

# Medieval building stone at the Tower of London

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## Introduction

ALTHOUGH much has been written about the Tower of London and its buildings, the different types of building stone used have been largely ignored. This is perhaps because there has been a vast amount of post-medieval rebuilding and refacing. However, much original masonry of many different phases remains; this can be supplemented by the documentary sources which often mention the building stone, its cost, and its source.

In January 1990 a small group of geologists and archaeologists<sup>1</sup> visited the Tower and examined original areas of masonry in many structures, thanks to the help of the authorities. This brief article summarises our observations. The locations of the buildings mentioned are shown on Fig. 1.

## The White Tower

Apart from the Roman city wall (largely built of Kentish Ragstone), the great early Norman keep, later known as the White Tower, is the earliest masonry building surviving at the Tower. Unfortunately most of the external ashlar masonry is a refacing of Portland Stone in the 18th century. At this time almost all the quoins, and the doors and windows, were completely refashioned. Inside the White Tower, however, it is possible to see quite a lot of original ashlar masonry, and perhaps the best place is in the exceptionally fine chapel of St John. Here the main material is Caen Stone, from Normandy, which first came into England at this time (the later 11th century). Caen Stone is not, however, the only material. A careful look at the masonry shows that there is another slightly darker type of stone, which on closer examination is seen to be packed with casts of broken shells. This is Quarr Stone from the north-east corner of the Isle of Wight, which was used much nearer to its source at this time (for example, in the contemporary

Winchester Cathedral), but which soon became scarce<sup>2</sup>. After this time, it is not found in London, although a similar stone from the Isle of Wight was brought to the Tower in the later 13th century (see below). In the north-east part of the White Tower, some Reigate Stone is also seen, but these blocks are almost certainly later medieval repairs. Documents tell us that in 1248 Henry III ordered 'all the leaden gutters of the Keep, through which the rainwater shall fall from the top of the same tower, to be carried down to the ground; so that the wall of the said tower, which has been newly white-washed, may be in no wise injured by the dropping of rainwater.'<sup>3</sup> Hence its name: The White Tower.

## Late 12th century work

Apart from the fragmentary remains of the Wardrobe Tower, which straddles the Roman city wall south-east of the White Tower (and may date from Henry II's time), the next major area of masonry to be built was the Bell Tower. This is at the south-west corner of the Tower and marks the limit of the enlarged castle of Richard Coeur-de-Lion's time. The tower was actually built in c 1190 by William Longchamp, bishop of Ely, who was in charge of the kingdom, as Richard had just left for the Crusades<sup>4</sup>. This tower and the contemporary curtain wall running east from it, was originally built along the waterfront of the Thames. It possibly sits on and replaces the late Roman riverside wall, but all the visible masonry, including that uncovered in the magnificent plinth, is clearly late 12th century in date<sup>5</sup>. Of particular interest is the very large plinth which was exposed in 1928. It has seven offset courses and a higher moulded string course that are almost certainly made of a Wealden 'Marble' (Fig. 2). The *Guide* and earlier reports say it is of Purbeck Marble<sup>6</sup>, but the large 'Paludina' shells

1. Dr Bridget Cherry, Professor Desmond Donovan, Mr Philip Lankester, Mr Geoff Parnell, Dr Eric Robinson, Mr Bernard Worssam and the author. We are particularly grateful to Mr Parnell for making the arrangements, and I am much indebted to members of this party for commenting on an earlier draft of this essay.

2. See T Tatton-Brown 'The use of Quarr stone in London and East Kent' *Medieval Archaeol* 24 (1980) 213-5.

3. L F Salzman *Building in England down to 1540* (1952) 266.

4. See the excellent new guide book to the *Tower of London* (1984) by R Allen Brown and P E Curnow, 15 and 44-6 for the documentary evidence, and a description of the Bell Tower.

5. Nick Fuentes' speculations about a lighthouse here (*London Archaeol* 6, no 8, 211-2) make no sense.

6. *The History of the King's Works* Vol. 2 (1963) 710-4; and P E Curnow 'The Wakefield Tower, Tower of London' in *Ancient Monuments and their interpretation* (eds) M R Apted, R Giland-Beer and A D Saunders (1977) 158-9.

