

The Excavation of an Outer Court Building, Perhaps the Woolhouse, at Fountains Abbey, North Yorkshire

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THE EXCAVATION of a much-ruined building in the outer court of this important Cistercian abbey, identified originally by Sir William St John Hope as the monastic bakehouse, revealed extensive remains of an aisled structure, now identified as the woolhouse with six principal phases of building. At first a storehouse, it was later used for the fulling and finishing of cloth. The building was dismantled some fifty years before the suppression of the house, much of the discarded architectural detail remaining where it had fallen, permitting accurate reconstruction of the building and the recovery of many internal fittings which had been left in situ. The building has now been consolidated for public display.

Fountains Abbey, a major Cistercian house, was founded late in 1132 in the valley of the R. Skell four miles to the west of Ripon in what is now North Yorkshire (N.G.R. SE 274 683). After an eventful history it was surrendered to the Crown on 26 November 1539 and finally sold to Sir Richard Gresham in October 1540.¹ The abbey ruins, after many years of sympathetic local custody, passed into the guardianship of what is now English Heritage in 1966, since when a systematic programme of consolidation and repair has been carried out. The need to consolidate and display a substantial building within the outer court, long known as the bakehouse, led to the excavation of the structure in 1977, a project which was finally completed in May 1979. The outer court at Fountains Abbey comprises some 85% of the total area of the precinct (Fig. 1), which itself is 24 ha (70 acres) in extent, and was the service area of the house with its granaries, storehouses, animal houses and industrial buildings.² Only two such structures survive above ground at Fountains Abbey; a substantial watermill and the building discussed here. Sir William St John Hope excavated this building, which he identified as the bakehouse, and the building immediately to the south, apparently the malthouse and brewhouse, in September 1888.³ His identification was based on the remains of two 'ovens' located in the southern part of the building and of uncertain date. Hope's excavation was only partial and the true functions of the building were by no means certain.

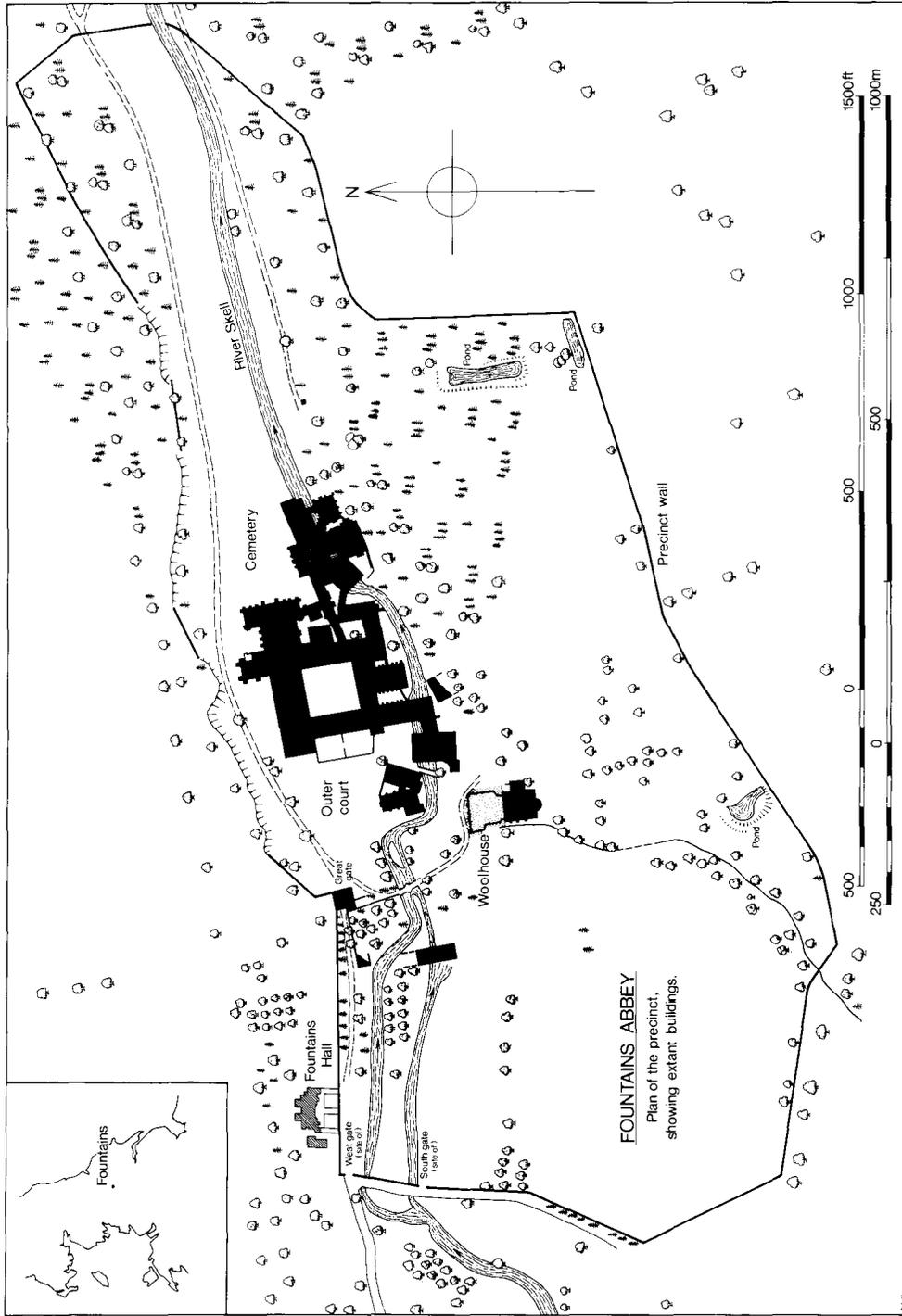


FIG. 1

The precinct of Fountains Abbey, showing the location of the building excavated

The lack of a pre-dissolution survey for Fountains Abbey complicates the identification of buildings within the outer court, for the planning and layout of monastic service buildings was never as predictable as that of the claustral ranges. A survey of 1540 describes two buildings within the outer court: the double watermill that is still standing today and the barkhouse or tannery with all its offices but by 1540 stripped of all movables.⁴ Fountains had been in royal hands for eleven months whilst it had been considered as a cathedral of the New Foundation,⁵ and it is quite likely that unwanted buildings were demolished at this time, their materials being converted to capital for the Court of Augmentations. The situation before the dissolution can be judged from a contemporary lease-book containing the transcripts of 270 documents dating primarily from the late 15th century to the surrender of the house.⁶ In passing, these leases refer to the following outer court buildings or offices: the tailory, the 'olde man's howse' (most probably a lodging for lay servants), the cheesehouse (*calefactorium*), the slaughterhouse, the tannery with its bark-mill and other 'howses of office', cart sheds and wagon houses. Clearly only those buildings which were served by outsiders or at which tenants received their allowances were mentioned, and the omission of the surviving mill demonstrates that the list is incomplete. Any buildings demolished before the late 15th century would presumably not have been recorded there, but a list of domestic officers or obedientiaries for the year 1449 has survived, and includes two officers serving a building which does not occur in later records, the monk of the woolhouse (*lanaria*) and hospice, and the Abbot's servant and monk of the kitchen and woolhouse.⁷ This instrument suggests that the granaries and more general offices of the outer court were under lay management, and no source suggests that the major animal houses normally found within the outer court⁸ were in fact there; indeed it is more likely that they were located at the adjacent home granges of Morker and Swanley.⁹ The identification of the building excavated is therefore uncertain, but in view of its size and prime location it must have been one of the principal outer court buildings.

THE BUILDING AS EXCAVATED

The area excavated was bounded to the south by the standing S. wall of the building and the limit of the guardianship area; to the east by a line of low walling visible in the turf; to the west by a line of mature trees and a ghyll running across the precinct to the R. Skell; and to the north by a modern pathway which was subsequently found to follow the line of a medieval road. In this way an area of some 900 sq. m was available for excavation and was examined in total to the level of the latest surviving floors (Pl. v, A). The depth of excavation was severely limited by the need to preserve structural elements of the building *in situ* and many early features remain unexcavated. Amongst these are the internal arrangements of the main structure buried below a large area of surviving flagstone floor of late medieval date, and the greater part of its construction levels. Deep excavation was possible in three areas, but the limitations posed by the needs of preservation have meant that the full history of development is not known and dating has been restricted to a reliance on surviving architectural detail which was fortunately well represented. Nevertheless

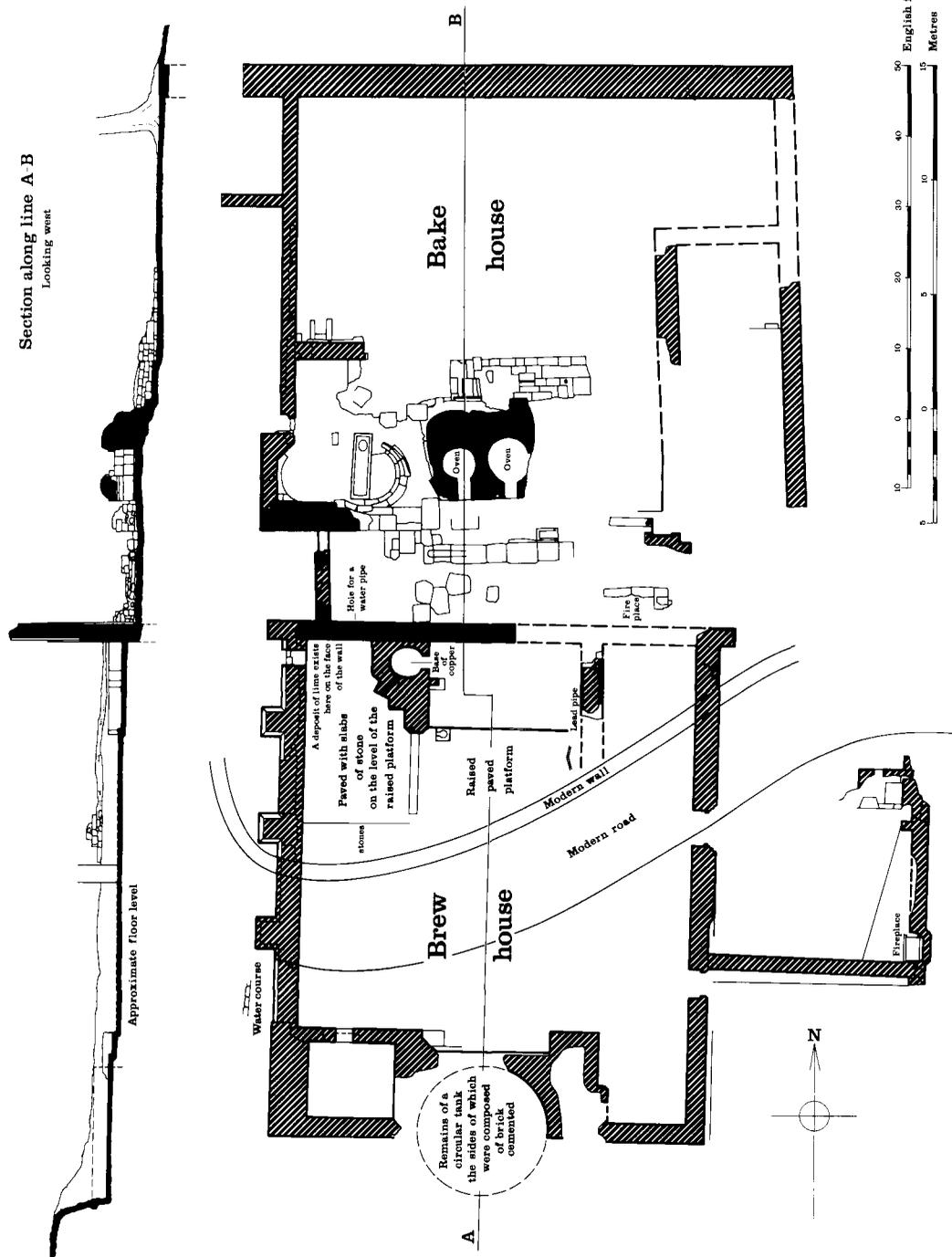


FIG. 2
J. A. Recve's plan (recaptioned) of the bakehouse and malthouse

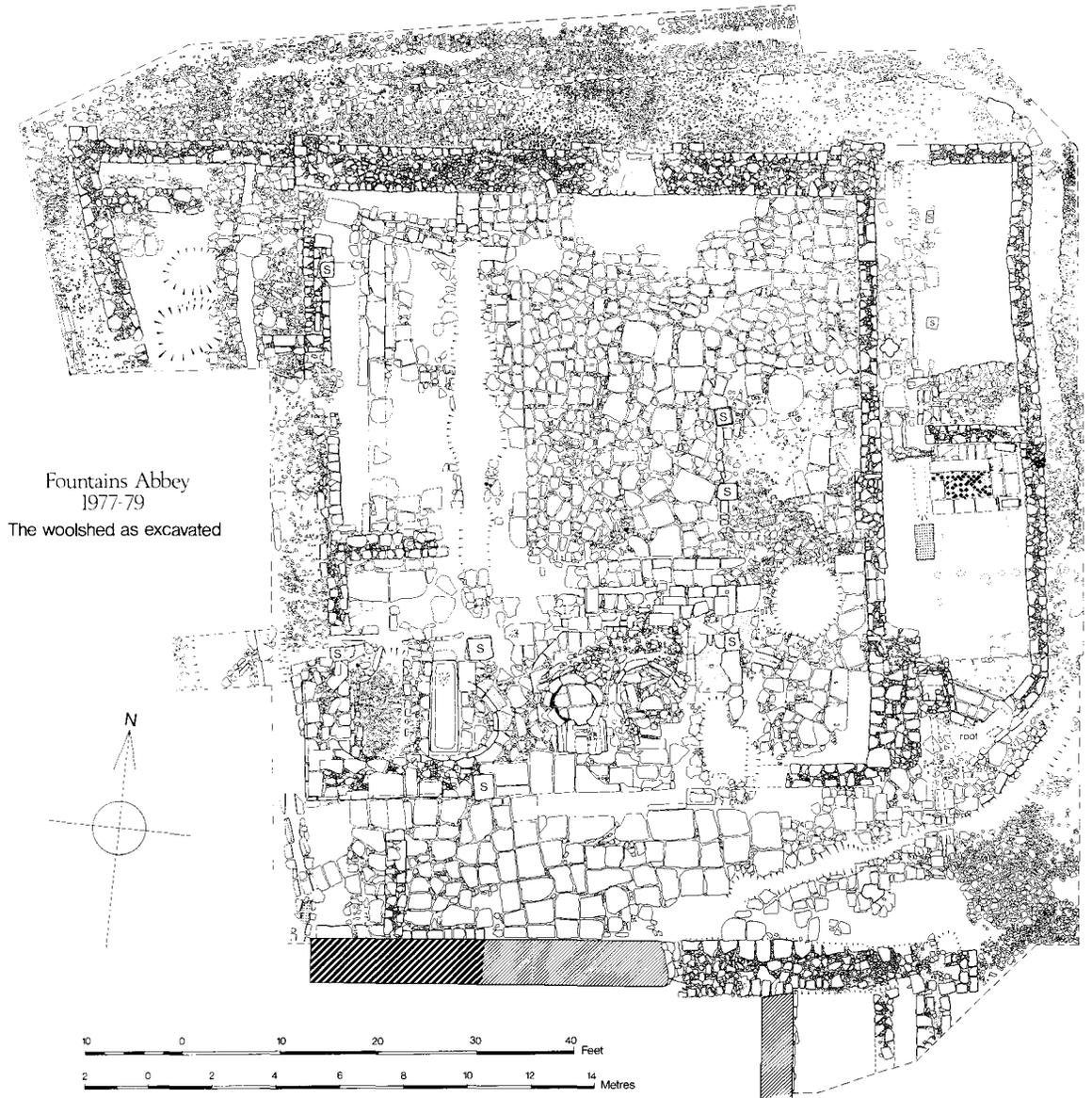


FIG. 3

The woolhouse as excavated between 1977 and 1979. (Lead objects are shown cross-hatched)

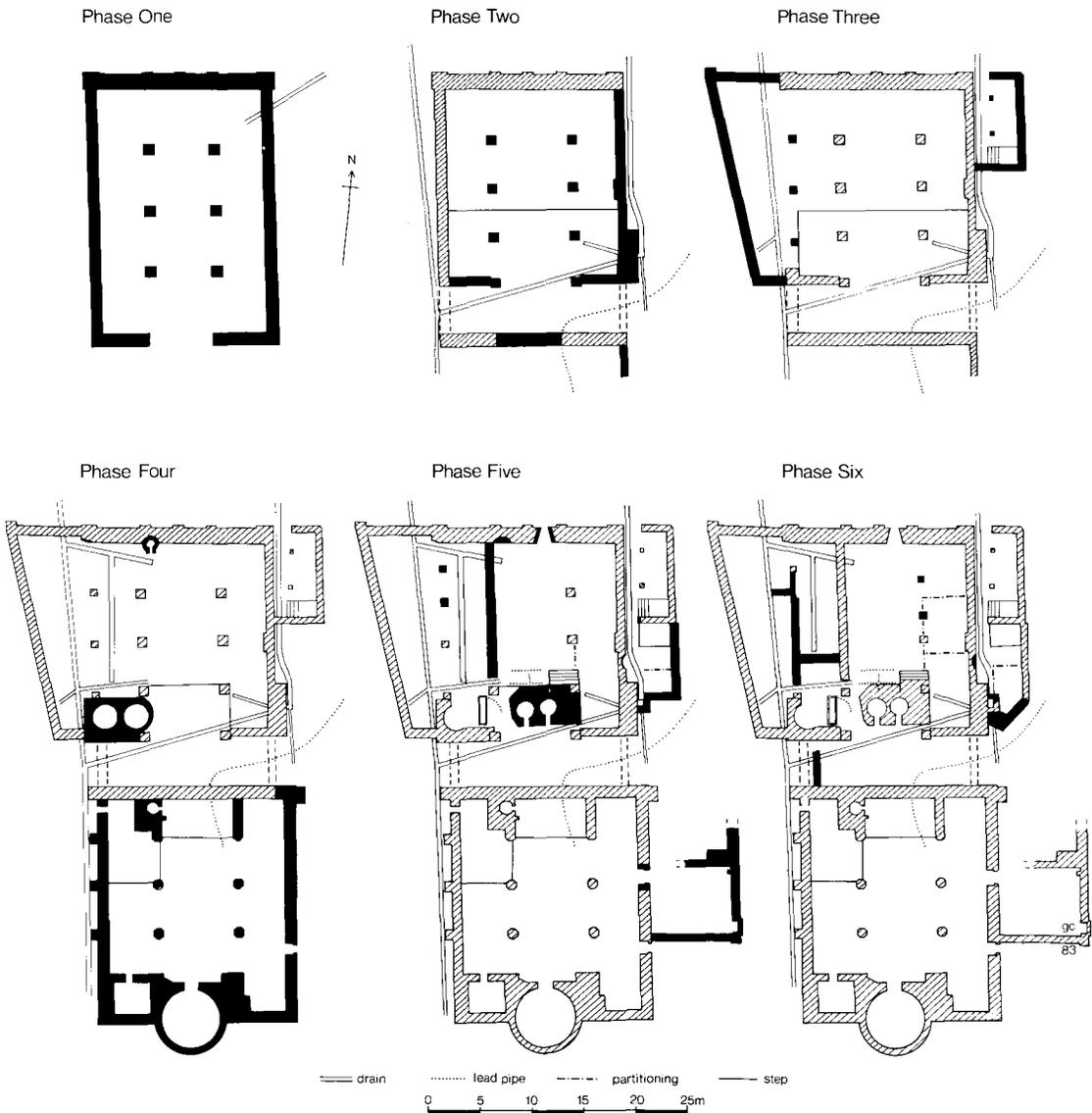


FIG. 4

Development of the woolhouse and malthouse from the mid 12th to the mid 15th century

it was possible to recover the greater part of the plan of the building at its latest phase of development, to recover cultural material relating to the use of particular elements of the structure, and to postulate its use and development.

