Restored loops; mid C19 two-light windows; restored west window of one trefoil light; Caernarvon-arched west doorway to north turrets; pointed-arched doorway and ancient door to south wall walk; late C19 pointed-arched doorway to north wall walk. Interior: ground-floor room with pointed embrasures and timbered ceilings; C13 dog-leg stair in north turret. First floor has hooded C20 fireplace (in place of original), pointed-arched mural passage and 3 embrasures'.

2.1.4 Historic Royal Palaces, as custodian of the Tower, seek the agreement of Historic England regarding any repairs, improvements or alterations that may impact upon historic fabric. Scheduled Monument Consent has been granted by Historic England for the renovation work. The recording during drainage and minor repair work was carried out as a condition of this consent.

## 2.2 Site Description

2.2.1 The Broad Arrow Tower is situated within the medieval fortress of the Tower of London, traditionally thought to have been constructed by William the Conqueror at a point where the eastern Roman fortifications abutted the north side of the River Thames. It is located on the north bank of the River Thames in central London and lies within the London Borough of Tower Hamlets, separated from the square mile of

the City of London by Tower Hill (**Figure 1**).

2.2.2 UNESCO's decision to award World Heritage Site status to the Tower of London, was a recognition of this significance and that 'The White Tower is the example par excellence of the royal Norman castle in the late 11th century' (Gregory, 2015). The Broad Arrow Tower is located within the innermost ward to the east of the White Tower. It lies between the Constable Tower to the north and the Salt Tower to the south.

### 2.3 Significance

2.3.1 The Statement of Significance (Roberts, 2015) states that 'The Broad Arrow Tower is of **exceptional significance** as a comparatively unaltered mural tower of Henry III's post-1238 building programme. The survival of the original cruciform loops is of great importance as in many other locations in the Tower of London they have been lost or 'restored'. The tower's social history is also a microcosm of the wider Tower story. It shows the site's development from royal palace, to a prison, to an Ordnance store through to a modern-day tourist attraction. Few other buildings at the Tower of London can do this.

2.3.2 The Inner Curtain Wall between Constable and Broad Arrow Towers is of **considerable significance** as a demonstration of the long history of use, maintenance and repair or rebuilding of a fundamental part of the castle's defences. The obvious division between the earlier Victorian treatment and re-facing of the wall and the later decision to leave the original stone reflects changing attitudes towards the conservation of the fabric of the Tower of London's buildings'.

# 3 METHODOLOGY

## 3.1 Aims and Objectives

3.1.1 The aim of the project as set out in the Brief (Roberts, 2017) was to record the surfaces under the small area of paving to be lifted on the wall walk north of the Broad Arrow Tower. The following questions were to be considered:

- Is there any evidence for an earlier drain next to the threshold to the first floor of the Broad Arrow Tower?
- Are there any surviving areas of earlier surfaces on the wall walk?
- Can this area of wall walk be compared to the other excavated area near the Bowyer Tower?

3.1.2 In addition, a badly decayed roofing joist, uncovered during works to the roof of the Broad Arrow tower, was recorded.

3.1.3 The survey was carried out in accordance with a Level 2 survey as defined by guidance published in Historic England (2016) *Understanding Historic Buildings: A Guide to Good Recording Practice*. The outcome was to provide a better understanding of the structures present, to analyse the results and compile a lasting archive.

## 3.2 Documentary Research

3.2.1 No research of primary sources was undertaken.

## 3.3 On-Site Recording

3.3.1 The building survey was carried out on the 7th March 2017.

3.3.2 A photographic survey comprising high resolution digital images was completed to record the drain structure revealed *in situ*, as well as any masonry and/or diagnostic features. A selection of photographs has been included in this report (**Plates 1a** to **10**) and **Figures 3** and **4** show the location and direction of these photographs.

## 3.4 Project Archive

3.4.1 The project archive is currently held at the offices of Pre-Construct Archaeology Limited in Brockley, London, under the site code ToL 151. It is anticipated that the archive (copies of the report, drawings and photographs) will be lodged with Historic Royal Palaces. The report will be prepared as soon as possible after completion of the on-site work and a copy will be submitted to Historic Royal Palaces and the GLHER (Greater London Historic Environment Record).

## 3.5 Guidance

3.5.1 All works were undertaken in accordance with standards set out in:

- CIfA (2014) *Standard and guidance for the archaeological investigation and recording of standing buildings or structures*
- English Heritage (now Historic England) (2005) *The presentation of historic building survey in CAD*
- Historic England (2015) *Greater London Archaeology Advisory Service: Guidelines for Archaeological Projects in Greater London*
- Historic England (2016) *Understanding Historic Buildings: A Guide to Good Recording Practice*

# 4 HISTORICAL BACKGROUND

## 4.1 Introduction

4.1.1 The following historical background is taken directly from the Brief (Roberts, 2017) and the Statement of Significance (Roberts, 2015).

## 4.2 Tower of London

4.2.1 The building of the Tower of London was begun shortly after the Conquest by William the Conqueror, whose great keep, the 'White Tower', sits at its heart. The fortress was first constructed within the south-eastern corner of the ancient Roman city walls, along the riverbank of the Thames.

4.2.2 Extended beyond the boundaries of the Roman city walls by Henry III, and developed as a concentric castle by Edward I in the 13th century, the Tower – the monarch's stronghold amidst an often hostile city – became the home of major State Institutions such as the Royal Mint, as well as the setting for nationally significant historical events.

4.2.3 The Tower is the home of the Coronation Regalia and Crown Jewels, and the birthplace of the Royal Armouries Museum, which still displays part of its collection within the White Tower. The fortress is most strongly associated in the popular imagination with the Tudors, and the turbulent events of the 16th century, particularly with the many prisoners kept within its walls. The 19th century Romantic perception of the Tower, and the castle's emerging identity as a tourist attraction, led to the demolition of many institutional structures and the addition of new 'medieval' style neo- gothic buildings.

## 4.3 Broad Arrow Tower

4.3.1 The Broad Arrow Tower was constructed as part of the works to re-enforce the Tower's defences undertaken by Henry III. This programme of works beginning in 1239 included most of the D-shaped towers along the eastern and northern inner curtain wall; the Salt, Constable, Brick, Bowyer and Flint Towers, as well as the Martin and Devereux Towers (Brown et al 1963). At first, the area to the east of the Tower was presumably not built upon, as part of it was leased as a garden by Edward I prior to the construction of the strengthened outer defences between 1275 and 1285, which saw the outer wall and current moat constructed.

4.3.2 Little is known of the original layout of the Broad Arrow tower, as few original internal features survive. Parnell's 1980 excavation of the ground-floor void suggested that it was contemporary with the original construction of the tower (Richardson, 1980) while the arrow holes on the ground and first floor are also thought to be original. The Broad Arrow's defences were strengthened further under Edward II in 1324-1325 who employed Master Thomas de la Bataile, *cementarius de Ledes* to crenelate and repair the building, along with the other eastern towers (Brown et al, 1963). No further works or improvements to the Tower have been identified prior to 1532.

