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YORK

ARCHAEOLOGICAL TRUST

CHAINAGE 2500-2586, CITY WALLS, YORK

REPORT ON AN ARCHAEOLOGICAL WATCHING BRIEF

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YORK CITY WALLS

CHAINAGE 2500-2586

REPORT ON ARCHAEOLOGICAL

OBSERVATIONS AND A WATCHING BRIEF

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ABSTRACT

Archaeological observations were made by York Archaeological Trust between January and March 2000 during consolidation of York City Walls close to Jewbury on the eastern part of the walls. That part of the chainage recorded was between 2500 – 2586. Stonework detail on 1:50 scale hard copy photogrammetric plots of the interior and exterior elevations were amended and detail added concerning stone types, offsets, cracks, mortar variations and vegetational growth. Records were also made of sub wall walk deposits where engineering works were carried out as well as of the lower parts of three exterior buttresses and three interior arcade piers, all the latter of which were underpinned. These observations demonstrated a complex sequence of wall building, re-building, repair, addition and restoration.

1. INTRODUCTION

On an intermittent basis between January 7th and 21st March 2000, York Archaeological Trust carried out observations and an archaeological watching brief during consolidation of part of York City walls between chainage points 2500 and 2586 (centered on NGR SE 60764 52082) (Figure 1). This stretch of the city walls extends from just east of tower 32, eastwards to the termination of the wall adjacent to Layerthorpe Bridge. A distinct ground-slope, mirrored by this part of the wall, is evident from west down to east. To the north of chainage 2500-2586 lies the extramural street of Jewbury. The gardens of the Borthwick Institute, the churchyard of St. Cuthbert's Church and a small area of open ground to the rear of a modern office block all lie immediately south of the chainage. The consolidation works involved re-pointing of stonework, repairs to cracks, selective cleaning and the partial dismantling and reconstruction of two buttresses together with some underpinning of three buttresses. Also part of this programme was the internal tying together of the inner and outer wall faces (in excavated trenches beneath the wall walk) with steel ties. These works form part of the City of York Council's ten year programme of major consolidation.

The drift geology of the area is boulder clay, sand, gravel, warp and lacustrine clays above a solid geology of Bunter and Keuper sandstones (Geol. Surv. 1967).

All consolidation works were carried out subject to Scheduled Monument consent whilst all archaeological works followed a specification issued by John Oxley, City of York Council Archaeologist. The records of the archaeological watching brief are currently stored by York Archaeological Trust under the Yorkshire Museum accession code YORYM: 1999.252

2. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

There are two records of archaeological watching brief observations being made along this part of the city walls between chainage points 2500 and 2586. The first of these concerns underpinning of Tower 33, the second repairs to an external buttress at chainage 2531-2, (YAT Gazetteer sites 138 and 137 respectively). In both cases some information was gained concerning stonework details and methods of construction. Of some relevance also is a watching brief carried out in 1984 some 60m to the north-west of the chainage, within the City Ditch

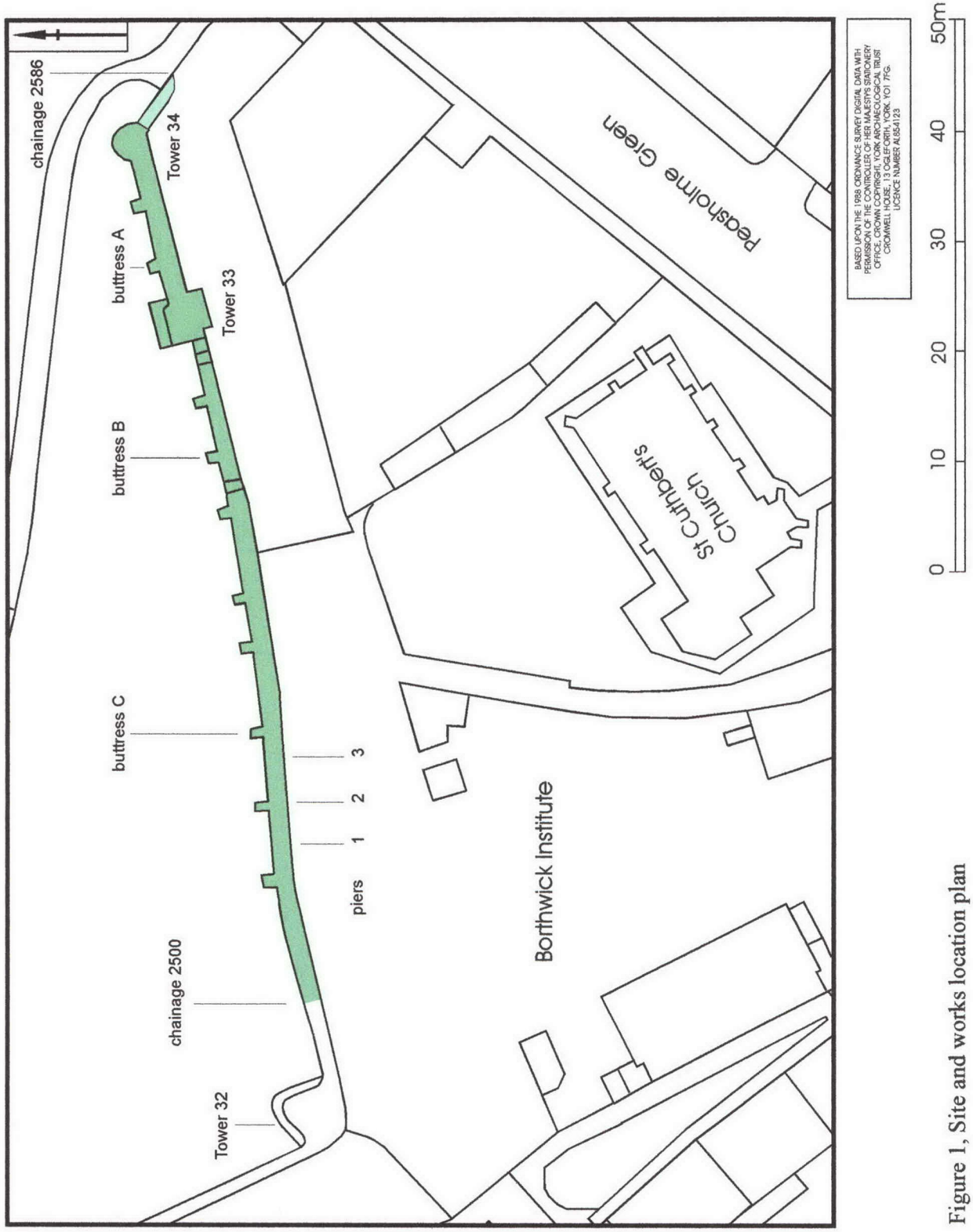


Figure 1, Site and works location plan

(YAT Gazetteer 1997, site 354). The City Ditch, which is also present between Jewbury and the walling of chainage 2500-2586, formed a defensive feature in front of the City walls. This watching brief demonstrated a deep build-up of recent fill and indicated that the original medieval ditch was of considerable proportions.

Whereas the northern part of the City defences was built directly above the walls of the Roman legionary fortress, this particular section of the defences forms part of a stretch that may have been extended towards the River Foss in the Anglo-Scandinavian period (Hall 1994). On the basis of excavations elsewhere in the city together with topographic detail, it has been suggested that the city defences of this period were characterised by an earthen rampart capped with a timber palisade. The Royal Commission suggest a post Norman conquest origin for this length of wall and state that "At the east angle of the Danish defences opposite Jewbury the Norman bank and ditch were continued up to the edge of the Foss in order to include St. Cuthbert's church" (RCHM 1972, 10). With the absence of any stratigraphic evidence to resolve this issue the true date of origin of this part of the city's defences must at present remain uncertain.

Whilst stonework is said to have been present in at least some of the city bars or gateways by the 12th century, the replacement of wooden palisades with a curtain wall of stone is a process not thought to have begun until the mid 13th century when a series of grants of murage were made to the city (RCHM 1972). It is probable that the first stone walling at chainage 2500-2586 was completed within the 13th century. A low height for the early stone curtain wall has been suggested and evidence centring on chainage 2515 used to support the argument (RCHM 1972, 12). Here a series of blocked crenellations of the former battlements are visible on the outer face of the wall that indicate a wall height generally little more that 3.5m above existing ground level. The eastern end of this stretch of walling formerly terminated at Layerthorpe Postern which stood at the south-western end of Layerthorpe Bridge. This gateway was first mentioned in the later 13th century and was demolished in 1829-30.

Even cursory inspection of variation in the coursing and stonework of the wall at this chainage indicates a variety of builds of different date. There is also documentary evidence for a number of repairs and restorations. In 1579 the city walls were repaired from Monk Bar to Layerthorpe Postern, in 1580/1 repairs to the walls are recorded near Layerthorpe Postern, and repairs were noted between Monk Bar and Layerthorpe Postern in 1666. In 1871 the city wall was thoroughly restored between Monk Bar and Layerthorpe and again in 1877-8 when a wall walk was added where missing (RCHM 1972, 132-3). There has also been some 20th century work on this stretch of the walls. In 1968 Tower 33 was strengthened whilst in 1975-1976 a length of about 40m of wall immediately west of Tower 32 required urgent works (Waterman 1980). Doubtless there were many other historical refurbishments for which no documentary evidence survives or existed. An example of this may be the addition of the wall walk supported on internal arches between Monk Bar and Layerthorpe that is said by the RCHM to be of late medieval type appropriate to the earliest years of the 16th century, though there is no direct documentary proof for this (RCHM 1972, 40).

3. METHODOLOGY

The archaeological works were comprised of two key strands. The first of these involved the checking, and amending of stone detail where necessary, of a photogrammetric survey, printed as hard copy at a scale of 1:50, of this chainage of the city walls. This plotted survey included

internal and external faces of the wall and the soffits of the arcading on the interior face. Also recorded, as annotated notes on the wall drawings, were mortar types, blocked features, changes and variations in build and alignment, cracks, vegetation and variations of stone type. The presence of encrusted black deposits, particularly on restricted areas of walling of the internal face within a number of the arcades, rendered the checking and observation of these details impossible in several small isolated areas. Again, in certain of the upper parts of the external face the problem of height combined with the presence of patches of vegetation made the recording of certain details difficult or impossible. This first strand of the works was carried out prior to the commencement of any consolidation works. Amended photogrammetric plots are reproduced in Appendix 1.

The second strand of the works involved the monitoring and recording of the foundations of the three buttresses to be underpinned. Included in this part of the programme also was the monitoring and recording any deposits revealed during the excavation of twenty one holes between the inner and outer wall faces below the level of the York stone flagged wall walk. Additional courses of the parapet wall revealed in these holes were added onto the checked photogrametric plot. The purpose of these holes was to facilitate the insertion of steel rods to connect and tie the two walls together. Each of these holes was nominally 1.0m wide and generally around 0.30m deep. All on-site elevations and sections were drawn at a scale of 1:10, plans at a scale of 1:20. Contexts encountered were recorded on separate pro-forma sheets. A number of colour print photographs were taken of the excavated holes.

4. OBSERVATIONS OF WALL FABRIC

4.1 Wall walk

The wall walk within chainage 2500-2586 is paved with York stone flags. The width of the walk ranges from 1.32m to 1.68m, tending to be at it narrowest immediately west of tower 33. In most places the wall walk is supported from below by a series of arches or arcades. Elsewhere the walk is supported by solid masonry or wall infill. Three major sets of steps are present towards the eastern end of the wall, the westernmost being of seven steps, the central of nine steps and the eastern of seventeen steps. A single step is present west of the westernmost steps, two are present between the central and eastern steps and two further steps provide access to the pavement at the extreme east of the chainage. The materials employed in the surfacing and steps of the wall walk imply an early modern date. A steel railing of recent date is present on the inner edge of the wall walk for the full length of the chainage. The width of the parapet at the level of the wall walk ranges from 0.40m to 0.55m.

4.2 Outer elevation of wall

The height of the outer face of the wall, from the top of the earthen rampart to the uppermost point of the parapet, ranges between 3.45m – 5.70m; though a maximum height of 6.45m is reached at the top of tower 34. Clues to the thickness of the upper part of this outer face of walling are provided by the parapet thicknesses cited in 4.1 above.

The overwhelming majority of the stone used in the construction of the wall is magnesian limestone. In most places this forms in excess of 99% of the stone employed. Small quantities of sandstone (including millstone grit) are present however. For the most part these occur fairly

randomly throughout the wall. The only place where real concentrations of this material are apparent is in that low stretch of walling to the east of the entranceway to the walls at Layerthorpe (also east of chainage 2586). The overwhelming bulk of this particular piece of walling is believed to be of 19th century date and post-dates the demolition of Layerthorpe Postern. Where small quantities of sandstone and millstone grit occur randomly throughout the wall it is probable that much of this represents the re-use of Roman material within medieval fabric. Lesser quantities of other "alien" stone are also present within the outer wall face, these include several pieces of oolitic limestone and the very occasional cobble. Small amounts of brick and tile, and fragments therefrom, were also noted. Certain of these may be course levelling pieces contemporary and integral to various of the builds and re-builds of the wall. Others however are likely to represent patching within the wall face, possibly replacing dislodged or decayed stones within episodes or programmes of maintenance. Such an example may be a solid area of roughly coursed bricks and tiles occupying an area of some 0.40 x 0.30m at chainage 2575.