Before excavation began in October 1977, the area of Hope's bakehouse was bisected by a modern service road. Some 16 m south of this roadway was a standing wall 5.20 m high, with a blocked archway visible in its northern face, and the heavily overgrown remains of two ovens, an area of gritstone paving, and what Hope had interpreted as a pair of dough-kneeding troughs set in the return angle of two substantial ashlar walls.¹⁰ Immediately to the north of the road two short sections of wall 4.40 m apart, the westernmost reset in recent years, broke through the turf, whilst further to the south the same walls could be seen entangled in the roots of a recently-felled elm tree. To the north of the roadway, the area of the building was defined by an artificially levelled platform. Indeed, the site was very much as Hope had left it in 1888. The only disturbance since that date was the laying of a power cable across the W. and N. sides of the site in 1969. Hope had effectively removed all the occupation and demolition deposits from the modern wall which constitutes the present guardianship boundary to a point roughly 4 m north of the ovens, from the W. wall of the building to a point some 6 m east of the eastern oven (1892 plan by J. A. Reeve, Fig. 2).

This area had not been backfilled although a part of it had turfed over, there had been no consolidation, and several elements shown on Reeve's plan or mentioned in his text¹² no longer survive. Hope had also cut a N.-S. trench along the line of the western arcade of the main building which located the line of the inner face of the N. wall, and a second sondage which located its outer face.¹³ Hope had removed approximately 200 sq. m of archaeological deposits from the area of his bakehouse, the remainder of the building being remarkably undisturbed. In part this was due to the placing of Hope's dumps, the principal of which lay over the eastern part of the building, its stone revetment roughly following the inner face of the E. wall of the main structure. The objectives of the recent excavations were to re-excavate the building for display, to check on Hope's interpretation and dating, to produce an accurate ground plan and to attempt to reconstruct the building on paper. All these points were achieved. Whilst Hope's plan and interpretation were both found to be incorrect, his dating of the structural phases still holds good.

The building as excavated between 1977 and 1979 is shown in Fig. 3. Features of all phases are shown on that plan and at first sight the development of the building is not particularly clear. In consequence, a simplified phase plan is also provided (Fig. 4).

PHASE ONE

The original form of the building was that of a substantial aisled hall, 16.0 by 23.5 m internally, the N. and S. walls of which had been retained in later building. Some 2.60 m of the W. wall were also seen at its northern end, robbed down to its offset course. The location of its arcades, most probably of timber, was demonstrated by pilaster buttresses on the outer face of the N. wall (Pl. v, A, foreground) which was further supported by a third buttress at its centre point and clasping buttresses at each corner. No stylobates belonging to this phase of

the building were recorded but the bay spacing can be calculated as approximately 4 m. Whilst the N. wall stood to a maximum of four courses above late medieval ground level, the S. wall stood to a height of 23 courses above offset level, with a number of surviving features relating to the superstructure of the building. The N. wall was carefully faced on the outside with squared blocks set in reddish-brown mortar, giving a fair face to the Great Court across the R. Skell. In contrast, its inner face was of rubble less carefully coursed with haphazard levelling courses, a technique of building well seen in the N. face of the southern gable wall (Fig. 7). In that wall was a large, round-headed carriage door 5.80 m wide and 4.70 m high, blocked in Phase Two when the greater part of its western jamb was removed. Slightly less than half the head of the archway of large and roughly dressed voussoirs remains. The wall had been refaced on its S. side at a later date and no original features remained there.

Deep excavation was possible at only two points inside the building: just within the N. wall where the later floor had been robbed, and in a destruction period pit within the eastern aisle. Both these areas revealed the nature of the floors within the building and the first demonstrated that the building stood on an artificial terrace which was revetted by the N. wall (Fig. 5, Section K–L). The original sloping ground surface, layer 6, was sealed by an ashy deposit which seems to have represented site clearance and two distinct layers, 10 and 11, of dumped material before the foundation trench for the N. wall was cut. That was filled with a mixture of rubble and mortar on which was built a foundation of six courses of coursed rubble to carry the wall above ground level. Once the foundation-work was completed, the interior of the building was filled up to a maximum depth of 0.95 m with redeposited clay and quarry waste, layer 12. In the centre aisle a cobble floor, layer 13, was laid over the filling to provide the original floor of the building. In the eastern aisle, the lowest floor was of pinkish mortar over a thin layer of levelling (not on section). Mixed with the levelling material was a considerable quantity of sheep skulls, horn cores, lower limb bones and other material suggestive of tanning and presumably derived from a nearby building. Outside the NE. corner of the building below the late 13th-century extension, deep excavation revealed a drain running away towards the R. Skell, with a bottom of blue clay, gritstone walls and cover slabs. It had been almost obliterated by later developments but was clearly of the earliest phase. It led from a feature within the eastern aisle which remains visible as a deep sinkage in the later floor there (Pl. v, A).

The date of this first phase can be closely established from a number of architectural features which were recovered from the destruction levels of the building and which could be related to the N. wall. In particular, elements of three windows lay where they had fallen from the N. wall on to the road surface to the north of the building (Fig. 9). The closest analogy to these windows, which are of remarkable quality for an outer court building, is to be found in the guest-houses just across the R. Skell and which belong to the major building campaign of c. 1150–60 which also saw the rebuilding of the abbey church, the west range at its northern end, and the laybrothers' reredorter block.¹⁴ The building was substantial, of three roughly equal aisles entered by way of a wagon door in the gable end, with heavy cobbled floor in the centre aisle. The surviving window elements indicate that the openings were both heavily barred and closed with shutters, indicating the need for security. The most likely interpretation of the structure is that it was built from the first as a storehouse.

PHASE TWO

Some 70 years or more after its original construction the building was substantially altered and enlarged, most of the changes taking place on the E. side, the N., W. and S. walls of the original building being retained; the arcades and roof were rebuilt and the area to the

LAYER DESCRIPTIONS ON SECTIONS (Fig. 5)

Section A-B

1. Dark brown to black soft earth fill
2. Crushed yellow-brown mortar
3. Yellow-brown mortar with gritstone rubble

Section C-D

- 2a. Yellow-brown mortar, sandy texture floor
- 2b. Yellow-brown mortar, clayey texture floor
3. Pink-brown sand
4. Yellow sandy mortar

Section E-F

1. Dark grey loam
2. Light grey sandy soil with charcoal
3. Coarse yellow-white sand.
4. Light grey sandy soil with stones
5. Coarse grey-white sand with gritstone rubble
6. Coarse orange-white sand with gritstone rubble
7. Fine grey clay into which drain floor slabs are bedded
8. Light grey/brown gritty sand with stones

Section G-H

1. Pale yellow to brown mortar
2. Dark brown soil
3. Pink mortar

Section I-J

1. Topsoil
2. Dark grey silty soil
3. Dark grey brown stony soil
4. Grey-brown stony soil
5. Loose, stony, grey soil
6. Mixed soil and mortar
7. Light orange/grey sandy soil
8. Dirty white mortar
9. Light grey silty soil
10. Cobbles in grey silty soil

Section K-L

1. Topsoil
2. Red-brown sand with some soil and mortar
3. Red/orange sand with mortar and fallen window details
4. Light brown soil with stone fragments
5. Grey/brown clayey loam with small stones
6. Red burned sand
7. Charcoal
8. Clay, loam and mortar
9. White ash
10. Clayey loam with mortar and charcoal flecks
11. Light brown loamy clay with small stones
12. Grey-brown redeposited clay with gritstone rubble
13. Cobbles set in grey-brown soil

south terraced back into the hillside to provide space for further building. This phase was identified by Hope as the work of John of Kent, abbot from 1220 to 1247 at the height of the abbey's development, and his dating is confirmed by architectural detail recovered from the recent excavation.¹⁵ The original E. wall was taken down to its footings and replaced by a narrow wall, only 0.56 m wide, sitting on the outer edge of the old foundations. The new wall continued southwards beyond the S. wall of the original building, being excavated as far as the guardianship boundary to the south in an area already cleared by Hope. Although he must have seen this wall, Hope did not record its existence here.¹⁶ Because of robbing, the junction with the old S. wall was not clear. To the south, the wall appeared to butt against the wall face and this may also have been the case to the north. As rebuilt, the building was of five bays, the arcades being clearly marked by two surviving stylobates on the W. side and two more with the robber pit for a third on the east. For ease of reference, work of this and later phases within the confines of this building will be described by bay, numbered from the north.

The new E. wall, which still stood to a maximum height of six courses, was built largely of reused material including a substantial window cill with a shutter rebate which does not match window elements known to belong to the first phase¹⁷ as well as large numbers of more fragmentary mouldings and ashlar blocks which were more obviously cannibalized from the original building. At the northern part of bay three an internal widening of the wall, which was unfortunately consolidated before excavation as it appeared above the turf line, indicated the position of a chimney breast serving a first-floor fireplace. The chimney itself had fallen and lay just to the east.¹⁸ The wall footings were widened from 0.56 m to 1.60 m throughout bay four, indicating the position of an external stair in that bay, whilst the wall was not apparent at all in bay five where a slabbed gritstone road-surface ran across the building. Between bays four and five a spur wall ran from the inner face of the E. wall to the

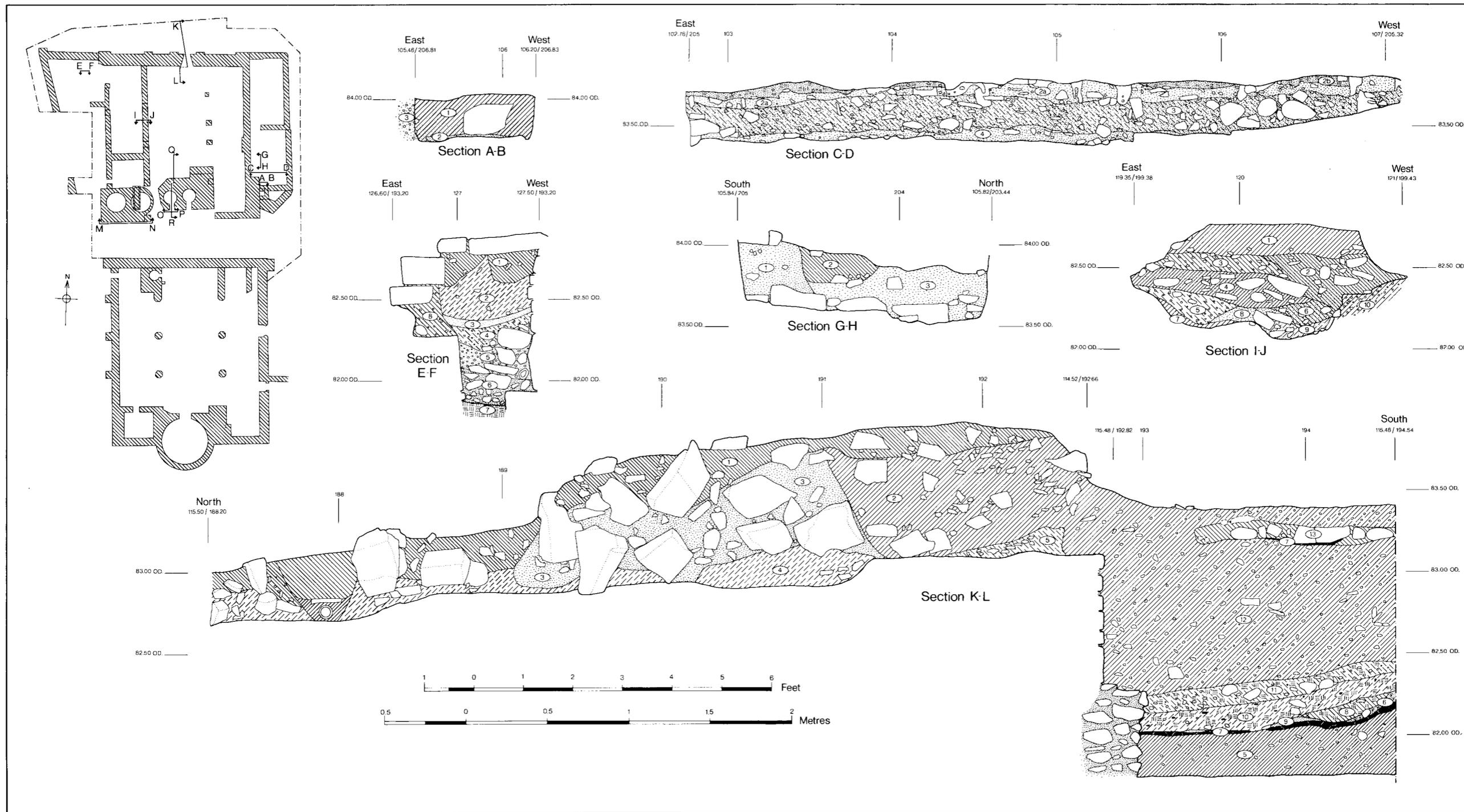


FIG. 5
Excavated sections within the woolhouse

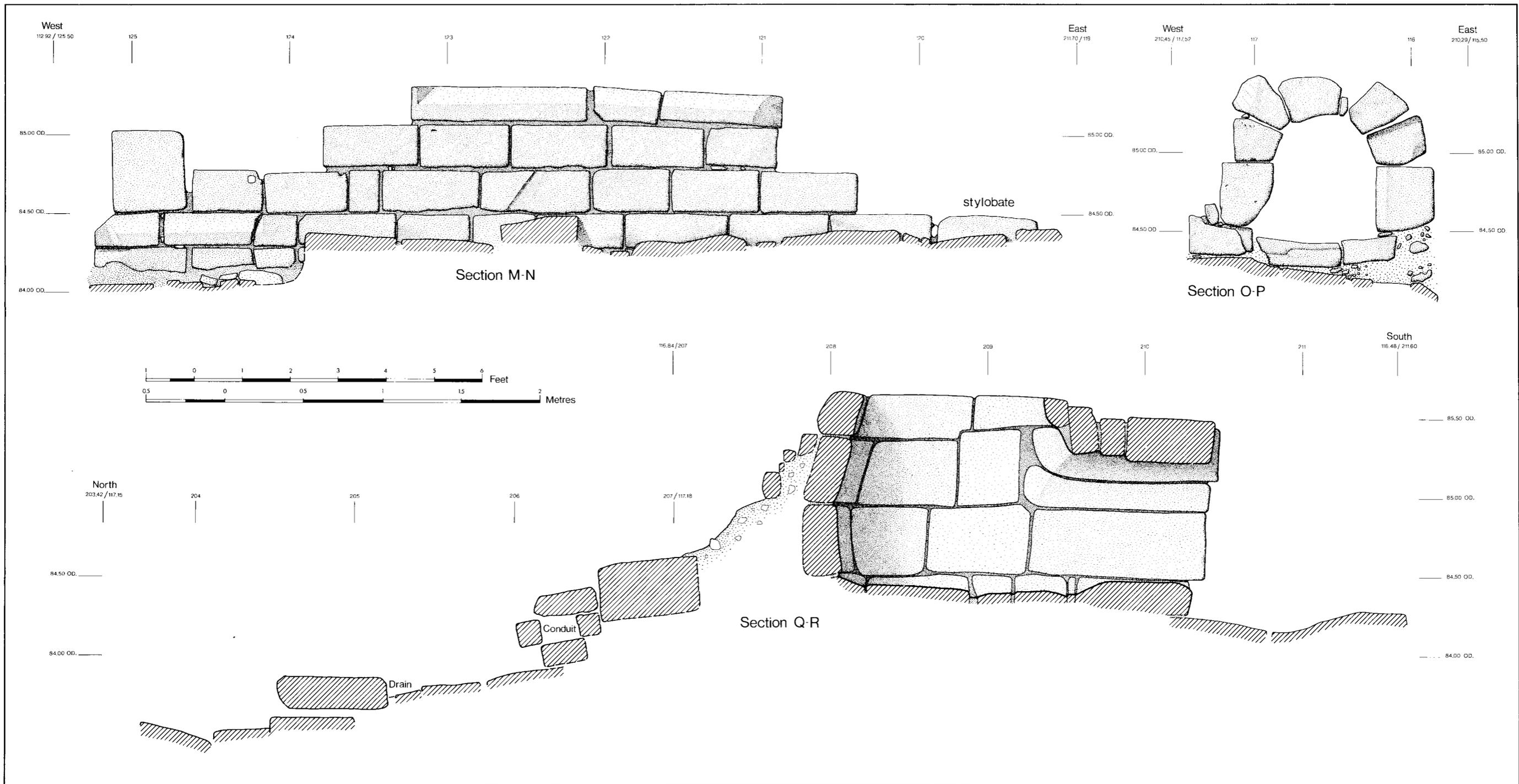


FIG. 6
Sections and elevations within the woolhouse

arcade stylobate, a feature probably mirrored to the west but destroyed by later rebuilding. On the eastern side of the building, bay five was occupied by a cart door some 5.0 m wide, the socket for a timber doorpost 0.20 m square remaining in the stub end of the E. wall. Double doors had been provided; the draw bolt of the southern leaf had trailed, wearing a deep groove in the surface of the roadway. Lying where it had fallen in the late 15th century, on the road surface to the east of this wagon entry, was the greater part of a window with a plate-tracery head (Fig. 10a) which can only have fallen from an upper storey. Elements of two further windows were recovered from bays three and four, showing that these windows had been a feature of this façade. Hope also recovered detail from at least one window in this series.¹⁹

In addition to building above ground, major underground works were carried out in this phase. A culvert, first excavated by Hope and recorded by Reeve (Fig. 2, marked 'watercourse'), built of gritstone blocks and originally lined with timber and sheets of lead,²⁰ was provided outside the W. wall of the building, apparently taking water from the stream that ran down the hillside at that point. A slot in the W. side of the channel opposite bay one indicated the location of a sluice to control the flow of water. Opposite bay five, a branch was taken off the culvert, running beneath the flagged roadway in that bay and which could not be traced by excavation. It appears to have fed a further conduit on the E. side of the building. The entrance to the branch was through the centre of a reused grindstone (Fig. 13, 17) set in the E. wall of the main culvert. Immediately outside the new E. wall of the building and starting opposite the fourth bay was a substantial stone-built drain or conduit running away towards the R. Skell. It was slabbed over and buried below contemporary ground surface. It was fed by a small channel 0.32 m wide from the building to the south, seen where it was cut by a demolition period robber trench for a lead water-pipe which was apparently laid at the time the drains were constructed. The pipe began somewhere to the south of the original building outside the area of excavation, ran through the wide doorway in the S. wall, below the roadway in bay five and away down the hillside in the general direction of the kitchen of the lay-brothers' infirmary. It does not appear to have been associated with the excavated building, unlike the other underground waterworks. The form of the channels, shown in outline on Fig. 4, suggests a leat to the west of the building to power a small undershot wheel driving machinery in the fourth bay of the western aisle, perhaps a forerunner of the fulling-mill that was to occupy that position in Phase Four.