4.3.3 Under the administration of Thomas Cromwell, the Tower underwent a major programme of repairs in 1532 (Bayley 1825). Named in the report as, "the tower at the easte ende of the warderobe", the Broad Arrow needed repairs to both turrets which were estimated to require a total of 40 tons of Caen Stone so they could be "ventyde, lowpyd, copyd and crestyd". During the programme of work between April 1532 and April 1533, further repairs were also undertaken which repaired the Broad Arrow's roof as well as inserting new floors for both rooms in the tower. The same accounts also note that an altar was built in the tower, probably in the southern turret (Keay, 2001).

4.3.4 This newly-inserted altar appears to reflect the relatively high-status of the lodging provided in the Broad Arrow during this period. Positioned close to the gardens of the medieval royal palace in the south-east corner of the inner ward along with the

probable provision of a garderobe on the first floor and what appears to have been a small oratory, it would have been a comfortable place of residence for a Tower or Court official. It may well have been for an officer of the Royal Wardrobe as the 1597 Haiward and Gascoyne map shows part of the Wardrobe being attached to the west-end of the Broad Arrow Tower. Keay has identified this building as the "newe frame nowe made a warderobe for the Kyng" in 1532, meaning that the work to improve the standard of the Broad Arrow's accommodation in the same year could be linked (Keay 2001). It is this continuing association with the Royal Wardrobe which gave the tower its name, with the Broad Arrow stamp being used to mark royal property from the fourteenth century.

4.3.5 By the 1550s, however, these renovations were being enjoyed by state prisoners. The first known prisoners held in the tower were Giovanni Battista Castiglione, tutor to the future Elizabeth I and John Daniell who were both imprisoned there in 1556. Its role as a prison continued in Elizabeth I's reign, with further surviving inscriptions including John Stoughton (1586), Ralph Ithell (1587) and John Gage (1591), all of whom have been identified as Catholic prisoners (Bayley, 1825). The Yeoman Warder William Francklyns identified the tower as prison lodgings in 1641 (Timbs, 1855).

4.3.6 The early-eighteenth century saw further work undertaken on the Broad Arrow Tower. In April 1701 the old steps leading to the tower were dismantled and a new hearth was built with "ten-inch tiles", while in June of the same year, the "topps of the two square towers" were re-bricked. The carpenter, Matthew Churchill was employed for some unspecified repairs to the tower in 1717, while further repairs to the roof were made in October 1726 when the "boarding on the flat" was repaired.

4.3.7 The tower was first noted as a Yeoman Warder's residence on a plan of 1680-81 and in 1714 the warder Edward Foulkes was recorded as being resident in Broad Arrow, "all that one room", suggesting he lived in only one of the tower's chambers, probably on the first floor. By 1727 this single room was occupied by the warder Gabriel Whitakker and he was still there in 1732. No work on the Broad Arrow is identifiable until 1849-50 when a water pipe was laid through the tower.

*4.3.8* The earliest description of the Broad Arrow's interior was published by Bayley in 1821. He noted that the tower contained only two floor*s*, "ascended by a small spiral staircase", but gave no indication of whether it was entered through the ground floor chamber or from the wall walk (Bayley, 1821). There was certainly first floor access to the wall walk in 1830, through a doorway in the south wall, past the garderobe, as recorded by Britton and Brayley who also noted that the tower had two floors; the basement floor and the upper floor. Clark's 1866 description of the Broad Arrow, also noted two floors as well as a single staircase, "…a steep narrow stair, not a well, entered below by a Caernarvon doorway." Clark's account also makes it clear that the first floor chamber was accessible from the wall walk to both the north and the south, "A passage from the rampart traverses this upper floor, making it *a place d'armes"* (Clark 1867).

4.3.9 These descriptions suggest that the second floor now existing in the Broad Arrow was inserted after 1866; however, plans from the National Archives suggest that it could have been added as early as 1852. These plans show the upper chamber divided into two floors connected by a stair vice. The lower of the two floors consists of two rooms; with a sink installed in the garderobe to the south, as well as a larger living area. There was a single room on the floor above, and a kitchen was installed in the southern turret accessed across the leads from the vice. The remains of this kitchen are still visible in the turret. The apartment was entered through a door on the south from the wall walk, although it is not clear if communication with the ground-floor chamber was maintained.

4.3.10 After the removal of the Irish Barracks in the mid-1870s, the Tower's authorities began to campaign for work to be started to repair the exterior of the Broad Arrow. The work, described as, "Restore Broad Arrow Tower opened out by removal of part of Irish Barracks" appears on an 1878 list of potential projects to be undertaken at the

Tower, although it was not approved until 1880. Assuming the work began soon after the expenditure was approved, then work must have begun by 1881 and was still continuing in June 1882, when a delegation from the Society for the Protection of Ancient Buildings (SPAB) noted that "much new work" was being undertaken on the Broad Arrow Tower (SPAB, 1882). This "new work" could refer to the two Office of Works drawings from April and May 1882 which show work to the windows on the west front as well as on the staircase. Work to the windows of the second-floor room show that it had certainly been inserted by this period.

4.3.11 As the Tower's popularity as a tourist attraction increased, pressure grew to open more of its buildings to the general public. A note suggesting the Broad Arrow be opened appears in August 1914 but was presumably delayed by the outbreak of the First World War and it was not until 1922 that preparations were made for visitors. It was estimated that it would cost £30.00 to remove wallpaper and other modern fittings in the residence as well as repair the steps to the entrance. The works were completed by March 1924 and the public were admitted for the first time in April 1925.

4.3.12 During the Second World War the Broad Arrow became an office and store for the Master of the Armouries after the Martin Tower was damaged by bombing. After the war, Lord Chetwode, the Tower's Constable, argued that the Broad Arrow should be returned to its earlier role as accommodation for Yeoman Warders.

4.3.13 The Royal Armouries did not however move out of the Broad Arrow, and in 1981, conservation works were undertaken with the intention to provide further space for this organisation, including a workshop on the ground floor, a mess room on the first floor and an armour store on the second floor. The plans for the store room were abandoned due to the load capacity of the floor being too low, although repairs to the roof and stone work were carried out. With the abandonment of the plan to use the Broad Arrow as an Armouries store and mess room, it was instead opened to the public as part of the east wall walk in 1982.

4.3.14 Little is known of the development of the wall walk to the north of the Broad Arrow Tower. Similar to the first floor room of the Broad Arrow, it is now used by visitors as part of the wall walks. As a result of these works, the wall walk is paved using modern Yorkstone paving. Nothing is known about the earlier surfaces in this area of wall walk. However one area of the wall walk, between the Bowyer and Brick Towers, has been previously investigated and an earlier asphalt surface and roof tile surface were found (OA, 2015).