Considerable variation in the individual size of stone blocks within the wall is evident, this ranges from 0.50 x 0.40m to less than 0.10 x 0.10m, with large quantities of lesser pieces used for course levelling and infilling purposes. Equal variation in the coursing of blockwork is also apparent. Only a very limited amount of tooling on stonework was noted. Pronounced tooling on two blocks of stone, both sandstone, in the lower part of the buttress immediately west of tower 34 may not be of great antiquity. In various short stretches, however, best exemplified by chainage 2545-2560, considerable regularity of both block size and coursing is evident. Where such regularity is present construction in a single episode is likely to be indicated. In numerous places along the wall e.g. chainages 2323-2544, 2565-2578 and immediately east of tower 34 very complex and irregular sequences of coursing and block sizes are apparent. It is clear that these indicate repairs and rebuilds representing both piecemeal and large-scale works. Despite the extensive variation in coursing cited, this is almost exclusively in well, and fairly well, laid horizontal bands, though in a few small areas quantities of very small size stone are "roughly coursed". The curious exception to this pattern occurs between chainage 2545-2506. Here the bulk of the coursing follows the gentle slope of the ground rather than a horizontal line.

Blocked embrasures are present between chainage 2503-2573. Five of these are depicted by the Royal Commission (RCHM 1972, 135). What may be a sixth blocked embrasure occurs to the east of these five at chainage 2503 (though note the variation of stone coursing below which may militate against this). Stonework above the level of the embrasures indicates their infilling and the heightening of the wall. Given the low level of these embrasures in relation to the height of the wall at this point and elsewhere within the chainage, a case can be made for this representing the earliest extensive piece of walling within this stretch.

Eleven horizontal offsets were noted in the exterior face of the wall, their width ranging from 0.04m to 0.20m. Eight of these occur below a height of 1.30m and none extends for a distance in excess of 6.30m. Nor do these extend beyond any given buttress, though they can be seen to progressively rise from east to west in accordance with the ground slope. Some variation in block size above and below these offsets was often seen to be present. It is probable that these features were always above ground and they are best seen as attempts to build a stable structure by providing a wider lower part to the wall. Three of the horizontal offsets occurred in the upper parts of the wall and again block size was seen to vary above and below these. Each of these was seen to be of longer extent than those examples in the lower parts of the wall. Whilst certain of these may be design features in the building of a stable wall it is possible that some may relate

to later heightenings of the wall, particularly when it is considered that in all cases they narrow down to taper into the main body of the wall. Two vertical offsets were noted at chainages 2526 and 2531. The part of the wall between these discontinuities was seen to be set back some 0.20m-0.30m from those parts at either side with the lower part of the wall sloping out at an angle of around 2-3 degrees. Buttresses were also present at either side of the vertical offsets. Differences of block size and coursing were also noted to each side of the discontinuities. It would seem fairly clear that this observation provides yet further evidence for separate builds within this stretch of walling, in this instance whole-scale reconstruction of around 5.0m of wall.

A total of twelve external buttresses are present within this chainage. Although it was not often possible to determine which butted or was keyed in to the wall, a number were seen to butt whilst only the westernmost two appear to be keyed in. The buttress at chainage 2531 appeared to be keyed in to the wall at its west, but not to its east, side. The Royal Commission consider that the squat buttress at the extreme east of the chainage is "original" (RCHM 1972, 135). On stylistic grounds it is suggested that the two other buttresses that appear to have keyed-in relationships to the wall (chainages 2508 and 2531), which are both tall and slender, may be of an early date.

Two towers are present within this stretch, one centring on chainage 2565 (tower 33) the other on chainage 2580 (tower 34). The western of these, tower 33, is rectangular with a chamfered plinth and a smaller chamfered course half way up its height. The uppermost part of the parapet is at the same height as the wall to the west but 0.90m taller than the wall to the east. Three internally splayed musket loops are present in the front and a further example on the south-western side. The solid platform projects internally but is offset to the east of the external projection. The Royal Commission suggest tower 33 to be a late medieval addition to the wall. Tower 34 is set in an angle close to the eastern termination of the wall and has straight sides to the west and north and a curve to the east and south-east. It is supported on two buttresses and, between them to the east, a pointed arch of five orders and to the south-east on six re-used corbels, the earliest said to be of the 12th century. There are two cruciform arrow slits in the merlons of the parapet, and a stone spout draining the platform projects to the south-east. The Royal Commission suggest that tower 33 is perhaps that called "Lathorp Towre" in 1370 (RCHM 1972, 137).

A variety of mortars were noted in the outer face of the wall. These were seen to be pale grey to cream in colour, flush, and to contain aggregate of various sizes. The degree of weathering in combination with the colour and aggregate proportion and size (ranged from <3mm to <9mm) enabled the determination of a considerable number of separate mortaring episodes. All of these readily visible mortars however were clearly of the early modern and recent periods and relate to programmes of structural consolidation. A limited amount of erosion of mortar between block joints was noted in a few isolated areas.

Between chainage 2500-2586 a total of eighteen visible cracks were noted, the overwhelming majority of which were vertical rather than horizontal. In all cases these cracks followed joints within the blockwork rather than through blocks. Most cracks were minor, typically running for 1.50m or less and seldom wider than 1 – 3mm. Certain of these in the area of the blocked embrasures may also relate to minor cracks observed in the rear face of the parapet, see 4.3.3 below. The most serious of the cracks occurred within the buttresses at chainage 2525 and 2550. Cracks, some quite major, were noted on the low stretch of walling east of chainage 2586.

Vegetation and accretions of a relatively minor nature were visible at a number of points along the outer face of the wall. Moss was noted occurring on most of the horizontal offsets and in places on the chamfered plinths of certain of the buttresses and tower 33. A thin, dark greyish brown growth was present to varying degrees on most of the buttresses though restricted largely to the outer face. Identical though less dense growth was also noted on parts of the walls, this tended to be concentrated in the uppermost parts. A black accretion was noted in localised parts of the eastern end of the chainage, this occurring most thickly over mortar joints rather than stonework. The origin of this material is uncertain though it tended to be distributed most heavily in the lower halves of the walls with particular concentrations noted immediately east of tower 33 and on tower 34.

4.3 Inner elevation of wall

Substantial parts of the inner face of the curtain wall are obscured by the arcading that forms much of the support for the wall walk. Further parts are obscured by discontinuous skins of masonry occupying the gaps between the arcading that also serve to support the wall walk. It is known historically that both the arcading and the intervening skins are additions to the wall constructed some centuries after the defensive wall itself was built. Indeed in a number of the arcades the arches can be seen to butt directly up to the wall. Whilst acknowledgement is made to the fact that the curtain wall is itself of many builds/re-builds, this wall and the subsequent wall walk supporting arcades/walls can logically be broken down to two separate components both physically and for ease of discussion. The internal face of the parapet wall is visually separated from the lower part of the inner face of the curtain wall. Although it is likely that in this stretch of the walls these two elements form parts of one and the same wall, because of the visual discontinuity the parapet wall is discussed separately.

4.3.1 Inner face of curtain wall

The very uppermost parts of the inner face of the curtain wall are hidden behind the arcading and walling that support the bulk of the wall walk. The presence of this arcading and its associated walling has served to make only small isolated segments of the interior curtain wall available for inspection.

As was the case with the exterior face of the wall, around 99% of the stone was magnesian limestone. A quantity of sandstone, including millstone grit, is present within the wall and as with the exterior face this appears to be fairly randomly distributed. Much lesser quantities of other "alien" stone were noted, in particular, cobbles. Whilst a very few occurred randomly throughout the wall, concentrations of cobbles were recorded as forming around 90% of the lower 0.50m of wall of the eastern half within the seventh arcaded bay from the west. This particular group may be indicative of repair patching. Small amounts of brick and tile, often fragments rather than whole pieces, were observed at a number of places in the wall. The bulk of the tile occurs as horizontal isolated examples or in very small groups and appears to represent no more than an aid to the levelling-up of stone courses. A number of single bricks and brick fragments may indicate infilling or replacement of stones as part of maintenance works. A further example of such maintenance, albeit on a larger scale, may be marked by an extensive patching of bricks in the seventh arcaded bay from the west immediately adjacent to the cobbles noted above.

Variation in block size is greater within this face of the wall than on the exterior face, this variation being evident within and not just between, the sections of wall visible within the arcaded bays. That said, the two westernmost bays, and to a lesser extent the two to the east of these also, contained extremely large percentages of small stone often only 0.10m – 0.20m in size and sometimes smaller than this. Elsewhere in the wall blocks of a size < 0.50m x 0.35m were noted. Numerous changes in coursing, though the bulk of this is regular, were noted throughout the wall. Discontinuous areas of regularity in blockwork and coursing are likely to be indicative of a lack of contemporaneity, the overall effect suggesting large-scale building/re-building and repairs over the centuries, much as was noted on the exterior face.

In two areas, lower stonework of the walling can be seen projecting out beyond the flush line of the wall. The first of these areas encompasses the eighth, ninth and tenth arcaded bays from the west. The second the fourteenth bay from the west. In the first area this projection has a very irregular undulating upper surface which ranges in height above ground level from 0.05m – 0.80m. The width of this projection from the extant flush curtain wall is 0.04m at the east widening to 0.47m at the west. The face of the walling is of fairly flush regular appearance. In the second area the projection extends approximately 0.70m from the face of the extant curtain wall and survives up to 0.70m above ground level. The two most likely interpretations of these projections are that they represent either purpose built load bearing offsets for the curtain wall or that they mark the course of earlier stretches of wall whose alignment was at slight variance with that of the present wall. Given the "hacked about" appearance of the upper parts of these projections the second case is perhaps the more likely.

Various mortars were seen bonding the blockwork of the inner face. The bulk of these were flush, pale grey to cream in colour and contained varying proportions and sizes of aggregate. All of these are believed to be early modern to recent in date. In a few restricted areas of the seventh arcaded bay from the west a fairly weak, cream coloured lime mortar containing a few flecks of brick/tile but virtually no other aggregate was noted in the curtain wall. Whilst quite probably of post-medieval date, it is uncertain if this mortar is contemporary with the construction of the wall in this area. In the upper central part of the tenth arcaded bay from the west an area of thick "whitewash" or rendering was noted covering an area of some 1.50m x 0.70m.

Fairly small vertical cracks were noted in just two areas of the curtain wall, one in the upper part of the sixth arcaded bay, the second, slightly larger, in the upper parts of the seventh arcaded bay.

Virtually no moss or other growth was noted on the interior curtain wall; this probably owing to its sheltered location beneath the arcading. Quantities of an undetermined black deposit were however recorded in many places. The presence of this was so dense in the first, fifth and seventh bays from the west that in certain areas the coursing of the stonework in these localities is totally obscured. To a greater or lesser extent this deposit is present on the wall in nearly all the arcaded bays.

4.3.2 Wall walk arcading and supporting walls

A total of fifteen arches forming a discontinuous arcade are visible in the internal elevation of the wall. These arches, which support the wall walk above, have shallow recesses. The span of the westernmost eight of the arches is each approximately 3.10m as are the arches between chainage 2551-2558. This, combined with broad similarities of stonework suggests that they are

likely to be of contemporary date. The eastern two arches are both approximately 4.40m wide and are of similar construction one to the other. Of the three remaining arches two share a common span of approximately 4.0m whilst the third at chainage 2544, which has a very flattened arch, spans some 4.20m.

The suggestion of contemporaneity of construction of the parts of the arcading described above finds some support in the regularity of blocks and coursing within those areas. The presence of stone, other than magnesian limestone, also lends weight. Sandstones, including millstone grit occur profusely in both the two eastern arcades and the arcade located eleventh from the west, but nowhere else with the exception of one piece employed as a keystone within the tenth arcade from the west. Again, amounts of sandstone occur within the intervening wall walk supporting walls. On the basis of all these observations it is suggested that the eight westernmost arcades are all of a single build. The two arcades immediately adjacent to the east may also be of relatively early date. The arcading and intervening wall walk supporting walls east of this point may be of various dates, some of which are likely to be 19th century.

All mortars noted on the wall walk supporting arcades and walls were pale grey to cream in colour, flush and contained varying proportions and sizes of aggregate. Variations within the above cited attributes in combination with the degree of weathering indicates a number of pointing episodes. All however are believed to be of early modern to recent date. A single major vertical crack was noted in a stretch of walling at chainage 2550. Little in the way of vegetational growth and black deposits was noted.

