

The Cow Tower, Norwich: a detailed survey and partial reinterpretation

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With a contribution by
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*CONSOLIDATION OF THE COW TOWER allowed access to all parts of the interior for a detailed drawn and photographic survey. Numerous details hitherto unrecorded were discovered, the most notable of which was that the tower is constructed of flint and faced in brick. An interpretation is offered for the unconventional chases and sockets between ground- and first-floor levels. The report is supplemented by the first thorough appraisal of the available documentation and there is an alternative view of the chases by T. P. Smith.*⁴

I. INTRODUCTION

The Cow or Hospital Tower (TG 2396 0919; County Monument Number 20; County Site Number 632N) stands on the S. bank of the R. Wensum in the NE. corner of the medieval city area of Norwich (Fig. 1). It is a freestanding brick structure built to three storeys with roof and integrated stair turret. It is reasonable to suppose that the existing building is that for which building accounts survive from the late 1390s (see v, below).

An interpretative appraisal of the building has recently been published in this journal.⁵ However, while that paper was in press, the Historic Buildings and Monuments Commission scaffolded the entire interior to allow repointing and consolidation to take place. The opportunity was taken to observe the building at close quarters and to produce an accurate survey.

The survey consisted of a detailed plan at a height of every two metres, undertaken using Electronic Distance Measuring Equipment. This was supplemented by both black-and-white and colour-slide photography. In addition detailed notes were taken at every level. The work extended over a period of some four months in the winter of 1985–86 as the scaffold was slowly dismantled from the top. The Survey archive is held by the Norfolk Archaeological Unit and the National Monuments Record.

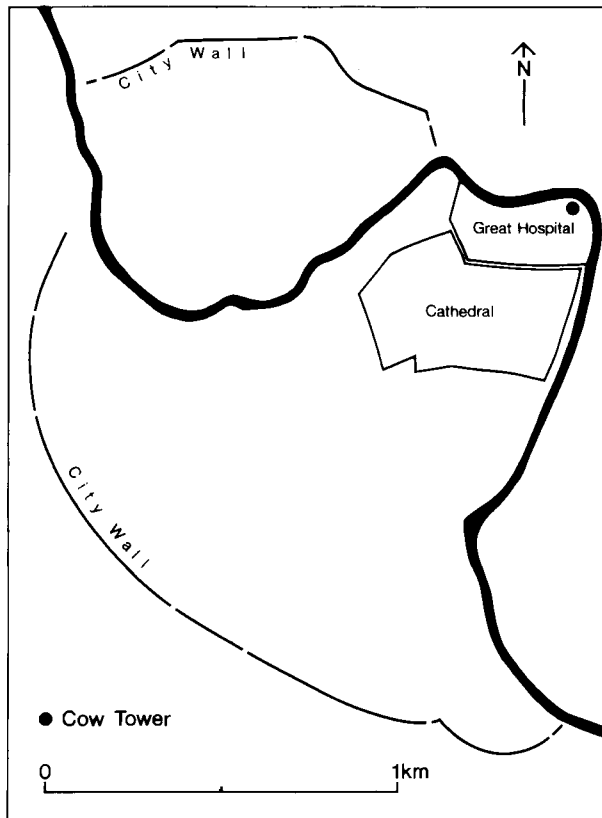


FIG. 1

Map to show the location of the Cow Tower within the medieval walled area of Norwich. Scale 1:25,000

Description (Figs. 2-6)

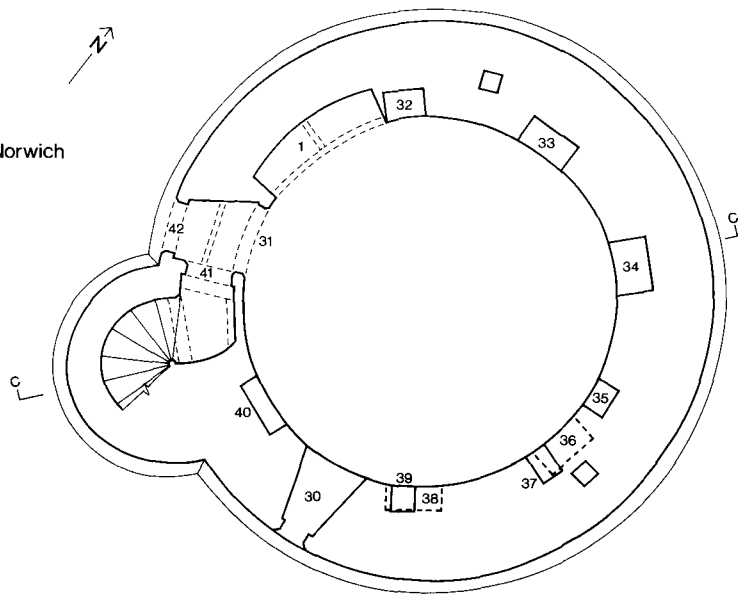
Figures 2-5 have context numbers which were given to the individual features of the building to allow for clarity in the records. Not all these numbers will be referred to in the text, which is a digest of the descriptive account contained in the archives. The method of scaffolding employed meant that each of the three floors of the building was recorded in two stages as the scaffolding was lowered with the battlements recorded as a single stage.

II. THE SURVEY. *By* BRIAN AYERS *and* ROBERT SMITH

Ground floor (Fig. 2). The wall fabric is entirely of brick and almost exclusively laid in stretcher bond. Besides the doorway (see below) there is only one aperture, a large window (30). This feature has a broad, flat, two-centred arch of two-brick header courses with a chamfered brick interior lintel. There is a splayed embrasure to jambs for an exterior aperture with a round-headed exterior arch and a chamfered exterior arris. The embrasure has a sloping floor of brick and flint; its roof is rendered. The walls of the embrasure course through to the faces of the tower wall. There is a blocked loop to the stair lobby.

The entire internal face of the tower at this level is circumvented by a diagonal chase pattern, the probable function of which is discussed below. These chases are recessed one

632N
Cow Tower, Norwich
Ground Floor



First Floor

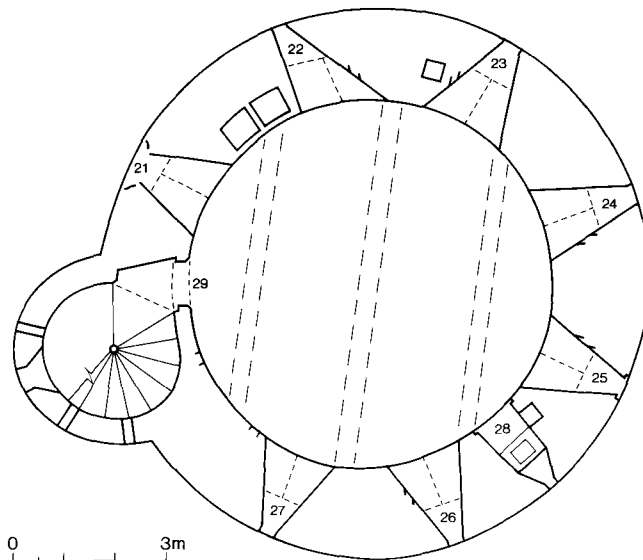
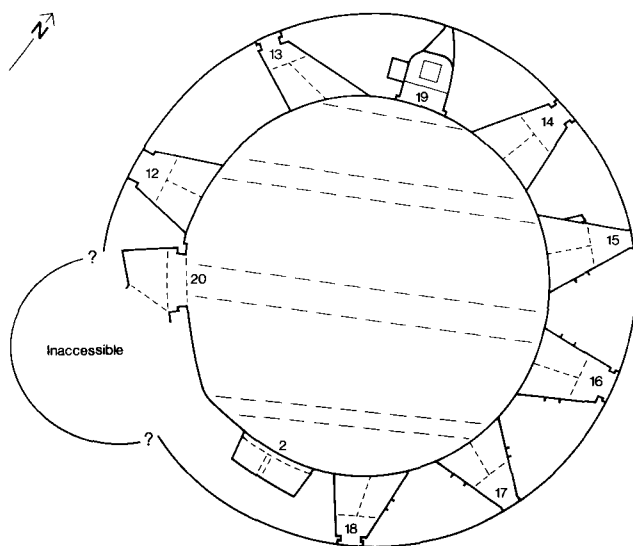