The S. wall of the original building became an internal division between the excavated building and that built to the south in this phase. The original doorway was blocked with substantial coursed gritstone rubble packed with broken roof tile in its lower courses and galletted elsewhere with small pieces of gritstone. A corbel on the line of the rebuilt western arcade was inserted above and just inside the line of the W. jamb of the blocked door, too low to carry the arcade plate at 4.40 m above offset level, but perhaps supporting a floor across this bay of the building (Fig. 7). Within the body of the building floor levels were altered to suit the changed level of access from bay five. The centre aisle, 7.20 m wide between the arcade posts, became the means of access from the roadway in bay five. A platform of gritstone blocks was built across the building, occupying all of bay four and the southern half of bay three, and served as a loading bay for wagons. Much of this platform remains buried below later features and it was raised in height at a later date, but its surface of gritstone slabs survives in bay four of the eastern aisle. A culvert within this floor ran away towards the drain outside the E. wall. Against the wall, two sockets cut deeply into the floor slabs indicate a bench or cupboard some 2.60 m by 1.20 m in the corner of the aisle below which no floor was provided. In the second bay of the E. aisle, an area of gritstone paving 0.60 m lower than the platform in bays three and four is probably contemporary and represents the floor level at this phase throughout the remainder of the building.

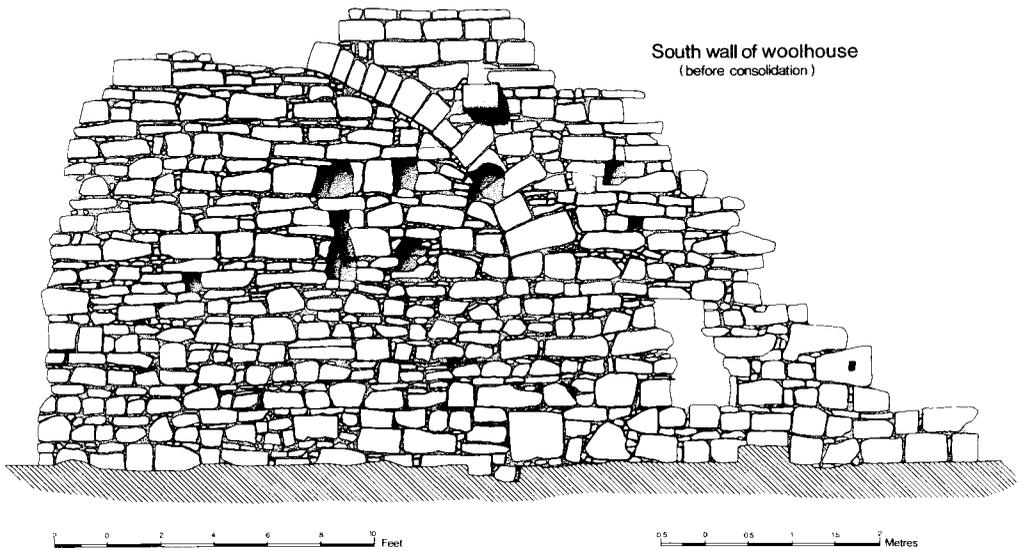


FIG. 7

The S. wall of the woolhouse, before consolidation

The use of the building still seems to have remained that of a storehouse as in Phase One, but the associated waterworks must give a clue to its further use. If they did indeed serve a fulling-mill as at a later date this building was probably the abbey woolhouse,²¹ used for storing and processing one of the house's principal assets. The evidence for a first-floor apartment in the eastern aisle is unequivocal, but no evidence was recovered in the western aisle. It would appear that an upper floor carried on the aisle posts and corbels inserted in the original S. wall occupied the nave and the E. aisle of bay five. No garderobe was provided and the most likely use of a well-lit and heated chamber in such a position is that of an obediary's office; it might be interpreted as a gallery from which he could observe what went on below.

PHASE THREE

The next phase of development added an outer western aisle of somewhat irregular form and a rectangular two-storey block against the NE. corner of the woolhouse. The date of this work, derived from the head of a two-light window that had fallen from the N. wall of the new aisle (Fig. 10b), falls in the 1260s although the work may have begun a little earlier.

The outer western aisle was not explored by Hope although Reeve's plan indicates that its N. wall and an internal partition wall were either known or suspected (Fig. 2). Mercer noted the N. wall when it was cut by a power cable trench in 1969. Because of the proximity of a group of mature trees, it was only possible to examine the northern 7.20 m of the aisle and to check on its line opposite the junction of bays three and four further south. Much of the interior of the aisle at its northern end had been destroyed by two oval pits of post-medieval date, perhaps for tree planting that had failed,²² or disturbed by tree roots from those trees in the area that had developed. In spite of this a number of conclusions could be drawn from the

features that had survived. The purpose of the aisle was to enclose the watercourse that ran down the W. side of the building and to enlarge the floor area of the main building by the removal of the mid 12th-century W. wall. That wall was demolished to the first course above offset level and post-pads were provided opposite the stylobates of John of Kent's western arcade. The second and third of these from the north remained in place. The outer wall of the aisle, built of coursed gritstone rubble, was not parallel to its predecessor but the aisle narrowed considerably to the south. At its N. end, the W. wall survived to offset course or above but the rest was totally robbed out and almost impossible to trace amongst the tangle of tree roots to the south. Presumably it returned against the W. wall of the building opposite the junction of bays four and five but no trace of it was seen. The aisle wall returned at its northern end against the W. wall of the original building just south of the clasping buttress at its NW. angle, the bonding of the W. and N. walls of the aisle being unbroken. For some reason this was found to be unsatisfactory and the N. wall was taken down, its E. end being totally removed and its W. end reduced to floor level. A new N. wall was provided, butting against the clasping buttress at the angle of the main building and at its W. end returning through a right angle to join up rather clumsily with the W. wall. A pilaster buttress was provided at the angle, perhaps to match those of the original N. façade. Within the aisle, west of the watercourse, a flagged floor was laid. Most was subsequently robbed but it seems likely that it covered the whole aisle and a few displaced slabs to the east of the leat may indicate that the same floor existed there. Four flagstones over the culvert show that it was floored over at its northern end (Fig. 5, section E-F). The N. wall of the aisle was simply built over the leat. In the small area of the aisle examined to the south, a drain running into the watercourse may be of this date. Only the subfloor of packed soil and gritstone rubble survived there and this appeared to be coeval with the drain.

The block attached to the NE. corner of the main building was not only better preserved but was also totally excavated and more can be said about its development. Its walls, averaging 0.60 m in width and of coursed rubble, survived to a maximum height of seven courses above footings and four courses above floor level. The room was entered through an external doorway in its NW. corner where a block of gritstone 1.60 m length and a section of reused window mullion of similar length comprised the door cill and carried the wall over the drain that ran down the E. side of the main building. A small area of gritstone paving in the centre of the room was set in an otherwise earthen floor which had been scoured hollow throughout later phases. Along the W. side of the room, the floor had either subsided into the backfilled construction trench of John of Kent's drain or it had been intentionally set lower than the rest of the room. In the southern half of the room, the floor had been provided with a stone kerb and the floor of the 'sinkage' had been roughly paved, suggesting that this was indeed an intentional feature. The lower floor in the SW. corner of the room was fitted with a stone 'hopper' (Fig. 13, 16) for collecting liquids and leading them into the underlying drain. Two stone post-pads set on the earth floor marked the location of supports for the floor above, which was reached by way of a stone-built staircase against the S. wall of the room. The four lowest steps survived and a stone at its base was socketed to take the newel post of a handrail. The rather irregular appearance of the staircase is the result of subsidence and tree-root disturbance and it was originally more symmetrical in appearance. The use of the block is unknown but it could have comprised further accommodation for the obediatory. Its upper floor would have fouled the windows of the first and second bays of John of Kent's aisle and these may have been removed. No evidence was found for either window in excavation although parts of the other three were recovered. The first floor of the new block may well have communicated directly with the office accommodation in the aisle, although there is no way of proving that.

PHASE FOUR

Towards the end of the 13th century, major alterations entailed the total rebuilding of the southern building identified by Hope as the malthouse and the reconstruction of the fourth and fifth bays of the inner west aisle of the excavated woolhouse. Only the NE. angle of the former was re-excavated, and was found to be slightly more complex than Reeve had thought (Fig. 2). The junction with the SE. corner of the mid 12th-century building had been damaged by robbing but it would appear that the new work was just butted against the existing wall which was refaced on its S. side. The buttress noted by Reeve was in fact offset to the south of the line of the mid 12th-century wall. Hope had stripped the whole of the area to the north of the guardianship boundary and this area had been left open and unconsolidated. Reeve's survey was found to be rather inaccurate and a resurvey of what remained exposed has enabled both that survey and a later survey made by Harold Brakspear²³ to be corrected.²⁴ The width of the building had been mistakenly reduced by almost 1.50 m although the length of the building, as far as it could be established, was correct. The building consisted of a central nave and two aisles and was of five bays. The north wall stands to a height of 5.20 m above floor level (Fig. 8). Hope described the building thus: 'The southern block was about 70 ft long and 55 ft wide, but is ruined to its plinths, and traversed by a modern wall and cart-track'.²⁵ Hope's analysis of the building is substantially correct. The office attached to the E. side of the building belongs to Phase Five according to Hope's published plan²⁶ but there is no way of checking that without re-excavation. The building is

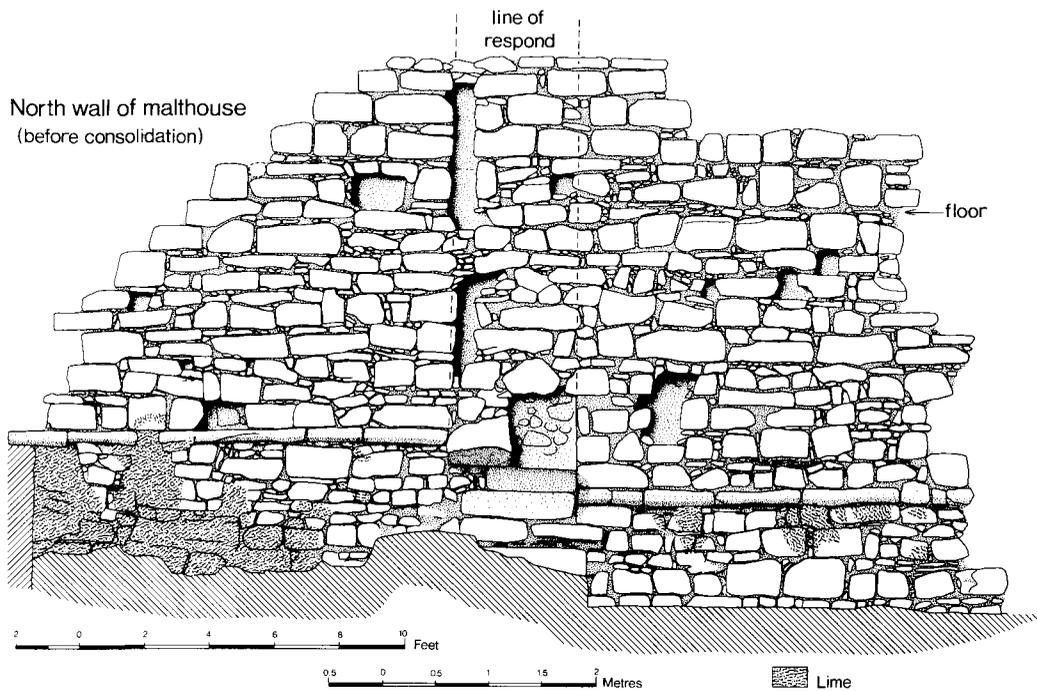


FIG. 8

The N. wall of the malthouse, before consolidation

of ashlar throughout in contrast to the coursed rubble of the greater part of the woolhouse, and the circular vat at the S. end of the malthouse, built of brick and faced with lime mortar, may be an insertion rather than a contemporary feature. Brick was first used in the woolhouse in the next phase.

Also in ashlar and thus probably contemporary with the building of the malthouse was a remarkable structure in the fourth bay of the inner western aisle of the woolhouse. Essentially it comprised a solid mass of masonry containing two circular tubs or vats (Pl. v, B), both of which had been largely cut away by later alterations which have caused considerable problems of interpretation. Both tubs had been lined with ashlar, that on the west surviving to a height of three courses. Hope's excavation had removed almost all the archaeological deposits from this area but the greater damage had occurred when the tubs were cut away to insert a stone trough and a clay-lined pit in the mid 14th century. This massive structure appears to be the base of a fulling-mill, perhaps a replacement for the mill suggested in Phase Two. The way in which it was forced into the aisle, projecting eastwards between two stylobates of the western arcade and westward to the leat within the outer western aisle, demonstrates the importance both of the location and the watercourse. The leat itself was badly damaged by tree roots opposite this feature but was 0.80 m wide where it could be measured accurately against the abutment compared with 0.40 m elsewhere, and so was wide enough to have taken a small wheel.

The S. face of the fulling-mill structure comprised a spur wall flanking the road-surface in bay five as far east as the line of the western arcade and survived to a height of five courses of ashlar (Fig. 6, elevation M-N), an interrupted chamfered plinth showing the position of the N. jamb, complete with lower hinge fixing, of a new carriage door in the fifth bay of the building continuing the alignment of the W. wall of the malthouse. There was no S. jamb as such but a pin-hole in the fourth course of the S. wall of the building (Fig. 7) indicated the fixing of a wooden door-post or frame at that point. Apparently the roadway in bay five was resurfaced at this point to its surviving level. The heavy rutting of this surface shows that the access was used regularly and with heavy loads. The platform in the fourth bay of the centre aisle was raised to match the new carriage way, extending only as far north as the aisle posts between bays three and four and butting up against the fulling-mill to the west. The east side of the platform had been robbed but probably stopped on the line of the eastern arcade. Coupled with the rebuilding of the entry platform, the remainder of the woolhouse was refloored with gritstone slabs which survive over substantial areas of the building and particularly in the eastern and centre aisles (Pl. v, A). Incorporated in the floor of the first bay of the centre aisle were three sections of quatrefoil pier set flush with the floor surface and apparently derived from elsewhere in the abbey precinct. They are of early 13th-century date and are closely comparable with a fourth drum which was set on the floor of the room at the NE. corner of the woolhouse. That drum (Fig. 13, 14) had fillets on each face but came from a pier of like size. Its function is unknown but it was probably placed there during this phase. Set within the slabbed floor of the woolhouse were two open drains or gutters. One ran from the first bay of the centre aisle, across the western aisle and into the watercourse within the outer western aisle (Pl. vi, A). Where it passed through the W. wall of the original building the broken edge of the clasping buttress was refaced. At its mid-point, it was fed by a shallow channel which began in the third bay of the western aisle and which must have served the fulling-mill. Robbing of the floor slabs from the western aisle has served only to confuse the situation in this area (Pl. vi, A). Much of the N.-S. drain had been robbed and was only traceable by its bottom slabs where they remained *in situ*. The southern end had been damaged by Hope's excavation, but two stones of its E. edge survived just to the north of the ashlar fulling tubs.

Also belonging to this phase was a small oven, contrived in the inner face of the N. wall. Three facing stones survived to show its outline where it was cut back into the wall and an area of burning on the flagstone floor to the south demonstrated that it was built out in 'keyhole' form. It was ruthlessly swept away in the next phase and nothing remained to identify its use.

PHASE FIVE

The first half of the 14th century saw further development of the woolhouse buildings, with the demolition of the fulling-mill in the W. aisle and the provision of further accommodation to the east of the main building. Apparently belonging to the same building phase was the provision of offices to the east of the malthouse, partly excavated by Hope and dated by him on architectural evidence which is no longer visible. There seems little reason to doubt his dating of this building or of the range to the east of the woolhouse. The work of this period is marked by the use of a hard white mortar which contrasts sharply with the orange-brown mortar used in earlier phases.