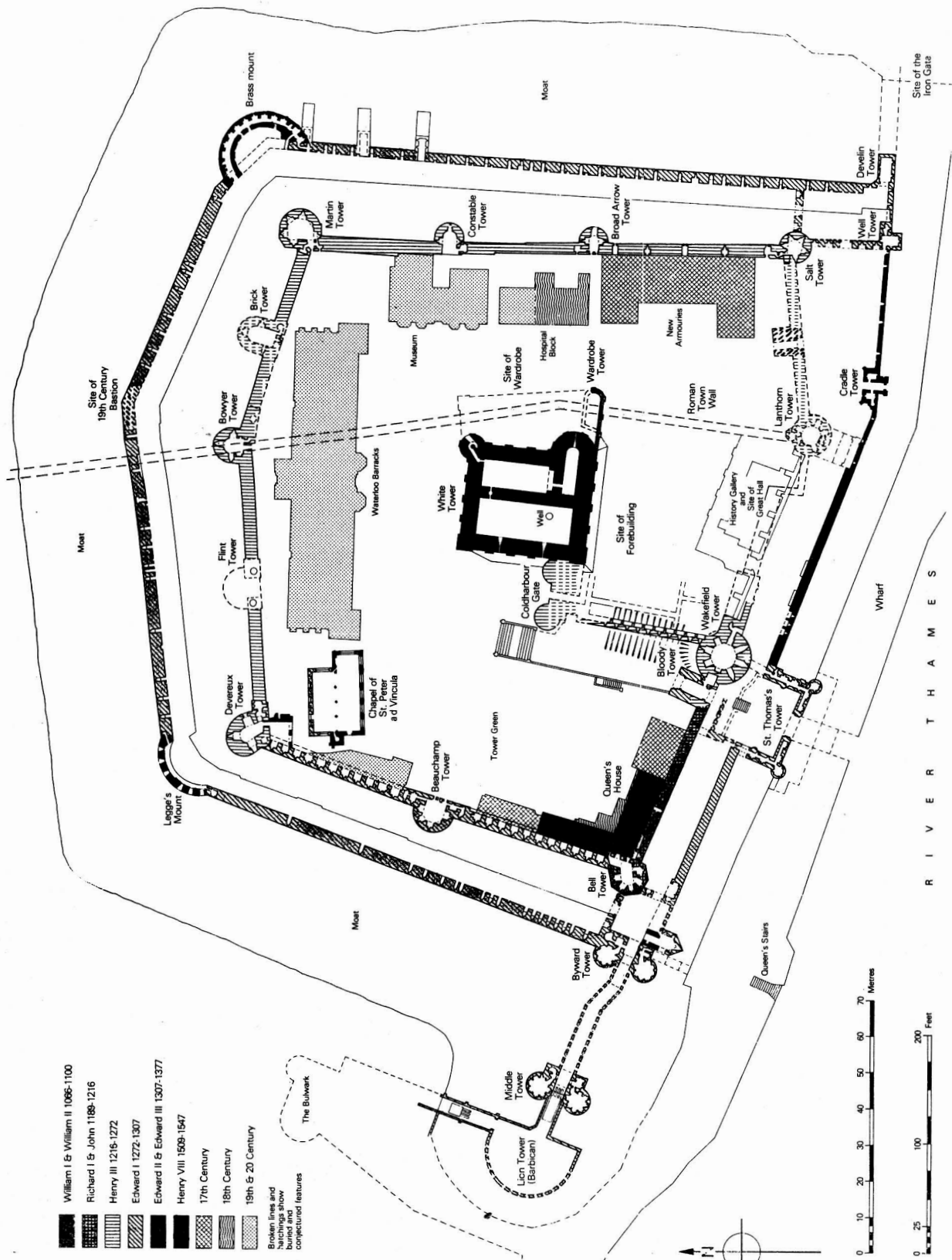


Fig. 1: plan of the Tower of London.

