

‘The Church of Beverly is fully repaired.’

The roofs of Beverley Minster

by

P. S. BARNWELL

The roofs of Beverley Minster are described and discussed with particular reference to the partial remains of a tower at the eastern crossing, the fourteenth-century nave roof, and the eighteenth-century work in all the other roofs. After some tentative suggestions are made concerning the development of the central tower it is concluded that the scale of the eighteenth-century work at the Minster has not been fully appreciated, and that it marks a significant phase in the construction of the present building.

This paper concerns the development of the roofs of Beverley Minster from the thirteenth-century origins of the present building to the early eighteenth century. The architectural history of the Minster as a whole is not as well studied as it deserves, and little systematic effort has been directed at the area above the vaults. It is hoped that this paper will begin to address the subject, and show that the rarely seen upper parts of the building have an important story to tell. After a summary of the evolution of the church, discussion will concentrate on a partly-surviving thirteenth-century tower at the east crossing, the fourteenth-century nave roof, and then the remaining roofs, all of which date from the eighteenth century. Finally, some suggestions will be made concerning both the evolution of the main crossing tower (which was less fully investigated) and the significance of the roofs in the history of the Minster.

CHRONOLOGY OF THE DEVELOPMENT OF THE MINSTER¹

The Minster was founded by Bishop John of York, who was buried in Beverley in 721. Of the church which existed at that period nothing is known, and the next significant event concerning John is his canonisation in 1037. Following that, Archbishops Ælfric and Ealdred promoted Beverley as a cult centre and began a substantial programme of re-building. With the exception of the font and a few

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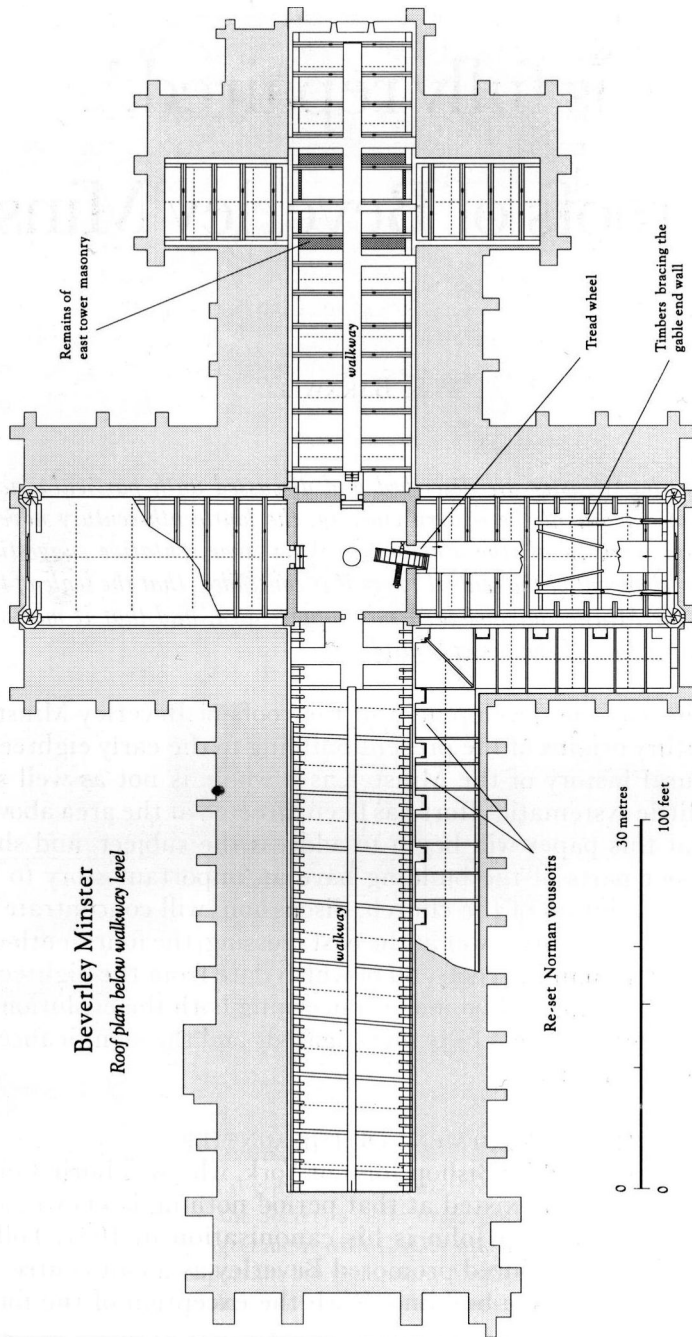


Fig. 1

Roof plan, showing the main medieval phases of the construction of Beverley Minster.