In the woolhouse, the inner western aisle was divided from the nave by a wall 0.72 m wide built on the line of the arcade from the inner face of the N. wall to the S. end of the third bay, where it was stopped against a drain. A deep construction trench was dug for the wall, cutting the floor of the preceding phase but stopping at the level of the early 13th-century floor. All but the northernmost 1.60 m of the wall had been robbed and the line of the robber trench had been followed unwittingly by one of Hope's trenches. Consequently the situation was not entirely clear (Fig. 5, section I-J). Layers 2 to 4 in the section represent Hope's backfilling, the remainder late medieval robbing which had haphazardly removed parts of the underlying floor. The building of this wall, which must have risen to arcade-plate level since it removed two arcade posts and their stylobates, had the effect of dividing off the two western aisles from the main structure. Coupled with this was the removal of the fulling mill from the fourth bay of the inner western aisle and its replacement by two rectangular tanks, one of stone, the other set with cobbles lined with yellow clay (Pl. v, B; the clay lining of the western tank has been removed) both set in the floor of the aisle. A narrow drain, badly damaged by Hope's excavation, ran across the aisle just north of the stone tank in the direction of the watercourse in the outer western aisle and appears to be of this phase. To the north of this, a new flagstone floor was laid in the third bay of the aisle, partly sealing the N.-S. gutter of the previous phase, which otherwise was left open and in use. The two tanks clearly had a water supply for a deep groove had been cut into the upper surviving course of the eastern fulling-vat to take a lead pipe which had run into the NE. corner of the stone tank (Pl. v, B). Its source could not be traced, but in all probability it had come from the direction of the malthouse. A hole cut through the S. wall of the woolhouse had carried a water-pipe (Figs. 2 and 7) which was running in this direction. Any source of water under pressure must in any case have lain uphill to the south.

A pair of furnaces was built at this period, again of gritstone set in white mortar, on the surface of the entry platform in the fourth bay of the centre aisle (Pls. VI, B and VII, A). Hope had believed these to be bread ovens and thus identified the building they occupied as the abbey bakehouse. A close inspection demonstrated this not to be the case. The western oven is tolerably complete (Fig. 6, Elevation O-P and Section Q-R) and is not the domed structure usually identified as a bake-oven²⁷ but a flat-topped structure with near vertical walls (Pl. VI, B). The eastern 'oven' is badly damaged but appears to be of similar form. Both sat on a substantial plinth which incorporated a series of conduits designed to carry lead pipes. One of these actually ran down the back of the 'ovens' themselves. The line of these

pipe-runs is shown on Fig. 4, running in the direction of the inner western aisle. On the E. side of the platform a flight of stone steps, four of which survive, led up to the top of the 'ovens' where it would appear that coppers had been placed, one over each furnace, to provide a copious supply of boiling water which was led by pipes into the walled-off western aisles. If this was the case, the processes carried out there may relate to the working of cloth and perhaps dyeing.²⁸

The building of the two furnaces which were charged from the roadway in the fifth bay of the woolhouse effectively blocked the main access to the body of the building and may indicate a change in the use of the structure. A new doorway was cut in the N. wall, just to the east of the central buttress of the façade, its threshold and a part of its E. jamb remaining to show that it had only been 0.80 m wide and thus only for pedestrian access. The use of the building as a store for bulky commodities therefore seems improbable, and the partitioning of part of the eastern aisle to form a separate room in bays two to four by a wooden parclose would emphasize this point. Later alterations which included the removal of the late 13th-century floor in the second and third bays of the aisle had effectively removed all evidence for the use of the room. The form of the screening, which itself was later altered, was of timber posts set at intervals and socketed into the floor. A single socket remains on the lowest step of the stair on the E. side of the furnace platform. The partition was on the line of the arcade.

To the east of the main building a rectangular building was added to the south of that built *c.* 1260–70. The walls were of coursed gritstone rubble, the E. wall surviving to a maximum height of five courses and the S. wall to three courses. The position of the S. wall, slightly to the south of the third pair of arcade posts in the main building, was controlled by the need to provide a garderobe in the angle of that wall and the stair leading to the first floor of the eastern aisle. Cutting of two trial-pits (Fig. 5, sections A–B and G–H) in the course of construction had revealed the capstones of the major drain that ran along the E. side of the building, and the garderobe was contrived within the southern extremity of that drain. It had served a ground-floor room with a thick floor of yellow-brown mortar (Fig. 5, section C–D) laid on to a deposit of builders' rubble. The lower walls, where they had been protected by a later floor, were plastered and limewashed. Entry was by way of a door forced through the S. wall of the north-eastern block at its W. end, the repair to the broken wall-end including pieces of floor tile. In the NE. corner of the room and sitting on the surface of the mortar floor was a dais with a massive kerb of gritstone slabs, set with plain tiles in an irregular pattern. On the dais and against the E. wall of the room two large gritstone blocks demonstrated the location of a desk. From the NW. corner of the dais a drain of slates and floor tiles led into a gritstone channel running into the main drain at the foot of the stair in the north-eastern block. The room was heated by a small fireplace in the centre of its W. wall, roughly cut into the masonry and provided with a hearth laid on the surface of the mortar floor. The southern half of the chimney breast in the eastern aisle wall was taken down and rebuilt, apparently to provide a flue in what had been a solid block of masonry at ground-floor level.²⁹ Three stone blocks set on the floor surface indicated the existence of a timber screen or partition across the room, just south of the fireplace. Between this and the dais, a large area of scorching was visible on the surface of the mortar floor and a small pit had been cut there. There was no indication of an upper floor over this room but the fact that a parapet which matched that of the north-eastern block had been provided here (Fig. 12, 8 and 9) would suggest that the two blocks were of the same height. This new accommodation was clearly an office, perhaps replacing that which had occupied the first floor of the eastern aisle of the main building.

Apparently contemporary with this work was the unexcavated road-surface that ran around the W., N. and E. sides of the building. A step up to the doorway inserted into the N. wall in this phase shows that the surface is no later, and the fact that it respects the new

eastern block would show that it is no earlier (Pl. v, A). The roadway appears to have continued to the south to provide access for the malthouse and then continued as a hollow way towards further building sites in West Applegarths.

PHASE SIX

The final phase of construction belongs to the middle years of the 15th century and may well be the work of Abbot John Greenwell, 1442–71. Thereafter, the whole structure to the north of the malthouse was demolished in the final quarter of the century.

The northernmost aisle post of the eastern arcade must have failed and was replaced by two new posts, the first set on a reused chamfered stylobate 1.30 m to the south of the original placing and the second 2.00 m to the north, its location being marked by a missing flagstone where a further stylobate had sat. The failure of such a major structural member and the degree of settlement apparent throughout the building at the time of excavation would suggest that the building was in a poor state of repair and perhaps in danger of collapse. Within the aisle after this repair, the partitions of the enclosed room were renewed on low cill walls and those areas of flagged flooring which had literally worn away were made good with packed rubble which included a waster floor tile. A low hearth, built largely of reused mouldings and heavily burned, was built against the inner face of the E. wall just to the north of the 13th-century chimney stack, and the northern part of the partitioned room was fitted out as a smithy. Amongst the ash and hammer scale on the floor, which extended as far south as a fragmentary cill wall, were the lead linings of three wooden tubs or water-boshes in their original positions, and a pair of tongs which lay to the south of the hearth, showing that the smithy had survived as a working unit to the very end of the building's life.

In the third bay of the aisle, a pit roughly 2.0 m in diameter and 0.90 m deep with near-vertical sides and a flat bottom was cut down through all earlier floors. Its lower filling consisted of a mass of copper ore, slag, and bronze scrap, suggesting further metalworking in the building, perhaps in the fourth bay which had been stripped by Hope and where no occupation deposits survived. Later, the pit was filled up with a layer of rubble and a mass of occupation debris. Finally a lead-hearth was set into its upper filling in the course of demolition. It may well have been lead melted down for casting into ingots in this hearth that had run down between the adjacent aisle-post and the masonry packed around it, giving a perfect cast of the grain of the oak.

The southern room of the eastern range was substantially altered in this phase. The wall fireplace was blocked although the hearth was left *in situ*. The S. wall was then demolished to one course above floor level, and was replaced by a massive chimney stack which incorporated the garderobe which had served the southern room. This new work was partially obscured by the roots of an elm that had grown above this corner of the building, but the general arrangements were clear. The garderobe was walled off from the room by the addition of an L-shaped block of stonework set on to the levelled foundation of the old S. wall (Pl. vii, B), indicating that it must then have served an upper chamber, and the fireplace was built immediately to the east. The stonework, which survived to a maximum height of four courses, was of large ashlar blocks. The hearth itself was of gritstone flags, edged by sections of detached Nidderdale marble shafting of 13th-century type. A mortar surface extended from this edging to the inner face of the old S. wall by way of flooring. A damaged mask corbel set in the E. wall, and a second, fallen from the E. wall of the garderobe (Fig. 11, 6), had carried the lintel that had supported the chimney. Some 56 cut bricks, originally measuring 230 by 115 by 55 mm, had fallen from the upper part of the chimney. The floor of the ground-floor office was then renewed in timber. Grooves cut in the old mortar floor at the N. end of

the room indicated N.-S. joists at 0.40 m centres, across which boards had been laid just below the level of the dais. This floor had then rotted and was buried below a levelling of black soil mixed with mortar and ash over which was laid a surface of reused roof slates (Pl. VII, B). Contemporary with this surface was a wooden partition across the room, marked by six post-holes. In the northern half of the room a lead sheet measuring 1.10 m by 0.55 m represented the base of a wooden tank from which a wooden pipe with a lead closing ran northwards below the floor into the earlier tile-built drain.

Possibly belonging to this phase but stripped of all archaeological deposits by Hope were two lengths of walling in the western part of the building. The first, in the fifth bay, was a blocking wall across the carriageway but inside the western carriage-door. At the N. end of the wall was a door, rebated to open to the west. Associated with this wall was a series of beam sockets cut into the S. wall of the building (Fig. 7) to carry a floor or loft 3.60 m above the road surface. The second wall was more uncertain, two courses of obviously reused blocks, crossing the third bay of the inner western aisle and overlying the flagstone floor of the previous phase. Neither wall was set in mortar, unlike the remainder of the structure, but both were accepted as old by Reeve (Fig. 2) and Hope. A third length of walling, which relates to this phase, closed off the outer western aisle, with a spur on the line of the northern pair of arcade posts in the main building running up to the edge of the watercourse.

The final occupation of the building was represented by a substantial spread of late 15th-century pottery throughout the structure. Other materials, particularly large quantities of scrap metalwork, painted window glass, and building materials found amongst the general occupation debris, indicated that the final use of the building was that of a builder's workshop where scrap materials were cannibalized, structural ironwork produced, and materials stored. Abbot John Greenwell's restoration of the church between 1442-71 and Abbot John Darnton's extensive building works of 1479-95 provide a clear context for such a use,³⁰ and after the completion of this work the building itself was demolished and the site levelled. The date of the demolition of the malthouse is not known.

MOULDED STONES AND ARCHITECTURAL DETAIL

A total of 123 moulded stones was recovered from stratified archaeological contexts in and immediately outside the ruins of the woolhouse, most stones lying where they had fallen in the late 15th century amid the heaps of discarded rubble that buried the lower walls of the building. More must have been excavated by Hope, and several stones in the site masonry store can be identified as elements of this building. Loose mouldings lay all around the site before excavation, apparently being dumped from elsewhere, and as they bore little or no relationship to those recovered in excavation they are not discussed here. Where possible, architectural detail has been related to that part of the building whence it derived. The importance of this material is that it comprises the basic dating evidence for the construction phases of the building, as well as providing clear evidence of its actual appearance. On a site where so much architectural detail remains *in situ* the survival of so much material makes it possible to see the building phases in the woolshed in the wider context of the whole precinct. The principal building stone at Fountains Abbey is a locally quarried gritstone, from which all the mouldings described below were cut.

1. (Fig. 9) Ten sections of jamb, head, and cill of a mid 12th-century window from the mid-point of the N. wall of the original building. Elements of two further windows of closely comparable form were recovered from both inside and outside the N. wall in both the eastern and western aisles of the building. The height of the window is uncertain but has been reconstructed here on the basis of a regular iron grille, for which sockets remained in the stonework as drawn. Internally, the window splay was recessed for wooden shutters, the mark of the lower hinge remaining between the two lowest stones of the jamb. This window and its fragmentary neighbours are work of the period 1150–60, seen elsewhere in rebuilding work which followed the disastrous fire of 1146, and particularly in the E. wall of the dormer,³¹ the nave and transepts of the abbey church,³² the W. range at its northern end³³ and the guest houses.³⁴

2. (Fig. 10a) Sixteen mouldings and 30 ashlar blocks had fallen from the first floor of the E. wall of the main structure on to the road surface outside the fifth bay of the building. They represented the greater part of a window and the adjacent wall which had fallen in one piece. Missing elements of the window were made good by the recovery of a matching section of cill from the roots of an elm tree opposite bay four and a capital attached to a matching fragment of mullion derived from a window in bay three, both of which are included in the reconstructed drawing of the window. An identical capital and several

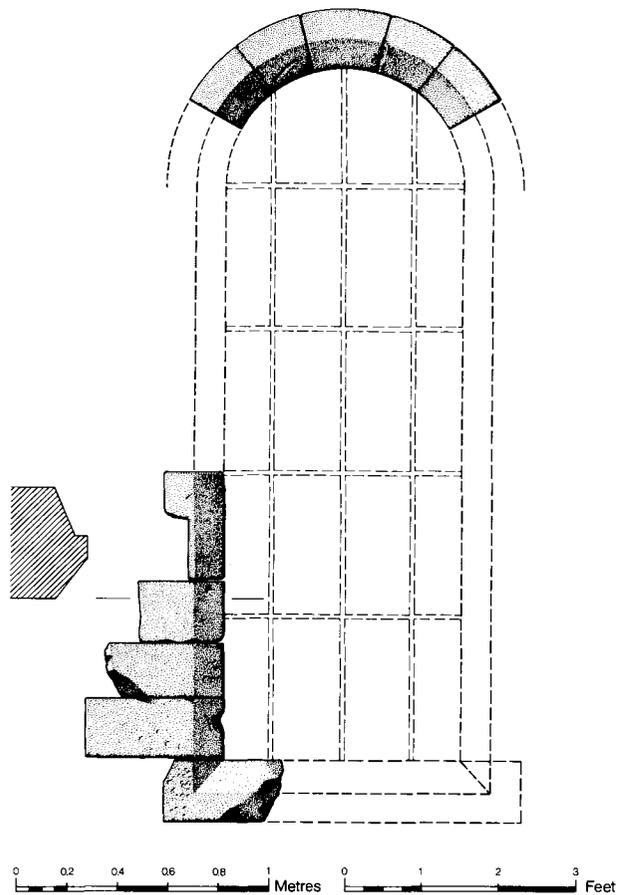


FIG. 9

Mid 12th-century window from the N. wall of the woolhouse of Fountains Abbey

sections of mullion now in the site masonry store apparently derive from this series of windows and must have been recovered by Hope in 1888. In form, the window consists of paired lancets with plate tracery heads and a quatrefoil oculus within a half-round dripstone which ends in mask corbels. The window head was made up of two plates, one of which was sufficiently complete to be certain of its form. The most noticeable feature was a crudely carved palmette or acanthus leaf on the splay above the capital. This 'signature' occurs on two other plate tracery window heads from Fountains Abbey. These were found by J. R. Walbran in the ruins of the infirmary during his 1851 excavation³⁵ but have remained unpublished. The infirmary at Fountains is known to have been built by Abbot John of Kent between 1220 and 1247,³⁶ and the close similarity of the infirmary windows to those of the rebuilt woolshed would indicate that the same masons worked on the detail of both buildings and that they were thus contemporary. Whilst the infirmary windows were rebated for wooden frames and were probably glazed, those from the woolhouse were closed with iron grilles and wooden shutters, the fixings of which survived as shown in the drawing.

3. (Fig. 10b) Head of a two-light window, now broken but originally cut from a single stone, with pierced cusps and a trefoil light above the main lights. The head is channelled for glazing. No similar detail survives elsewhere in the precinct but this piece, which falls within the early geometric Decorated style in Yorkshire, can be dated to *c.* 1260–70. It was found in a robber pit immediately within the NE. angle of the outer western aisle and had fallen from the N. gable wall of that aisle.

4. (Fig. 11, 4) Six sections of a stone chimney in fine ashlar, two fragments of its moulded cap, and a chamfered square section of the chimney flue on which the circular section was placed were all found immediately outside the E. wall of the third bay of the eastern aisle of the woolhouse adjacent to the internal thickening which supported a fireplace at first-floor level. The cap, though badly smashed, is curious in that the flue enters its base with a circular section but has become of square section at the top. The weathering pattern shows that this is indeed the cap and not the junction of the chimney to the square-sectioned wall flue. The ashlar chimney sections have matching assembly marks to aid construction. The chimney is not datable stylistically but must belong to John of Kent's rebuilding of 1220 to 1247.

5. (Fig. 11, 5) Decorative gable finial, found amongst destruction material to the south-east of the building where it had been seen by J. A. Reeve who mistook it for a chimney cap.³⁷ How it got there is not known, for this finial matches the coping of the N. gable wall of the woolhouse and it was probably placed there in the late 13th century as a repair. As with the coping, its outer face is chamfered. Both sides are decorated with trefoil-headed niches and further elaboration that has now weathered away. It cannot have fallen from the S. wall which did not appear above the roof line of the building, and the finial is too early to be associated with the malthouse to the south.

6. (Fig. 11, 6) Mask corbel matching those used elsewhere in John of Kent's work, notably in the presbytery and infirmary. This is the pair to that surviving in the wall above the fireplace at the S. end of the obedientiary's office and both must have been reused from elsewhere. The illustrated example was found where it had fallen on to the office floor.

7. (Fig. 12, 7) Four stones from the lowest course of coping from the clasping buttress at the north-western angle of the original building. The drip-groove in its under-surface clearly stops against the face of the N. wall of the building but continues around the W. face of the buttress. These stones, like the windows of the N. façade, date to the period *c.* 1150–60.

8. and 9. (Fig. 12, 8 and 9) Sections of parapet coping from the range of rooms on the E. side of the building. 8 was found in the north-eastern room but was damaged and apparently recut. It may originally have matched 9 which had fallen from the E. wall of the obedientiary's office. A mason's mark was clearly cut into the back of 9. Both stones are of early 14th-century date and probably date from the construction of that office.

10. (Fig. 12, 10) Section of gable coping, one of ten such stones recovered from the N. gable wall of the building and hence of mid 12th-century date. These stones match the 13th-century finial, 5, described above. All the copings were badly broken, presumably as a result of their being pitched down. Most were dumped within the north-eastern room although three were found at the W. end of the gable wall.