4.3.3 Internal face of parapet (curtain) wall

The internal face of the parapet stands to a height of between 1.10m and 1.95m above the level of the wall walk. Eight embrasures are present within the chainage (excluding those of towers 33 and 34) all of which are irregularly spaced within the eastern two thirds of the stretch. A few pieces of non magnesian limestone, namely sandstones (including millstone grit) and lesser amounts of possible oolitic limestone and cobbles were observed as occurring fairly randomly throughout the wall. Very small quantities of brick and tile (mostly fragments) were also present. These appear to represent both levelling-up pieces within contemporary stone coursing and the later filling/patching of voids. Variation in block size and coursing was of broad similarity to the outer face of the wall and again appears to represent different builds as well as just variation within builds. A number of different mortars were evident within the parapet. Nearly all these were pale grey to cream in colour, flush, and contained varying proportions and sizes of aggregate. These are all of early modern to recent date as are a few isolated areas of pale grey mortar with virtually no aggregate. Deep within the blockwork joints behind some of the more eroded recent mortars, traces of a cream mortar containing few but large pieces of aggregate were noted. Traces of this material, which is believed to be of some antiquity - though not necessarily original to the wall, were noted around chainages 2503 and 2550. A total of seven cracks were noted on the inner face of the parapet wall, all of which were fairly minor. At least two of these centring around chainage 2520 seem likely to coincide with those seen on the exterior face of the curtain wall. Little in the way of vegetational growth is visible in this part of the wall though a few weeds were present within jointing voids in the stonework.

5. WATCHING BRIEF

The watching brief component of the archaeological works was comprised of three elements. The monitoring of underpinning to three external buttresses, monitoring of the excavation of twenty one holes within the wall walk for the tying together of the inner and outer parts of the curtain wall and the underpinning of three arcade piers on the interior side of the wall.

5.1 Exterior buttress underpinning

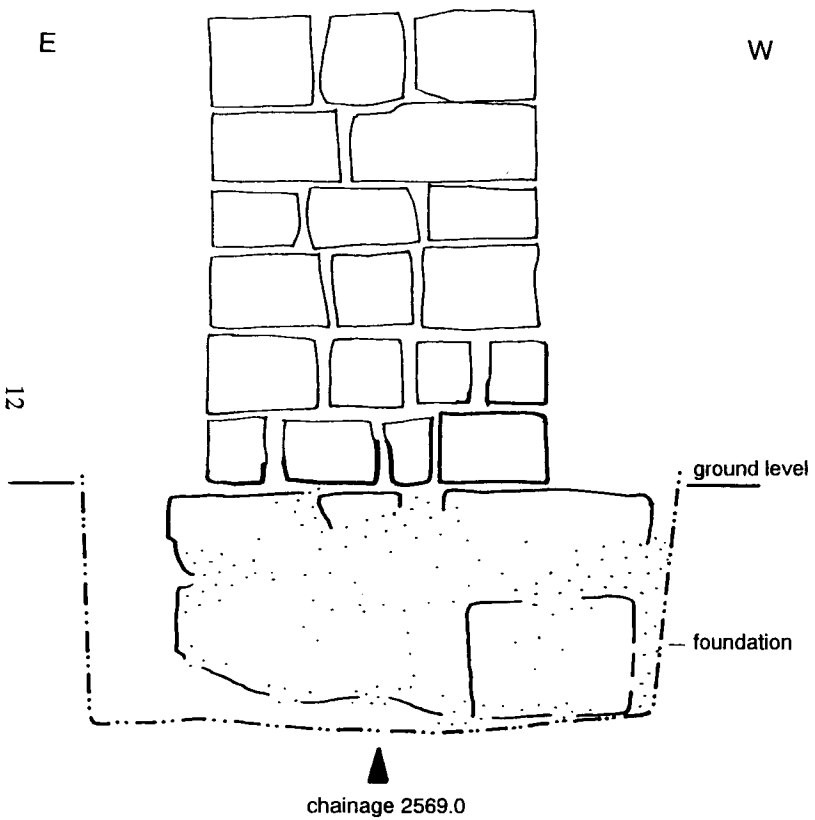
The three buttresses consolidated were: the first buttress to the east of tower 33, the second buttress west of tower 33 and the sixth buttress west of tower 33. Of these, the first was fully underpinned, whilst owing to the structural integrity of the remaining two, these were only partially underpinned. These buttresses have been lettered A, B and C respectively. Prior to the underpinning narrow trenches were excavated around the base of the buttresses. In some instances these trenches cut right through the buttress foundations, their full extents continuing beyond the trench limits. Whilst all the foundations were overlain by the extant topsoil, which ranged in depth from 0.14m – 0.25m, each cut through rampart/bank makeup which in all cases was a homogeneous reddish brown clayey silt of clean appearance.

5.1.1 Buttress A (chainage 2569) (Figure 2)
The foundations of Buttress A measured in excess of 1.30m (east – west) by in excess of 1.40m (north – south) and had a depth of up to 0.61m. The foundation material comprised undressed blocks and fragments of magnesian limestone, many of which were of irregular shape. The largest of these was 0.70m x 0.23m, the smallest some 0.07m x 0.05m. None of this material showed any indication of coursing whatsoever. Copious amounts of mortar had been used to bond the stonework together. This mortar was a weak, buff to cream coloured lime mortar containing small fragments of limestone and grit up to 3mm as aggregate. By contrast, the mortar employed in the buttress itself was slightly paler in colour and considerably harder. It was noted that the buttress did not sit centrally on the foundation but somewhat to the east of centre. It is uncertain if this mis-location of the buttress together with the observed variations in mortar indicate differences in date of construction of both extant buttress and foundation.

The underpinning of this buttress entailed the removal of all of the old foundation material within the trench to within approximately 0.40m of the curtain wall. This void was then filled with concrete.

5.1.2 Buttress B (chainage 2550) (Figure 3) The foundations of buttress B measured in excess of 1.40m (east – west) by in excess of 1.34m (north – south) and had a depth of approximately 0.68m. The stonework of the foundation was of undressed blocks of magnesian limestone, most of these tending to be either sub-rectangular or sub-square. These ranged in size from 0.10m x 0.05m to 0.44m x 0.32m, with a particularly large flat block or slab forming the lowest south-eastern corner of the foundation. It was noted that the stonework within the foundations was coursed, albeit somewhat crudely and copiously bonded with hard, cream coloured lime mortar. At least two fairly large pieces of tile, laid horizontally, were mortared within the stonework. As with Buttress A, Buttress B did not sit squarely on the foundation, but was fairly hard against the eastern edge. Again it is uncertain if this relates to a lack of contemporaniety between the buttress and its foundation. The mortar of the foundation was so hard that removal of part of the foundation proved difficult. On the basis of this it was surmised

North facing elevation



East facing profile

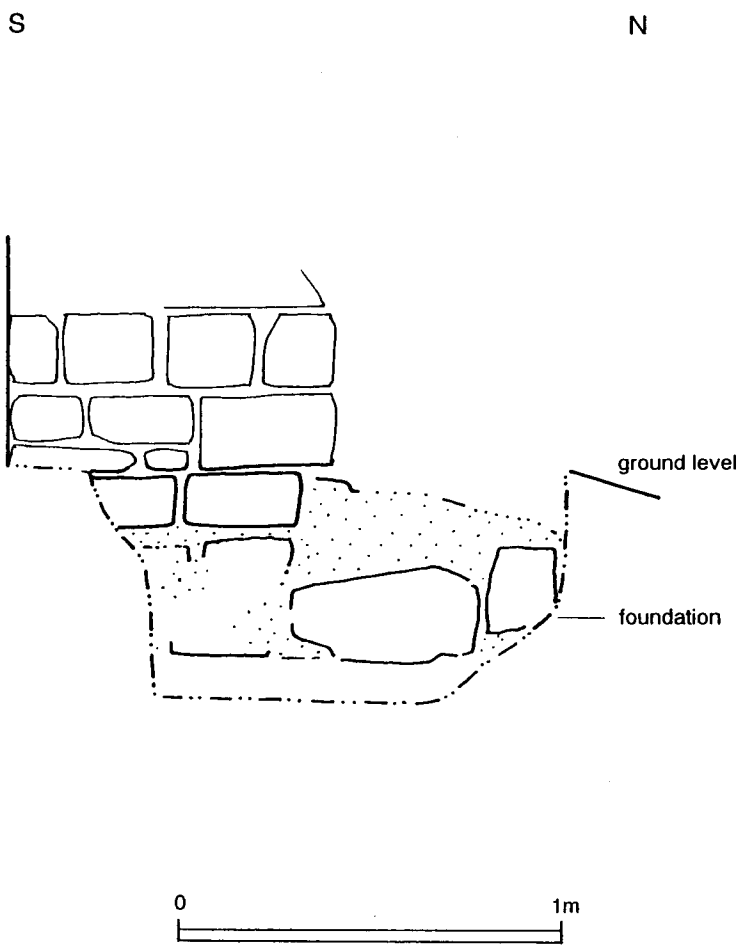


Figure 2, Buttress A, elevation and profile

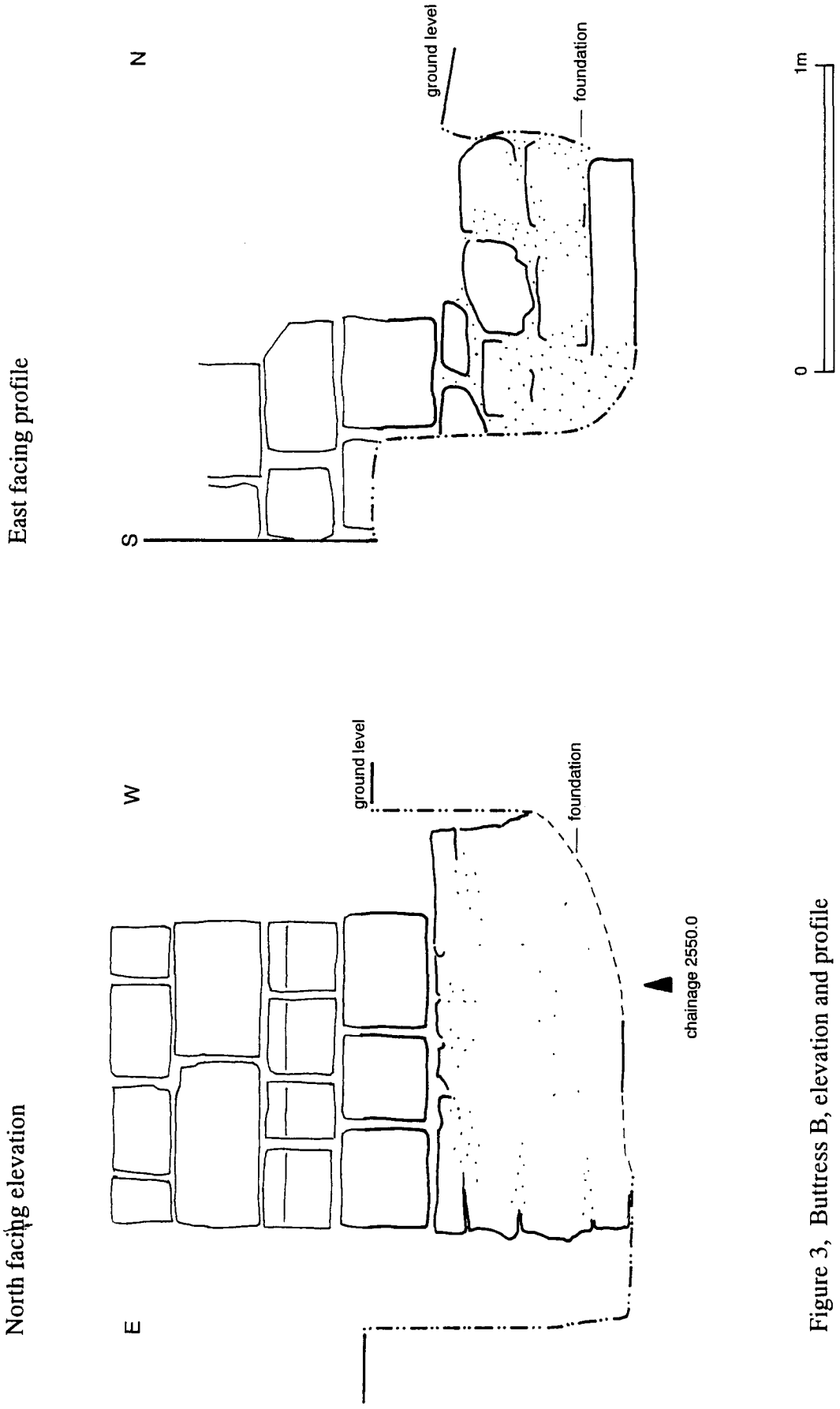


Figure 3, Buttress B, elevation and profile

that full underpinning would not be necessary and so those few parts of the foundation removed were simply replaced with concrete.

5.1.3 Buttress C (chainage 2300) (Figure 4) The lower parts of Buttress C differed from those of A and B in so far as the lower three courses of C widen towards its point of juncture with the foundation. When viewed from the front this widening has a stepped appearance though viewed from the side the profile is that of a chamfer. The foundation itself measured 2.01m (east – west) by in excess of 1.90m (north –south) and was at least 0.52m deep. All stone used in the foundation was of undressed, but roughly squared, blocks of magnesian limestone mostly of a size 0.20m – 0.40m. This stonework was coursed and bonded with large amounts of a hard, cream coloured lime mortar. The buttress was noted as sitting fairly centrally upon the foundation. Two fragments of brick/tile, at least one of which is of Roman date, were recovered from the interface between the base of the foundation and the rampart material. As with Buttress B, the foundation of Buttress C was, after removal of a small part of it, considered stable. Consequently, only that small part removed was replaced with concrete.