R I V E R T H A M E S



Fig. 2: the Wealden marble string course at the top of the plinth at the junction of the Bell Tower and the curtain.

in it indicate that it is a Wealden 'Marble' rather than Purbeck<sup>7</sup>. These Wealden 'Marbles', i.e. stones that could be polished, are given different names in the different parts of the Low Weald where they are found (i.e. Bethersden, Petworth or Sussex Marble etc.), but all are much alike and no exact source for the Tower stones can be given. It is worth noting that Wealden Marbles, as well as Purbeck Marble, were already being used to pave the new eastern arm of Canterbury Cathedral from c 1180. It must have been used in the curtain and tower plinth as a harder material against which the tidal river could wash.

Inside the ground floor chamber of the Bell Tower, a fine series of ribbed vaults and ashlar piers can be seen. These are of Reigate Stone, which comes from the Upper Greensand at the foot of the North Downs (near the crossing point of the M25 and M23). Reigate or Merstham Stone (later sometimes called Firestone) was apparently first used in London for Edward the Confessor's mid-11th century Westminster Abbey<sup>8</sup>, but it is only used for

7. I am grateful to Bernard Worssam for his comments on this.

8. See *Archaeologia* 83 (1933) 227-236.

9. In the refaced western towers at Westminster Abbey, for example, though much of this was later replaced in Portland Stone. There is, however, still some plain walling in Reigate Stone on the outside of the 15th century clerestory.

10. See the *Guide* (op cit fn 4), 17-20 and Curnow (op cit fn 6), which describes the major excavations of 1967-73. Unfortunately the latter report is muddled and difficult to read. The list of 13th century layers (p. 177) refers frequently to Chilmark chippings. These are surely of Reigate Stone, not Chilmark.

many masonry buildings further afield (for example in the Thames Estuary littorals) from the mid-12th century. By the 13th century it was being used on a large scale for many buildings in London (Henry III's rebuilding of Westminster Abbey, for example) and south-east England. By this time it was perhaps being mined underground. Only a century or so later was it fully realised that it was too soft to use on exposed external work, and Caen and Kentish Ragstone are more commonly used on the outside of London buildings in the late Middle Ages<sup>9</sup>. Some Caen Stone is also found in the Bell Tower, and this stone was used throughout the Middle Ages at the Tower of London, though it may briefly have been hard to obtain after King John lost Normandy in 1204.

### Thirteenth century work

King John's reign ended in chaos in 1216 with several of the royal castles of England being besieged (first Rochester, then Dover and Windsor). Then from the 1220s (i.e. during the minority and early years of the reign of Henry III), the great castles were repaired and greatly strengthened and then given major new masonry buildings for the Royal Palace. At the Tower this work took place in the Inmost Ward immediately south of the White Tower. Unfortunately much of this masonry has been destroyed and only the Wakefield Tower (Fig. 3; earlier called the Blundeville or Hall Tower) survives to show early 13th century work<sup>10</sup>. The



Fig. 3: the Bloody Tower and Wakefield Tower from the south-west.

removal of the Crown Jewels from this tower, and the re-exposure of its lower levels (in 1967-73) has revealed some magnificent fresh ashlar work of Reigate Stone, with much vertically-combed tooling and many masons' marks.

As well as the Wakefield Tower, which was used as part of the royal residential complex of the Inner Ward, lengths of the contemporary inner curtains to the north and east of the Wakefield Tower were uncovered and these too show some fine Reigate ashlar masonry (Fig. 4). Sadly the great hall to the east (of the same date) has been totally destroyed<sup>11</sup>, and only the rubble core of the foundations survive of the Cold Harbour Gate to the north.

In about 1238 the very bold decision was taken to very greatly enlarge the tower on the north-west, north and east (breaching the Roman city wall) to make a large new castle surrounded by a whole series of new semicircular perimeter towers set in a massive new curtain wall. Beyond this, a large moat was dug. A new main gate was built on the west (where the Beauchamp Tower now stands), but this collapsed on the night of 23 April 1240, as the contemporary Chronicle of Matthew Paris tells us. (The whole of this area was rebuilt in the later 1270s when Edward I moved the main entrance to the Tower to the south-west corner.) Of Henry III's towers on the new curtain wall, the Salt, Broad Arrow and Martin Towers in the east curtain, are the most accessible. Despite much later restoration, it is still possible to see original Caen and Reigate Stone and Kentish Ragstone in the walling.