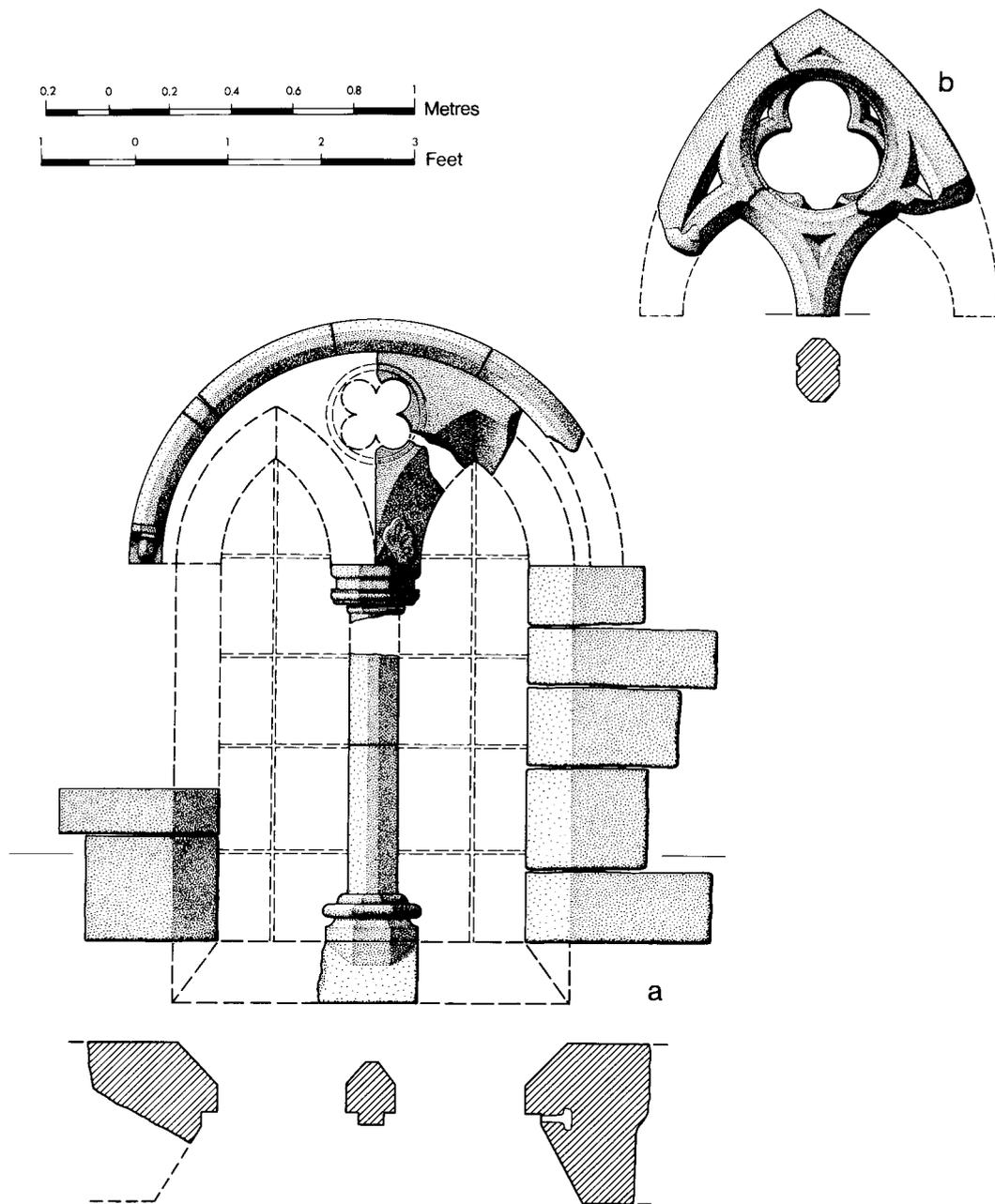


FIG. 10

- (a) reconstructed window from the eastern aisle wall of the woolhouse;
 (b) head of a two-light window from the N. wall of the outer western aisle of the woolhouse

11. (Fig. 12, 11) Incomplete section of window cill with the fixings of a strong iron grille and a deep and chamfered shutter rebate on the sloping inner cill. This stone was found within demolition debris within the nave of the woolhouse but cannot be related to any part of the structure and is undated.

12. (Fig. 12, 12) Section of rebated window cill from the window in the N. wall of the E. aisle of the original building. Its significance lies in the fact that it is cut from the drum of a circular pier with attached circular shafts which was either a waster or came from a building demolished in the mid 12th century.³⁸

13. (Fig. 13, 13) Reused ashlar block from the N. wall of the original building which had first served as half of a half-round wall-shaft or respond, again most probably derived from a building being demolished in the mid 12th century. It bears the scar of an iron cramp from its first use.³⁹

14. (Fig. 13, 14) Section of quatrefoil pier with a fillet on each surviving face, set on the floor of the north-eastern room. Three similar pier drums, lacking the fillets, are set in the floor of the centre aisle of the woolshed. All four are derived from an unknown building of early 13th-century date.

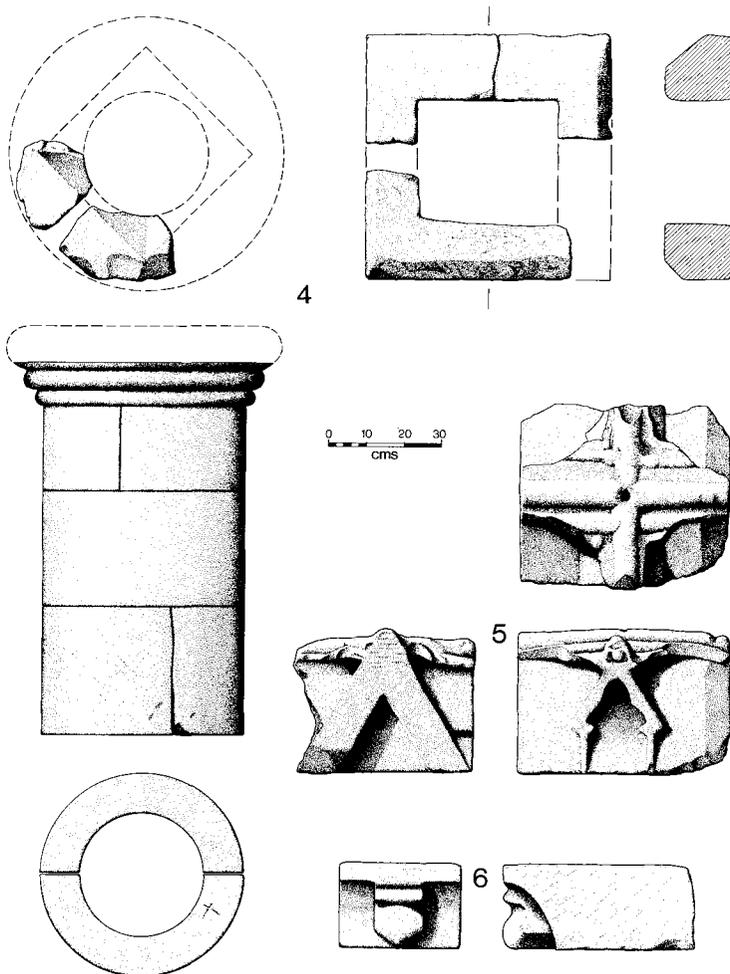


FIG. 11

Architectural detail from the woolhouse at Fountains Abbey

15. (Fig. 13, 15) A broken section of window mullion rebated for shutters, reused as the inner door cill in the N. wall of the north-eastern room. Its original source is unknown.

16. (Fig. 13, 16) Stone drain hopper set in the floor of the north-eastern room and apparently of late 13th-century date.

17. (Fig. 13, 17) Grindstone with a square axle hole and badly worn out of true, reused as the entry to the drain or culvert that ran across the site of the woolhouse and which was built in the campaign of 1220 to 1247. The grindstone must of course be of earlier date.

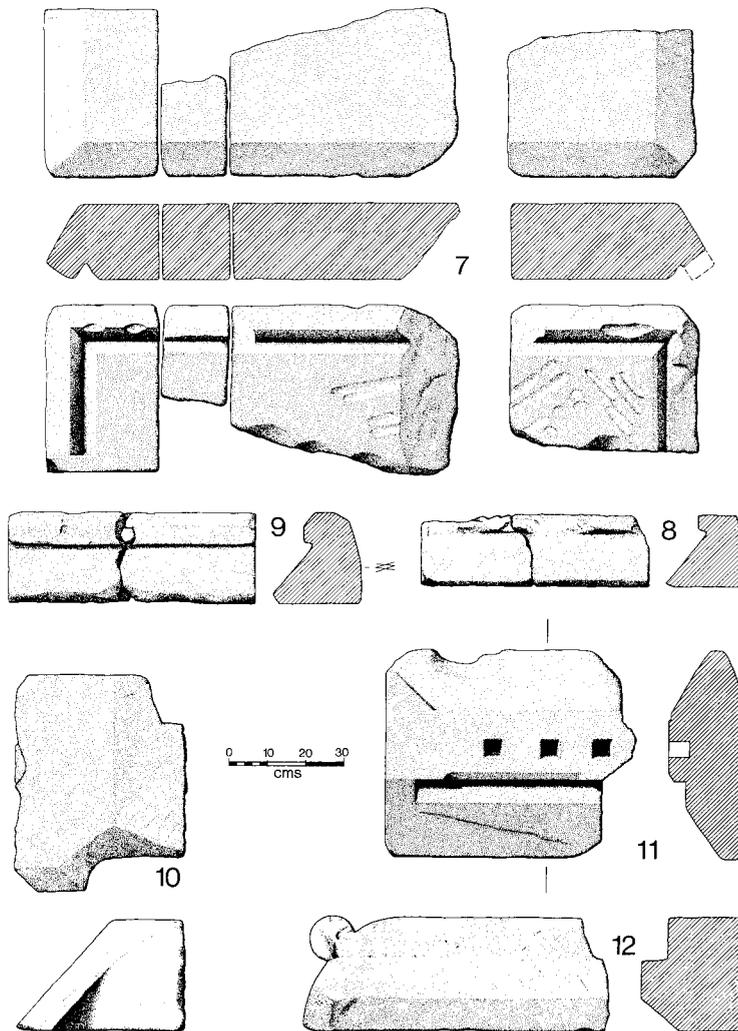


FIG. 12

Architectural detail from the woolhouse at Fountains Abbey

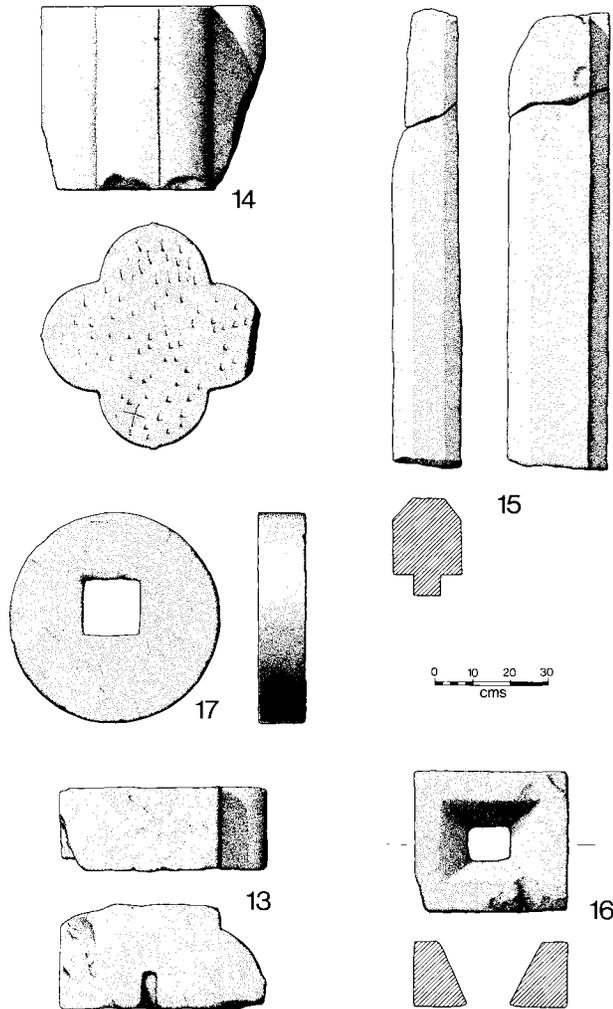


FIG. 13

Architectural detail from the woolhouse at Fountains Abbey

OTHER BUILDING MATERIALS

As well as architectural detail, a considerable quantity of other building materials was found within the general demolition spreads in and around the building. This material, although no longer in place, can be related to particular areas of the building and gives further clues to the appearance of the vanished superstructure. The bulk of this material comes from the eastern half of the building where demolition deposits were largely undisturbed.

FLOOR TILES (Fig. 14)

Apart from the tiled dais in the eastern range, no floor tiles were found in place, and there was no evidence to suggest that any ground-floor rooms were tiled. The considerable quantity of tiles, both mosaic and quarry forms, suggested that upper floors may have been tiled at least in part.

(i) *Mosaic tiles:*

1. Square tile, 70 mm by 70 mm and 19 mm thick, in a hard, sandy, purple-brown fabric with a painted white slip on the upper surface below a pale yellow glaze. From the north-eastern block.
2. Square tile, 72 mm wide and 18 mm thick, fabric, slip and glaze as 1 but with a knife-cut keying on the base. From the north-eastern block.
3. Cut triangular tile, 70 mm square originally and 19 mm thick, fabric as 1, the upper surface and cut edge are covered with a thick dark purple-brown glaze. From the north-eastern block.

Tiles 1 to 3 can be identified with those remaining in early 13th-century flooring of the abbey church, particularly in the south-eastern transept chapel, and which are ascribed to Abbot John of Kent, 1220–47.⁴⁰

4. Circular tile, 115 mm in diameter and 33 mm thick, in a hard, sandy, orange fabric the surfaces of which tend to purple. The upper surface is covered with a thick, off-white slip below a thin yellow glaze. From the eastern office.
5. Circular tile and surrounding ring, the whole 115 mm in diameter and 33 mm thick, fabric as 4. The circular tile has a thin white slip below a yellow glaze, the outer ring has a thick black glaze. From the eastern office.
6. Rhomboid tile, 148 mm by 40 mm and 30 mm thick, fabric, slip and glaze as 4. From the eastern office.
7. Border tile, 90 mm by 48 mm and 27 mm thick, fabric, slip and glaze as 4. From the north-eastern block.
8. Fragment of a *fleur-de-lis* tile, fabric, slip and glaze as 4. The upper surface has worn away completely. From the north-eastern block.
9. Square tile, 64 mm by 64 mm and 34 mm thick, fabric, slip and glaze as 4. From the north-eastern block.
10. Triangular tile, 90 mm each side and 32 mm thick, fabric as 4 but with a thick black glaze that survives only on the sides of the tile. From the north-eastern block.
11. (Not illustrated) Small triangular tile, fabric as 4 and with a thick black glaze. The sides, two of which are hollowed, measure 55 mm, and the tile is 26 mm thick. From the eastern office.

(ii) *Slip-decorated tiles:*

12. Fragmentary and apparently waster tile from a 16-tile pattern. The background of thin cream slip defines a stag grazing within a double circle. The surface of the tile has splashes of a thin pale yellow glaze. Found in the packed rubble floor belonging to the final phase of the smithy in the eastern aisle of the main building.

Tiles 4 to 11 and some quarry tiles⁴¹ can be matched in the tile floor laid in the abbey church by Abbot John Greenwell between 1467/68 and 1471, and tile 12 has been noted in a floor ascribed to Abbot Darnton (1479–95) in the infirmary.⁴²

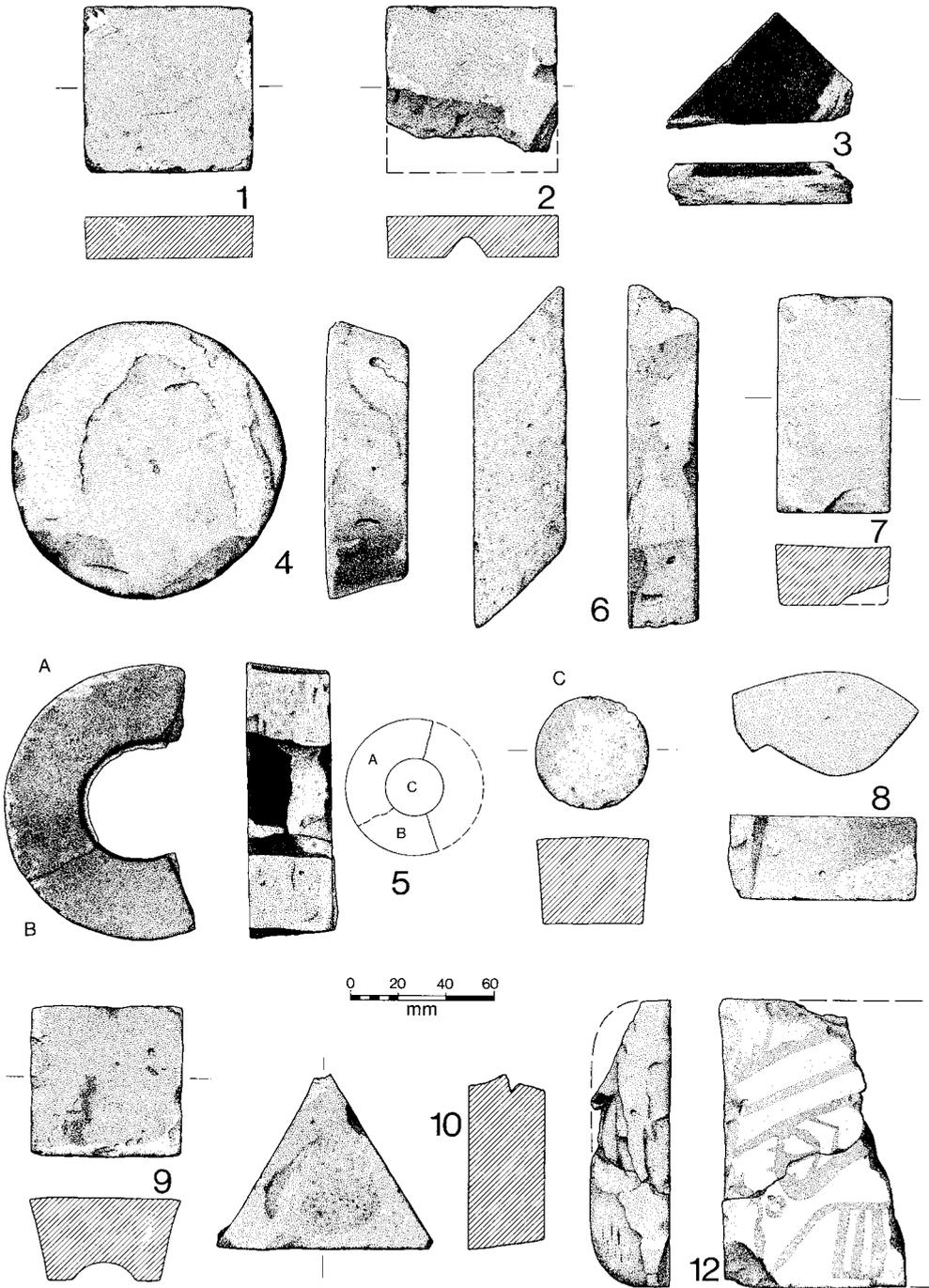


FIG. 14
Floor tiles from the woolhouse at Fountains Abbey

OTHER ARTEFACTS

NUMISMATICA. By the late STUART RIGOLD⁴³

One coin and two jettons were recovered from destruction levels or the latest occupation deposits preceding the destruction of the building:

Coin 1. From the latest occupation within the smithy

Not a 'cut halfpenny' in the usual sense, but the rejected half of a foreign 'penny' of poor silver with the Sterling long simple cross and pellets reverse (diam. about 17 mm, inner circle 11 mm), legend unclear (W . . ?). This was not even a usual imitation Sterling, but something rather small and (?) late and perhaps N. German (? Munster); the obv. was not a head but perhaps a draped figure with (?) TN. It is little use for dating but belongs perhaps to the late 14th century.