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fragments embedded in the later structure, nothing remains of the eleventh- and twelfth-century church, which was extensively damaged by fire in 1188. After the fire an attempt was made to restore the church but work was halted in 1213 by the collapse of the central tower, which seems to have survived the conflagration. As a result of the fall further restoration was deemed impossible, and a completely new church was commenced.

The new building (Fig. 1) was erected in two major phases. From the 1220s to the 1260s the eastern end of the present building was constructed, as far as the main (west) crossing and including the east bay of the nave, which is flanked by the west aisles of the transepts. The Norman nave continued to be used during this period, only being replaced during the second main phase of construction, which began in about 1310 and was completed towards the end of the fourteenth century. With the erection of the west towers and façade, shortly after 1400, the fabric of the Minster reached its mature medieval form which, in terms of what is visible from ground level, is largely what can be seen today.

The next significant stage in the history of the fabric lies in the first half of the eighteenth century, when the building was in poor shape and, in particular, the north-west transept was in danger of collapse. During the period from 1716 to the 1730s, Nicholas Hawksmoor, then Minster architect, and William Thornton, a craftsman from York, took down the upper parts of the transept, levered the north wall back into place, and reconstructed the transept with a timber vault. In addition, the present low crossing tower was built, originally surmounted by a cupola, and all the roofs apart from that of the nave were replaced (see below). At the same time, the interior of the building was re-ordered, though little remains of that, as most of the eighteenth-century furnishings were removed during further campaigns of works in the 1820s and later. Between 1866 and 1878, there was a further structural restoration, conducted by Sir G.G. Scott, which probably included work to stabilize the nave roof (see below).

THE EASTERN CROSSING

Above the choir vault at the east crossing are parts of what was clearly intended to be a tower or lantern.² The evidence consists of a well-finished low wall spanning the choir above the west crossing arch, a much rougher wall above the eastern arch, and four spiral stairways, one rising from the clearstorey in each corner of the crossing.³

The west cross wall (Fig. 2) is fully bonded into the north and south walls of the choir, indicating that it formed part of the same phase of both design and construction. Its upper surface is approximately level with the top of the vault which cuts across it. At each end of the wall is a plain attached shaft, beside which is a two-centred blind arch with dogtooth moulding; below the arches are single shafts which, although black, appear to be painted limestone rather than the Purbeck marble which was used extensively elsewhere in the eastern part of the building.⁴ Towards the centre of the wall are two quatrefoils, with slightly differently designed foliage cusps and spandrels. The centre of the cross wall is entirely obscured