When Edward I came to the throne in 1272, work on his father's curtain and towers no doubt still had to be finished, but in a short time a new plan was evolved to move out and greatly enlarge the moat. A new lower outer curtain was built, and a new large watergate (now called Traitor's Gate) and tower (St Thomas' Tower) was also constructed on the south (Fig. 5). The huge sum of about £21,000 was spent in about a decade (c 1275-85), and by the

11. It was already ruinous in the 16th century. See W Hayward and J Gascoyne's map of 1597 where it is shown 'decay'd'.

12. See *Guide* (fn 4) 22.

13. Salzman (fn 3) 135 and 128.

14. At the time of our visit (Jan. 1990) the upper chamber was being stripped out and we were able to see the interior masonry especially well. Bernard Worssam adds (in correspondence) 'I noted that the lower room of the SE turret had the same vaulted design as the upper room, but was of Reigate Stone. The SE and SW turret upper rooms had stone vaulted ceilings and seemed to be of Caen Stone, as if the better-looking stone had been used for these rather grander apartments.'

end of it the Tower of London was one of the strongest 'concentric' castles in Britain<sup>12</sup>.

Among various documents relating to this work are accounts of 1278 which record that 75 shiploads of Caen Stone were imported containing 89,200 'parpayns' (i.e. stones worked on two parallel faces). This cost £332 2s. In the same year 304 shiploads of grey stone of Aylesford (i.e. Kentish Ragstone shipped down the River Medway) and three shiploads of freestone from Folkestone were brought in<sup>13</sup>. The 'freestone from Folkestone' is Kentish Rag quarried on the foreshore just to the west of Folkestone. This stone is sometimes much more glauconitic than that from the Medway area.

Much other stone was also brought in, and Binstead Stone (from the Bembridge Limestone on the north-east side of the Isle of Wight) can be seen, for example, as ashlar in the plinth of Edward I's new outer curtain wall. It was being used at exactly the same period on the outer nave chapels and enlarged flying buttresses at Chichester Cathedral as well as at the nearby Royal Castle of Portchester. The western sector of the outer curtain wall, northwards from the Byward Tower, includes some slabs of Wealden Large - 'Paludina' Marble from a bed roomm thick.

At St Thomas' Tower (1276-8) the basal courses of the plinth are of a finely sandy limestone with brachiopods, probably Kentish Rag from near Folkestone. The plinth has some Binstead Stone

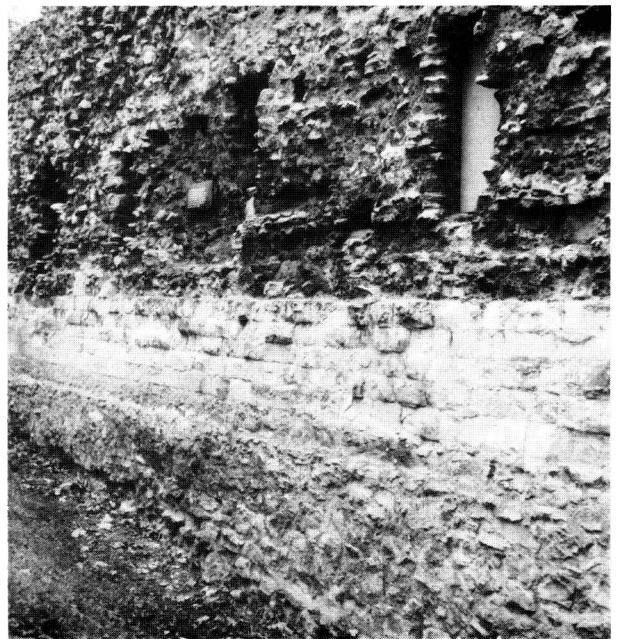


Fig. 4: Reigate stone ashlar on the west side of the inner curtain wall north of the Wakefield Tower.

ashlar facing as well. Inside Reigate Stone is used (in high quality newels and fire-backs, for example) and Caen Stone can be seen in the shafts and capitals in the angle turrets. (The Totternhoe Stone used in the window jambs is later)<sup>14</sup>. The south-east turret in the upper room, which was probably used as an oratory, had a piscina on a Purbeck Marble window-sill on the south side, and a basin (without a drain hole) on the sill on the north side.