Jetton 1. From demolition material on the west side of the woolhouse

Sterling series, English, diam. 19 mm, chipped. Orthodox but bad dies (i.e. late and slovenly). Lion rampant/short cross molines and pellets (two per quarter in radial pairs); borders of pellets and saltires/pellets. Berry, Type 4, rev. 5, border G/D (parallels with Fox type XV), 1320s or even 1330s but hardly later.

Jetton 2. From demolition in the centre aisle of the woolhouse

Late French official, verging on 'Derivative' style, diam. 28 mm. Shield of France 'modern', pellets l., r. and over, + AVE MARIA: GRACIA: PLEN, plain colon stops, long serif to L. Rev. 3-strand cross flory in quatrefoil, pellets in spandrels, As on cusps. In sharp condition for poor workmanship. Probably *c.* 1450–60.

The mysterious cut sterling (obviously a bad one) and the rather battered late Sterling jetton are not much help for a terminal date, but if one may argue for the sharp late French one (not in the sort of condition that they may turn up in 1536–40 dissolution debris) might one still wonder if this [the demolition of the woolhouse] did not take place as part of a tidying up say around 1475? Minor buildings may be 'dissolved' at earlier dates occasionally. There is no trace of the usual Nuremberg material that comes in dissolution debris, but it would be overdoing it to argue from silence here.

MEDIEVAL POTTERY

The medieval pottery of north Yorkshire outside the city of York remains very much an unknown quantity, and the identification of sound and datable groups is of the first importance. Sites such as Fountains Abbey which combine good documentation with well-dated architectural detail are thus of great significance, and well-stratified groups which can be related to the construction or demolition of closely dated structures are of particular importance. The excavation of the abbey woolhouse recovered a total of 3,310 pot sherds which could be considered stratified. Much of this material, because of the nature of the excavation, came from the final occupation and demolition of the building. Some of these deposits had been damaged or badly disturbed by the 1888 excavation and were not complete. However, four groups of pottery could be isolated, from undisturbed and datable contexts, and they are described below:

Group A: Construction of the original building	<i>c.</i> 1150–60
Group B: Construction of the north-eastern block	<i>c.</i> 1270
Group C: Final occupation of the north-eastern block	<i>c.</i> 1480–90
Group D: Final occupation of the smithy	<i>c.</i> 1480–90

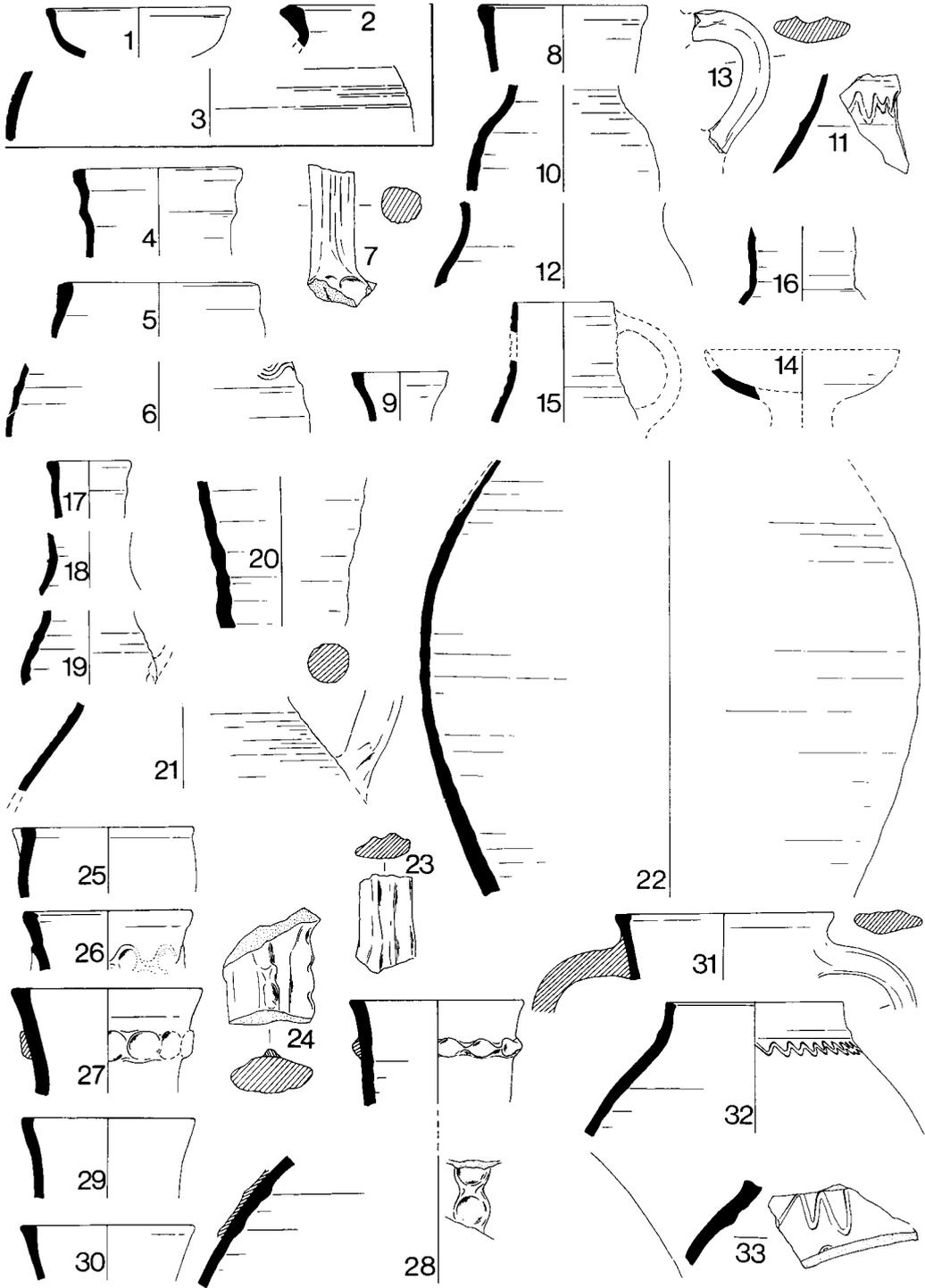


FIG. 15

Pottery from the woolhouse. Scale 1:4

These groups comprised 677 sherds (20.45% of the pottery recovered) from a total of 108 vessels. The bulk of this material came from the eastern side of the building which had escaped disturbance below Hope's dumps. The greater part of the final occupation pottery from the central and western parts of the building duplicated the vessels found in Groups C and D, and was therefore not selected for publication.⁴⁴

The pottery presented here has been treated empirically and basically described. Where possible, the source of the pottery or its fabric-type is appended to the description.

Group A (Fig. 15, 1–3)

A group of seventeen sherds from a total of six vessels was recovered from two deposits which comprised sealed construction deposits of the original building. Sixteen sherds came from the levelling below the cobbled floor of the building (Fig. 5, Section K–L, layer 13), whilst the final sherd derived from the construction of the first period drain below the later north-eastern block. A date of c. 1150–60 for this deposit is suggested on the basis of recovered architectural detail.

1. Shallow bowl in a fine, smooth, grey-buff stoneware, glazed on both surfaces with a drab olive-green alkaline glaze which has decayed, perhaps from being in contact with dumps of tanning waste. Possibly Chinese *celadon*.⁴⁵
2. Cooking-pot rim and eight small non-fitting body sherds in a friable, pale-grey gritty ware. The vessel has been used for industrial purposes, for there is a thick deposit of glass waste on the outer surface, much of which has spalled away. *York gritty ware*.
3. Shoulder sherd from a jug in a hard, gritty brown-buff fabric with a dark grey core. The outer surface has a light green splashed lead glaze. This sherd derived from the drain below the north-eastern block.

Unillustrated sherds in this group comprised a further splash-glazed jug, fabric and glaze as 3, and two fitting base-sherds from a jug in a hard, sandy, pinkish-cream fabric.

Group B (Fig. 15, 4–16)

The packing below the floor of the north-eastern block, dated on structural analogy with the outer western aisle which produced a window-head of c. 1260–70, contained a total of 45 sherds from some nineteen vessels, all of which could be considered as sealed and primary to the building.

4. Jug rim in *Hambleton ware* with splashes of dark green glaze.
5. Jug rim in *Hambleton ware* with a clear lead glaze which tends to yellow on the outer surface.
6. Four abraded body sherds from a jug in *Hambleton ware* with incised comb decoration below a patchy mottled green glaze.
7. Ribbed rod-handle from a jug in *Hambleton ware* with a mottled green glaze.
8. Jug rim in a hard, sandy orange fabric with a single splash of clear lead glaze on the outer surface.
9. Flask or bottle rim in an orange-buff finely sand-tempered ware with a grey-buff outer surface.
10. Shoulder sherd from a flask or bottle in a hard, sandy orange fabric.
11. Neck sherd from a jug in a fine orange-pink fabric with a light grey core and a light apple-green glaze on the outer surface over incised wavy-line decoration.
12. Shoulder sherd from a jug in an orange-brown gritty fabric with a mottled green glaze on the outer surface.

13. Strap-handle from a jug in a hard, smooth, dark grey fabric with purple-orange surfaces below a light apple-green. *Humber ware*.
14. Sherd from the bowl of a lamp in dark grey, sandy, fabric with pale grey margins and a rich green glaze on both surfaces.
15. Rim and neck sherds from a small jug in *Siegburg stoneware*.
16. Neck sherd from a small jug in *Langewehe stoneware*.

Group C (Figs. 15 and 16, 17–38; 39–53)

A thick deposit of occupation debris lying on the scoured floor surface of the north-eastern block and sealed by a layer of fallen roof-slates and coping from the N. gable of the main building represented the final use and occupation of that room. Amongst the debris were 432 sherds from a total of 55 vessels, most represented by fitting sherds and most probably a contemporary deposit. The scoured floor indicates that the room was normally kept clean and would suggest that little if any of the pottery found on it was residual.

17. Rim of a bottle or flask in a hard, sandy orange fabric.
18. Neck of a bottle or flask, fabric as 17 but not from the same vessel.
19. Shoulder sherd, with the scar of a handle, from a flask in a hard, sandy, orange fabric with a pale grey core. The vessel was poorly finished.
20. Sherd from the lower body of a bottle or flask in a hard, sandy, orange fabric, roughly finished.
21. Seven sherds from the neck of a jug with a plain rod-handle in a hard, sandy, cream-buff fabric with a grey core. (?) *Hambleton ware*.
22. Jug body in a hard, sandy, dark grey fabric with a purple outer surface below a clear lead glaze.
23. Strap-handle from a jug in a fine, lightly tempered pale grey fabric with orange-red margins below a rich olive green glaze.
24. Jug handle with an applied, finger-impressed strip on its upper surface in a hard, light grey fabric with pale orange margins below a rich green glaze.
25. Jug rim in *Northern reduced ware*.
26. Jug rim with an applied thumb decorated strip in *Northern reduced ware*.
27. Jug rim, decoration as 26, in *Northern reduced ware*.
28. Rim and shoulder sherds from a jug with applied, thumb decorated strip decoration, in *Northern reduced ware*.
29. Jug rim in *Northern reduced ware*.
30. Jug rim in *Northern reduced ware*.
31. Cistern rim in *Northern reduced ware* with one surviving strap-handle.
32. Rim and neck of a wide-mouthed vessel in *Northern reduced ware* with incised wavy-line decoration.
33. Shoulder sherd from a jug with two bands of wavy-line incised decoration in *Northern reduced ware*.
34. Neck of a jug with incised wavy-line decoration in *Northern reduced ware*.
35. Upper part of a jug in an oxydized variant of *Northern reduced ware* with a band of impressed decoration at the neck.
36. Strap-handle from a jug in *Northern reduced ware*.

37. Strap-handle from a jug in *Northern reduced ware*.
38. Rim, shoulder, and handle sherds from a jug or cistern in a hard, finely sand-tempered orange, fully oxydized fabric with a thin but lustrous clear lead glaze on both surfaces.
39. Two-handled cup with a lid-seating in *cistercian ware*.
40. Cup in *cistercian ware* with applied pads of white clay, at least one of which has a vertical knife-cut across it.
41. Rim of a *cistercian ware* two-handled cup.
42. Cup rim in *cistercian ware*.
43. Flaring cup in *cistercian ware*.
44. Flaring cup rim in *cistercian ware*.
45. Body sherd from a two-handled cup or beaker in *cistercian ware*.
46. Handle from a cup in *cistercian ware*.
47. Handle from a cup in *cistercian ware*.
48. Body sherd from a cup with applied decoration in white clay, in *cistercian ware*.
49. Body sherd with a fragment of 'grid-iron' decoration in white clay from a beaker in *cistercian ware*.
50. Lobed cup in a hard, cream-buff, finely sand-tempered fabric with a rich, streaky green glaze on both surfaces. The vessel was multi-handled, alternating long and short handles between every other lobe.
51. Neck and rim of a small jug in *Siegburg stoneware*.
52. Large drinking-pot in *Raeren stoneware*. The base of the vessel was in fact found with vessels of Group D below in the smithy.
53. Handled bottle in *Cologne stoneware*, decorated with acorns and oak-leaves.

Associated with this group were five sherds from a Type 1 Martincampf costrel.

Group D (Fig. 17, 54–64)

The distinctive ashy debris within the smithy in the eastern aisle of the main building produced a total of 197 sherds representing some 28 vessels, one of which in fact comprised 103 sherds alone. This deposit, as did Group C, lay below the demolition deposits of the building and belongs to the final period of use of the smithy. Coin 1,⁴⁶ a late 14th-century cut N. German imitation Sterling, was found within this group, but must have been residual.

54. Cistern with applied thumbled-strip and incised wavy-line decoration in *Northern reduced ware* which has been overfired and partly wasted.
55. Upper part of a jug in *Northern reduced ware* with incised wavy-line and comb-impressed applied thumbled-strip decoration.
56. Shoulder of a jug in an oxydized variant of *Northern reduced ware* with fine incised wavy-line decoration on the neck.
57. Rim sherd from a urinal in an oxydised variant of *Northern reduced ware*.
58. Body sherd from a jug in a finely tempered grey fabric below a dark apple-green glaze. The glaze in the area of the applied decorative strip is enriched with copper and coloured bright green.