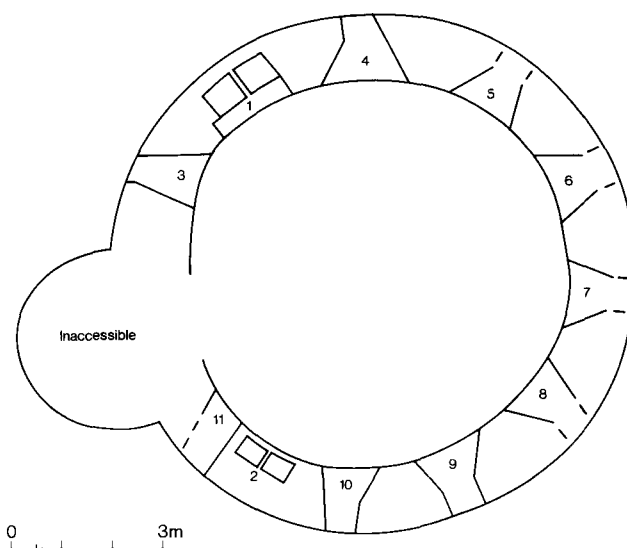
FIG. 2

Cow Tower, Norwich. Ground-floor and first-floor plans. Scale 1:150

632N
Cow Tower, Norwich
Second Floor



Battlements Level



0 3m

FIG. 3

Cow Tower, Norwich. Second-floor and battlements plans. Scale 1:150

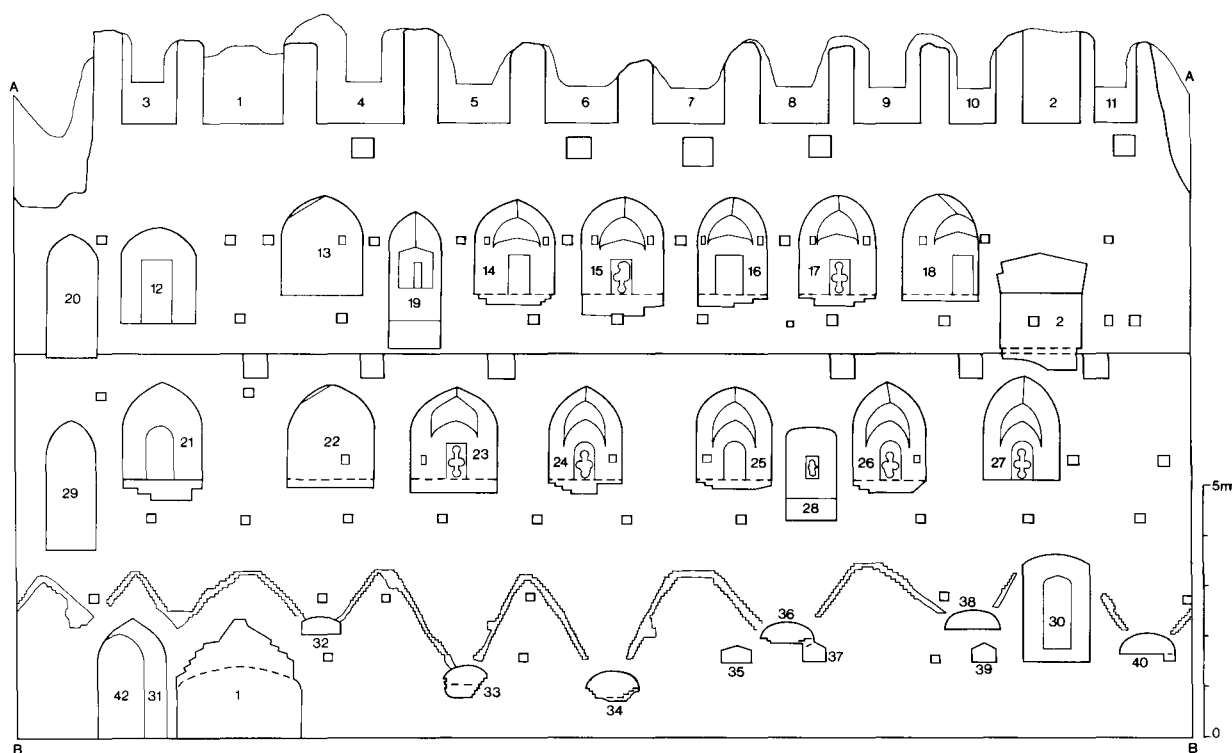


FIG. 4

Cow Tower, Norwich. Opened-out interior elevation of the building. Scale 1:150

brick width into the face of the wall, the back of each chase being lined with brick. Flint is visible, however, at the back of some chases, for example, immediately S. of the doorway. The chases are augmented by small recesses (32, 33, 34, 36, 38 and 40), some of which have sloping bases, others flat. These are also faced with brick. Three additional recesses (35, 37 and 39), similar to lamp niches in the garderobes (below), are also built into the wall.

Doorway 31 leads to a small lobby which gives on to exterior doorway 42 and the doorway to the stair turret (41). This latter doorway, rebated and with a two-centred arch, in turn gives on to a lobby at the foot of the stair. The floor of this lobby is worn brick, the stair treads also of brick. A newel post of limestone with integral formers to the brick stair survives as far as the first turn of the spiral. There is little wear on the stair treads.

First floor (Fig. 2). The wall face is entirely brick save for about half-a-dozen small flint pebbles. Generally the brickwork is laid in stretcher bond with occasional headers. The brick is offset slightly at the level of the joist holes which supported the second floor. These joists ran N-S. and all their sockets were observed (Fig. 4).

First-floor apertures largely mirror those on the second floor (below) although positioning varies (Fig. 4). The exception is doorway 29 into the stair turret, directly below doorway 20. This doorway has a two-centred arch, chamfered on the tower side. It is rebated for a door on the stair side and there is evidence for the location of hinges in the N. wall. The sill is broken. The doorway enters a lobby. The stair treads change between the first and second floors to a stepped ribbed stair from the more usual helix-type construction. The turret is lit by windows, one with a flat, two-centred arch, the other larger with a chamfered, depressed

three-centred arch. The walls contain evidence of rendering in a hard, creamy-coloured sandy mortar with flint inclusions, a similar mortar to that used in the joist holes.

A second doorway (28) leads into a garderobe. This doorway has a flat two-headed arch and is rebated on the exterior, that is into the tower. A splayed interior sill of flint with walls of brick has a small loop with a smaller version of the cruciform stones observed in other apertures (Fig. 4). The garderobe seat setting is almost intact and there is a lamp niche on the N. (left) side.

Five apertures on the first floor are furnished with cruciform loops (Fig. 4; that in 22 is too deeply recessed to show on the elevation and a sixth in aperture 25 is missing). The lack of a loop in the seventh aperture (27) indicates that it functioned as a window. Traces of internal rendering were visible on most of these first-floor apertures and such rendering was probably common on both the first and second floors. The first floor was unheated.

Second Floor (Fig. 3). The fragmentary remains of a tattered brick string-course were observed below joist holes for the battlements level. Here the wall fabric in general showed signs of possible burning, particularly on the N. side. Brickwork is common on the wall faces although the spandrels between the windows are faced with a mixture of brick and flint. Below spandrel height the wall face is almost entirely brick. Cutting-out by workmen at this level demonstrated that the face was one brick thick with a flint and mortar core. The brickwork is generally laid in stretcher bond with occasional headers.

Apertures at second-floor level consist of doorways, windows and loops (Fig. 4). Of the two doorways one (20) opens into the stair-turret. It fronts a small lobby, the floor of which

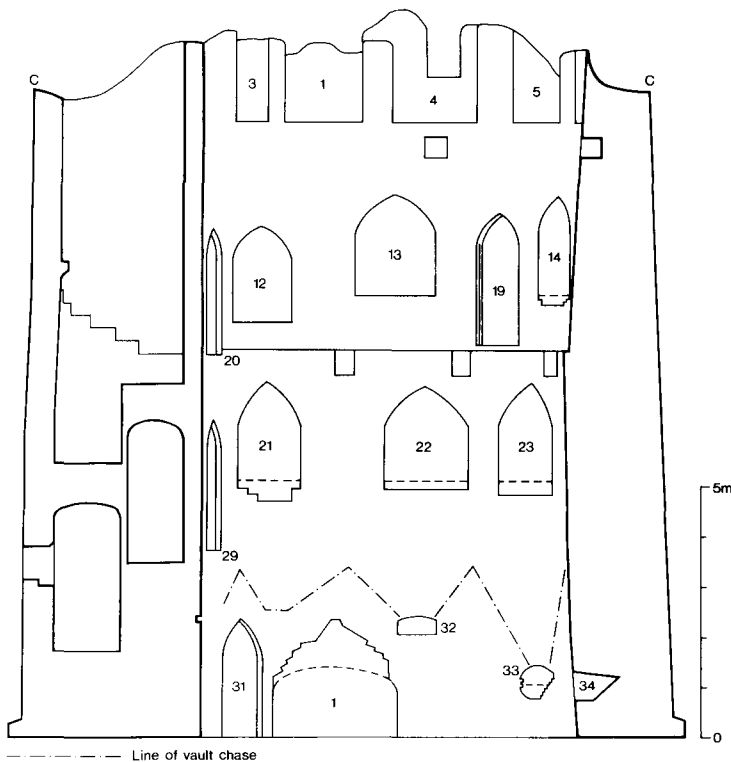


FIG. 5

Cow Tower, Norwich. Section through the building (section located on Fig. 2). Scale 1:150

survives, being formed by brick and flint, but almost all the stair treads are missing. The surviving margins are finished with brick-on-edge above flat bricks. The treads seem to have been supported on a rising vault. The lobby is roofed in brick.

The other doorway (19) fronts a garderobe with its jamb on the exterior, that is, facing the tower. There is a small interior relieving arch, then a small internal splay behind the garderobe seat for a window with a narrow rectangular loop. As with other windows the base of the splay is fashioned in flint but edged with brick (in most cases the brick has been destroyed). The setting for the garderobe seat is of brick above a square chute lined with brick. On the western (left) side of the garderobe is a small lamp niche or cupboard. The wall faces are of brick, neatly rounded at the back of the garderobe so that the sides and back run through as one without arrises.