# 5 DESCRIPTIONS

## 5.1 Broad Arrow Tower

5.1.1 The Broad Arrow Tower forms part of the inner curtain wall of the Tower of London constructed by Henry III between 1239 and 1275 and is flanked by the Constable Tower to the north and the Salt Tower to the south. It is 'D-shaped' in plan with flanking rectangular turrets on the north and south sides. The northern example acts as a stair turret, while the southern is solid up to the first-floor level to accommodate the postern. Originally of two storeys, the third was inserted between 1881 and 1882 as part of the Victorian renovation of the tower. The tower is abutted along its northern and southern elevations by the inner curtain wall and wall walks, which, along with the tower, now form part of the visitor attractions.

5.1.2 The ground-floor room is roughly rectangular in plan and entered through a door with chamfered jambs and two-centred head. The room had a timbered ceiling, and three loops with pointed embrasures.

5.1.3 The first floor follows the same plan as the ground floor but was clearly the best and residential chamber. The chamber has a 20th century hooded fireplace, presumably in the location of the original, and is served by a garderobe situated off the pointed-arched mural passage running from the wall-walk entrance to the south into the chamber. There are three original loops with embrasures (north, east and south), as on the floor below, but that on the east is skewed to avoid the fireplace while that on the south is much restored. The west wall has a large two-light trefoil window which is a nineteenth-century insertion. The inserted floor above has clearly reduced the original height of the room.

5.1.4 The inserted second floor is mostly faced with crude brickwork of eighteenth-century date or later, and has a Victorian two-light window in the west wall, of the same pattern as the one below it. The stairway in the northern turret, above the level of the exit to the wall-walk, becomes a vice to reach this top floor, and continues to the roof. The southern turret is accessible only from the roof and contains surviving evidence of its use as a kitchen in the nineteenth century.

## 5.2 Inner Curtain Wall between Constable and Broad Arrow Towers

5.2.1 The length of curtain wall running between Constable and Broad Arrow Towers is clearly of two different building phases as defined by a straight joint and distinct change in fabric type roughly half way between the towers. To the Broad Arrow side the majority of the wall is of thirteenth-century date, dating to the original construction of this wall as the outer curtain wall of the castle in an expansion programme undertaken by Henry III between 1238 and 1275. The main body of the wall is of irregular Kentish Ragstone rubble. Only the parapet and northern line of dressed quoins of this half of the wall are nineteenth-century in date. This half of the wall also contains two restored arrow loops.

5.2.2 The Constable Tower side of the wall appears to be entirely of 19th-century date. The fabric is regular, squared and coursed Kentish Ragstone. Due to the way this length of wall is set back from that to the south, and the differences in slope of the batter, it appears unlikely that any original material is contained within the 19th-century wall face. It would appear more likely that the northern extent of this length of Inner Curtain wall has been completely rebuilt.

## 5.3 Drain

5.3.1 The northern door opening to the wall walk is built with Portland stone dressing and a pointed two-centred arched head (**Plate 1a**). The internal Yorkstone steps fall away immediately beyond the threshold, down to the level of the first floor, via a quarter landing to the northern stair turret (**Figures 3** and **4**; **Plate 1b**). The door threshold is built flush with the level of the Yorkstone paving to the wall walk, hence the problems with water run-off from the wall walk down into the tower (**Plate 2**). This issue was

probably further exacerbated by a short flight of (four) steps to the north, built to address the differential in level between the wall walk and the north door opening, which indirectly creates a 'sump' (**Plate 3**).

5.3.2 A redundant rainwater hopper had been identified on the inner (west facing) side of the curtain wall adjacent to the doorway, suggesting that some form of drain, to redirect this run-off, was formerly in use (**Figures 4** and **5**). However, how such a drain functioned was not immediately obvious as the area to the front (north) of the doorway had in the recent past been re-laid using machine cut Yorkstone slabs. This work was probably carried out when the adjacent steps to the wall walk were rebuilt.

5.3.3 The machine cut Yorkstone flags to the north of the door opening (**Plate 4**) all measured just over 5cm (2 inch) in thickness. That closest to the wall walk steps was 195cm in length (i.e. the full pedestrian width of the wall walk) and 32cm wide and the two flagstones to the south (those to be lifted) 151cm and 45cm long by 44cm wide (**Figures 3** and **4**). The flagstones were laid with fine, tight joints and dry laid, not mortared into place. Yorkstone flagstones that covered the threshold to the door opening and the adjoining steps to the south were cleaved and not machine cut.

5.3.4 The removal of the larger machine cut flagstone adjacent to the door (only possible by cutting a narrow section from the eastern end) uncovered the extant structure of a former drain (**Figure 4**; **Plates 5** to **7**). It was clearly a modern drain, built re-using a selection of bricks including mainly machine-made Flettons with large frogs, and also re-used yellow stock and modern perforated bricks. The drain gulley extended east to west across the front of the door threshold with a dog leg (half brick in length) back to the wall line to the west of the threshold and probably the same to the east. The brickwork was mortared together using a weak sand/cement mortar and laid onto a Yorkstone flagstone, used as a base to the gulley. It was unclear whether this base was in fact an earlier floor surface to the wall walk or was used specifically as a base for the drain.

5.3.5 As the intention was to 'line' the existing gulley structure and improve the drainage to it, no further recording works were carried out.

5.3.6 **Flat Roof**

5.3.7 At the time of the site visit, the code 8 leadwork to the drainage gulley along the western side of the roof of the Broad Arrow Tower had been 'peeled back exposing a small section of the flat roof structure adjacent to the threshold of the southern turret door (**Plate 8**). This revealed, below the softwood roof boards (6 inch scantling) for the flat roof, two joists running east–west across the roof (**Plates 9** and **10**). The southernmost joist was much decayed and in need of replacement (**Plate 10**). It was a regular cut joist measuring 4x4 inches, heightened, by the addition of a narrow strip of modern timber (18mm thick) nailed onto the upper surface of the joist (as a spacer). The same treatment was given to the adjacent joist to the north, which had also been locally bedded onto a pad of re-used plasterboard. Clearly these works were associated with a recent reworking or repair to the flat roof, possibly as part of improvements to the roofs surface drainage.

# 6 DISCUSSION AND CONCLUSIONS

6.1.1 The survey works at the Broad Arrow Tower revealed, following the removal of a large machine-cut Yorkstone flagstone adjacent to the northern first floor door threshold, the structure of a modern brick-built drain. It was constructed re-using a selection of modern/post-war bricks built onto a Yorkstone base. Given the character of the bricks forming the gulley and the smooth machine-cut Yorkstone used for the overlying flagstones and the contemporary flight of steps to the wall walk, the drain was most certainly built or improved within the recent past, at most within the last 35 years. No evidence of a former historic drain was observed. It was not clear if the underlying Yorkstone was re-used to form the base to the drain or if the drain was constructed onto a pre-existing former Yorkstone floor surface to the wall walk because no further intrusive works were carried out. No Yorkstone flagstones were archaeologically recorded when the wall walk surface between the Bowyer Tower and Brick Tower was removed in 2015. Here, asphalt overlay a levelling layer of packed mortar over a thin sand layer, which covered a peg roof tile surface, which in turn overlay a brick surface (OA, 2015).

6.1.2 It is very unlikely that the Broad Arrow drain is associated with repairs made to the steps by the towers entrance, completed in March 1924 but could well have formed part of the improvements made to the tower as part of its integration into visitor attractions in 1982.