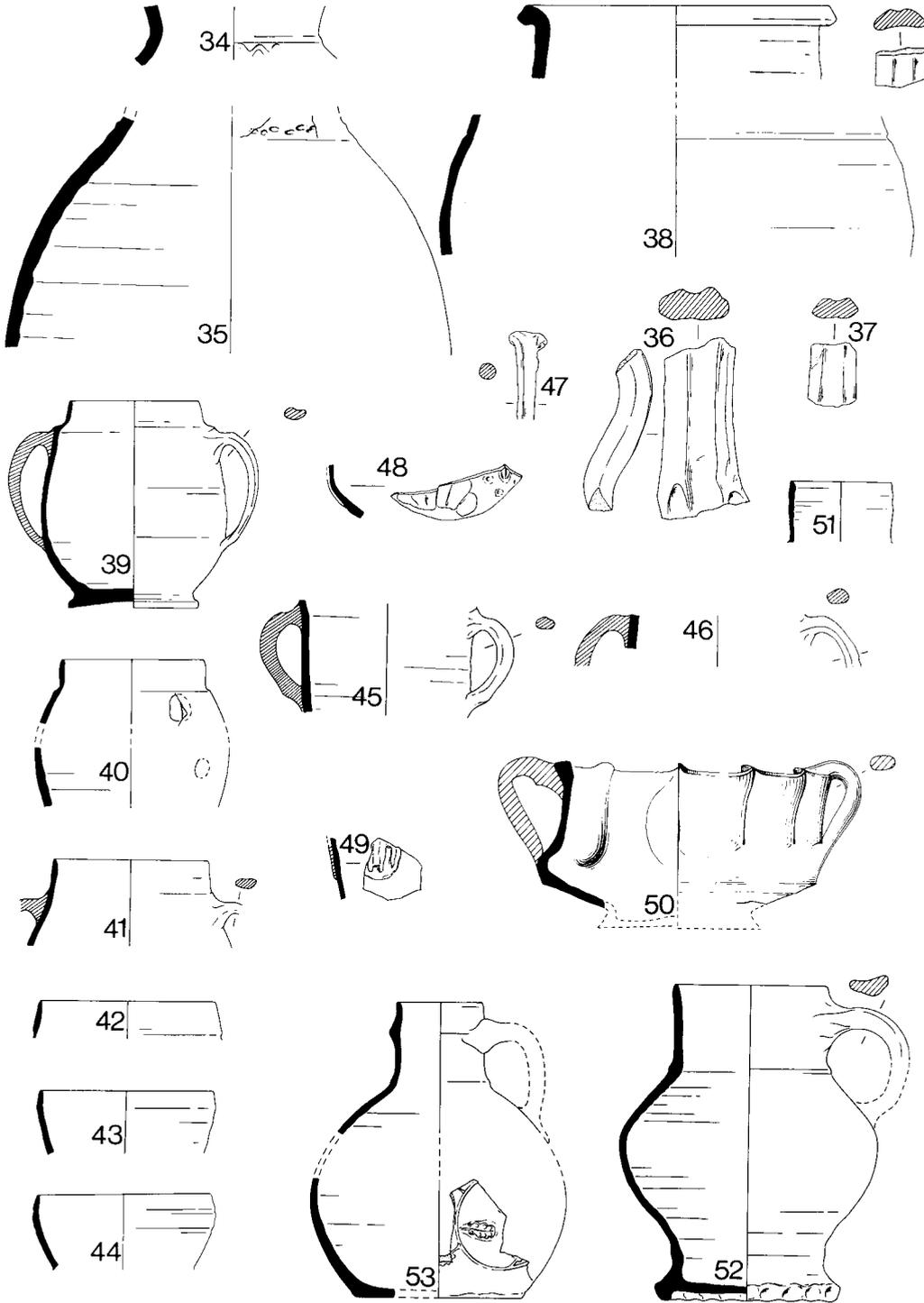


FIG. 16

Pottery from the woolhouse. Scale 1:4

59. Base of a jug, decorated on the basal angle with finger-tip impressions, in a hard, sandy, cream-buff fabric with a grey core, with a thin yellow-green glaze on both surfaces. (?) *Hambleton ware*.
60. Cup lid in *cistercian ware* highly decorated with white clay strips and pellets. This can be identified as a Wrenthorpe produce.⁴⁷
61. Cup in *cistercian ware* decorated with pads of white clay.
62. Body sherd from a two-handled cup in *cistercian ware*.
63. Base of a cup in *cistercian ware* with the scar of a handle and an applied white clay pad.
64. Base of a cup or vase in a pale orange sandy fabric with a clear lead glaze on both surfaces, in imitation of cistercian ware.
65. Small drinking-pot in *Raeren stoneware* from which the footring has been carefully chipped away and a lead foot cast on in its place. The new lead footring was decorated with knife-scoring. The purpose of this modification was apparently to make the vessel almost impossible to upset.

Also found within the smithy but not illustrated was a body sherd from an altar vase in *South Netherlands maiolica* which had lost its tin glaze on both surfaces.

Discussion

Group A, closely dated to the middle years of the 12th century, was unfortunately too small to be of much value, although it should be seen in conjunction with contemporary vessels from the construction of the abbey church.⁴⁸ The splash-glazed wares and York gritty ware were unexceptional, but the single vessel in Chinese *celadon* is quite remarkable, especially for a community pledged to a simple life; whether this was the chance find of a single Chinese import, or an indication of the extensive use of high quality pottery at Fountains Abbey remains to be seen.

Group B, deposited *c.* 1270, is a reasonably typical group of the later 13th century, with *Hambleton ware* and *Humber ware* vessels of the forms seen in contemporary groups at Ripon,⁴⁹ and in groups at Bolton in the Vale of York, dated perhaps too conservatively to the early 14th century.⁵⁰ The orange-ware flasks are also closely paralleled at Bolton. Firmly stratified with these vessels were two stoneware vessels, one from Siegburg, the other from Langewehe. A date in the later 13th century on first sight might seem to be too early, for at Dordrecht, Safartij has the earliest occurrence of stoneware fixed by dendrochronological association at 1330, with the full range of vessels not apparent until *c.* 1350,⁵¹ although Baart in Amsterdam has argued for a start before 1300.⁵² In England, the earliest recorded stoneware comes from the frater of the Dominican friary at Boston, Lincolnshire⁵³ from a context of before 1292, which has not found universal acceptance. There are also suggestions that stonewares are occurring in the late 13th-century contexts at Hull.⁵⁴ The occurrence of two stoneware vessels in a group which is otherwise typical of its period, with no obvious signs of intrusion, would suggest that they are indeed early. They came from the levelling below a floor which itself was unbroken by later features.

Groups C and D, being closely contemporary, should be seen together, comprising a realistic cross-section of the pottery in general use in the last decades of the 15th century. The *Northern reduced wares* are ubiquitous, being found in later contexts at both Rievaulx and Byland Abbey and as far afield as York and southern Scotland.⁵⁵ The large quantity and range of vessel-types from the woolhouse with a limited date-range fixes the forms of this fabric-type some forty years or more before the monastic dissolution, the presumed date of the Rievaulx and Byland pottery, and is thus particularly useful. The associated vessels in the main are typical of the period, particularly the Siegburg and Raeren stonewares, the South

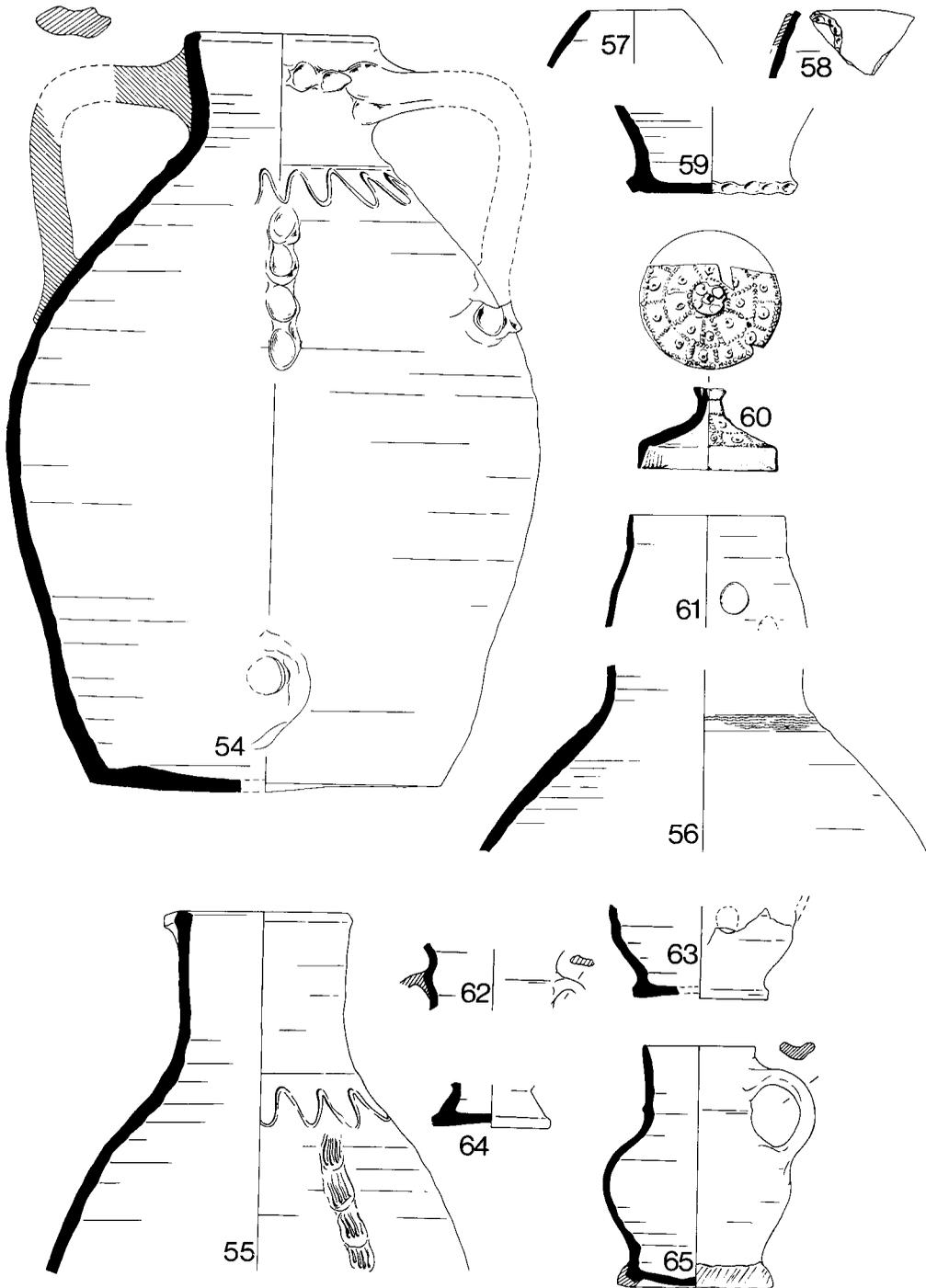


FIG. 17

Pottery from the woolhouse. Scale 1:4

Netherlands maiolica, and the French lobed cup. The *Cologne stoneware* bottle might normally be expected to date to the early 16th century, but such an early date is not impossible and this particular vessel is early in the series. Of the greatest significance is the *cistercian ware*. The full range of basic forms is represented, including several highly decorated pieces. A number of these vessels, particularly with complex decoration, are normally thought to be 'late', and probably of post-dissolution date. It has been argued that cistercian ware was not introduced until the 1480s, based on material recovered from Sandal Castle⁵⁶ and Kirkstall Abbey,⁵⁷ both sites close to major production centres. A single sherd from the Old Bishops' Palace, Lincoln,⁵⁸ in a context of the 1450s or earlier, would suggest currency at least 30 years earlier, and the occurrence of reasonably developed forms at Fountains is perhaps not as surprising as it would at first seem. The Type 1 cup lid, 60, would post-date the 1485 group from Sandal Castle,⁵⁹ where none of the local Wrenthorpe products are represented, and it must be one of the latest vessels in Group D. The argument that cistercian wares generally post-date this deposit does not hold good at Fountains itself, for their occurrence in the latest church floor, dated by both coin and documentary evidence to 1467–71⁶⁰ in association with *Northern reduced ware* vessels identical to those of Groups C and D, is firmly established.

OTHER OBJECTS FROM THE SMITHY. By CAROLINE ATKINS (Fig. 18, 1–25)

All of the objects included in this section can be directly related to the function of this part of the building, either as fittings or as items that would have been worked on there, or as items belonging to the people who worked there. This is a closed group of material, dating to c. 1480–90, which was found in association with pottery Group D.

Objects of Iron

Bar Iron

1. Rectangular sectioned bar, presumably saved for scrap. 2 and 3 are moods, or unfinished blanks, which would have been wrought to make tools.

Tools

4. Pair of tongs, with spatulate ends, and a riveted hinge, 0.57 m long overall. The tongs were found lying on the stone floor, near the forge, where they would have been used.

5. Part of a bucket binding, found on the west side of the smithy.

Knives

6–7. Knives, and as such would have been personal belongings. 6 is an incomplete blade, with the stump of a scale tang. 7 is a virtually complete knife, with a scale tang, which has three counter-sunk rivet-holes, and a faceted bolster.

Door Furniture

All four of these items, being broken, were probably intended for reworking.

8–9. Keys, both with a narrow stem and a welded bow; 8 having the remains of an oval bow, and 9 a kidney bow. Neither has any trace of non-ferrous plating.

10–11. Broken strap hinge, and a decorative hinge terminal with a central rivet.

Rivets and Nails

12–13. Rivets, 12 with a circular head and rove, and a round-sectioned shaft, which has been used on timberwork measuring 51 mm; 13 is a rivet with oval head and rove and a square-sectioned shaft, which has been used on timberwork 25 mm wide.

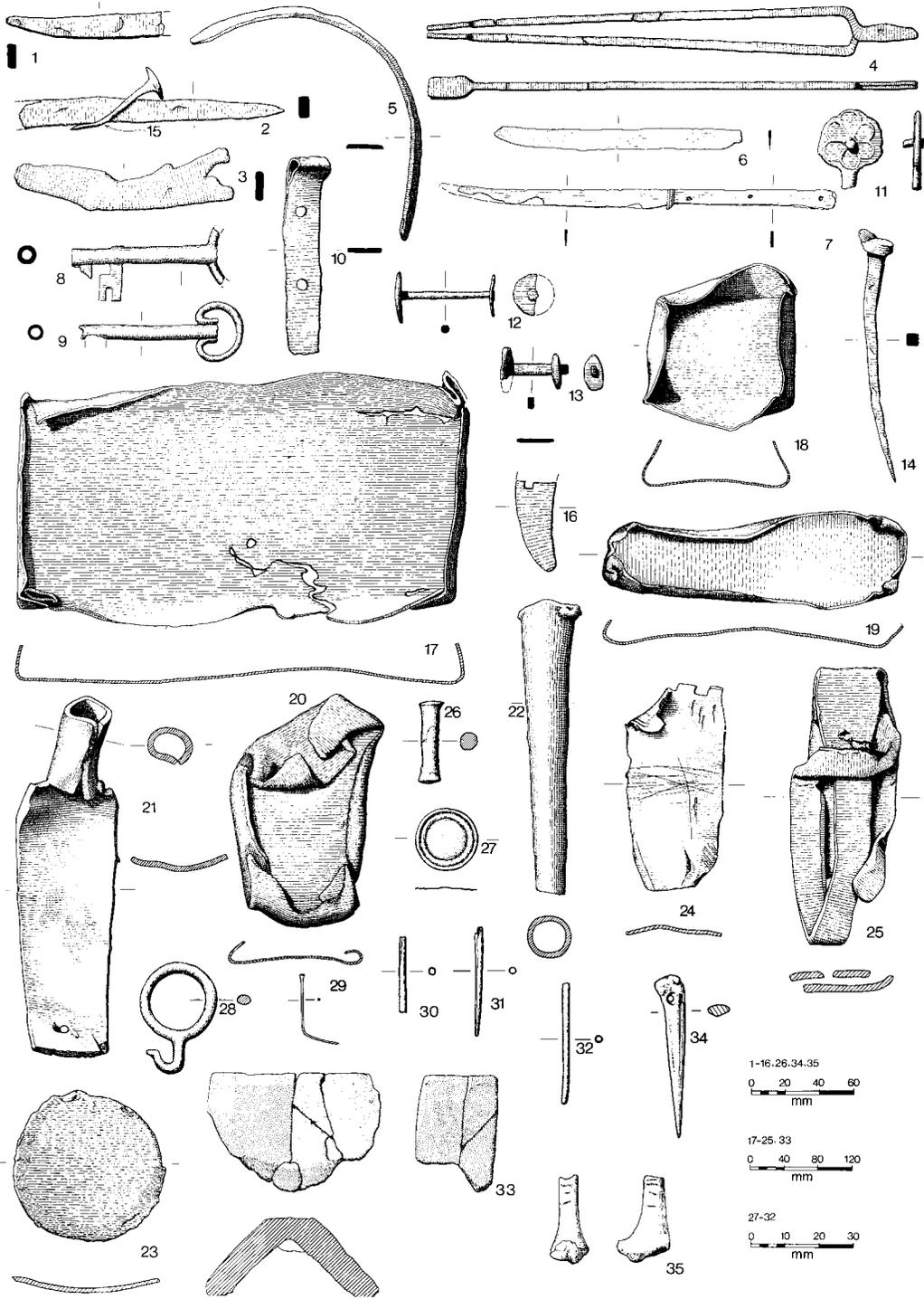


FIG. 18
Objects from the smithy

14–15. Nails. 14 is a 137 mm (5½") spike nail, of a type used in joinery. This example is unused and may have been made in the smithy. 15 is a used 63 mm (2½") nail, with an oval head, typical of the large number which must have been used in the roof of the woolhouse and were recovered from demolition contexts.

Miscellaneous

16. Fragmentary horse-shoe branch, with no calkin.

Objects of Lead

Boshes

17–20. lead liners for the bottoms of wooden tanks or boshes, which would have held water to cool and temper the iron items being worked in the smithy. Their locations within the smithy are shown on Fig. 4. 17 measures 0.51 m × 0.22 m internally, and has been made from a single folded sheet of lead. 18 measures 0.12 m × 0.16 m internally and has seamed corners. 19 measures 0.32 m × 0.08 m internally and has very roughly folded sides and corners. 20 measures 0.15 m × 0.26 m internally, and has folded corners.

Miscellaneous

21. Piece of sheet lead which has been used to repair a wooden spade or shovel, by wrapping the top of the sheet around the lower shaft, and nailing the bottom of the sheet to the back of the blade.

22. Lead spigot, or spout, with an internal diameter of over 30 mm. This spout would have been hammered into place through the side of a wooden trough, or bosh.

23. Lead disc which would have been set in mortar between two sections of stone shafting; probably from window with nook shafts.

24. Sheet of scrap lead, with broken nail-holes at the top which suggest it was originally a roof patch. It was apparently used as a firm base for cutting on, and was probably kept for melting down.

25. Lead strip, folded for easy carrying, and probably saved for scrap.

26. Lead rivet, 43 mm long, with burred over ends.

Objects of Copper Alloy

27. Thin disc decorated with concentric circles, which was probably part of the decoration on a harness or belt. Being small, it is likely to be a chance loss.

28. Curtain hook.

29. Fine, cast pin, with a conical head.

30–32. Lace-ends.