Of the seven remaining apertures one at least appears to have functioned as a window. Aperture 12 (Fig. 4) has a two-centred arch on the interior but a rectangular opening at the exterior end of the window splay. Apertures 13, 14, 16 and 18 may have functioned similarly but could have been furnished in the manner of Apertures 15 and 17 which are finished with limestone cruciform loops or 'shotholes'.

Finally a fireplace (2) is constructed into the wall at the S. side of the tower. It has a base of flint, sides essentially of brick and a lintel of three rows of interlinked brick-on-edge.

Battlements (Fig. 3). This level was recorded after the latest repointing and thus examination of the wall core was not possible. The wall fabric at this level, however, including the faces of embrasures, is almost entirely constructed of random flint rubble with

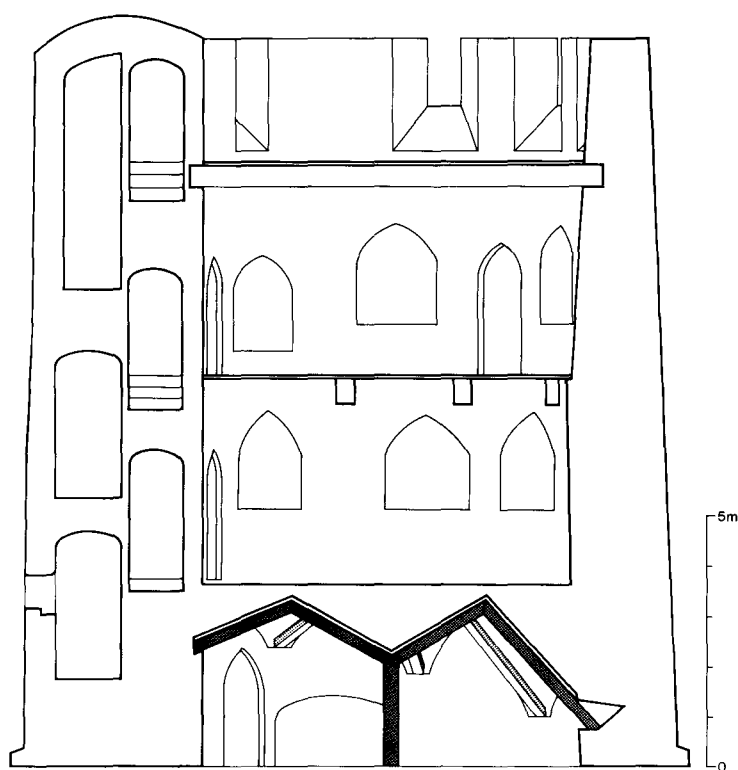


FIG. 6

Cow Tower, Norwich. Suggested reconstructed section through the building. Scale 1:150

occasional apparent attempts at coursing. Brick is used to line and divide the chimney-stacks but otherwise is confined to dressing the internal and external jambs on the embrasures. These dressings survive indifferently except on embrasure 4 (Fig. 4). The base of each embrasure slopes (as reconstructed on Fig. 6) and is rendered. The range of mortars and cements observed presumably reflects successive repairs and consolidation. The battlement level was floored in timber, three joists running E.-W. The joist sockets are not well preserved save one which measures 0.34 m by 0.37 m and 0.47 m deep and is lined with brick.

The stair turret hardly exists at battlement level. The treads are missing as is the roof, although the remains of a roof dome do survive. The wall cores are mainly of flint construction but the facing is of brick and flint coursed (approximately 50% of each material). The flints are generally rounded cobbles with none being knapped or squared.

The putlog sequence on the interior was recorded (Fig. 4). Putlogs were also observed in the stair turret where they pierce the wall. Most of the putlogs in the tower itself are blocked with English Heritage 'anti-roosting' tiles. It will be noted that many putlogs are located in the embrasures of the apertures.

The brickwork is variable as befits handmade bricks but approximates to a standard size of some 200 × 100 × 50 mm fired to a dullish red. The bricks used on the stack above fireplace 2 are noticeably pinker than elsewhere with one or two showing good straw-marks on the edges. Flints tend to be rounded cobbles although knapped and quarried flints were also observed.

The exterior of the tower was not the subject of the Survey although it would probably repay detailed study. Of immediate interest is the wave-moulded limestone plinth, a string course of knapped and squared flint immediately above the plinth, and apparent changes in the brickwork facing of the tower, notably at battlement level.

III. THE DOCUMENTARY EVIDENCE. *By* MARGOT TILLYARD

It became apparent at an early stage in the documentary research that the scattered and infrequent references to the Hospital Tower within a large body of potential material necessitated concentration on key periods. It was decided therefore that time would be best spent searching sources of the 14th century, when the tower to be seen today was built, and of the 16th century, particularly the years round 1549, the date of Kett's rebellion.

The tower now known as the Cow Tower was at first called the Dungeon⁶ and subsequently the tower in the Hospital meadows.⁷ It was built at a vulnerable point in a bend of the R. Wensum, at the NE. corner of a low-lying meadow called Cowholme. In the mid 13th century the part of the water-meadow N. of Holmstrete (now Bishopgate) became the property of St Giles's (now the Great) Hospital which had been founded in 1249 by Bishop Suffield.⁸ The eastern part of this was the gift of William de Dunewic⁹ (subject to an annual rent to the Priory of thirteen sesters or 52 gallons of wine which was later commuted to 40s).¹⁰

There is no mention of the Tower at the Hospital in the list of Norwich gates and towers equipped with espringolds on completion of the defences in 1343.¹¹ Blomefield stated, without identifying his sources, that a tower had been built there by the Prior as a toll-house and prison, which was afterwards assigned to the hospital.¹² The uses assumed for it by Blomefield sound unconvincing in view of the situation, but there seems no reason to dispute his statement that in 1378 the Master of the Hospital conveyed it 'by the name of the Great Tower called the Dungeon to the City forever'.¹³ No mention of the tower was found in either the Great Hospital 'Domesday' or in the Hospital's surviving 14th-century account rolls.

At the beginning of 1378 the bailiffs of Norwich had received a commission from the king.¹⁴ They were enjoined to clear the river of weeds and the ditches of rubbish, to repair decayed walls and towers and to rebuild the paling on the river bank¹⁵ for the defence of the city, compelling all landowners and traders to contribute to the cost. It is at this point that the bailiffs seem to have purchased, or leased, the tower from the Hospital.

The next twenty-five years saw attempts by the most successful burgesses to obtain a new royal charter, which was eventually granted in 1404.¹⁶ The burgesses also sought to increase municipal income by controlling trade and acquiring property, and the License in Mortmain for these purchases of 1392 specified that the resulting income was to be used for the City's defences.¹⁷ Norwich Assembly Rolls survive for 1377, 1379 and 1381 and an account roll for 1381, but none refer to the acquisition of the Hospital Tower; nor is a copy of the transaction to be found in the City 'Domesday', which lists the purchases made at this period, or in the other bound books which include City business, the 'Old Free Book' and the 'Liber Albus'.

Litester's rebellion of 1381 and fears of a French invasion a few years later led to expenditure on guns in 1384–85¹⁸ and from then onwards the annual appointment of wardens responsible for the upkeep of all the gates and towers.¹⁹ The list of these for 1386 does not include the Hospital tower.²⁰ The tower therein called 'the Dungeon' is the outer one of the boom towers in Conesford, about one km to the S., while the 'tower next the river' is on the northern bank S. of Barregates (Pockthorp Gates) some 300 m upstream.

The Norwich account rolls and corresponding Chamberlains' Books for the last twenty years of the 14th century contain numerous references to building activity on the city's recently acquired possessions. A number probably refer to the Hospital tower. Some concern a tower which was on the river, as material is delivered to it by lighter; other entries are marginally annotated '*le Dungeon*'. In one case beside such a marginal note is the record of the delivery of bricks 'to the tower', so they appear to be one and the same. The Dungeon, or outer boom tower, had been completed by 1343. Therefore it can probably be assumed that these entries refer to the Hospital tower, and a tentative list of expenditure for various years may be compiled as follows:

1386/87 'for *le dungeon*': £5 paid to four leading citizens '*p. factur. dil Cluses*' (? the vault). They had perhaps lent the money for this.

'*le dongon*': purchase of 8,000 bricks, with carriage and labour; purchase of sand.

1388/89 '*le Dungeon*': negotiations at St Benet's. Carriage of a last of 'Tyle' from St Benet's and a further 5,500 'tyle'. 6 lighters to the tower with 'Tyle'; labour for carrying 'Tyle'.

1394/95 '*Le dongon*': purchase of 1,000 bricks; Roofing ('*cooptur*') the tower at the Hospital.²¹

The above three groups of entries are in the bound book of Chamberlains' records. The corresponding Treasurers' Roll for 1394/95 records ten large weekly payments to John de Shipdham and his servants 'at the tower', with separate

amounts to a mason (for freestone), a carpenter and a locksmith and associated purchases of wood, hurdles, sand, brick and stone.