6.1.3 The observation of a small area of the leaded flat roof structure of the Broad Arrow Tower revealed that it was constructed using modern timber and plasterboard. This repair work was possibly as an attempt to improve surface drainage. Both this roof repair and the construction of the drain by the north door of the Broad Arrow Tower may have been part of the same work completed at the tower during the early 1980s.

# 7 ACKNOWLEDGEMENTS

7.1.1 Pre-Construct Archaeology Limited would like to thank Historic Royal Palaces for commissioning the project. The project was managed by Charlotte Mathews. The building survey and report were completed by Adam Garwood. Hailey Baxter compiled the illustrations

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## APPENDIX 1: OASIS FORM

### OASIS ID: preconst1-284441

| | |
|---|---|
| **Project details** | |
| Project name | Building Recording Watching Brief Broad Arrow Tower, Tower of London, Tower Hamlets |
| Short description of the project | Pre-Construct Archaeology was commissioned by Historic Royal Palaces to undertake an Historic England Level 2 building recording watching brief during repairs at the Broad Arrow Tower, HM Tower of London, Tower Hamlets. The Tower of London is a World Heritage Site, a Scheduled Monument and lies in a Conservation Area. The Broad Arrow Tower and Inner Curtain Wall are Grade I listed and are described as 'Inner curtain wall built 1238-75. Broad Arrow Tower: 1238-75; restored by Salvin 1855-7. D-shaped plan with rectangular turrets to north and south'. The repairs were undertaken to the wall walk in front of the north first floor doorway and to a badly decayed roofing joist. The recording was carried out as a condition of Scheduled Monument Consent. The survey works revealed the structure of a modern brick-built drain. It was not clear if the underlying Yorkstone flagstones were re-used to form the base to the drain or if the drain was constructed onto a pre-existing former Yorkstone floor surface to the wall walk because no further intrusive works were carried out. The drain is thought to have been associated with improvements made to the Broad Arrow Tower as part of its integration into visitor attractions in 1982. The observation of a small area of the leaded flat roof structure of the Broad Arrow Tower revealed that it was constructed using modern timber and plasterboard and may have been part of the same work completed in the early 1980s. |
| Project dates | Start: 07-03-2017 End: 07-03-2017 |
| Previous/future work | No / No |
| Any associated project reference codes | TOL151 - Sitecode |
| Type of project | Building Recording |
| Site status | World Heritage Site |
| Site status | Listed Building |
| Site status | Conservation Area |
| Monument type | TOWER Medieval |
| Methods & techniques | '"Photographic Survey"',"'Survey/Recording Of Fabric/Structure"' |
| **Project location** | |
| Country | England |
| Site location | GREATER LONDON TOWER HAMLETS TOWER HAMLETS Broad Arrow Tower, Tower of London, London Borough of Tower Hamlets |
| Site coordinates | TQ 33616 80542 51.507491368239 -0.074467710139 51 30 26 N 000 04 28 W Point |
| **Project creators** | |
| Name of Organisation | Pre-Construct Archaeology Limited |

| | |
|---|---|
| Project brief originator | Historic Royal Palaces |
| Project design originator | Charlotte Matthews |
| Project director/manager | Charlotte Matthews |
| Project supervisor | Adam Garwood |
| Type of sponsor/funding body | Historic Royal Palaces |
| **Project archives** | |
| Physical Archive Exists? | No |
| Digital Archive recipient | Historic Royal Palaces |
| Digital Media available | "Images raster / digital photography","Text" |
| Paper Archive recipient | Historic Royal Palaces |
| Paper Media available | "Plan" |
| **Project bibliography** | |
| Publication type | Grey literature (unpublished document/manuscript) |
| Title | Building Recording Watching Brief at the Broad Arrow Tower, HM Tower of London, London Borough of Tower Hamlets |
| Author(s)/Editor(s) | Garwood, A. |
| Other bibliographic details | PCA Report No. R12903 |
| Date | 2017 |
| Issuer or publisher | Pre-Construct Archaeology Limited |
| Place of issue or publication | London Office |
| Description | A4 PDF |
| Entered by | Charlotte Matthews (cmatthews@pre-construct.com) |
| Entered on | 6 June 2017 |