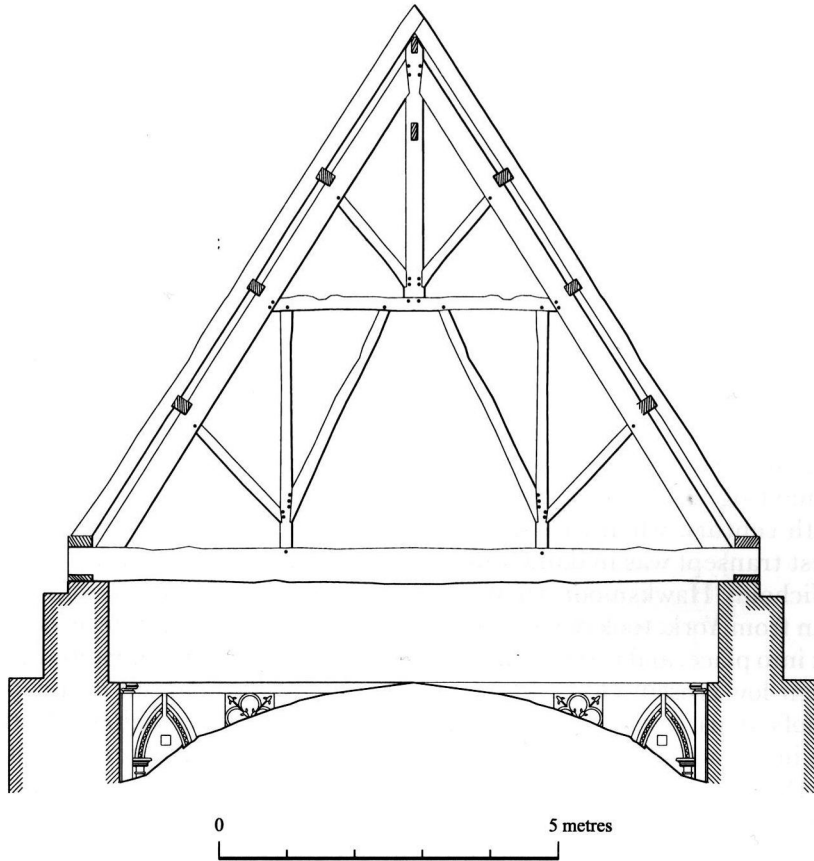


Fig. 2

Section through the choir roof at the eastern crossing, showing the form of the eighteenth-century roof above the west cross wall of the incomplete lantern tower.

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by the vault, but the spacing of the other motifs makes it unlikely that there was another decorated panel. Part of what may be described loosely as a 'coping' survives on top of the wall, overhanging it to create a deeply undercut and filleted string course or cornice; further fragments of the coping are to be found in the rubble which has accumulated on top of the vaulting.

To the east of the cross wall, the north and south walls of the choir are stepped back at the level of the cornice. The lower parts of the walls are plain apart from a single shaft and moulded capital beside each end of the west cross wall, suggesting that the decorative scheme once continued on to the side walls. Above the eastern arch of the crossing is a second cross wall, but the finish is much rougher than that

of its western counterpart, and it is undecorated. Its north end is fully bonded into the side wall of the choir, suggesting that the two walls were constructed at the same time, but on the south side the evidence is less clear.

Each corner pier of the crossing contains a spiral stair which descends from the level of the top of the cornice to the clearstorey. The tops of the stairs are now capped with large irregular stones which project from the north and south walls of the choir, but clearance of debris and rubble during investigation revealed the uppermost step of the south-west stairway, and enabled a small aperture to be made, both there and at the north east, through which the stairs could be seen.

The sum of this evidence indicates that there was at least an intention to construct a tower or lantern above the east crossing. It may be this which partly accounts for the unusual form of the piers below, which have flat faces and corbelled-out upper parts;⁵ both features are unusual and do not accord with the design of the remainder of the thirteenth-century work in the Minster. The purpose may have been to thicken the upper sections of the piers in an attempt to give added strength to support the tower above, and/or to accommodate the stairways. Despite one earlier opinion,⁶ it seems that the piers were originally designed in this way, and that the inclusion of a tower formed part of the original thirteenth-century design of the building. The decoration of the west cross wall supports this interpretation since it is of similar character to that found elsewhere in the eastern end of the Minster: the blind arches without Purbeck shafts are similar to those on the inner face of the gable of the south-west transept, and the design of the blind arches and quatrefoils is drawn from the same repertoire as the decoration of the screens at the west ends of the choir aisles. Further, the presence of the decoration presupposes that it could be seen from below and, therefore, that the tower formed a lantern to cast light immediately in front of the High Altar below.

It is not clear whether the tower was ever completed, or was abandoned during the course of construction. In favour of the former suggestion is the fact that the west cross wall has cracked approximately 75 cm (30 inches) in from each end, the central part of the wall having moved slightly forward (to the east). It is difficult to see how this could have happened once the area to the east of the wall was vaulted, as the vault should have prevented the movement. Further, the debris on top of the vault contains a number of fragments of black-painted limestone shafts similar to those used on the cross wall, suggesting that the decorative scheme was once more extensive. Against these facts are others of equal, if not greater, weight. In particular, at the ends of the west cross wall the upper surface of the cornice has circular marks for the siting of corner shafts which were to rise from it, but the surface is so clean that the shafts themselves can never have been fixed in place. Furthermore, as noted earlier, the east cross wall is altogether rougher than that at the west, and there is no evidence that it was ever decorated or capped by an extension of the coping or cornice. The balance of this evidence suggests that the tower was abandoned during the course of the construction of the east end of the church, perhaps because it showed the slight movement apparent in the west wall. Given that the thirteenth-century re-building of the Minster was occasioned