An observation worthy of some note was the fact that the upper parts of the rampart material observed in the trenches of all three buttresses was virtually identical, and this over a distance of some 45m. The implication here being that the uppermost parts of the rampart, at least, may well have been deposited during a single episode of construction. Unfortunately, insufficient finds, which includes residual Roman brick/tile, was recovered from this material to give real clues as to its date of deposition.

5.2 Wall walk (Figures 5, 6 and 7: tie-holes 9, 13 and 11)

A series of twenty one tie holes were excavated within the wall walk. These were located in positions as shown on the City of York Council internal wall elevation drawing. The purpose of these was to enable holes to be drilled into both the parapet and arcading walls thus facilitating their tying together with steelwork. Subsequent to the lifting of the York stone paving slabs and their underlying bedding of sand, some gaps were visible between the parapet wall and wall walk deposits. This was particularly evident to either side of tie-hole 8 where a crack some 0.02m wide was evident between the wall and wall walk. Once the flags and their bedding had been lifted tying was achieved by the excavation of narrow trenches between the parapet and arcade walls. Typically these were in the region of 0.70m wide, extending to the width of the wall walk, and ranged in depth from 0.40m – 0.98m below the upper surface level of the wall walk. The depth of the flag stone bedding was variable, this ranging from 0.06m to 0.19m. In most places this was a moderately clean, fairly pure, yellowish brown sand, though in places a rubbly content was evident within this. The flagstones and their bedding are all believed to be of 19th century, or later, origin.

5.2.1 Sub wall-walk deposits

Some modern works were evident immediately below wall walk level. This was clearly evidenced in tie-holes 16 and 17 within Tower 33. Here a concrete lintel was observed beneath the lowest step of the adjacent stairs (visible in tie-hole 16) whilst concrete of an equally modern date was visible in the bases of both holes beneath the level of the flagstone bedding. This concrete was seen to extend under the off-set courses of tower stonework in hole 16. These modern materials almost certainly equate with restoration works carried out in 1968 when it is known that: "This tower was extensively restored in 1968 following severe cracking as a result

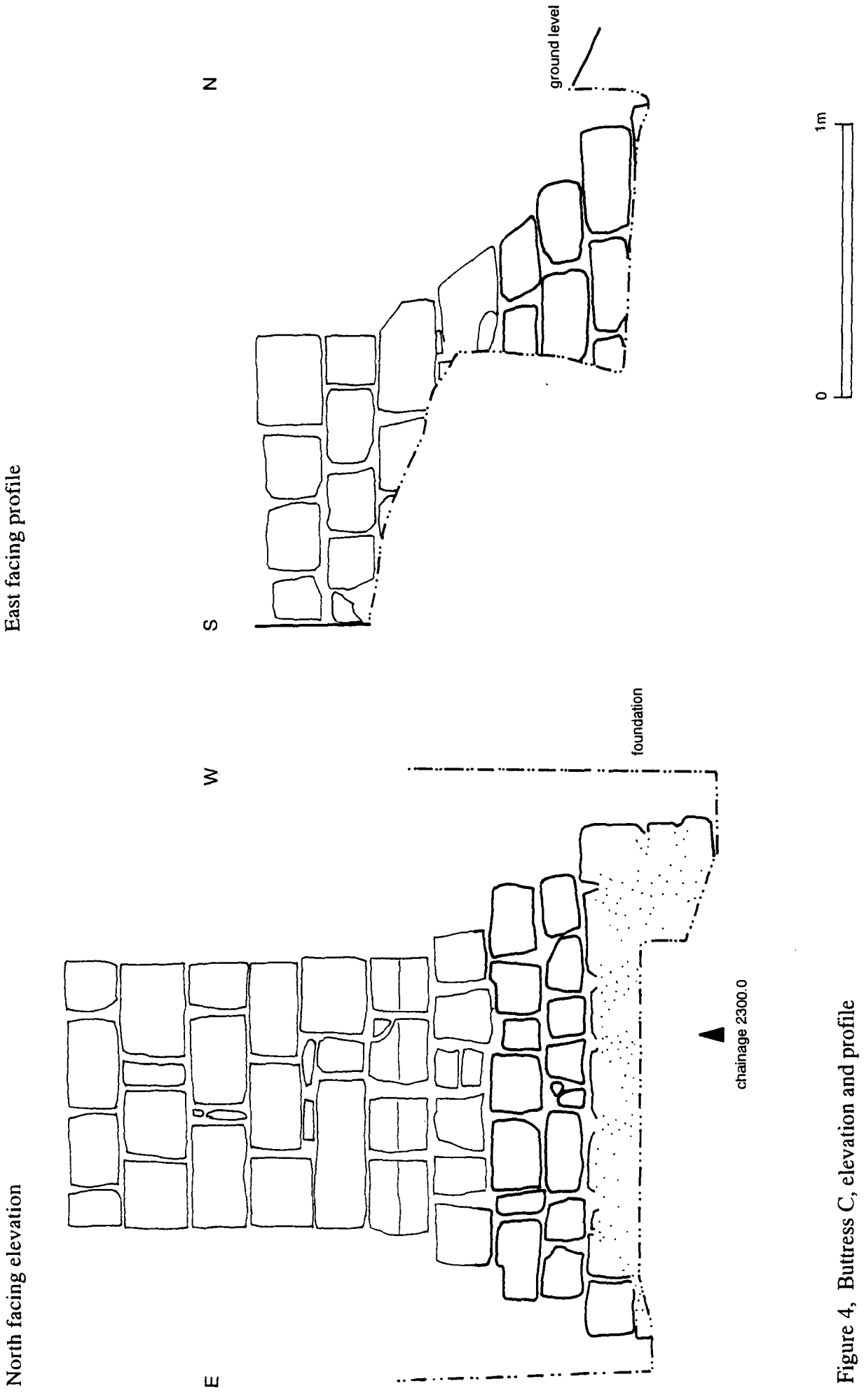


Figure 4, Buttress C, elevation and profile

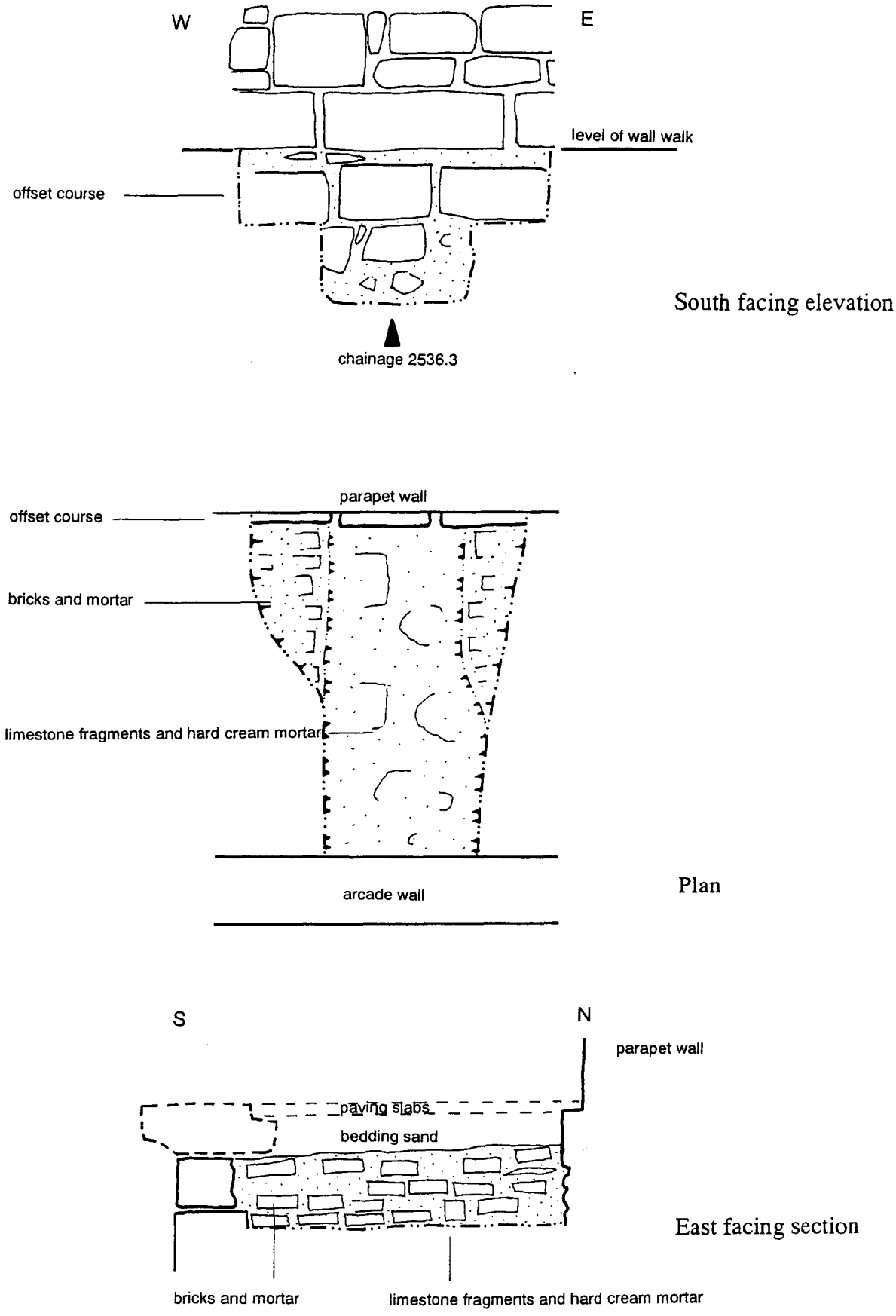
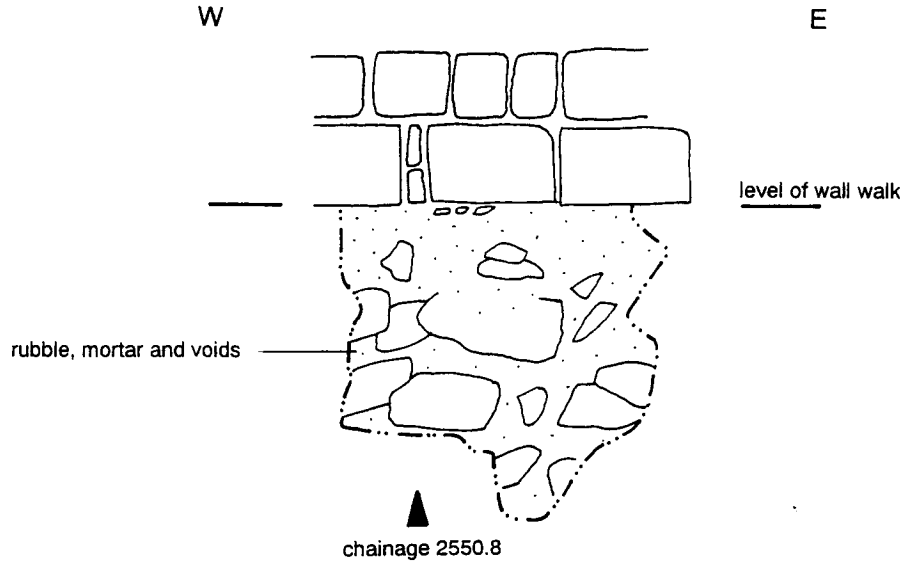
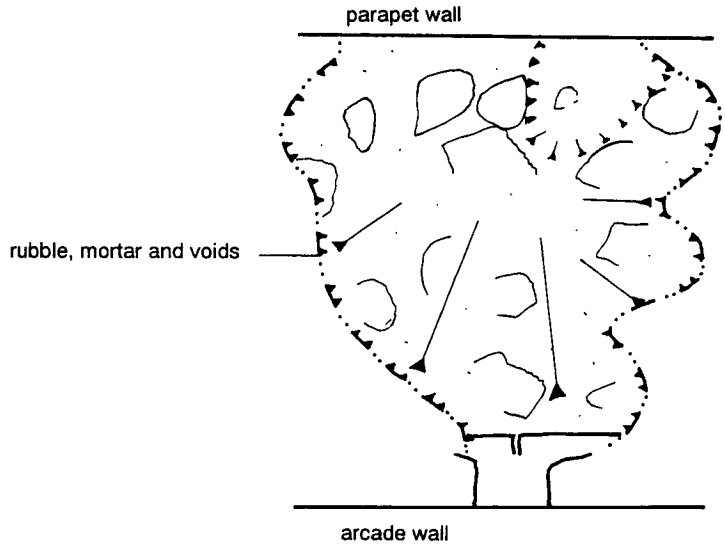