At the end of the list there is a payment for 'roofing (*coopstur.*) the tower at the hospital', followed by purchases of nails, planks, timber and a 'Seene' (a net for the windlass?). The total (though not added in the original) amounts to £32 9s. *od.*

1395/96 (from the Chamberlains' Book) '*per le dongon*': purchases of spars, ropes, lime, bricks, and 'stone for the tower'; two lighters 'to the tower'.

1395/96 (from the Treasurers' Roll) £14 14s. 10d. paid for lime, brick and stone 'for the tower'.

Unfortunately, from this date until 1400, the Chamberlains' Book is incomplete; there is no Treasurers' Roll for 1396/97 and nothing attributable to the tower in the roll for 1397/98.

These suppositions may be open to doubt, but the Treasurers' Roll for 1398/99 provides more clear-cut evidence. There, with a marginal heading of 'le Dungeon', is set out a detailed list of expenditure on labour and building materials totalling £36 17s. 2d., which, if only because of the very large number of bricks purchased, must refer to the Hospital tower. A full translation of this extremely thorough and interesting account is presented below in Appendix I. Its important elements can be summarized as follows:

The account occupies the back of the roll and undoubtedly represents the City's major building effort for the year. It can be divided into two parts — the first the record of days worked and money earned by five groups of workmen, and the second a list of miscellaneous payments.

The Workers. The first group listed are the carters, of whom there were seven, paid by the load. They brought to the site 163 loads of stone and 28 of sand, together with unspecified amounts of each, two loads of lime and the windlass (or hoist) and its gear ('instrument').

There were four carpenters, one of whom had a mate. They were paid 6d. a day and between them worked for 32 days.

Of the ten masons, who also earned 6d. a day, one, Robert Aillesham, worked far longer than the others — 68½ days. He heads the list and may have been the foreman. The total for them all was 220 days.

There is a very long list of labourers. Six of them worked for longer than the others — 23, 27, 29½, 31½, 33½ and 40½ days respectively. The remaining 29 worked an average of about 14½ days each. Their daily rate of pay was 4d. but 9 of them, 7 of whom had worked for some days at 4d., worked a total of 93 days at 5d.

The last group of workmen mentioned are the stone-miners. Five of these are named who supplied 144½ cartloads of stone at 3d., 3½d., or 4d. per load.

Small Payments. The most significant item under this heading is the total of 36,850 bricks purchased for the dungeon in this year. The use of bricks occurs in Norwich at least from 1263, as is attested by the name of Geoffrey the Tiler appearing as a witness of several property deeds from that date. The bricks he used were probably imported from Flanders, though by the end of the 14th century it is likely they were made locally. An entry in the Norwich Chamberlains' Book, mentioning both 'bricks and Flemish bricks' supports this view. The brickyards may have been at St Benets.²² As the masons would have built the flint core of the tower as well as laying the bricks, and as it is not known what reserves of bricks there may already have been on the site, it is impossible to calculate their work-rate exactly.

However, by simply taking the figures given in the 1398/99 account, a number of just under 200 a day is reached. At a very rough estimate the number of bricks purchased in that year seems to be not more than half the number needed to complete the work at the tower.

Other Raw Materials. Flint-stone was mined from chalk pits, of which there were two, with their associated lime-kilns, immediately inside and outside Conesford (King Street) Gates at the southern extremity of the City. Fir-poles were used for ladders and, with hurdles, for scaffolding.²³ The entry for piles supports the hypothesis that the tower was under-pinned.²⁴ The use of sedge, which would not have been suitable as the final cladding of a defensive tower, must remain for the moment unexplained unless it was used for temporary covering of the wall at the end of a season.²⁵

Freeman. Of the names in the account nine are of Freeman.²⁶ If this seems a small proportion, it must be remembered that those inheriting the freedom from their fathers would not appear on the lists of admissions. There are two masons, a merchant and a boatman, the last of whom was admitted in 1398/99, a fact attested by the inclusion of his name on the receipt of entry fines, which, exceptionally, is attached to the front of the account.

From 1400 the Hospital tower formed part of the City defences, maintenance of which often occurred only as a result of a directive from the king. Such was the case in 1451 when the record of the instructions to the wardens for East Wymer (one of the sub-leets or administrative divisions of the City) reads in part: 'and they shall have . . . Barre Gates (Pockthorp Gates), and all the walles unto the toure in the water, and the same toure; with the dongeones by the Hospitall Medowes on the northeast corner'.²⁷ The king called for more repairs in 1452, 1458 and 1460,²⁸ and the instructions quoted above were renewed in 1481, probably in order to repair damage caused by the severe earthquake of December 1480.²⁹

The Chamberlains' account for 1424/25 records the payment of 4*d.* to John Tynkere for a lock for the 'dongeoun' in the Hospital meadow. This may be associated with the surviving indenture of 1425 recording a lease of the meadow to two widows (the tower is not mentioned).³⁰

In 1450 the Master of the Hospital quitclaimed to the City the 'Towre bigged (built) be the Ryversyde and be the medewes of the said hospytall' and 'certeyn Ground from the seid Towre be alle the lenght into a Trench of water that cometh owt of the seid hospitall, and in brede from certeyn Wilwes growying upon the medewes aforseid' to 'the seid Ryvere side ageyne the est'.³¹

Subsequent documentary search was directed to the mid 16th-century records and the years before and after Kett's rebellion. During the early years of the century the defences of the City were kept in repair and this expenditure may be followed through the Chamberlains' accounts. A paper of 1527 indicates the constant necessity for this. It records provision for a rate to be levied for the repair of the 'walles, gates, toures and tourettes beautified with goodly mansions and enhabited with Substanciall merchantes and Craftysmen . . . now of late a parte decayed for lack of lokying to'.³² It is likely that the Hospital tower was leased with the exception of 'time of war', as was the proviso in the lease for the 'houses at Bishopsgates' of 1375.³³ It may be supposed that owing to its isolated position the tower escaped damage in the fires of 1505 and 1507.³⁴ It was provided with a new lock in 1532.³⁵

There was considerable expenditure on the walls in 1542/43 when 36 yards of 'olde Frestone Redy Wrought' was bought for repairs.³⁶ In June the same year the accounts record payments for 'rowyng Mr. Mayor and others in two botes to vew the Ryver ageyn betwyxt the Whytfryers and byshopps Gate', for on a similar occasion three weeks before the party repaired to the New Common Hall (in the former Blackfriars) for a 'banket' at which they consumed 'a jerkyn of bere, spyce bred, manchetts, straweberyes, sugar and wyne'³⁷

More seriously, an entry in 1544 concerns the casting of 'gunnes' in London and the construction of carriages for them. Four were stored in the Guildhall, and two in the Common Hall.³⁸ The following year a footbridge was built 'over a Cryk nere Bishopp's gate in to the hospital medows for a waye to the gret Tower'.³⁹

All the gates and towers came into prominence during the insurrection of July and August 1549.⁴⁰ This was led by Robert Kett, a well-to-do tanner of Wymondham, and chiefly provoked by the enclosures of the period. Kett camped, with his large following of malcontents, some of whom were Norwich citizens, on the heights overlooking the NE. side of the city. The ruling citizens contented themselves with 'rampiring' or blockading most of the gates and manning the towers. The rebels on the eminence now known as Kett's Castle posed the greatest threat to the Hospital tower, but their prime target must have been Bishops Gates directly below. That overwhelmed, entry to the City over the bridge would have been simple.

However, the rebels twice crossed the river and broke into the City via the Hospital meadows. The first time they unrampired Bishops Gates and bore away six guns which had been positioned on the bank there, beside a gate N. of the bridge (this may have been by the foot-bridge constructed in 1544). The second time they routed the first force sent from London to relieve the City, and burnt down much in the area of the Great Hospital.⁴¹ A second and larger relieving force expelled them from the City, but they continued to bombard Bishops Gates, damaging the gate tower severely and shooting the king's Master Gunner through the head.