by the fall of an earlier tower, it is possible that the builders were particularly sensitive to problems with the new structure, and, faced with signs of instability, preferred to compromise the design rather than take risks. It is nevertheless possible that the decorative scheme of the west wall was continued on the north and south walls, and that the fragmentary shafts in the debris were either never used or were removed as part of a programme of stabilisation during which the side walls were refaced with plain masonry.

One further feature which could suggest a concern with stability is the presence of four stairways, one in each corner. This is unusual, a single stair usually sufficing to provide access to the roof, intermediate floors or galleries, or such surrounding roofs as were otherwise inaccessible. One possible explanation is that an attempt was being made to create stability by rendering the weight of each pier similar, but this is only speculation. (Four stairways are also found at the main crossing tower - see below.)

The later history of the fabric in the area of the eastern tower is also problematic. Above the level of the step back, the north and south walls do not appear to have been built until the fourteenth century or later. The absence of walling in these areas in the thirteenth century is indicated by straight joints in the masonry above each end of the east cross wall; that at the north contains (out of place) a thirteenth-century capital for a corner shaft like those on the west cross wall. It is likely that there were similar straight joints above the west cross wall, but evidence is lacking owing to eighteenth-century reconstruction in brick of the north and south walls to the west. The only clue as to the date for the in-filling of the side walls above the tower is provided by the fact that they contain a number of fragments of carved stonework, one of which is decorated with naturalistic foliage of fourteenth-century type. It lies at the base of the north side of the north wall, and cannot have been inserted after the wall above it had been constructed; but there is nothing to indicate how long after it was carved it was moved to this position. One possibility is that the walls in this area were built in the eighteenth century: Christopher Wilson has drawn attention to the fact that the tooling of the stonework is similar to that on eighteenth-century work in the north-west transept which, as Ivan Hall has shown, may have come from St Mary's Abbey in York.⁷ Although this is persuasive, it is difficult to imagine why irregularly shaped carved stones should have been transported over such a distance when there was a plentiful supply of good quality ashlar masonry available at St Mary's Abbey. Further, it is not in any case clear why even good stone would have been transported for use in this position in the eighteenth century, since much of the upper parts of the north and south walls of the choir were repaired and rebuilt in brick at this time, as was the structural fabric of the main crossing tower. Despite these questions, alternative hypotheses are at least as problematic, particularly since there is no obvious source in the Minster itself (either in the eighteenth century or earlier) for the fourteenth-century fragment. The situation is further complicated by the presence, in the same sections of walling, of other carved fragments, mostly of less certain date; one, towards the east end of the south side of the south wall, is an inverted twelfth-

century-quality capital, the provenance of which is no more clear than that of any of the other pieces. In the absence of any conclusive evidence, the only certainty seems to lie in the fact that the upper parts of the north and south walls in the area of the east tower were built during or after the fourteenth century, with the most likely date lying in the eighteenth century.

THE NAVE ROOF

The next oldest part of the fabric above the vaults is the roof over the nave, which remains substantially as it was built in the fourteenth century. The structure is divided into ten bays, corresponding to those of the nave below, and following the distinctive slightly skewed plan of the building (Fig. 1). The main trusses have tie beams, while the common ones have sole plates lying across the tops of the walls. Apart from that, and from the twelve trusses at the far east end of the roof (see below), the trusses are of uniform type. Each has two collars (Fig. 3); above the lower collar are raking struts, while below are soulaces which are interrupted by, and tenoned into, parallel rafters. At the base of the truss, the inner rafters rest, sometimes in shallow notches, on top of the sole plates or tie beams, while the main outer rafters are notched into a wall plate.