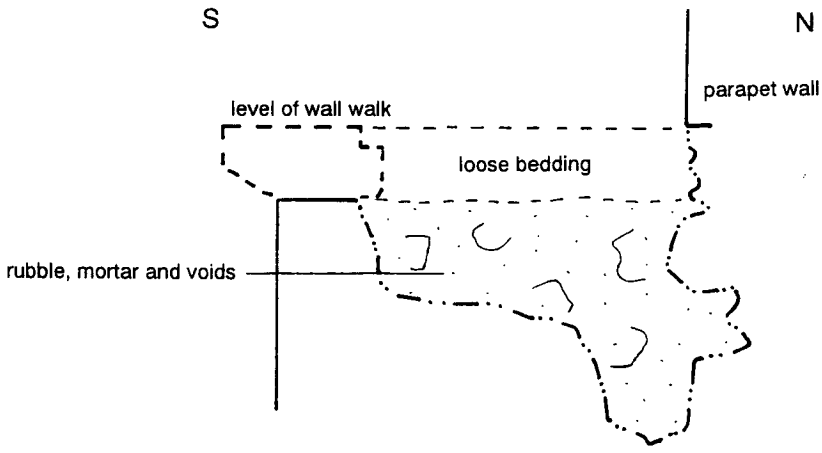
Figure 5, Elevation, plan and section, tie-hole 9



South facing elevation



Plan



East facing section

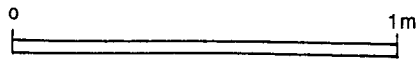
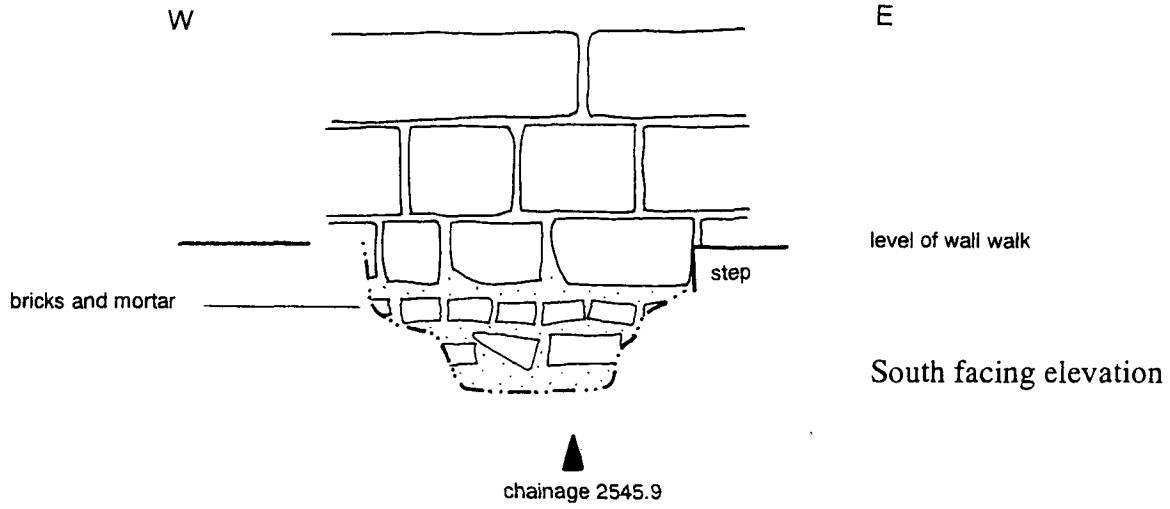
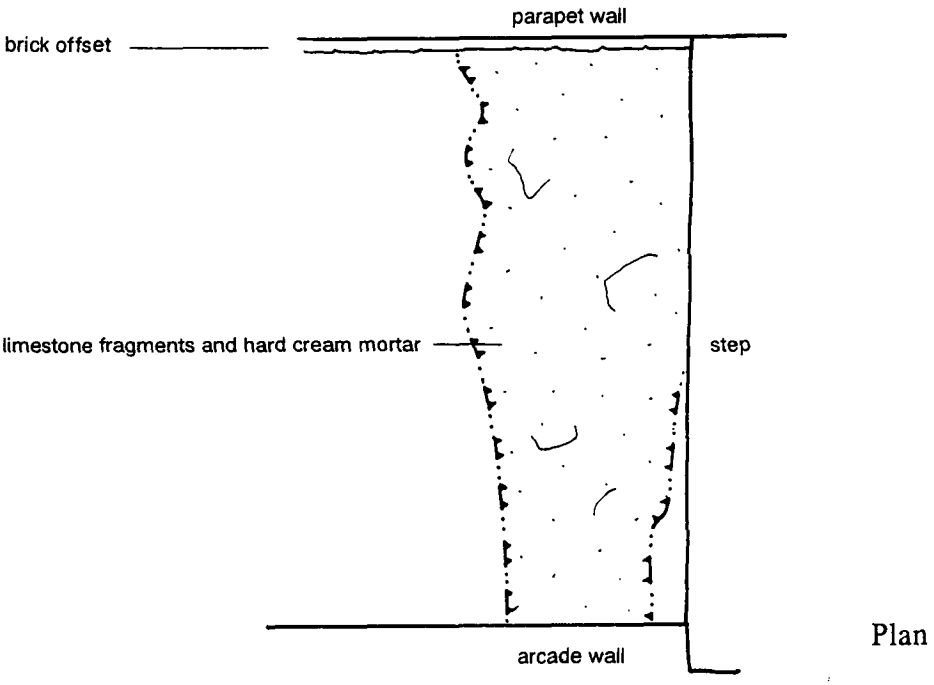


Figure 6, Elevation, plan and section, tie-hole 13





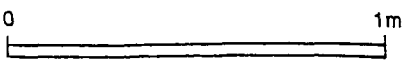


Figure 7, Elevation and section, tie-hole 11

of foundation movement. This restoration included the insertion of a concrete anchoring slab at walkway level" (Waterman 1980).

Works likely to be attributable to the 19th century were apparent in a number of places. Within tie-holes 8, 9, 10 and 11 a deposit of roughly coursed bricks, up to five courses deep and copiously bonded with large amounts of pale grey-cream lime mortar was noted beneath the bedding sand. (This material in turn lay directly over mortar and rubble that was probably contemporary with the construction of the arcading). Deposits within tie-holes 12, 13 and 14 proved to be comprised of extremely loose rubble, mostly fragments of limestone, some cobbles and a few fragments of brick. All were bonded with very weak lime mortar in which numerous, and often very large, voids were present. So loose was this material that it proved necessary to excavate large, deep holes and backfill them with concrete before the process of tying in could be carried out. Within tie-holes 18, 19 and 20 further loose deposits were encountered though in this instance they were much less rubbly and void free. These were essentially comprised of smaller sized limestone rubble with lesser quantities of brick fragments in a matrix of mortar rich sand of dirty appearance. Although the full depth of most of these putative 19th century deposits was not reached within the tie-holes it will be noted that they occur exclusively within the western part of chainage 2500 – 2586. It has been noted in 4.3.2 above that on stylistic and construction material grounds the arcades and intervening wall-walk supporting walls east of the eight westernmost identical arches (with the possible exception of the two at the extreme west) appear to be of late date; some probably 19th century. The evidence from the sub wall-walk deposits lends considerable weight to this notion of extensive 19th century renovation.

The sub wall-walk material below the level of the bedding sands in the western part of the chainage was uniform and singular. This material comprised hard cream coloured lime mortar which contained large amounts of limestone, generally rough hewn and sub-angular pieces of a size 0.10m to 0.30m. One or two unidentified architectural fragments were noted within this material. Although in most places the stone element of this deposit appeared to be randomly distributed, some suggestions of rough coursing were evident. What appears to be the same deposit was also seen in tie-holes 8, 9, 10 and 11 below the level of later brick and mortar deposits. Nothing that equates with this material was observed east of tie-hole 11. The occurrence of the bulk of this deposit has a direct spatial correlation with the eight easternmost identical arches. It is probable that the sub wall-walk deposits in this area represent material contemporary with the construction of these arcades.

5.2.2 Sub wall-walk elevation of interior face of curtain wall

Courses of brickwork, or rubble and brickwork, were present on the interior face of the parapet/curtain wall immediately below walk-walk level in the area of tie-holes 18, 19 and 20. Two courses of brickwork were also visible within tie-hole 11. It must be assumed that the presence of these materials indicates post-medieval – modern renovation works. The scale of such works is not certain. It may be that some of these areas indicate 19th century repairs to the wall face before the laying of the paving, whilst others may represent more extensive repairs and re-building; the use of brick perhaps being considered acceptable below wall-walk level and stone being used in more visible areas. Elsewhere, the presence of well-coursed stonework of the curtain wall continuing down below the level of the wall-walk was restricted to a minority of the tie-holes. More frequently, mortar and rubble, or a combination of poorly coursed stonework with mortar and rubble, was present. It should also be noted that in the area of tie-holes 12, 13 and 14, where loose rubble and voids had been noted below the wall walk, the same material was

seen to continue into the area of the parapet wall. This clearly indicates that the parapet wall in this particular area consists of little more than a thin exterior skin of blockwork behind which lies an expanse of void filled rubble. A case has already been put to suggest the likelihood of a 19th century date for this material.

Sub wall-walk projections or off-sets keyed in to the fabric of the parapet wall were observed in a number of places. The longest stretch of these ran from immediately east of tie-hole 8 to just west of tie-hole 10, a distance of some 10.85m. The off-set projected up to 0.18m out from the parapet wall at the west, tapering down to around 0.05m at the east. Projecting off-set courses have been noted in Tower 33 above which some of this work may be of antiquity. Smaller lengths of lesser off-set courses, typically projecting no more than a few centimetres, were noted in tie-holes 1, 4 and 5. Small off-sets in brick were present in the area of tie-hole 20 which were clearly of later post-medieval date. These latter may relate to the provision of a stable base for 19th century paving of the wall-walk. The off-set extending between tie-holes 8 – 10 may well be of some antiquity and the function of this may relate to an earlier wall-walk arrangement, the ledge perhaps serving to support a timber structure. That this projection was not aligned exactly parallel to the parapet wall may suggest that parts of this stretch contain fabrics of different dates. It may be that the off-sets noted in tie-holes 1, 4 and 5 served a similar function.

5.3 Interior pier underpinning

The three piers underpinned were the fifth, sixth and seventh piers of the wall walk supporting arcading from the west. These were numbered piers 1, 2 and 3 respectively. In each case a concrete foundation slab measuring 1.2m – 1.4m x 0.7m x up to 0.32m deep was cast in front of, and partially underneath, the piers. The necessary pre casting groundworks comprised the excavation of holes up to 0.46m below existing ground level in front and below each pier. The deposits cut through by the foundation holes were the same in each case. This consisted of the present top/garden soil above a reddish brown, clean, slightly plastic, clayey silt. Both materials sloped away from the wall in a southerly direction. The latter material was identical to the rampart material observed in each of the three buttress underpinning holes on the exterior face of the wall. The only finds recovered consisted of 19th – 20th century material within the topsoil.

5.3.1 Pier 1 (chainage 2515) (Figure 8) Only a single course of pier blockwork, bonded with hard, cream coloured lime mortar, was present below existing ground level. This blockwork did not extend beyond the limits of the pier blockwork which lay above. As such, this additional course of stone formed part of the pier itself rather than part of a foundation. Not only was no foundation present, it was also noted that the southern side of the pier only just sat on top of the rampart material. It is possible that the pier originally sat at a greater depth within the rampart and that subsequent truncation has removed much of this.

5.3.2 Pier 2 (chainage 2519) (Figure 9) Again, only a single course of stonework was present below ground level; likewise bonded with hard, cream coloured lime mortar. In this instance however the stonework did extend beyond the side limits of the overlying stonework, though it did not project out to the front. In this sense, this additional course can be argued to represent a foundation. As with pier 1, the southern side of the pier only just sat on the rampart material.