Perhaps the Hospital tower was not made much use of during the disturbance, and it may have escaped major damage. At any rate there appears to be no record of repairs to it in the Chamberlains' accounts to 1567. For some reason, after the rebellion the main timber from the footbridge over the creek was removed and used for the repair of St Stephen's Gates.⁴²

Lack of time has precluded a thorough search of the records to the present. There are two references to the Hospital tower in the book of Proceedings of the Assembly 1553-83. On the 5 May 1564 it was agreed 'that the Right Honorable Duke of Norff. his grace shall have to ferme the Tower in the Hospytall medowe with the way to it for the terme of 99 years payeing therfor yerely vi s. viiid'.⁴³ This was confirmed on 3 September the following year, when the Duke was also leased the Butterhills, in the southern extremity of the City, for 33s. 4d.⁴⁴

The Hospital tower is not mentioned in a very comprehensive estimate for repairs to the 'Walls, Gates, Bridges, Stathes and Wastes' of the City drawn up in 1725.⁴⁵

After that there are only glimpses. The staircase was said still to be complete in 1809.⁴⁶ There is a newspaper cutting of a lecture of c. 1900 in which it was stated that

the tower was leased to Lord Maltravers in Queen Elizabeth's reign and questioned whether it was intended as a residence.⁴⁷ There is also a cutting from the Norfolk Chronicle of 17 December 1904 reporting that a Captain R.A. with other military officers and the Clerk of the Ordnance Stores inspected the 'Old Tower standing in the Meadow by the River' to decide whether it was worth repairing for use as a store for ammunition.⁴⁸

IV. DISCUSSION AND INTERPRETATION

The survey and associated documentary search on the Cow Tower has produced two major surprises. The first, now that it is recognized, is an obvious one but, for all that, one not previously commented upon, namely that this great brick tower is merely a brick-faced structure for a core of stone. The second is the wealth of documentary material, in particular the great account of 1398/99 translated in Appendix I. This account is much more thorough than had been expected and underlines the importance of returning to primary sources. Hudson and Tingey's reference⁴⁹ gives little suggestion that they were providing an extract. The now-published full account must rival that of many national monuments, being comparable with other important municipal accounts like that for the building of the North Bar at Beverley in 1409/10.⁵⁰

The account is pregnant with information, much of it summarized above. Its immediate importance is that a distinction is quite clearly drawn between stone ('lapid') and 'Stonmyners' and brick ('tegul'). This distinction was impossible to draw from the 1910 extract as stone references were omitted altogether except for the provision of stone loops. The full account summarizes at least 170 carts of stone in the payments to carters and mentions 135½ carts of stone (some or all probably being among those carted) in the payment to 'Stonmyners'. The stone was flint, almost certainly found locally although some could have come from further afield, John Drayton possibly working a stone pit in Drayton, a village some 8 km (5 miles) NW. of the city. Parts of Norwich on the fringe of the medieval city are still cratered with the remains of chalk and flint quarrying and mining, much of it post-medieval activity but considerable medieval working also being known. Galleries are still occasionally being located (one such in November 1987 off Ber Street in the southern part of the medieval city) and a recent summary of such workings has been published.⁵¹

The lime used in building the tower was almost certainly the product of local kilns. The Chamberlains seem to have employed their own limeburner at least part of the time (Michael *Lymbrennere*), perhaps burning lime on site, but it is clear that lime was being imported. There were many limekilns below the Ber Street escarpment behind King Street in the S. of the city. Limeworking here was clearly an environmental problem: in 1561 staithes off King Street next to the river which had been built for washing clothes could not be used because certain persons had loaded lime at the same staithes.⁵² William Blakehommere, who was paid £4 17s. 6d. for lime, had his capital messuage, staithe and a limekiln on King Street so this area is the most likely source.

The provenance of the bricks is more difficult to ascertain. Most seem to have been delivered by water, some being carried from the Common Staith which was on King Street. Earlier, in 1388/89, a last of 'Tyle' was brought from St Benet's, the great Benedictine Abbey E. of the city on the R. Yare where there were probably both tileries and brick-kilns ('Tyle' in this context probably means brick, used in the same way that 'wall tile' was used in Hull in the earlier 14th century).⁵³ No medieval brick kilns have been found in the vicinity of the medieval city although there were large post-medieval brickyards immediately W. of the city walls near present-day Queen's Road.

Other materials were probably from a mixture of local and foreign sources. Hurdles, sedge, nails, shovels and barrels must have been of local manufacture; *Sparres* were brought by boat from Jernemuth (Great Yarmouth), perhaps indicating a Scandinavian origin. There are a number of references to the windlass and its equipment. This may have been used in the construction of the tower but, given the interpreted use of the structure suggested by Saunders, that of an artillery tower,⁵⁴ it is also possible that the windlass was needed to haul guns to the roof. It is also gratifying to see that drinks were bought for the workers at various times.

The detail of the account provides interesting data on the surnames of the artisans. Locative surnames indicate Norfolk places such as Aylsham, Buckenham, Beeston, Dickleburgh, Mendham, Swanton and Snoring. Robert Snape, who provided the *Shotholes* (most of which are still extant) may have hailed from Suffolk. Occupation surnames marry nicely with services rendered: Nicholas *Wright* (carpenter); William *Hirdelere* (hurdles); Godfrey *Coupere* (barrels); and Lawrence *Coupere* (buckets). In 1425, a later account records one John *Tynkere* who was paid 4d. for a lock.

The tower constructed as a result of payments recorded in the 1398/99 account and others was clearly a brick and flint structure. This inference from the documentation was borne out by the survey which, besides observing the very great quantities of flint used at roof level and in the upper parts of both the second floor and the stair turret, also observed the wall core during necessary cutting-out and repair by H.B.M.C. masons. Generally speaking the brick fabric of the tower was seen to be only one course thick, the core being constructed of flint rubble and mortar. Very occasionally it is possible to glimpse the core in fractures in the façade at ground-floor level but it is a tribute to the work of the original masons that the facing of brick remains so remarkably intact.

The structure appears to be all of one phase. The survey did not notice any evidence for the insertion of apertures and it must be concluded that all openings are original, including that on the ground floor.⁵⁵ Window openings fall into two groups: embrasures with 'defensive' loops with cruciform shotholes, many of which remain; and large embrasured windows presumably fitted with frames. These latter face south-westwards towards the city, away from the field of action. The stair turret is also on the south-western side and, at parapet level, battlements are only provided to the N., E. and SE., that is covering the field. The only doorway is not fortified, emphasising that although the tower formed part of the city's defences, it was not *defensible*. In other words, its defensive role was only of use against insurgents across the R. Wensum; it immediately lost any effectiveness once such insurgents crossed

the river. This observation tends to confirm Saunders's hypothesis that it was used as an artillery tower; it could only function efficiently when employed in such a manner.

The tower appears today as a defensive work in the bend of the river, isolated from the main stretches of city wall, although there are documentary references to suggest that this isolation was less marked. The royal commission of 1378 referred to above mentions rebuilding of the paling on the river bank for the defence of the city, implying that while the river formed the main defence in this area, a fence immediately next to it would also be effective. Such a fence could have linked the Cow Tower with the fortified bridge on Bishopgate some 200 m to the S.

Internally, the tower was handsomely furnished. The second floor, which had a timber ceiling formed by the parapet level, was heated by a brick fireplace and served by a garderobe. Both these features survive in a good state of repair, the garderobe with a lamp niche and a narrow window loop. The internal walls of the garderobe are curved to imitate the curve of the tower and it was fitted with a door which opened outwards. The first floor was unheated but it too contains a garderobe, also with a lamp niche and door, but with squared-off internal walls and a cruciform shothole, a miniature version of those used in the embrasures. It is difficult to escape the subjective conclusion that the first floor had a more military air to it, in contrast to the more domestic furnishings above.

The ground floor was heated with a large fireplace and also contains enigmatic chases and sockets incorporated into the walls. These latter features, in the opinion of the writers, are contemporary with the structure. The rear faces of both the chases and the sockets are lined with brickwork, numerous bricks extending behind the brick facing, an impossible achievement if they had been cut in subsequent to the construction of the tower; had this been the case the wall core would have shown through. The suggestion made by Saunders, that the chases held 'an irregular structure intended to support a timber plate which could carry the first floor independently of the wall'⁵⁶ cannot, in isolation, be proved or disproved. His proposals for the purpose of the sockets, to hold corbels providing further support for the timber work, does, however, overlook one important feature: depending on the height of the socket, the angle of the floor varies. Sockets lower down have floors angled at some 60 degrees; those higher up are almost horizontal. This has to be explained and clearly could not have provided satisfactory housing for corbels at the lower levels. It seems more likely that the sockets held timbers which supported brick webbing, serving the same structural function as ribs found in undercrofts. In this case the size and plan of the tower dictated a central column and radiating timber ribs with two pitches in each segment. The chases were constructed for wall arches to hide and support the junction of the brick webbing and the wall, a feature common in Norwich undercrofts of the late 14th and 15th centuries. The irregular coursing of the chases and the varying heights and shapes of the sockets is accounted for by the necessity to vault around features, namely the doorway, the fireplace and the window. The three remaining arched sockets at ground-floor level opposite the entry are lamp niches, their position opposite the entrance being consistent with lamp niches found in other undercrofts in the city.

Figure 6 is a sectional reconstruction demonstrating how such a structure would have worked, the angled floor of the sockets providing an efficient footing to resist the thrust of the timber ribs.

In summary the survey and documentary search undertaken on the Cow Tower has served to emphasize the importance of assessing apparently well-studied monuments as closely as possible. Considerable information frequently resides within wall fabrics and archives to enhance and occasionally overturn the accepted record.

VI. THE CHASES AND ARCH-HEADED HOLES: AN ALTERNATIVE VIEW. *By* T. P. SMITH

I am grateful to the principal authors of this paper for allowing me to add an alternative interpretation of the puzzling holes and chases at ground-floor level of the Cow Tower. This interpretation was originally developed independently, and in reaction to Mr A. D. Saunders's proposals, following a site visit with Mr D. H. Kennett in 1986. Subsequently, a site meeting with Mr B. S. Ayers and Mr R. Smith in 1987, though it failed to bring agreement, enabled us to discuss our differences in a most irenic spirit.