In 1978 a postern gate was rediscovered on Tower Hill at the southern end of the Roman city wall. It had probably been built at the end of the 13th century after the construction of the huge new northern moat to the Tower. John Stow, the Elizabethan historian of London, tells us that it collapsed in 1440, and that originally it has been a 'fair and strong arched gate, partly built of hard stone of Kent, and partly of stone brought from Caen in Normandy'<sup>15</sup>. It was never properly rebuilt and the re-excavated lower portion can now be seen near the modern underpass beside the main road. This lower portion, which owes its good state of preservation to its collapse into the moat, displays the finer ashlar of Kentish Rag and Caen Stone that Stow mentions, as well as some Purbeck Marble (the latter perhaps re-used)<sup>16</sup>.

#### Fourteenth century work

King Edward II (1307-1327) started the final stage of the rebuilding of the Tower though the majority of the work was carried out in the very long reign of his son, Edward III (1327-1377) with final

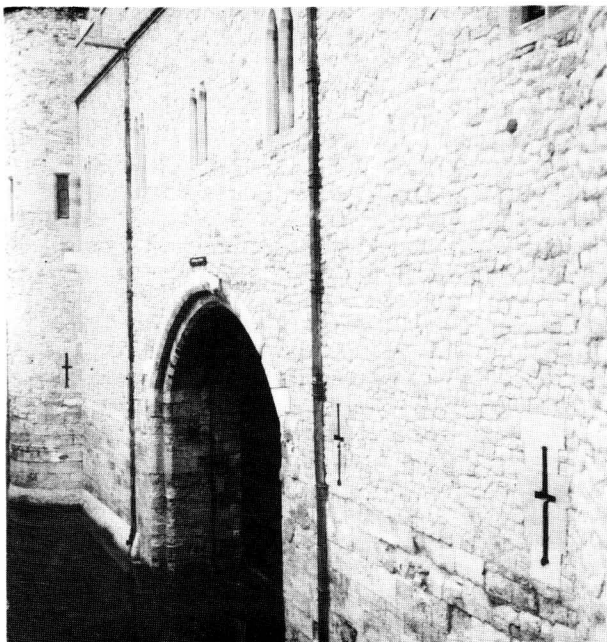


Fig. 5: Traitors' Gate and St. Thomas' Tower from the east.

completion under his grandson, Richard II (1377-99). Most of this work was concentrated on the southern side of the Tower where the outer curtain was built 'broader and higher' than before. Work had commenced on the south side in Edward I's time<sup>17</sup>, but it was not until 1336 that it was carried on, and in this year the outer curtain west of St Thomas' Tower was heightened and strengthened. Then in 1339-41 the whole of the southern inner curtain (from the Bell Tower to the Salt Tower) was heightened, crenellated and repaired. This heightening in Kentish Ragstone rubble can still clearly be seen on the upper part of the wall east of the Bell Tower. There is also some fine Ragstone and Caen Stone ashlar repair work in the lower face. In preparation for this work '400 stones of Maydenstone [i.e. Maidstone] called ounal' (probably ashlar) were brought in for 'the water gate' in 1338<sup>18</sup>. This new 'watergate' in the inner south curtain was between the Lanthorn and Salt Towers. It was altered in 1506, when Henry VIII's long gallery was built over it and then demolished in two stages in 1776 and 1826<sup>19</sup>.

In 1348 a new privy water gate to the royal apartments was started. Now called the Cradle Tower, it was not completed until 1355, probably because of the Black Death. Unfortunately, the top part of this gateway was cut down to make a gun platform, and then rebuilt in the 19th century. The lower part of the gateway, however, still contains some very well made mid-14th century masonry (Fig. 6), including some exceptionally fine vaulting. Documents record the bringing in, in 1349, of Beer Stone (100 great stones, of which 50 were worked as voussoirs for the heads of doors and windows), as well as in 1350 of 'Purbeck Stone carried from Westminster to the Tower in a dung boat'<sup>20</sup>. The Beer Stone (a hard chalk) as well as Reigate Stone can be seen inside this tower, while some of the hard outer quoins are in a shelly limestone, perhaps more Binstead Stone from the Isle of Wight. There also appears to be some original Portland Stone, an exceptionally early use of this in London.