Figure 8, Pier 1, elevation and profile

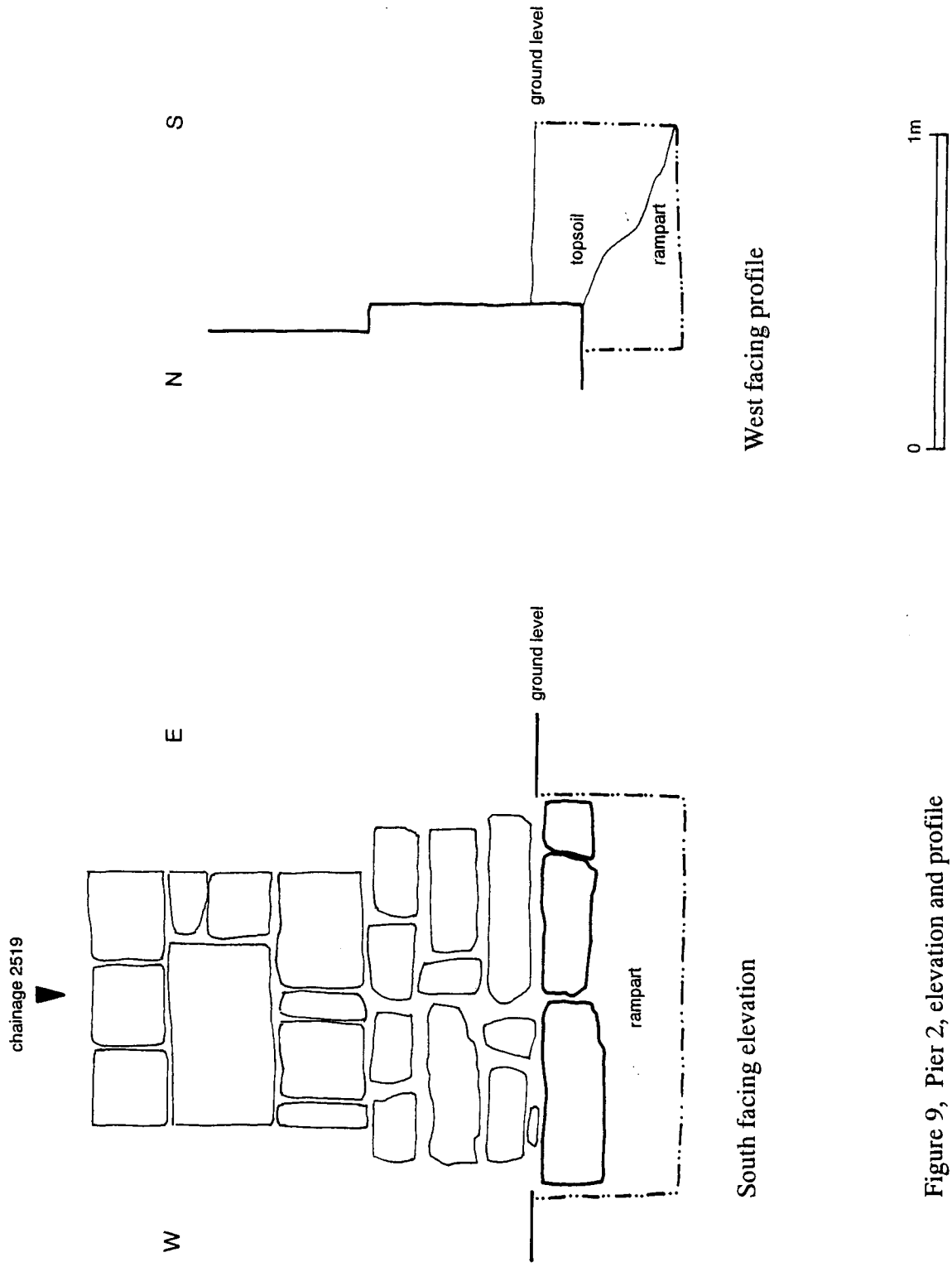


Figure 9, Pier 2, elevation and profile

5.3.3 Pier 3 (chainage 2523) (Figure 10) Only a single course of below ground stonework bonded with hard, cream coloured lime mortar was present below the remainder of this pier, which again barely sat atop the rampart material on its southern side.

The lack of anything resembling foundations of substance was particularly marked in all three piers. It is uncertain if these are representative of the remaining piers, most of which are likely to be contemporary. This lack of foundations is largely at variance with the buttresses on the exterior of the wall. It was noted above that the southern sides of the piers only just sit on top of the reddish brown rampart material. One might have expected the piers to be more fully embedded within the rampart. This observation raises the question of whether or not this may once have been the case and that the upper part of the rampart has subsequently been truncated.

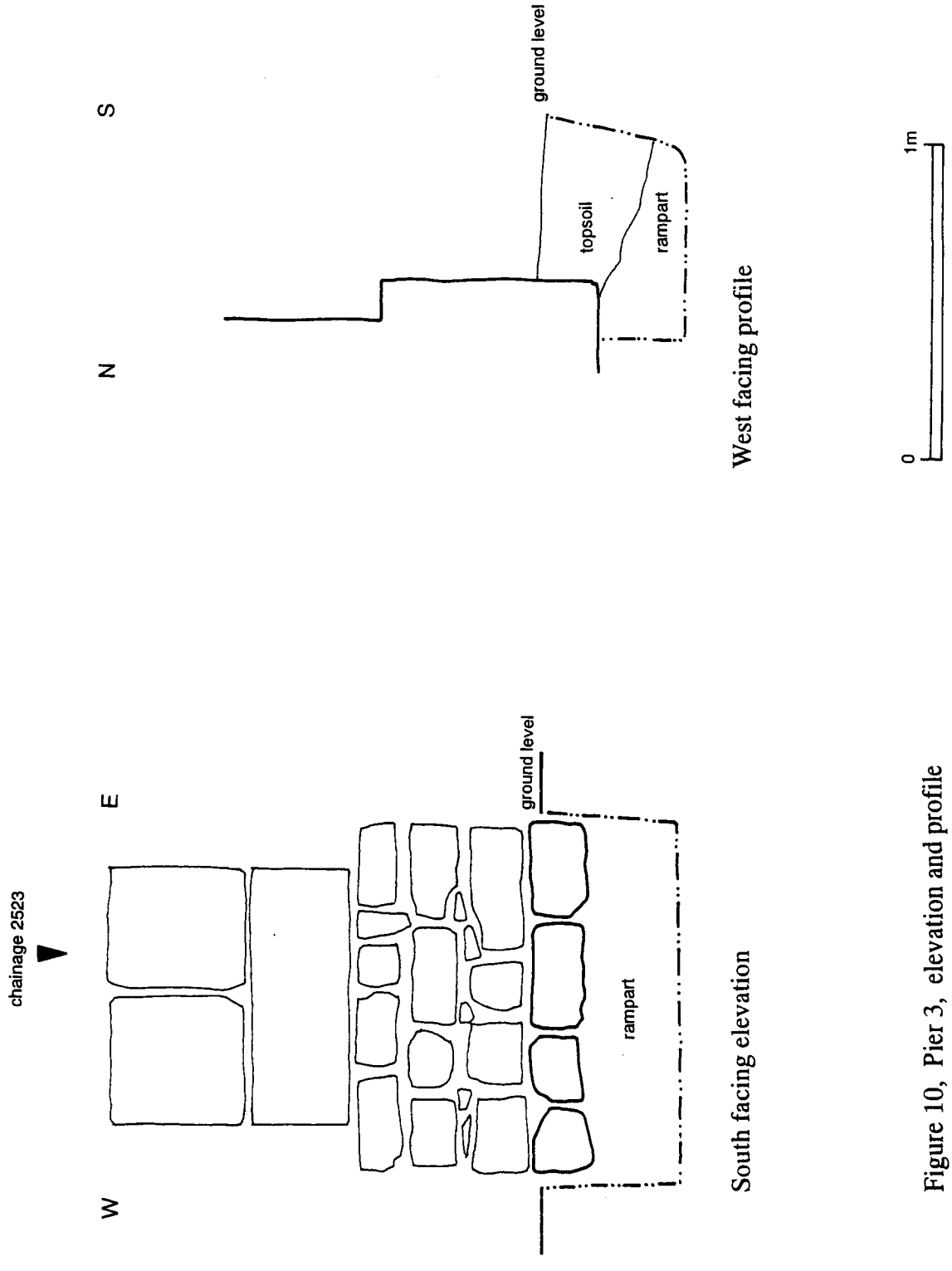


Figure 10, Pier 3, elevation and profile

6. LIST OF SOURCES

Geol. Surv. 1967	Geological Survey of Great Britain (England and Wales), Sheet 63, Solid and Drift.
Hall. R.A. 1994	Viking Age York
RCHM, 1972	Royal Commission on Historical Monuments, City of York vol. II The Defences.
Waterman, R.D. 1980	City of York, The Bars and Walls, A Survey.
YAT, 1997	The York Archaeological Trust Archive Gazetteer. *York Archaeological Trust.*

7. LIST OF CONTRIBUTORS

Watching brief	Mark Johnson
Illustrations	Mark Johnson
Report text	Mark Johnson
Editor	David Brinklow

APPENDIX 1

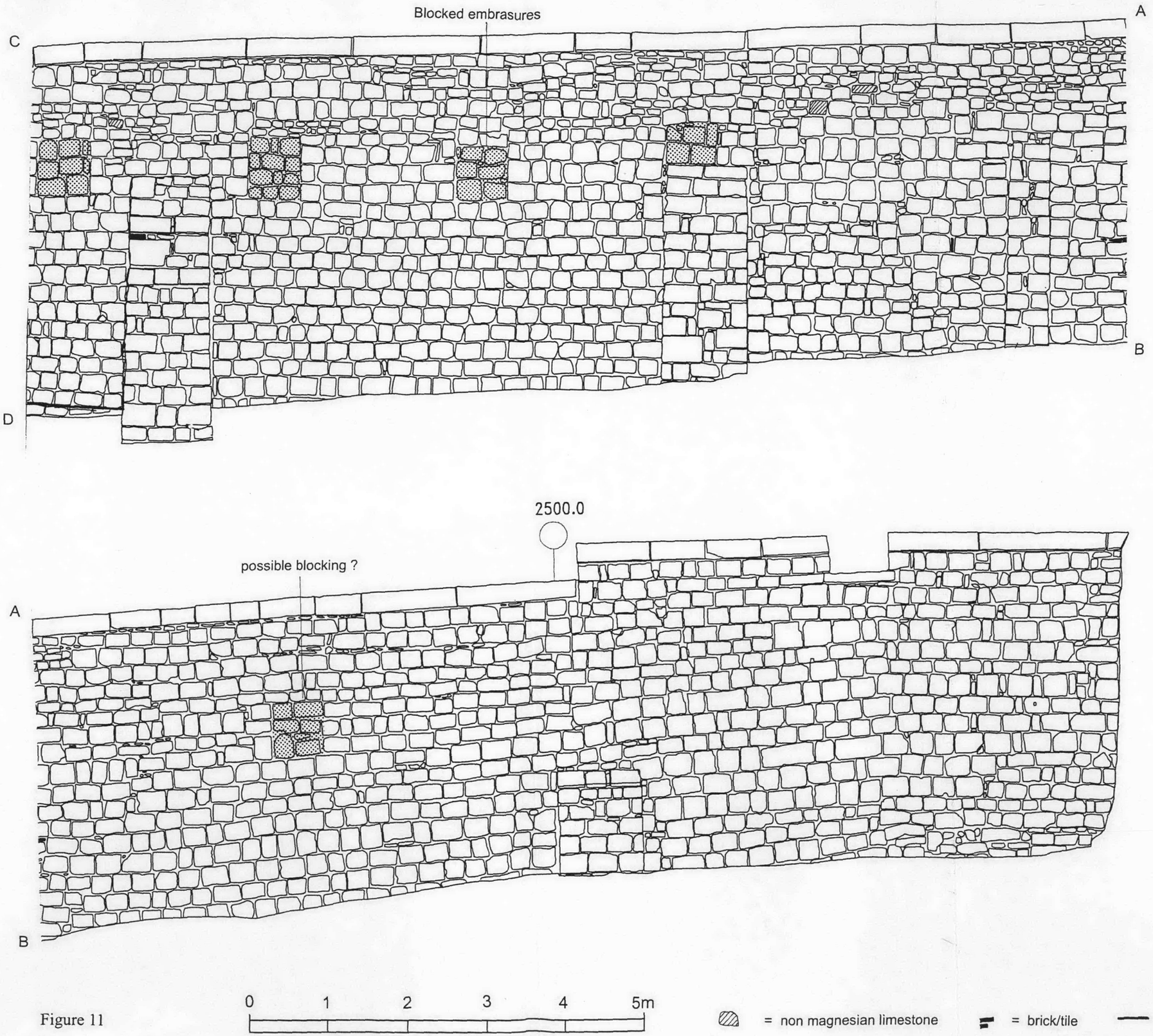
AMENDED PHOTOGRAMETRIC ELEVATIONS.

The elevations reproduced below are based on the photogrammetric survey of City Wall chainage 2500 – 2586. Alterations and additions have been made to the original survey where:

1) Comparison of the actual wall fabric showed stone detail at variance with that depicted on the plot.
2) Blocked features indicative of the past appearance of the wall are present. These have been highlighted.
3) Horizontal and vertical offsets were recognised. Some of which clearly relate to episodes of rebuilding and repair. These are indicated by a bold line.
4) Materials other than magnesian limestone were present. Where these are of brick or tile they are indicated by solid infill. All other materials (gritstone, finer grained sandstones, cobbles and oolitic limestone) are shown as hatched.

Figures 11 – 14 are of the outer elevation of the wall, figures 15 – 17 of the inner. Chainage measurements are shown on both elevations. The numbered locations on Figures 15 – 17 relate to the position of engineering tie-in works.

Greater detail is contained within the annotated field drawings of the YAT archive. These drawings discriminate between the various non magnesian limestone stone types, show the presence of cracks, principal mortar variations, the presence of vegetational growth and various other observations made at the time.