I am in large agreement with the interpretation of the building offered in this paper, and with Saunders's proposal that it was a *bastille* or artillery tower.⁵⁷ The only point of disagreement remains the date and nature of the holes and chases, which I am inclined to see not as primary features, but as secondary, and to some degree debased, alterations to a structure otherwise marked by the consummate skill of its brickwork construction. (In the following discussion reference should be made particularly to the elevation drawing, Fig. 4.)

First, it would be curious if the irregularity which these show should occur *as a primary feature* in a building which exhibits, especially in its brick-built newel-stair, an instance of the finest medieval brickwork in the country, calling for the utmost skill on the part of the brick-layers and for fully conceived designs on the part of the architect/master craftsman responsible for its planning. The arch-headed holes are at different heights, whilst the chases reach to different points; some of the chases have their upper surfaces lined with bricks on-edge whilst others do not; they are at different angles and show different degrees of curvature; their relationships to the arch-headed holes are different: some meet the arches at their springings, others much higher on the haunches; in some cases the chases meet more or less at an angle, in others they meet at a horizontal chase some 2 ft (0.6 m) or more in length; over the doorway (42) two adjacent chases are arranged most awkwardly and without the arch-headed holes. It is, of course, possible that *some* of these irregularities could have been masked within the overall structure envisioned by the authors; but not all of them could have been, particularly the horizontal chases at the heads of only *some* of the diagonal chases. Moreover, my experience of medieval brick buildings (including vaulted structures in Norwich, as in the Blackfriars' undercroft) does not include such careless structural work. That such sloppy work should be produced by the builders of the newel-stair and the other brick features of this well-constructed tower I find hardly credible!

Secondly, examination of the chases convinces me that they have been hacked out of a pre-existing wall: in several cases bricks have actually been chopped through. So, too, the associated arch-headed holes appear to have been hacked out and their heads inserted. That the arch-heads are of similar fabric to the rest of the building is accounted for by the fact that sufficient bricks would have been removed whole (or nearly so) from all this hacking about to be re-used in the arch-heads. On the E. side one of the holes (36) cuts into one of the (primary) triangular-headed recesses (37), despite Saunders's assertion that the chases 'respect' these recesses.⁵⁸ In the discussion above it is noted that the chases and holes are lined with brick, in some cases 'extending beyond the brick facing, an impossible achievement if they had been cut in subsequent to the construction of the tower'. In fact, however, inspection of the fissure on the N. side reveals that the flint core at ground-floor level is very thin, the basic fabric being of brick (unlike higher levels, where the brickwork really is a 'skin' to flint construction).⁵⁹ The brick 'linings' seem therefore to be part of the primary structure, that is not actually *linings* at all. In a few cases, as noted above, the thin flint core is exposed in the backs of the holes, consistent with the latter's being hacked out at a later date.

Third, the absence of any forethought in setting out the work is shown above the E. jamb of the doorway (42), where two chases meet each other very awkwardly. The arrangement N. of the fireplace (1) is also uncomfortable. This lack of proper planning is sufficient to explain too the fact that the ground-floor window (30) *appears* to cut through the line of the chases; rather, the chases approach the window but cannot continue (of course) over the opening and are simply stopped short. There is no reason to accept that the window itself is other than primary.⁶⁰ Once more, it is very hard to see this careless setting-out as the work of the builders of (say) the newel-stair.

Fourth, it looks as though the work of hacking-out was never completed. Certainly some of the holes have an unfinished appearance and it is evident that the chases never had masonry actually mortared into them, although this must have been the intention (see below). Further, as already noted, above the doorway (42) the arch-headed openings are altogether missing — an indication surely of unfinished work?

Finally, the disposition of the holes and chases seems to be dictated by the presence or absence of other pre-existing features — doorway, window, fireplace, lamp niches — and the chases themselves have been arranged so as to fit around these features. Although the differing heights are worked into the reconstruction offered above and in Figure 6, it is surely significant that the holes occur at the higher level always and only when there is some other feature preventing their being set at the lower level. If this work is primary, it can only indicate a lack of foresight in planning which is wholly at variance with the rest of the building — the newel-stair and its entrances in particular. Moreover, this almost aleatoric approach to design would have resulted in a peculiarly asymmetrical, haphazard-looking structure.

In the light of this accumulation of evidence, the conclusion seems to me irrecusable that the chases and arch-headed holes are secondary features. I am thus unhappy with the ingenious, though unparalleled, structure offered in the previous

section of this paper and illustrated in Figure 6. Besides reasons for this rejection already touched upon, it may also be questioned whether the arch-headed holes are appropriate as housings either for corbels (as suggested by Saunders) or for beam-ends (as suggested above). Both corbels and beam-ends are normally (always?) embedded within the brickwork fabric — which is, in effect, built around them — without arches. Indeed, the presence of these holes may too readily have led to the assumption that they are *sockets*; from their arched heads and their generally shallow elevations, I am inclined to see them as not intended to house *anything* (see below). Moreover, the chases do not form the proper arch-shapes which they would have to take if they are indeed the housings for wall-arches to a medieval vault, as proposed by the principal authors of this paper; and the fact that the arch-headed holes are missing altogether above the doorway (42), where there are no proper housings either for corbels or for beam-ends, makes any such reconstruction of a primary vault difficult to accept. Nor is it really possible to accept the picture of a vault 'with two pitches in each segment', for the arch-headed holes (or the places where the missing ones were intended to be, above the doorway (42)) do not fit this pattern. Those which were intended to be above the doorway would both have been set at the higher level, as is shown by the chases and by the presence of the doorway itself. Thus, reading the elevation drawing (Fig. 4) from left to right, the disposition is: three at the higher level, two at the lower level, two at the higher level (though actually lower than those above the doorway), and one which is actually at an intermediate level (40).

If all this be so, however, two problems remain. First, there is the question what form the primary flooring took. The very irregularity of the chase-heads rules out their having consistently destroyed previous beam-holes. One possibility is that the put-logs served as beam-holes at this level. They are, to be sure, considerably smaller than the beam-holes of higher levels, although they are more numerous, and any floor carried in them would presumably have required some sort of supporting framework — a central post at the very least. They seem, however, too high to form such a floor, especially with regard to the doorway (29). (On the other hand, the chase-heads are perhaps too low for a primary floor.) An alternative suggestion — and the one that I am inclined to favour *faute de mieux* — would be of a freestanding timber structure within the bottommost storey of the tower, not unlike that proposed by Saunders though unrelated to the (later) chases; a variation of this, also suggested by Saunders,⁶¹ would be an open gallery around the inside of the tower at 'first-floor' level; this is possible, and indeed beguiling, since it would explain the absence of a fireplace at 'first-floor' (that is, open gallery) level. Excavation within the tower *might* be able to settle this point.

The second problem concerns the nature and date of the structure — here understood as secondary — which was held by the holes and chases. Despite the steep angle of some of the chases, a masonry (presumably brick) structure is to be envisaged. Some of the chases curve slightly in elevation and all, of course, curve in plan: it would have been some most awkwardly shaped timbers indeed that could have been housed in such emplacements; and the degree of craft skill required to produce them would be out of all proportion to that exhibited in general by this

inferior quality secondary work. Nor, one is inclined to think, would the game really have been worth the candle! Thus a vaulted structure of masonry, perhaps utilizing a central pier, is to be thought of. Because of the arched heads of the holes, because of their shallow nature, and because the chases in most cases fail even to reach them (see Fig. 4), it is unlikely that they were intended to house corbels. In fact, as intimated above, it is unlikely that they were intended as housings at all. It seems more likely that they were hacked out with the sole purpose of facilitating the construction of the arches above them. That is to say, the thrust from the proposed vault would be carried by relieving-arches contrived in the wall, rather than by corbels: the arches, not the holes beneath them, are the significant features. Probably the intention was to refill the spaces beneath the arches, although this was never done. All in all, some hurriedly executed, scarcely planned, work is to be envisaged, posterior to the tower's original construction. Since the spaces were *not* filled in, since two of them were not even made, and since (as it would appear) the chases did not actually hold the masonry work intended for them, we can be reasonably certain that this hasty project was never in fact completed.

The most likely occasion for such hurried refurbishment is Kett's Rebellion of 1549, some details of which, as they affect the Cow Tower, are set out in the documentary section of this paper.⁶² Not only does the concentration of the insurgents on this side of the city provide a context for work on the tower, but the rebellion's short-lived nature also explains why the work was (as it would seem) unfinished: the danger had simply passed. Precisely what had been intended is not altogether clear. Not a gun-emplacement, for the top of the vault would be well below any openings. Possibly an ammunition store, with guns at the top of the tower, was intended: the 6 ft (1.8 m) thick walls would provide fully adequate protection against 16th-century bombardment, though such a store would be vulnerable to a 'lucky' shot coming through the top of the tower. A hastily constructed vault, with the conoids rapidly filled with sand or rubble, would provide the necessary protection. This scenario would fit work by (impressed?) civilians rather than by professional military engineers, who surely would have created something better than the shoddy work at the Cow Tower. Although other events could have occasioned this speedy work, the exigencies of Kett's Rebellion do indeed provide the most plausible occasion.