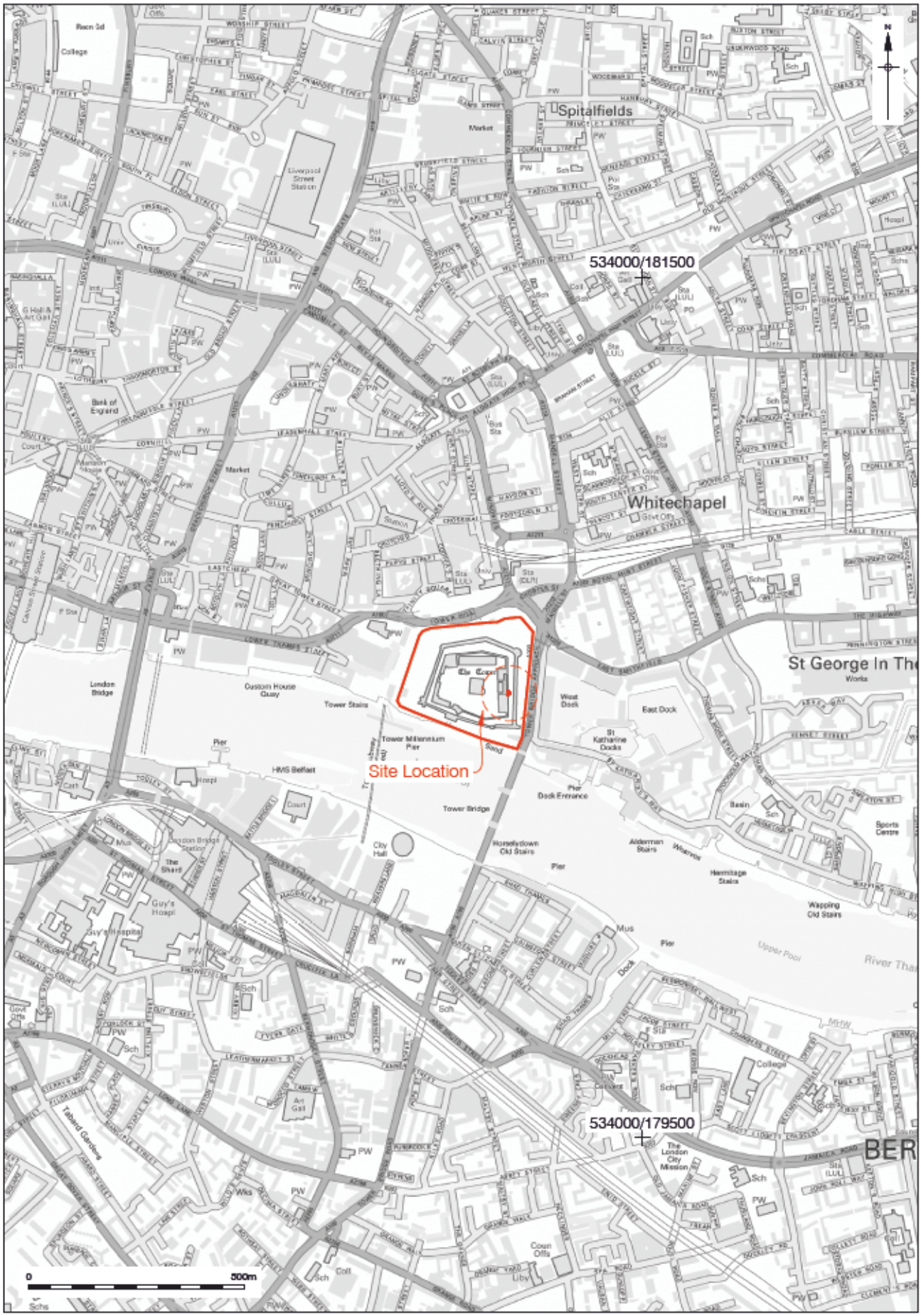



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Figure 1
Site Location
1:12,500 at A4