Blocked embrasures
A
C
B
D
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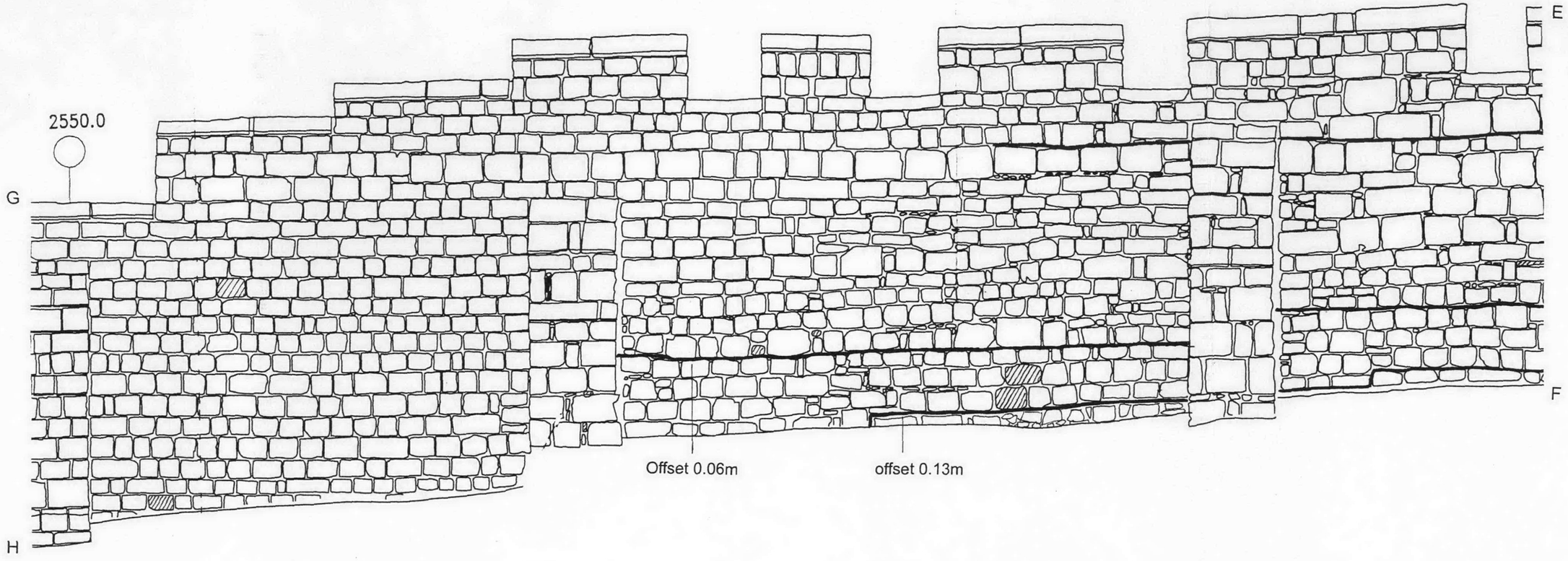
possible blocking ?
A
B
0
1
2
3
4
5m
= non magnesian limestone
= brick/tile
= offset

Figure 11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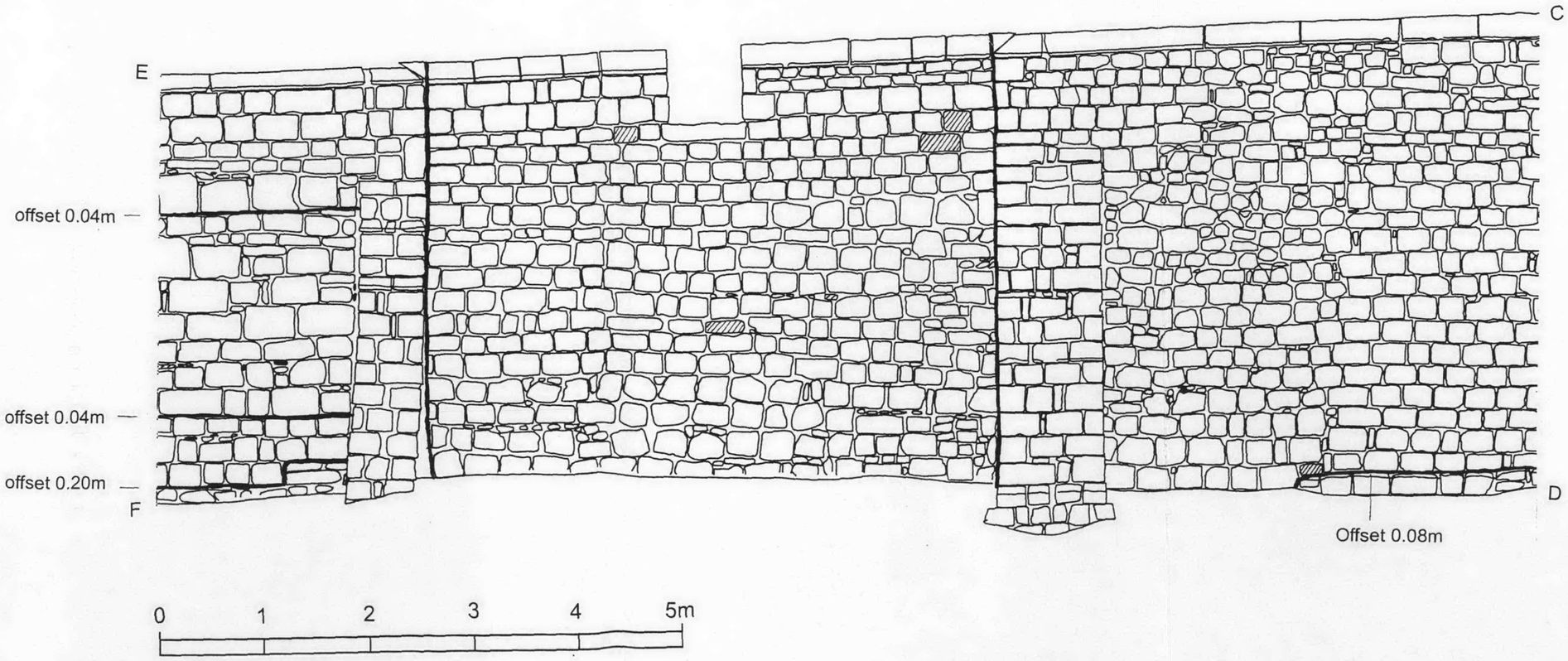
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Figure 12

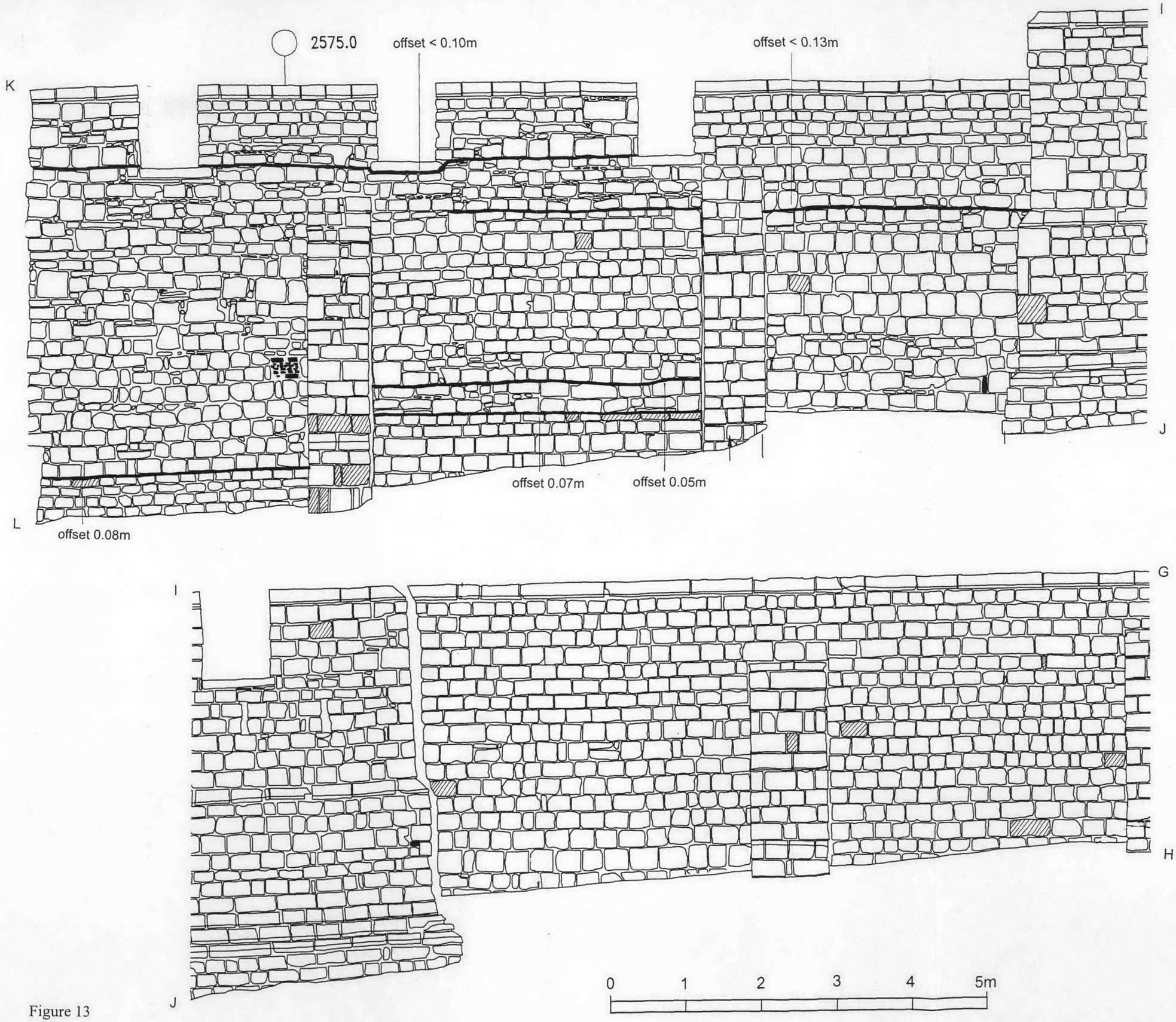
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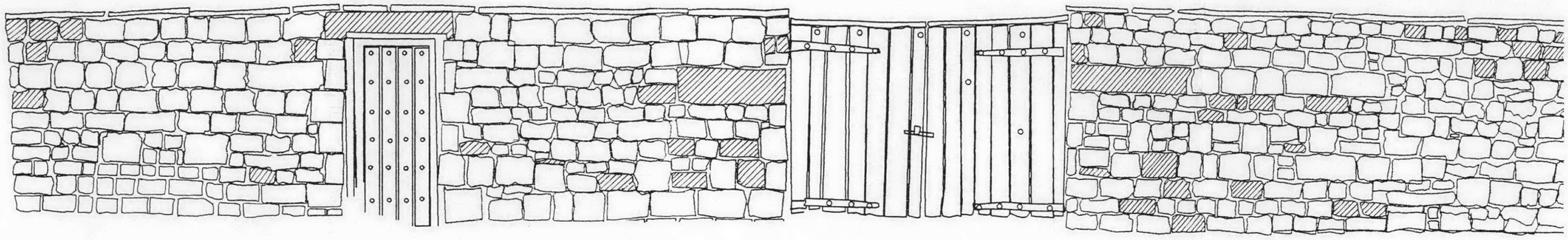
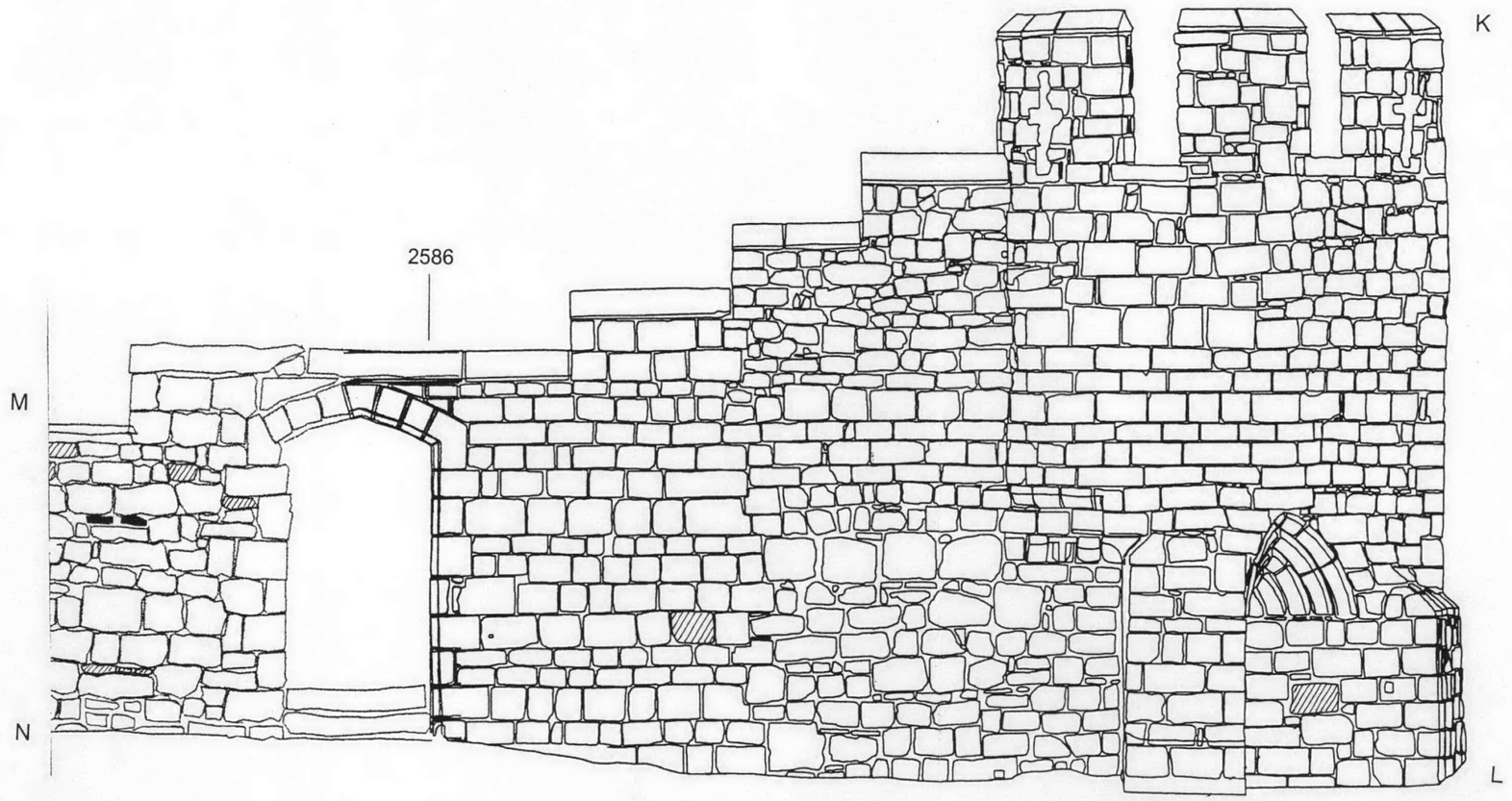
Figure 13