The construction of the bases of the trusses is unusual, and appears archaic for the fourteenth century, particularly since the form of the roof does not change towards the west end where it was completed near the end of the century. By the middle of the century, 'normal' assembly (in which the wall plate was below the tie beams in order to hold it against spread and rotation) was widespread. At Beverley, by contrast, the plate is above the tie beams, and does not appear to be fixed to them in any way; there is, therefore, almost no resistance to the twisting forces to which it was subject.⁸ The employment of this relatively inefficient mode of construction is surprising in a building of such high status as the Minster where one would expect the craftsmen involved to have been aware of the latest techniques. A further feature of the roof which is relatively unusual for its date is the apparent inclusion of some timbers which were re-used from an earlier structure, as witnessed by the presence of redundant mortices and matrices for lap joints. In other respects, though, the roof is less atypical of its age: the absence of longitudinal stiffening (in the form of purlins or a ridge) is not unusual, and most of the joints are tenoned.

Leaving aside minor patching repairs, there appear to have been two phases of significant alteration to the roof, one in each of the eighteenth and nineteenth centuries. As noted above, the form of the twelve trusses at the far east of the roof, against the central tower, differs slightly from that of the others. The variation is that there is no wall plate, the outer rafters instead resting directly on the sole plates or tie beams: this is a better form of construction than that in the rest of the roof, since there is no plate to be subjected to rotation. It is particularly striking that the better construction is found at the east, as that was almost certainly the first part to be constructed. The most likely explanation is that this area of the roof was taken down in the eighteenth century in order to facilitate the erection of the new crossing tower, and was re-assembled in slightly modified form, without the

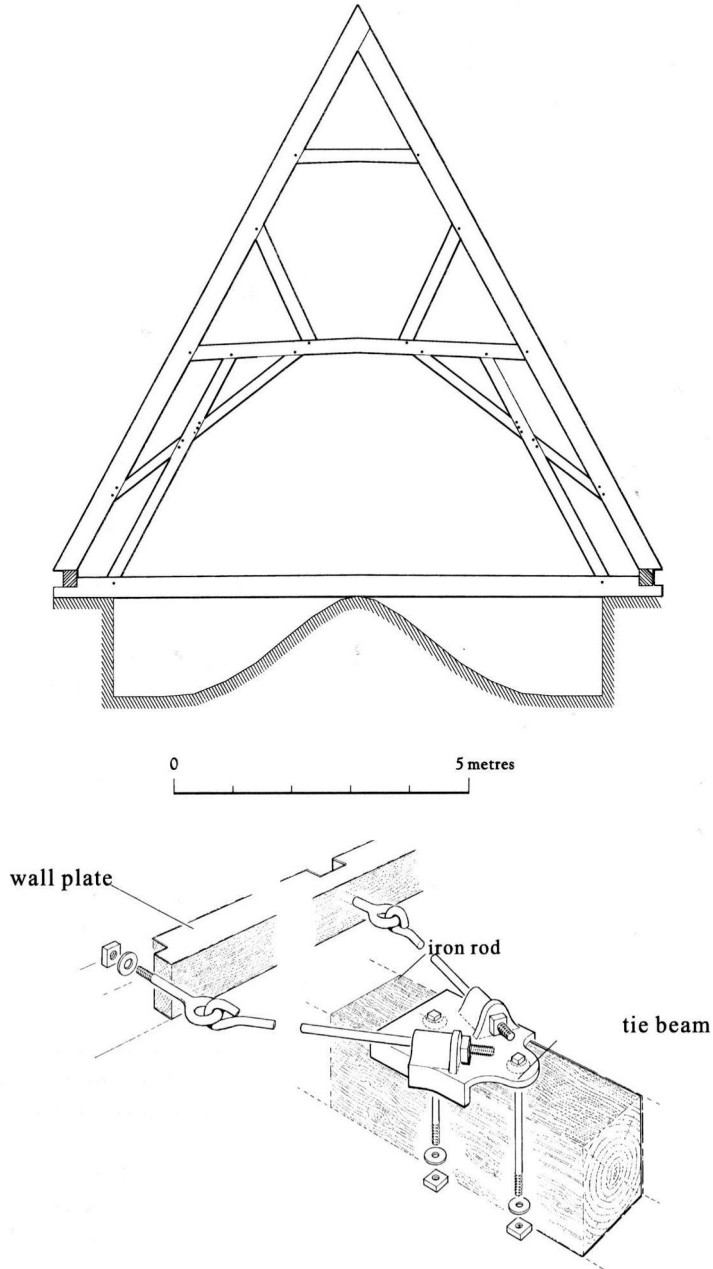


Fig. 3
Section through the fourteenth-century nave roof, with detail of nineteenth-century tie rods.
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Fig. 4