Objects of Stone

33. Damaged cresset lamp, made of chalk, which is square inside and octagonal outside.

Objects of Bone

34. Bone bodkin with an eye.

35. Notched piece of bone, probably for use as a tally stick.

A SUGGESTED RECONSTRUCTION OF THE BUILDING

By GLYN COPPACK and SIMON HAYFIELD

With the exception of great barns, few monastic service buildings have survived, and fewer have been excavated,⁶¹ with the result that remarkably little is known of their form and scale. The recovery of the total ground plan of the Fountains Abbey woolhouse, together with

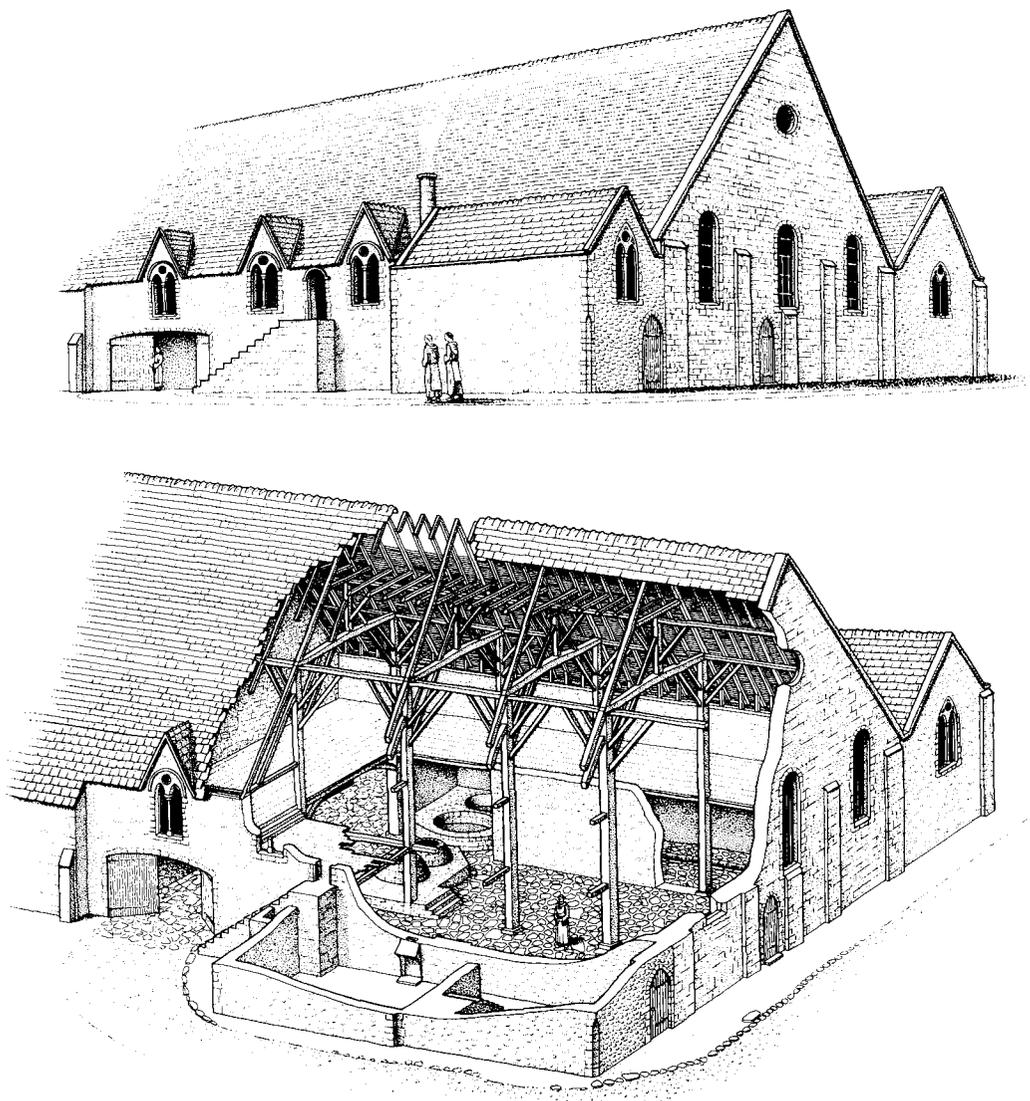


FIG. 19

The woolhouse at Fountains Abbey as it would have appeared in the mid 15th century viewed from the north-east

an exceptional amount of fallen detail, permits the reconstruction of the structure with an unusual degree of certainty (Fig. 19).

Much of the evidence used in this reconstruction derives from the eastern side of the building where 19th-century disturbance was minimal, or from the road-surface to the north where discarded stones from the N. gable wall had been dumped. The S. wall survived to just below eaves level, and considerable information can be derived from the plan recovered by excavation (Fig. 3). The external view of the building, with the eastern office block omitted

for clarity (Fig. 19a) shows only detail for which evidence was recovered. To the south was Hope's malthouse, which awaits re-excavation, but whose proportions are controlled by the height of the woolhouse. The height of the ridge, which is critical to the reconstruction, was calculated in the following way. First-floor height in the eastern aisle was established as 2.44 m (8 ft) by an analysis of the stair-base opposite bay four. Allowing for the width of the wall, the stair was 0.91 m (3 ft) wide, and the likelihood is that there was a square landing before the door, allowing space for twelve steps with 254 mm (10 in) treads. The average height of the risers in stair-cases elsewhere at Fountains is 228 mm (8 in) which would not be inappropriate here. The first-floor windows can be reconstructed from Fig. 10a, and are of a type normally set within a gablet. Allowing 0.76 m (2 ft 6 in) between floor level and the window cill, the height of the wall-top, level with the springing of the window-heads, can be established as 4.72 m (15 ft 6 in). This allows a minimum working height on both levels of the aisle. As the N. gable wall had retained its mid 12th-century coping, it is reasonable to assume that the 13th-century E. wall was of identical height to its predecessor. The precise angle of the gable can be established from the coping recovered, and thus the height of the gable must have been 15.20 m (49 ft 10 in). The windows of the N. gable were reconstructed from fallen elements (Fig. 9), their proportions being calculated from surviving contemporary lights elsewhere on site. Their cills are unlikely to have been below the level of the inserted floor in the eastern aisle in view of the fact that the easternmost window of the N. façade lit the upper floor there. Thus a minimum cill height could be reasonably established. The location of doors at ground-floor level was established from the plan, whilst the first-floor door to the aisle, modelled on John of Kent's work elsewhere, was established from the evidence of the stair. All the windows shown were located in two ways. First, the position of all fallen detail was accurately plotted during excavation, showing where individual mouldings had fallen from. Then, for the purpose of reconstruction, the windows were centred up with the bay of walling they belonged in. The exception to this is the window in the gable of the north-eastern block, which was not recovered. A first-floor chamber was indicated by the stair in the SE. corner of the room, and it has been presumed that it was lit by an identical window to that found within the contemporary outer western aisle. Given that considerable attention was paid to the N. façade, visible from the Great Court and guesthouses, it would seem realistic to balance the appearance of both wings. Other lights must have existed in the E. wall of the eastern block, but no evidence was recovered, much of the tumbled material lying outside the excavated area. Consequently, no windows have been shown. The location of the 13th-century chimney was fixed by the surviving chimney breast in bay two of the eastern aisle, and the location of the fallen pieces. Its height is uncertain, but it would have been at least as high as the adjacent gablet if it was to draw.

The external appearance of the building was controlled not only by its proportions, but by the materials used. The mid 12th-century main gable was of carefully cut ashlar, and was retained throughout the life of the building. The remainder of the structure was of coursed rubble construction, with ashlar dressings and wall-copings. There was no evidence for external plastering or lime-washing, even where masonry had been buried by medieval deposits. The main roof was of clay tiles, a number of which were glazed with a copper-rich lead glaze on their outer surface, suggesting a patterned roof of some form.⁶² The eaves of the main roof, however, appear to have been slated, a feature still noticed in post-medieval roofing in the area. The ridge, judging from recovered fragments, had crested clay ridge-tiles, which also occurred on the eastern block and outer western aisle. The gablets of the eastern aisle had smaller, trefoil-crested ridge-tiles. The outer western aisle and the eastern block were roofed with split stone slates, most of which lay where they had fallen, whilst it is clear that most of the tiles from the main roof had been salvaged.

The interior of the building (Fig. 19b) is a little more speculative as none of the timber-work survived. However, a number of points are known which fix the major elements of the roof and aisle structure. From the four surviving arcade stylobates, the original location of six of the eight aisle-posts can be established, and their sectional measurement, 0.48 m (1 ft 7 in) square, was recovered from the cast of the third post of the eastern arcade buried within the 'oven' platform. The calculated height of the eastern aisle wall of 4.72 m fixes the height of the wall-plates and hence the height of the masonry aisle-ties that a building of this form would undoubtedly have had. The outline of the roof-structure was controlled by the profile of the N. gable, and hence the line of the common rafters can be established. The height of the aisle-posts is calculated simply by carrying them up to meet the rafter-line, where the arcade-plate would have run, below a tie-beam which held it in position. Thus the principal elements of the roof define themselves. Because the structure was built early in the 13th century, it is not unreasonable to suggest that it is of similar form to contemporary aisled structures, and lying where it does, had a crown-post / collar-purlin roof. Double bracing, similar to that of the Beaulieu barns of St Leonard's and Great Coxwell,⁶³ of virtually the same decade, and seen in Flanders in the Cisterian barn at Ter Doest,⁶⁴ has been shown. Whilst this has been claimed as a peculiarly Cistercian practice, it does have a wider application, appearing as far apart as St Mary's Hospital, Chichester⁶⁵ and West Bromwich Old Hall,⁶⁶ and would seem most appropriate here. Because the building was not domestic, the roof structure would have been purely functional, designed to support an immense weight of roof tile and slate. The slight eastern aisle wall was not intended to carry much weight itself, so the method of bracing used would have to carry the maximum thrust back to the arcade-posts.

The height of the eastern aisle floor except in bay five is established by the height of the external stair-case. In bay five it was higher, to give additional head-room to the carriageway that ran through the building at that point. Its level there is given by an inserted corbel that still remains in the surviving portion of the S. wall. The level of the aisle floor in the W. aisle, if it indeed existed, is less certainly fixed, but as that aisle wall was not replaced in the early 13th century, it has been shown at the height of the floor in bay five. Internal detail, including the fulling-mill and the furnaces, the wall dividing the W. aisle from the main structure, the drains and flagged floor are all derived from the plan. The late 15th-century chimney has been omitted from the S. end of the eastern block for clarity, and the earlier wall fireplace and its inserted flue shown in the eastern office. Apart from the precise form of the roof-structure, all the internal features shown are derived from surviving evidence. The fulling tubs are shown without their machinery and are shown with the furnaces, though these clearly belong to a subsequent phase.

In all, the objective of the excavation, to define and reconstruct one of the more fragmentary buildings at Fountains Abbey, has been achieved. The view that the service buildings of the monastic precinct were greatly inferior to those occupied by the convent may not necessarily hold good, for this was a building of exceptional quality and scale, matched it would seem by the ashlar-built malthouse to the south.

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NOTES

¹ The history and development of Fountains Abbey is most conveniently summarized in R. Gilyard-Beer, *Fountains Abbey* (London, 1970), 4–25.

² G. Coppack, *Excavations at Thornholme Priory 1974–1980, The Outer Court*, especially Chapter One (forthcoming).

³ W. St John Hope, 'Fountains Abbey', *Yorkshire Archaeol. J.*, xv (1900), 393–97. This paper is otherwise quoted as Hope 1900.

⁴ J. R. Walbran (ed.), 'Memorials of Fountains Abbey, 1', *Surtees Soc.*, 42 (1862), 307–09.

⁵ *Ibid.*, 304–06.

⁶ D. J. H. Michelmore (ed.), 'The Fountains Abbey Lease Book', *Yorkshire Archaeol. Soc. Record Ser.*, 140 (1979–80).

⁷ I am indebted to D. J. Michelmore for reference to this unpublished document.

⁸ Coppack, *op. cit.* in note 2.

⁹ Michelmore, *op. cit.* in note 6, Document No 230, 237. Henry Atkinson was to find grass for the abbot's carthorses at Morker Grange.

¹⁰ Hope 1900, 396 and frontispiece. Hope's notes on all his work at Fountains are to be found in the library of the Yorkshire Archaeological Society.

¹¹ Monitored by Roger Mercer.

¹² J. A. Reeves, *A Monograph on the Abbey of St Mary of Fountains* (London, 1892). Quoted later as Reeve 1892.

¹³ Although it is not possible to identify Hope's trenches from his manuscript notes (see note 10), the occurrence of late 19th-century clay pipes in this trench would suggest it dates from the season of 1888.

¹⁴ G. Coppack and R. Gilyard-Beer: 'Excavations at Fountains Abbey 1979–80; The Development of the Early Monastery', *Archaeologia*, 108 (1985), forthcoming.

¹⁵ Below pp. 64–65 and Fig. 10a.

¹⁶ Hope 1900, 394 and frontispiece.

¹⁷ The cill, in two parts, was made for a window with recessed, not splayed, internal reveals, and was 4 in (102 mm) wider than those of the N. façade. It was rebated for shutters.

¹⁸ Below p. 65 and Fig. 13, 4.

¹⁹ These mouldings, including sections of drip-mould, mullion, and at least one capital, remain in the site stone store. They do not occur in this list of material from Walbran's excavations which was displayed on site, and were present when D.O.E. assumed guardianship. The precise findspot is not recorded but most of the material derives from Hope's excavation.

²⁰ The lead lining was removed for safe keeping and was found to have been nailed to a wooden drain lining. It only occurred at the southern limit of excavation and may never have existed further north.

²¹ The existence of this building up to 1449 is attested by an instrument of that date, see p. 59 above.

²² Existing trees within the Outer Court are either grouped around the sites of buildings or planted close to their corners. The recently felled elm, apparently planted in the 18th century as part of William Aislabie's emparking, marked the SE. corner of the same building. Both southern corners of the malthouse lay beneath standing trees, recently felled.

²³ Reeve, *op. cit.* in note 12; Hope 1900, frontispiece.

²⁴ This error was first noticed by David Greenhalf.

²⁵ Hope 1900, 394–95.

²⁶ *Ibid.*, frontispiece.

²⁷ The form of the monastic bread-oven is perhaps best demonstrated by two surviving examples at Thetford Priory, where the top is clearly domed over, and not at all like the example discussed here. F. S. E. Raby and P. K. Baillie-Reynolds, *The Cluniac Priory of Thetford* (London, 1939).

²⁸ On dismantling the eastern 'oven' for consolidation it was found to include a number of whole and cut bricks measuring 230 mm by 115 mm by 50 mm. At least one example was glazed on a header and stretcher face.

²⁹ This rebuilding, at first thought to be the blocking of an earlier door, only became clear during consolidation.

- ³⁰ Gilyard-Beer, op. cit. in note 1, 25.
- ³¹ Reeve 1892, pl. 22.
- ³² Ibid., pls. 5–8.
- ³³ Ibid., pl. 28.
- ³⁴ Ibid., pls. 38–43.
- ³⁵ J. R. Walbran (ed.), 'Memorials of the Abbey of St Mary of Fountains, II', *Surtees Soc.*, 47 (1876), 130.
- ³⁶ Walbran, op. cit. in note 4, 136: 'Hic novem altaria, Claustrum, Infirmatorium, Pavimentum ac Xenodochium, tam ad Christi pauperum quam mundi principum susceptionem, frabricavit et consummavit'.
- ³⁷ Reeve 1892.
- ³⁸ This may be an element from one of the buildings of the first stone monastery burned in 1146. See note 14.
- ³⁹ Ibid.
- ⁴⁰ Coppack and Gilyard-Beer, op. cit. in note 14.
- ⁴¹ A full report on the plain floor tiles can be obtained from the author at English Heritage, 23 Savile Row, London W1X 2HE.
- ⁴² Ibid., 131.
- ⁴³ Stuart Rigold drafted this note just before his death. As the writer was not able to discuss it with him, it has been left in the characteristic form Mr Rigold produced it, although he had obviously intended to refine it.
- ⁴⁴ All the pottery from this excavation is stored permanently on site at Fountains Abbey where it can be examined by prior arrangement with English Heritage.
- ⁴⁵ This identification was confirmed by Miss M. Tregear who commented that the vessel itself was unusual and impossible to date independently.
- ⁴⁶ See above, p. 72.
- ⁴⁷ Identified by S. A. Moorhouse.
- ⁴⁸ Coppack and Gilyard-Beer, op. cit. in note 14.
- ⁴⁹ The writer was kindly allowed access to unpublished groups from Ripon excavated by P. Mayes and D. J. Greenhalf.
- ⁵⁰ G. Coppack, 'An Excavation at Chapel Garth, Bolton, Fangfoss, Humberside', *Yorkshire Archaeol. J.*, 1 (1978), esp. 118–30 and figs. 16–24.
- ⁵¹ The writer is indebted to J. G. Hurst for this information and for his discussion of the dating of the early stonewares from Fountains Abbey.
- ⁵² Ibid.
- ⁵³ S. Moorhouse, 'Finds from Excavations in the Refectory at the Dominican Friary, Boston', *Lincolnshire Hist. Archaeol.*, 1 No. 7 (1972), 32–33 and figs. 1 No. 3, and 2 No. 11.
- ⁵⁴ Information from P. Armstrong and G. Watkins of the Humberside Archaeological unit.
- ⁵⁵ Substantial quantities of *Northern reduced ware* were found during Sir Charles Peers' clearance excavations at Rievaulx and Byland, and these sherds remain in the site collections held by English Heritage. For Glenluce Abbey, see S. H. Cruden in *Trans. Dumfries Galloway Natur. Hist. Antiq. Soc.*, 177–94.
- ⁵⁶ P. Mayes and L. A. S. Butler, *Sandal Castle Excavations 1964–1973* (Wakefield Historical Pub., 1983).
- ⁵⁷ H. E. J. Le Patourel, 'The Pottery', in E. J. E. Pirie *et al.*, 'Kirkstall Abbey Excavations 1960–64', *Publ. Thoresby Soc.*, 51 (1967), 36–50.
- ⁵⁸ H. Chapman, G. Coppack, and P. Drewett, *Excavations at the Bishops' Palace, Lincoln, 1968–72* (*Soc. Lincolnshire Hist. Archaeol.* mono. ser. 1, 1975), 21–23 and fig. 8 No. 45.
- ⁵⁹ S. A. Moorhouse in Mayes and Butler, op. cit. in note 56.
- ⁶⁰ Coppack and Gilyard-Beer, op. cit. in note 14.
- ⁶¹ Notable exceptions are the extensive areas of Outer Court excavated at Thornholme Priory (see note 2), and at Waltham Abbey; P. J. Huggins, 'Monastic Grange and Outer Close Excavations, Waltham Abbey, Essex', *Trans. Essex Archaeol. Soc.*, 4 (1972), 30–127, and A. E. S. Musty, 'Exploratory excavations within the Monastic Precinct, Waltham Abbey, 1972', *ibid.*, 10 (1978), 127–72 and pls.
- ⁶² Not unlike the decorative slate roof of the Hotel-Dieu in Beaune.
- ⁶³ W. Horn and E. Born, *The Barns of the Abbey of Beaulieu* (California, 1965).
- ⁶⁴ *Ibid.*, 50–52.
- ⁶⁵ W. Horn and E. Born, *The Plan of St Gall* (California, 1979), II, 91–95, especially fig. 342.
- ⁶⁶ M. Wood, *The English Medieval House* (London, 1965), pl. VI.