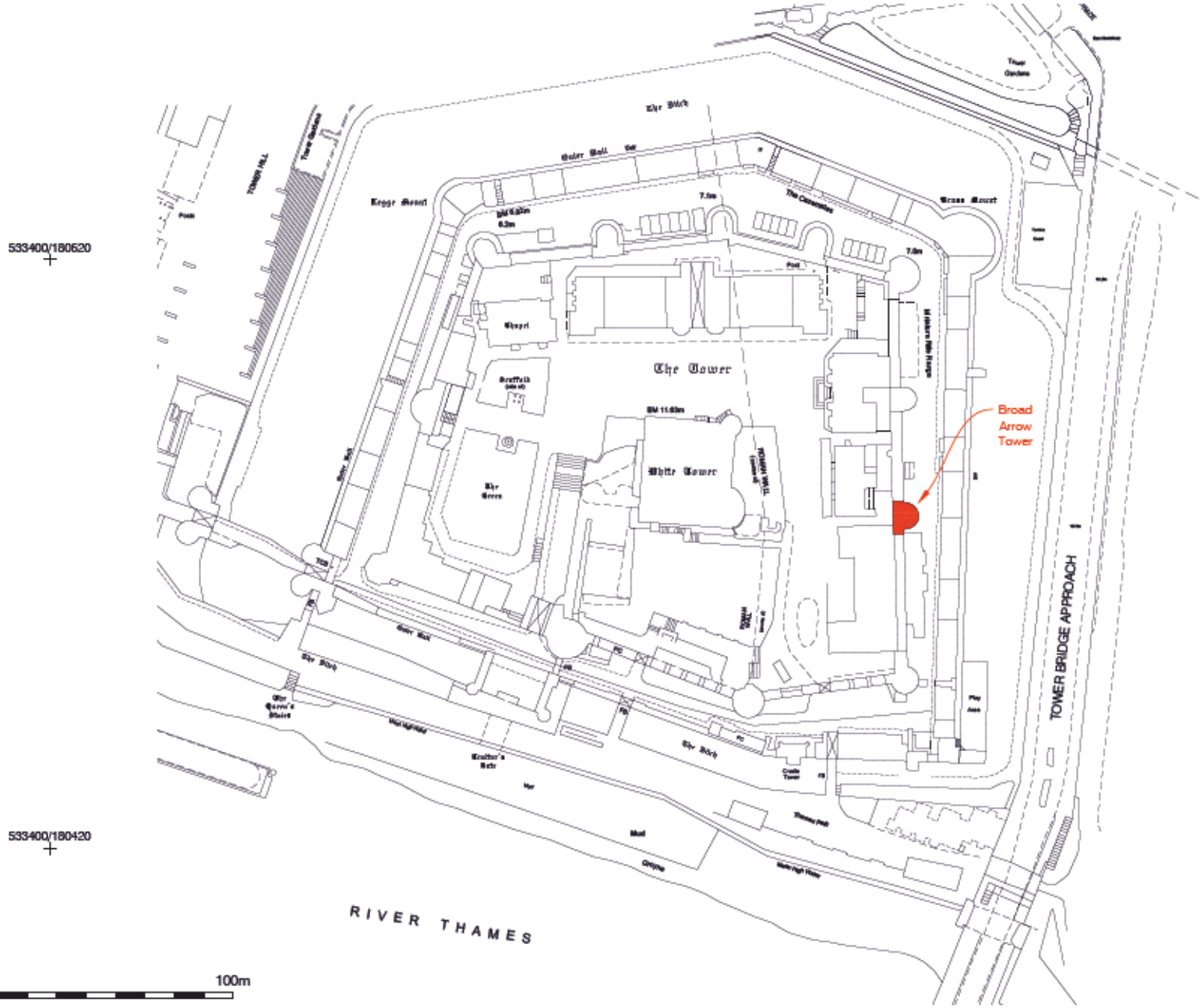



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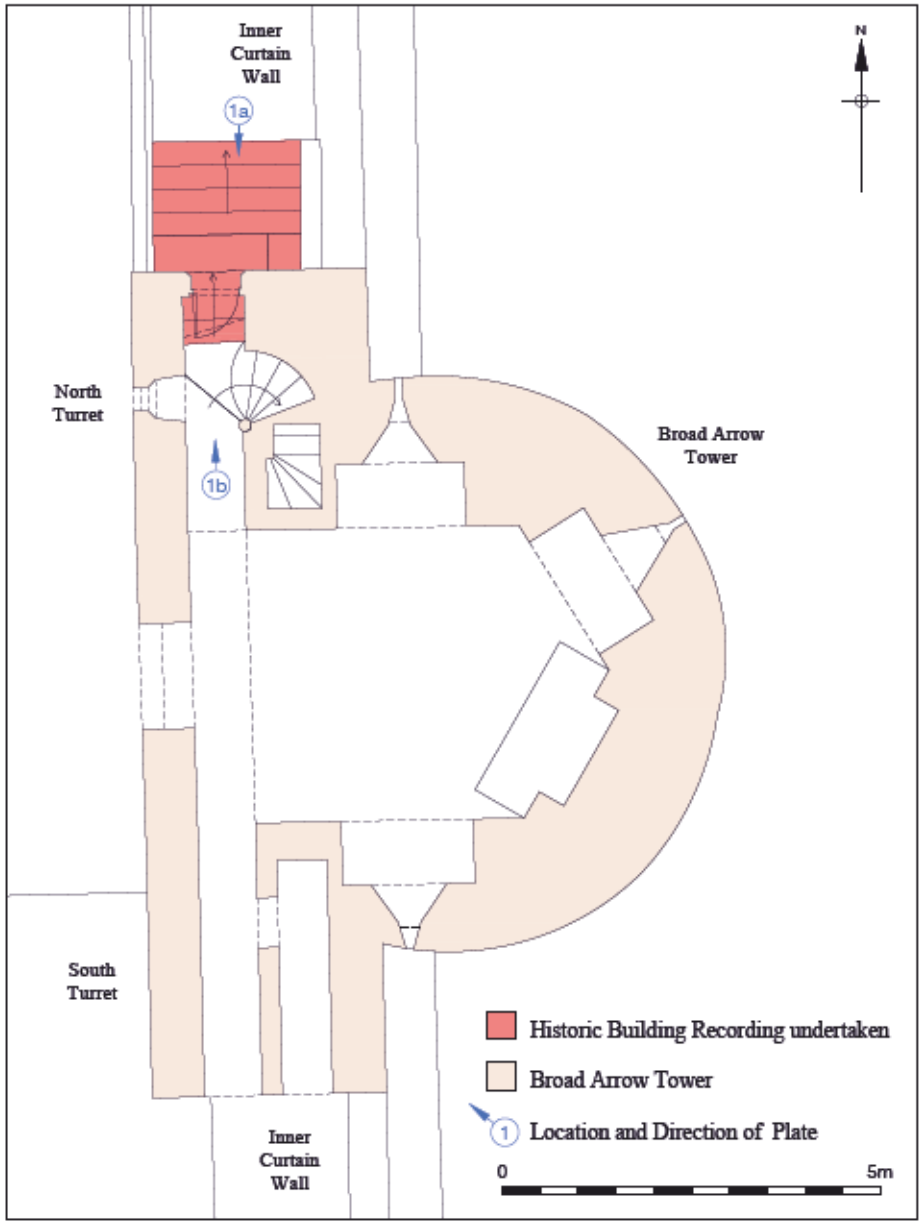
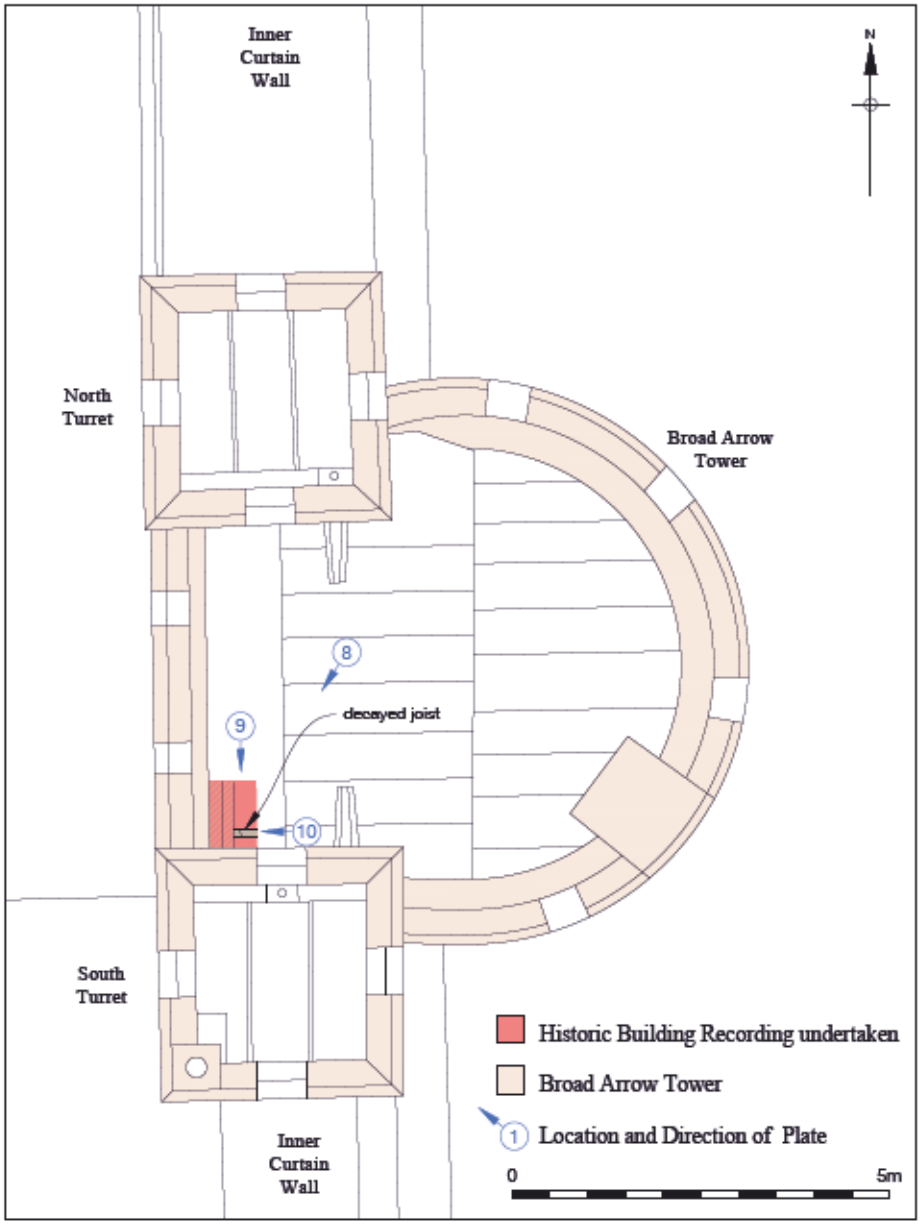
Figure 2
Detailed Site Location
1:2,000 at A4

First Floor Plan




Roof Plan




First Floor Plan based on drawing from Statement of Significance, page 37

Roof Plan based on inset taken from drawing 5133/12/SK02-A supplied by Cardon & Godfrey Architects