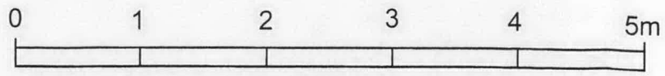
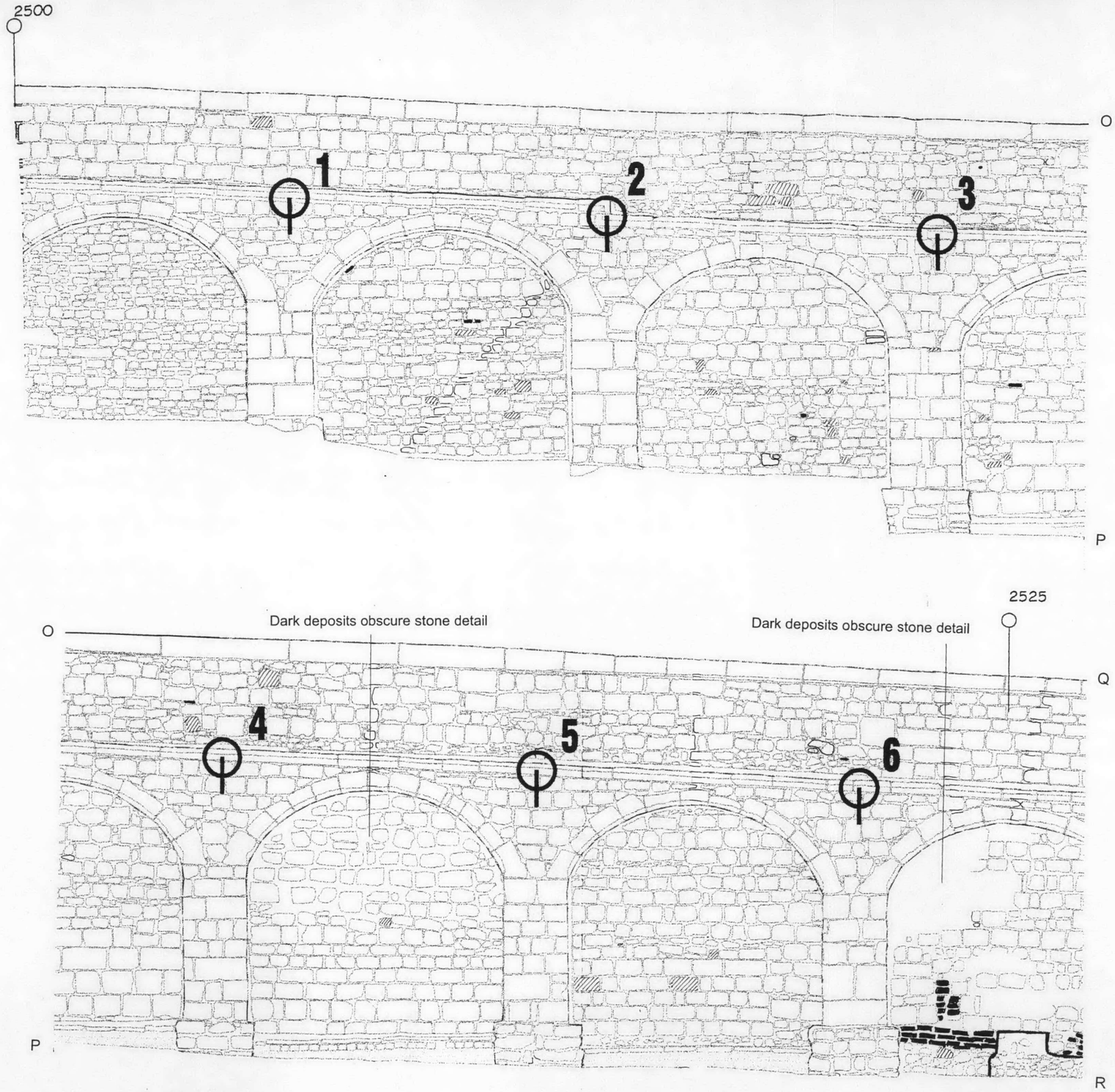


Figure 14


2500
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Dark deposits obscure stone detail
Dark deposits obscure stone detail
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Figure 15

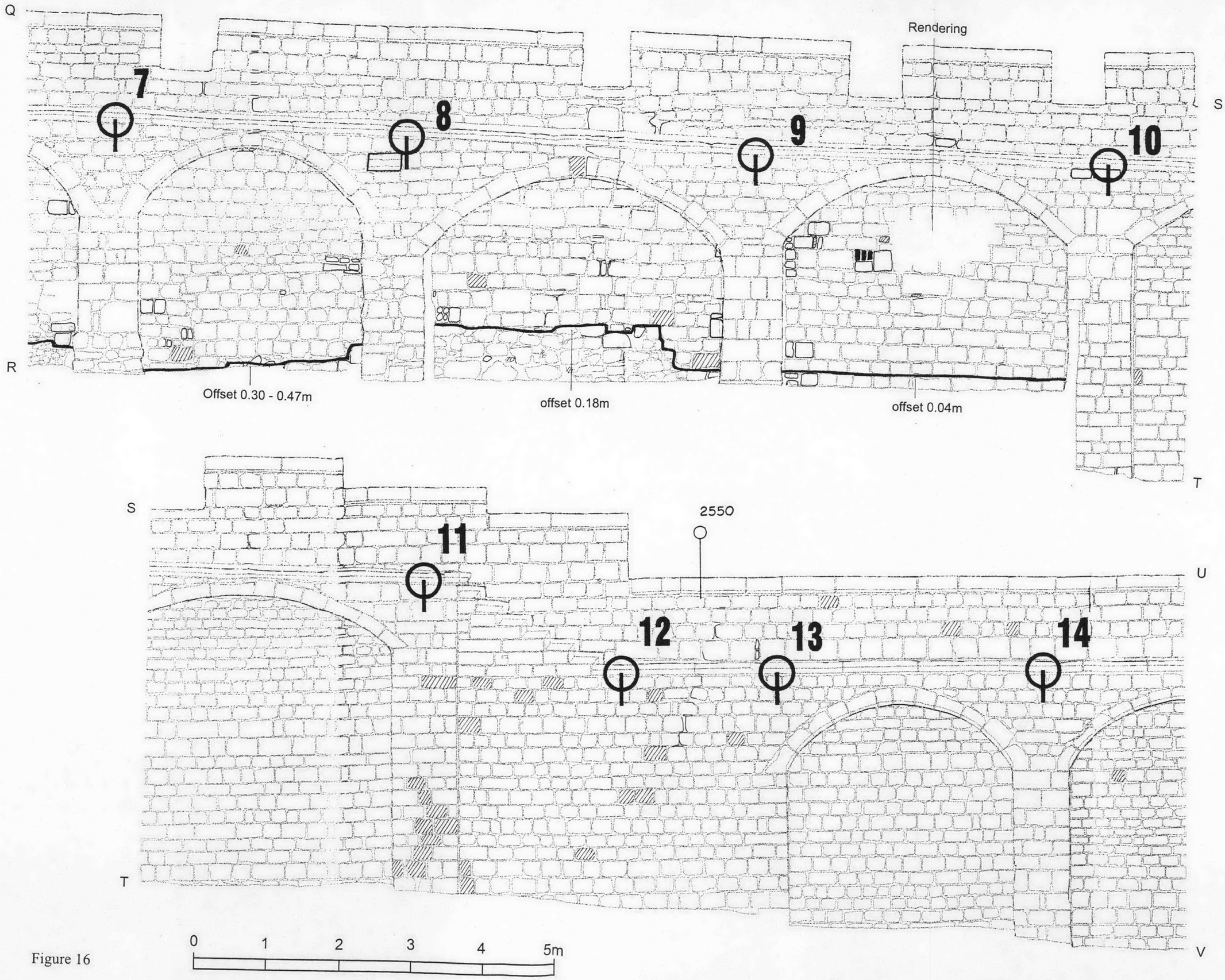
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Figure 16

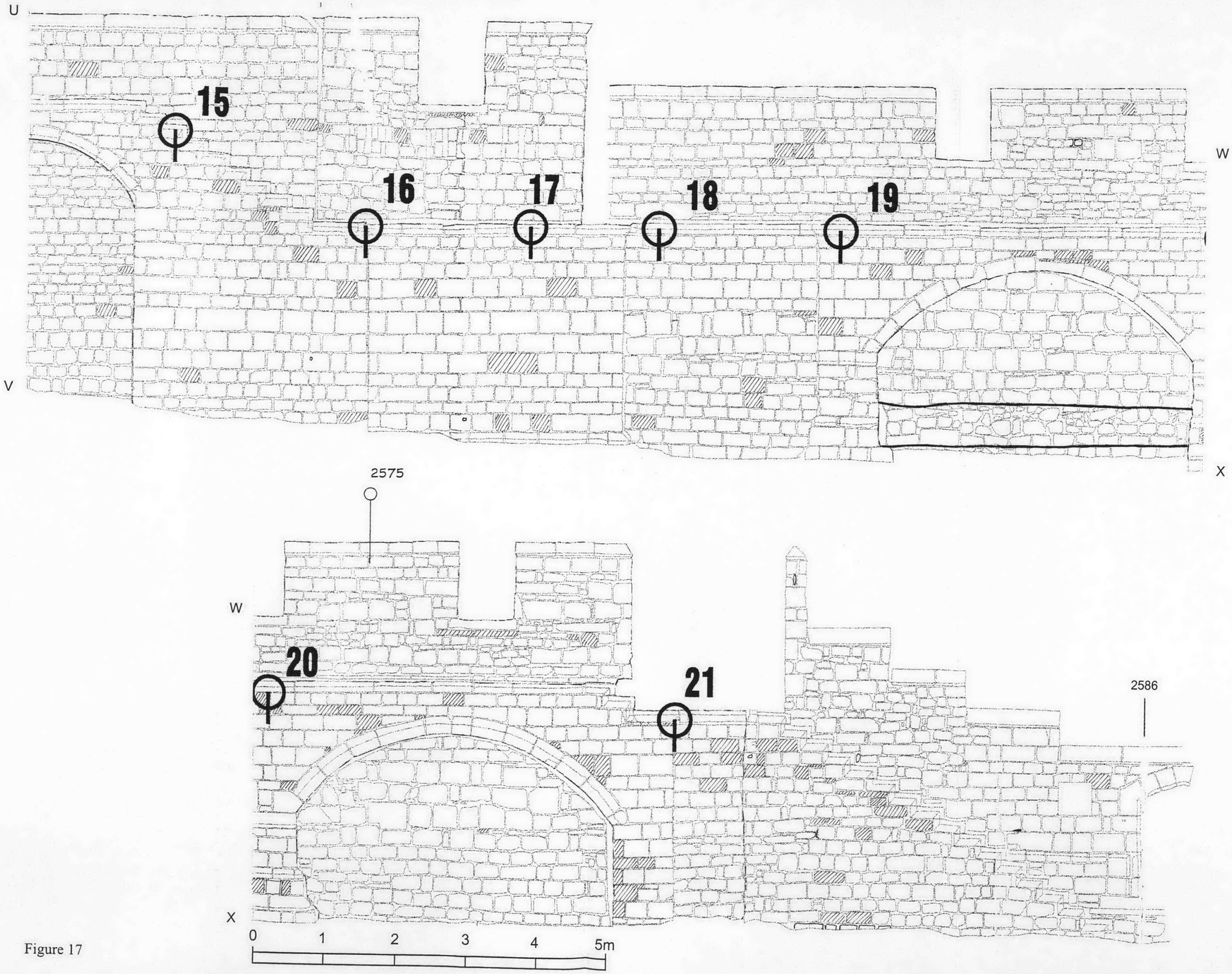

Figure 17

YORK ARCHAEOLOGICAL TRUST

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