Between 1360 and 1362, the old inner watergate (the Bloody Tower) was completely rebuilt with a fine

15. J Stow *Survey of London* (Everyman edition 1956) 27.
16. The extension to the Docklands Light Railway is now being built beneath it.
17. In 1313 a barge-load of 'grey stone called ragg' is recorded in the accounts, followed by 4 barge-loads of 'ragstone of Aylesford' in 1317. Salzman (*op cit* fn 3) 128.
18. Salzman (*op cit* fn 3) 129.
19. *Guide* (fn 4) 33.
20. Salzman (*op cit* fn 3) 132 and 350.

new vault being inserted and a new upper chamber created<sup>21</sup>. Other repairs were going on at the same time, and again there is a record (in 1363) of ‘650 feet of stone called urnell for mending the walls’ being shipped from Maidstone<sup>22</sup>.

When Edward I excavated his huge new outer moat on the west, north and east sides of the Tower, the southern ends were dammed to retain water at high tide. (There were sluices and later tide mills here.) Then during Edward III’s reign a new wharf was pushed out into the Thames east and west of St Thomas’ Tower (the Traitor’s Gate). This was finally put into virtually its present form in Richard II’s time when massive stone walls were built as quays on the front of the wharf. A contract of 1389 documents the building of Tower Wharf with walls 8 feet thick at the base, and faced in ‘ashlar of Kentish stone’, the backing to be of 13 feet of Rag and the remainder of chalk; at every 10 feet a long ‘end-stone’ was to be inserted<sup>23</sup>. The city walls of Canterbury, rebuilt at exactly the same period, still display very distinct long ‘end stones’ holding the face to the core.

### Later work

With this work at the end of the 14th century, major new building at the Tower ceased, and in the 15th century only small-scale work was undertaken. It is significant that, in about 1480, when a new outer bulwark was added to the entrance barbican (the Lion Tower), it was made solely of brick. Brick first appears at the Tower, however, in Edward I’s time, when it was used for the lining of the inner west curtain wall. Red brick then became a common material in the Tudor period, and it was used for Legge’s Mount (a gun platform on the north-west). In 1682-3 it was used to heighten many towers for the use of guns (Bell, Beauchamp, Byward Towers, etc.). Ironically, most of this Tudor and 17th century brickwork has subsequently been restored away and replaced by 19th century Rag and Portland facing. New timber-framed buildings (the Queen’s House and over St Thomas’ and Byward Towers) were also erected in Henry VIII’s time, and in 1532-33 we see the last refurbishing and rebuilding work for the Tower as a Royal Palace. The use of Caen Stone is again documented, and in 1533 we hear that ‘half the White Tower and more is new embattled copydented and cressyde wt. cane stone to the mounte of V<sup>c</sup> [i.e. 500] foot’<sup>24</sup>.



Fig. 6: view of the outside (south side) of the Cradle Tower.

Obviously the crenellations of the White Tower had just been rebuilt.

After this the tower effectively ceased to be a Royal Castle and Palace, and became the State Prison and Armoury<sup>25</sup>.

This is only a very brief survey of the medieval building stone of the Tower. A great deal more could be done on the surviving medieval masonry, and it would be nice to see a systematic survey of all the medieval walls. The high curtain wall between the Bell Tower and Bloody Tower, for example, if drawn and studied carefully (using, as well, old drawings) could easily be phased and better understood, particularly now that the lower part of this wall has been examined in excavations. A detailed survey of the masonry of St Thomas’ Tower and other structures undergoing restoration should also be carried out.

It is a sad fact that the study of the medieval masonry and building stone of London’s two greatest surviving medieval buildings, Westminster Abbey and the Tower of London, has hardly started. However, it is to be hoped that this will now be put in hand at both buildings in the near future.

21. An upper floor was put into this chamber in 1605-6 when it was being rebuilt as Sir Walter Raleigh’s prison. See *The Tower of London: its Buildings and Institutions* (ed) J Charlton (1978) 95. This volume also contains an essay by Peter Curnow on the new discoveries made in the Bloody Tower (*ibid* 55-61).

22. Salzman (*op cit* fn 3) 129.

23. *Ibid* 469.

24. See *The Guide* (*op cit* fn 4) 34 and Salzman (*op cit* fn 3) 89 & 94.

25. For these later uses, see J Charlton (ed) (*op cit* fn 21).