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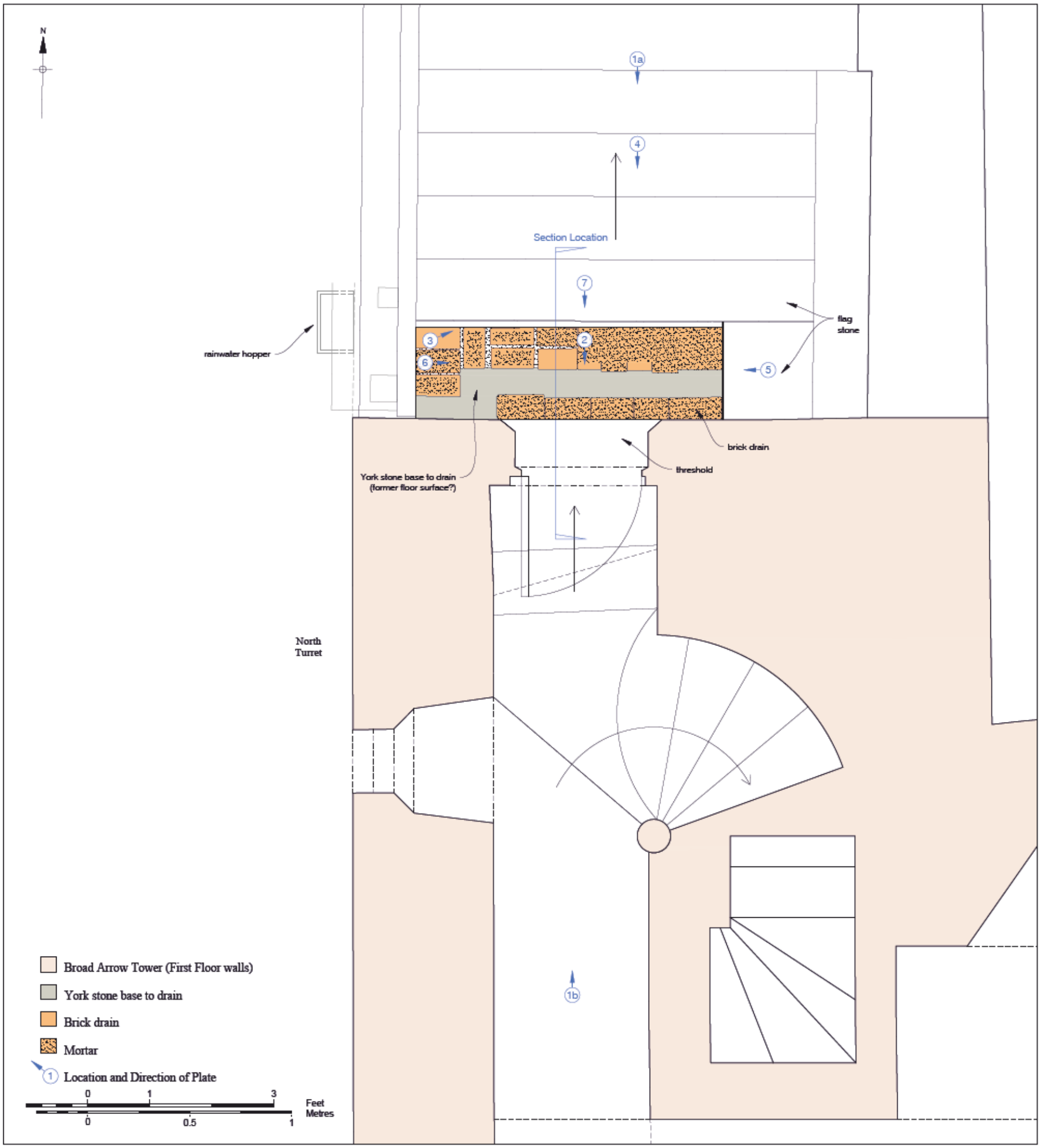
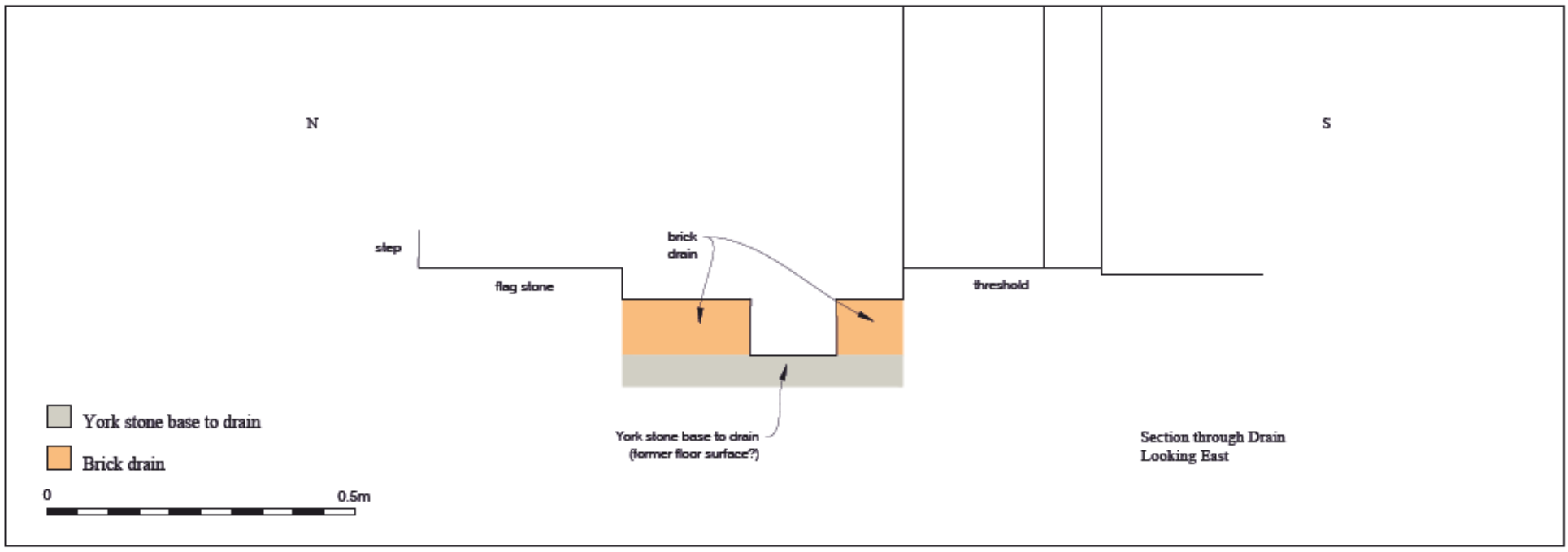
Figure 3
First Floor Plan & Roof Plan
1:100 at A4




First Floor Plan based on combination of drawing 5133/12/SK02-A supplied by Cardon & Godfrey Architects & drawing from Statement of Significance, page 37