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APPENDIX I. *By* MARGOT TILLYARD

Chamberlains' Account 1398/99 (NRO case 7a and b)

The Chamberlains' Account is found in the Chamberlains' Roll held among the City Archives at the Norfolk Record Office. It is translated here by kind permission of the Norfolk

Record Office. The original is in Latin although some words were rendered in English; these are italicized in the translation.

Le Dungeon

Carters

First paid to Tomkyn <i>Cartere</i> for carriage of 60 carts of stone	8s. 4d.
To the same for carriage of 5 carts of stone and 4 carts of sand	18d.
To Richard Large <i>Cartere</i> for carriage of 38 carts of stone to <i>le Dungeon</i>	8s. 2d.
To the same Richard in full payment for carriage of 16 carts of stone	2s.
To the same Richard for carriage of <i>le Wyndas</i> [windlass] and its gear to <i>le Dungeon</i>	5d.
To John Large <i>Cartere</i> for carriage of 15 carts of stone and 4 carts of sand	42d.
To the same John for carriage of 6 carts of stone	16d.
To the same John for ½ a day there and 2 carts of sand	15d.
To William Large <i>Cartere</i> for the carriage of 7 carts of stone and 5 carts of sand and 1 cart of lime	34d.
To Richard Cole <i>Cartere</i> for carriage of 18 carts of stone and sand	2s.
To the same Richard for carriage of sand	8s.
Paid to the son of Geoffrey <i>Cartere</i> in full payment for carriage of stone	12d.
To John Bonet <i>Cartere</i> for carriage of 5 carts of stone	15d.
To John Copping <i>Cartere</i> for carriage of stone and sand	2s.
Total	40s. 7d.

Carpenters

First paid to Nicholas <i>Wright</i> for 7 days working at <i>le Dungeon</i>	3s. 2d.
To Nicholas <i>Wright</i> and John Skut Carpenters for 4 days there	4s.
To William Snoryng and Nicholas his mate Carpenters for 7 days there	7s.
To Adam <i>Wright</i> for 3 days there	18d.
Total	15s. 8d.

Masons

First paid to Robert Aillesham <i>Mason</i> for 48 ½ days working at <i>le Dungeon</i> at 6d. a day	24s. 3d.
Paid to John Bokenham <i>Mason</i> for 24 ½ days working there at 6d. a day	11s. 9d.
To Richard Bonde <i>Mason</i> working there for 21 ½ days at 6d. a day	10s. 9d.
To William Tilly <i>Mason</i> working there for 33 ½ days at 6d. a day	16s. 9d.
To Robert Parker <i>Mason</i> working there for 8 days at 6d. a day	4s.
To Robert Beeston <i>Mason</i> for 3 days there	18d.
To Richard Dikelburgh <i>Mason</i> for 17 ½ days there at 6d. a day	8s. 9d.
To John Alcok <i>Mason</i> for 19 ½ days at 6d. a day	9s. 9d.
To Adam atte Chirche <i>Mason</i> for 5 ½ days at 6d. a day	33d.
To Hugh Twytneye <i>Mason</i> for 18 ½ days there at 6d. a day	9s. 3d.
Total	£4 19s. 6d.

Labourers

Paid to Roger Whityng <i>laborer</i> working at <i>le Dungeon</i> for 11 days at 4d. a day	3s. 8d.
To John <i>laborer</i> for 6 ½ days there at 4d. a day	2s. 2d.

To John Chapman <i>laborer</i> for 33 days there	12s. 10d.
To John Rudlond <i>laborer</i> 10 ½ days there at 4d. a day	3s. 6d.
To John atte Welle <i>laborer</i> for 11 ½ days there at 4d. a day	3s. 10d.
To Simon <i>Laborer</i> for 10 days there at 4d. a day	3s. 4d.
To Henry Glover <i>laborer</i> for 13 days there at 4d. a day	4s. 4d.
To the same <i>Henry</i> 10 days at 5d. a day	4s. 2d.
To Thomas <i>Laborer</i> for 5 days there at 4d. a day	20d.
To Henry Palmer <i>laborer</i> for 5 ½ days there	22d.
To John Brightled <i>Laborer</i> for 10 days at 4d. a day	40d.
To John Tilly <i>Laborer</i> for 12 ½ days at 4d. a day	4s. 2d.
To the same John Tilly for 21 days there at 5d. a day	8s. 9d.
To Robert <i>Laborer</i> for 5 days at 4d. a day	20d.
To Walter Smert <i>Laborer</i> for 9 ½ days there at 4d. a day	3s. 2d.
To the same Walter for 20 days at 5d. a day	8s. 4d.
To Robert, servant of Adam Riedere for 5 ½ days	2s. 3d.
To John Barkshire <i>laborer</i> for 5 ½ days there at 4d. a day	22d.
To the same John for 20 days at 5d. a day	8s. 4d.
To the same John and Walter his mate for 6 days	5s.
For a reward given to the said John and Walter	6d.
To John Lekman <i>laborer</i> for 2 ½ days	10d.
To Thomas <i>laborer</i> servant of Hugh Twytneye for 5 days	20d.
To Bartholomew Cosyn <i>laborer</i> for 21 days at 4d. a day	7s.
To the same Bartholomew for 6 days	2s. 6d.
To Robert Potager <i>laborer</i> for 3 days	13d. [sic]
To William Lancastre <i>laborer</i> for 4 ½ days	18d.
To William Barbour <i>laborer</i> for 24 days at 4d. a day	8s. 1d. [sic]
To the same William Barbour for 16 ½ days at 5d. a day	6s. 10d.
To John Thresshere <i>laborer</i> for 8 days at 4d. a day	2s. 9d. [sic]
To the same John for 5 ½ days	2s. 3d.
To John Boys <i>laborer</i> for 8 ½ days at 4d. a day	2s. 10d.
To the same John for 6 days	2s. 6d.
To Thomas Neve <i>laborer</i> for 6 days	2s. 6d.
To Robert Cruce <i>laborer</i> for 6 days	2s. 6d.
To Robert Riedere <i>laborer</i> for 5 days	20d.
To the same Robert for 6 days	2s. 6d.
To Robert Gardener <i>laborer</i> for 12 days at 4d. a day	4s.
To John Killaka <i>laborer</i> for 3 days	12d.
To John Braunche <i>laborer</i> for 14 days at 4d. a day	4s. 8d.
To John Dolfyn <i>laborer</i> for 1 ½ days	6d.
To Robert Yool <i>laborer</i> for 2 days	8d.
To William Kirkeby <i>laborer</i> for 6 ½ days	2s. 2d.
To John Heyneman <i>laborer</i> for 4 days	16d.
To a labourer for 4 days	16d.
Total	£7 13s. 6d.

Stonmyners

To Richard <i>Stonmynere</i> for 40 ½ carts of stone [flint]	12s. 11d.
To John Braunford <i>Stonmynere</i> for 30 carts of stone	10s.
To Adam <i>Stonmynere</i> for 53 carts of stone	12s. 10d.
To the same Adam for 9 carts of stone	27d.
To Roger Faunere and his mate <i>Stonmyners</i> for 10 carts of stone	40d.
To John Drayton <i>Stonmynere</i> for 2 carts of stone	7d.
Total	41s. 11d.

Small Payments

First paid to John Goby <i>Botman</i> for the carriage of bricks and lime for 2 days	8d.
Payments for drink at various times	19d.
To William <i>Hirdele</i> for 32 <i>hirdeles</i>	5s. 6d.
To Robert Perkyns for 1000 bricks	5s. 6d.
To John Castre for cutting <i>starre</i> [sedge] for 2 days (for roofing <i>le dungeon</i>) [insertion by the Chamberlains]	14d.
Paid by hand of Sampson Bakster for 200 <i>Sparres</i> bought	25s.
To Ralph Rieder for 23,000 bricks	£5 15s.
To Michael <i>Lymbrennere</i> for 7 days	2s. 4d.
For <i>Middelspikyng</i> [general purpose nails]	1d.
For one <i>barell</i> bought	4d.
To Godfrey <i>Coupere</i> for 12 <i>hopes</i> for 2 <i>barells</i>	8d.
To the same Godfrey for 6 <i>hopes</i> and 2 <i>barellsheds settingin</i>	4d.
To the same Godfrey for 9 <i>hopes</i> and 1 <i>barellshede settingin</i>	6d.
Paid by hand of Thomas Willyot for carriage of 20,000 bricks	2s. 1d.
For 4 <i>shoveles</i>	6d.
For carriage of <i>hirdeles</i> and <i>piles</i> from <i>le Stathe</i>	4d.
For 2 cords called <i>basteneropes</i>	5d.
In payments	4d.
For carriage of 100 <i>Sparres</i> [fir poles]	1d.
For carriage of 1 <i>cabyll</i>	1d.
For the hire of John de Mendham's boat 10 times	14d.
Paid by hand of Sampson Baxtere for carriage of 3,000 bricks from the <i>Common Stathe</i> to <i>le Dungeon</i> by water	4d.
To William Knappe <i>Botman</i> for carriage of 200 <i>Sparres</i> from Jernemuth	20d.
For the hire of a boat at various times for the carriage of <i>hirdeles</i> to <i>le Dungeon</i>	10d.
For payment of William <i>Hirdele</i> for 3 dozen <i>hirdeles</i> bought for <i>le Dungeon</i>	6s. 8d.
For 2 <i>bolis</i> bought for <i>le Masones</i>	4d.
For 1 board bought	2d.
For 2 <i>shovelis</i> bought	10d.
For 2 <i>troues</i> [troughs]	4d.
To Lawrence <i>Coupere</i> 2 <i>bokettes</i> bought	12d.
To Richard Wilbeghe 3 ½ thousand bricks	17s. 6d.
To John Eldrede for 1 <i>barwe</i> [barrow]	8d.
To Robert Snape <i>mason</i> for 12 <i>Shotholes</i> for <i>le Dungeon</i> at 9d. a piece	9s.
To the same Robert for 30 <i>Nowels</i> [newel-stones] at 3d. a piece	7s. 6d.