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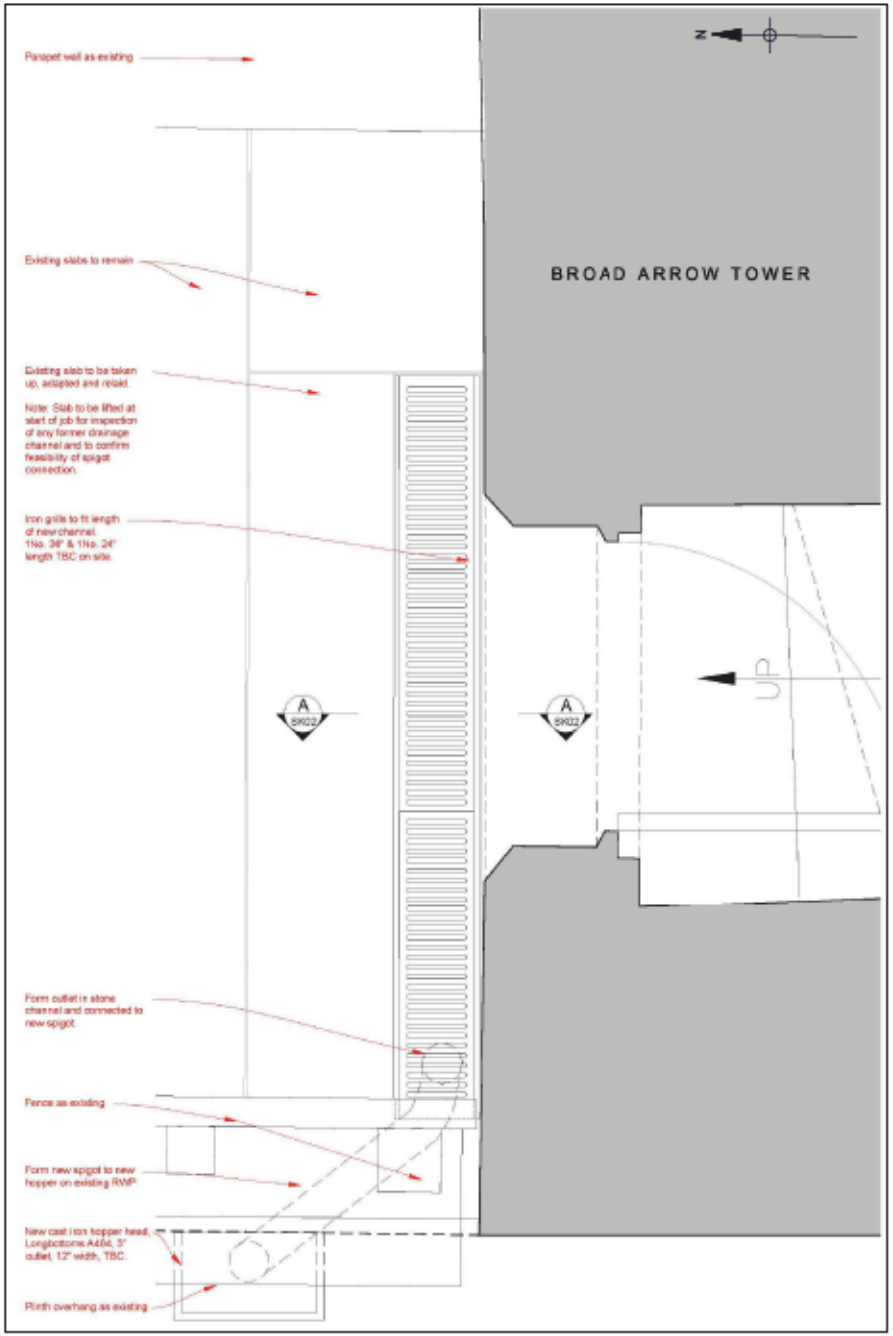
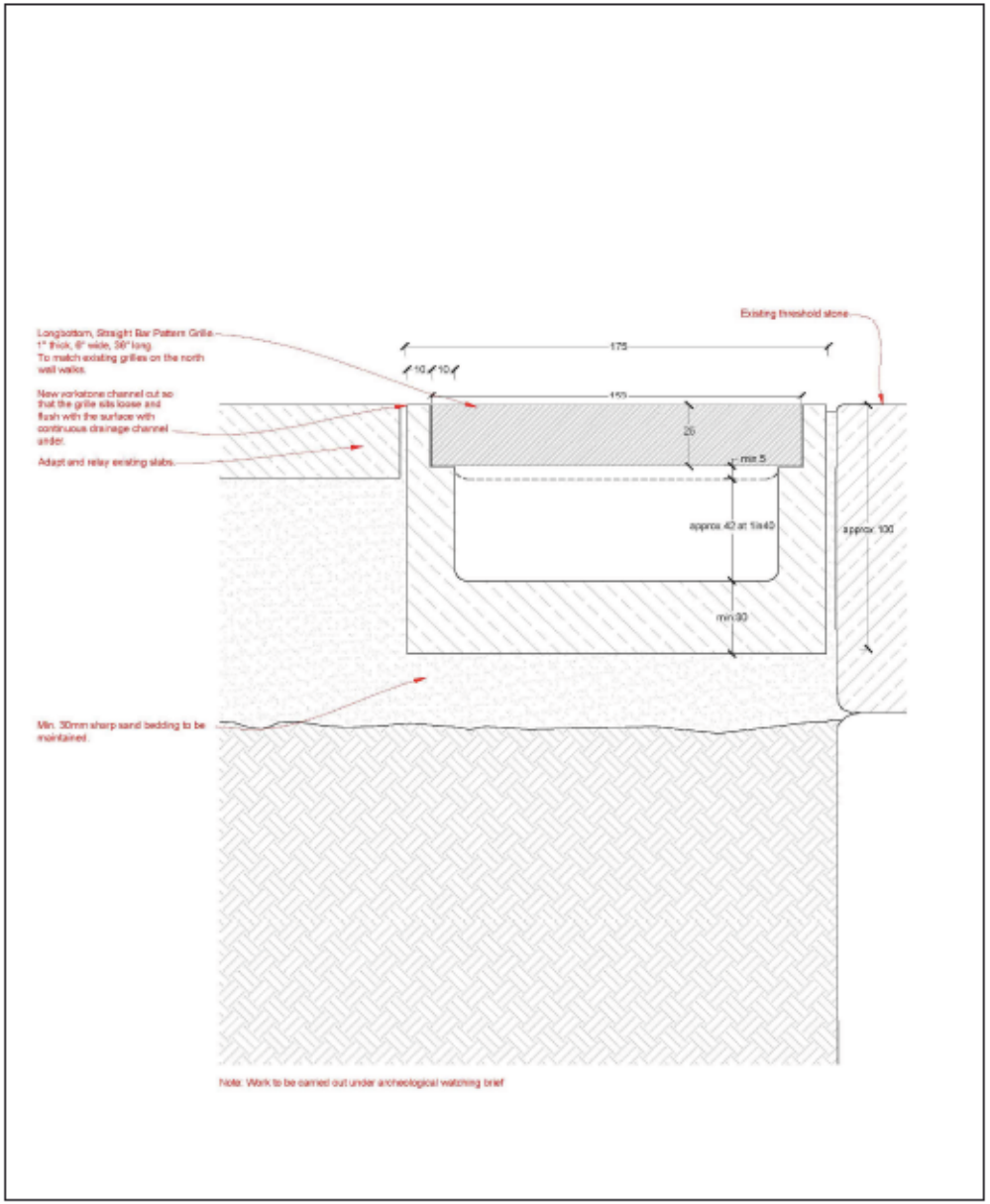
Figure 4
Plan & Section through Drain
Plan 1:20 & Section 1:10 at A3




Based on North Wall Walk drainage channel as proposed:
drawing 5133/12/SK02-A supplied by Cardon & Godfrey Architects


05/06/17 HB

Figure 5
Proposed Plan & Section
not to scale

Plate 1a North first floor doorway of the Broad Arrow Tower looking south from wall walk

Plate 1b Internal steps within Broad Arrow Tower at first floor level looking north to wall walk

Plate 2 Flush threshold to northern first floor door opening looking south

Plate 3 Machine cut steps from wall walk leading down to the Broad Arrow Tower, looking east

Plate 4 First floor door threshold and flagstones before works, looking south from wall walk

Plate 5 Modern drain revealed, looking west

Plate 6 Modern drain looking east

Plate 7 Yorkstone base to drainage gulley

Plate 8 Roof of the Broad Arrow Tower showing location of joist (below leadwork) looking south-west

Plate 9 Roof of the Broad Arrow Tower showing location of joist (below leadwork) looking south

Plate 10 Decayed roofing joist to be replaced (note re-used plasterboard below adjacent joist), looking west

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