For a cord called a <i>Wyndyngrop</i> for <i>le Dungeon</i> [for the windlass]	5s. 2d.
For 1 <i>Wyndynhook</i> [for the windlass]	2d.
For one cartload of timber for <i>le Dungeon</i>	3s. 8d.
For 100 of <i>Splentnaill</i>	3d.
For 4 <i>barwes</i>	2s. 5d.
For 4 <i>trowes</i>	8d.
For 15 <i>bastenropes</i>	3s.
For making <i>le Wyndas</i> and <i>Rote</i> [the windlass and wheel]	2s.
For a line bought for <i>le Dungeon</i> called a <i>fermetree</i> [?] for <i>Le Wyndas</i>	20d.
To John Eldred for 2 poplar boards	8d.
To Hamon Barbour for a beam of ash for <i>le Dungeon</i>	10d.
To John de Swanton for <i>trowes</i> and making a <i>bosse</i> [mortar-carrier] for <i>le Dungeon</i> and for one <i>lightere</i> for carriage	15d.
To William Blakehomore for 67 <i>treys</i> of <i>lyme</i> for <i>le Dungeon</i> at 18d. <i>le Treys</i>	£4 17s. 6d.
To the same William for 5,350 bricks at 5s. the 1000	27s. 3d.
For carriage of the said bricks and lime	3s.
To Thomas de Fyncham for 3000 bricks for <i>le Dungeon</i>	12s.
To William Chaundeler for 1000 bricks for <i>le Dungeon</i>	5s.
For 1 <i>barell</i> bought for <i>le Dungeon</i> for <i>tubbes</i>	6d.
For making of 4 <i>tubbes</i> from the said <i>barell</i>	6d.
	Total £18 18s.

Total of payments made this year for *Le Dungeon* as appears in the sections above amounts to the sum of £36 17s. 2d.

NOTES

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² Postgraduate student, University of East Anglia.

³ Freelance documentary researcher.

⁴ Independent archaeologist; Chairman, British Brick Society.

⁵ A. D. Saunders, 'The Cow Tower, Norwich: An East Anglian Bastille?', *Medieval Archaeol.*, 29 (1985), 109–19.

⁶ Norfolk Record Office (hereafter NRO):

Case 18a Chamberlains' Book 1384–1448

Probable reference in account for 1386/87 f.7d.

Certain reference in account for 1398/99 f.29.

⁷ NRO Case 3. St Helen Private Deed Holmstrete 105. 1450; and NRO Case 17b Domesday Book f.13d.

⁸ F. Blomefield, *History of the County of Norfolk IV* (London, 1805–10), 376.

⁹ NRO Case 3. St Helen Private Deed Holmstete 35. 37. 1267.

¹⁰ NRO DCN 45 Private Deed Holmstrete 853.

¹¹ NRO Case 17b. Domesday Book f.33d.

¹² Blomefield, op. cit. in note 8, 402.

¹³ Ibid.

¹⁴ Calendar of Patent Rolls 1377–81, 121, quoted by H. L. Turner, *Town Defences in England and Wales* (London, 1970), 137.

¹⁵ 39s. 0½d. in 1386/87 to a carpenter and a labourer for work (necessitating iron nails) 'apud *le pale*' may refer to this paling: NRO Chamberlains' Book 1384–1488 f.7d.

¹⁶ W. Hudson and J. C. Tingey, *The Records of the City of Norwich I* (Norwich, 1906), lx.

¹⁷ NRO Case 26 f.2 (the copy kept by the Great Hospital).

¹⁸ NRO Case 18a. Chamberlains' Book 1384–1448 f.4.

¹⁹ Ibid., f.4d.

²⁰ R. Fitch, *Gates of Norwich* (Norwich, 1861), xi–xiv.

²¹ An item of 20d. spent on reeds may possibly be associated with work on the tower. NRO Chamberlain's Book 1384–1448 f.29. See also note 25.

²² Ibid., f.5, account for 1338/39.

- ²³ See L. F. Salzman, *Building in England down to 1540* (Oxford, 1967) for all building terms and information.
- ²⁴ Saunders, op. cit. in note 5, 115.
- ²⁵ Cf. Salzman, op. cit. in note 23, pl. 6b and E. C. Fernie and A. B. Whittingham, 'Communar and Pitancer Rolls of Norwich Cathedral Priory', *Norfolk Rec. Soc.*, xli (Norwich, 1972), 35.
- ²⁶ W. Rye (ed.), *Calendar of the Freemen of Norwich 1317-1603* (London, 1888).
- ²⁷ Fitch, op. cit. in note 20, xvii.
- ²⁸ Ibid., and see note 14.
- ²⁹ Ibid.
- ³⁰ NRO Cases 3 and 4. Private Deeds Holmstrete 1425.
- ³¹ See note 7.
- ³² NRO Case 10f.
- ³³ NRO Case 17b. Domesday Book f.68.
- ³⁴ Fitch, op. cit. in note 20, xx.
- ³⁵ NRO Case 18a. Chamberlains' Accounts 1537-47 f.113.
- ³⁶ NRO Case 18a. Book of Chamberlains' Accounts 1541-50, entries for 2 and 23 June 1543.
- ³⁷ Op. cit. in note 35, f.191.
- ³⁸ Op. cit. in note 35, f.205.
- ³⁹ F. W. Russell, *Kett's Rebellion in Norfolk* (London 1859).
- ⁴⁰ Ibid.
- ⁴¹ NRO Case 24a. Great Hospital Account 1549/50.
- ⁴² Op. cit. in note 36, f.329.
- ⁴³ NRO Case 18d. Proceedings of the Assembly 1553-83, f.105.
- ⁴⁴ Ibid., f.115.
- ⁴⁵ NRO Case 16c. Mayor's Court Paper 47.3.
- ⁴⁶ J. A. Wight, *Brick Building in England* (London, 1972), 339.
- ⁴⁷ Norwich, Colman and Rye Library, E. A. Tillett, Scrapbook 13.
- ⁴⁸ Ibid.
- ⁴⁹ W. Hudson and J. C. Tingey, *The Records of the City of Norwich II* (Norwich, 1910), 52.
- ⁵⁰ A. Leach and J. Bilson, 'The Building of the North Bar at Beverley', *Trans. E. Riding Antiq. Soc.* (1896).
- ⁵¹ M. W. Atkin, 'The Chalk Tunnels of Norwich', *Norfolk Archaeol.*, xxxviii iii, (1983), 313-20.
- ⁵² Hudson and Tingey, op. cit. in note 49, 135.
- ⁵³ F. W. Brooks, 'A Medieval Brickyard at Hull', *J. Brit. Archaeol. Assoc.*, iv (1939), 151-74.
- ⁵⁴ Op. cit. in note 5.
- ⁵⁵ Saunders disagrees; op. cit. in note 5, 111.
- ⁵⁶ Op. cit. in note 5, 114.
- ⁵⁷ Saunders, op. cit. in note 5, 109-19. It is perhaps worth noting here that a brick tower (De Bijlhouwerstoren), remarkably similar to the Cow Tower although integrated into a continuous section of walling, formerly existed at Utrecht in the Netherlands, as part of the city defences. This tower too had a semicircular stair-turret on the side away from the field. Numerous drawings of the tower survive, but its details are best seen in a photograph taken early during its demolition in 1872, reproduced in L. C. van der Vlerk *et al.*, *Utrecht ommuurd* (Vianen, 1983), Fig. 21.
- ⁵⁸ Saunders, op. cit. in note 5, 114.
- ⁵⁹ The use of brick as facing to other materials was certainly not general in the Middle Ages, as numerous ruinous buildings testify. But it may have been somewhat more common than is usually realized. Certainly the earliest work at Queens' College, Cambridge (1448 onwards) is of clunch faced with brick: Royal Commission on Historical Monuments, *An Inventory of . . . the City of Cambridge* (London, 1959), 168. Although published accounts do not seem to mention the fact, a good deal of the work at Caister Castle, Norfolk (1432 onwards) is of cobbles, often used as the core to brick facings: personal observation by D. H. Kennet and T. P. Smith, 1987.
- ⁶⁰ Here I am in agreement with the principal authors of this paper, *contra* Saunders, op. cit. in note 5, 111.
- ⁶¹ Ibid., 114.
- ⁶² According to Walter Rye, the top of the Cow Tower was damaged by Captain Drury of the king's side: quoted in J. Wentworth Day, *Norwich through the Ages* (Ipswich, 1976), 60.

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