View along the fourteenth-century nave roof between the collars

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wall plate. This would have been a relatively simple operation, requiring no more than slight adjustments to the lengths and angles of the timbers in order to allow the rafters to come into contact with the sole pieces rather than the plate.

If this hypothesis is correct, it suggests that the potential for problems with the original structure was appreciated by the first half of the eighteenth century. By the nineteenth century, such difficulties must have manifested themselves more clearly, for measures were taken to counteract them. In the main part of the roof the wall plates were almost entirely renewed, and a set of iron tie rods was introduced to hold the new plates firmly in place (Fig. 3). Each truss has two collars (Figs 3 and 4), above the lower collar. One end of each rod was hooked through a large eye which was bolted through the wall plate; the other end was attached to an iron plate bolted to the upper surface of the tie beam. Between each main truss there are four sets of such rods, resulting in a chevron pattern on each side of the roof. At the east, where there was no wall plate, short lengthwise timbers were placed against the outer ends of the sole plates, and were similarly tied back into the centre by rods, so that there was no danger of the roof spreading outwards. Documentary research on this aspect of the fabric has not been undertaken, and so the date of this work is not certain, but its character suggests that it formed part of the restoration carried out by G.G. Scott between 1866 and 1878.

THE EASTERN AND AISLE ROOFS

All the other roofs in the Minster, including those of the nave aisles, were erected in the eighteenth century. The high roofs – those over the central areas of the choir and all four transepts – are of uniform type, and all the aisle roofs are identical: all were, therefore, replaced as part of a single programme. Despite an apparent lack of documentary evidence the date of this phase is clear: since the upper part of the north-west transept, including the roof, was taken down in the years following 1716,⁹ the present roof must be that erected over the restored transept with its timber vault, and therefore it follows that all the roofs belong to the ‘Hawksmoor period’ – though their construction was probably spread over several years.

The high roofs have principal trusses, between which are common trusses consisting of rafters notched over three tiers of purlins, with a ridge board at the apex. The base of each rafter is notched over a thin plate which sits on top of the tie beams of the principal trusses; below the plate are short vertical spacers which descend to a plank which rests on top of the wall, and over which the ends of the tie beams are lapped. Each principal truss (Fig. 2) has queen struts below a collar; above is a king post, which is braced to the principal rafters and to the ridge board which it carries. Both the collar and the raking struts meet the principal rafters at approximately the level of the purlins, which are notched into the backs of the principal rafters. All the joints are tenoned and pegged, but the construction at tie-beam level is not uniform. In the east transepts, and on almost alternate trusses in the choir (except above the eastern crossing) the tie beams are of conventional form: each is constructed of a single timber into which the queen struts and rafters are tenoned and pegged. On the remaining choir trusses, and on all those in the

west transepts, each tie beam, although also fashioned from a single timber, is split vertically throughout its length; the two halves are then bolted together, clasping the tenons of the queen struts and rafters, which are secured with pegs; the bolts are threaded, but some also have forelocks. The reasons for the variation in the structure of the tie beams remain unclear.

In the aisles, the principle trusses have tie beams from the inner ends of which rise posts supporting the tops of the principle rafters (Fig. 5). There is one raking strut between the principal rafter and the beam, and there are three purlins, the uppermost being supported on stone corbels which project from the buttresses at the back of the triforium and having the common rafters notched over it. The form of the ties is unusual: both ends are of reduced section, and each beam is only a half timber, those of adjacent trusses being the matching halves of timbers which have been split longitudinally. The combination of this and the fact that, like many of the tie beams in the high roofs, the timbers are not squared off, results in the mortices for the posts and principle rafters being set to one side of the tie beams – in the deepest part. The consequence is that there would be very little to prevent the tenons breaking through the sides of the tie beams if there was movement along the length of the roof. The fact that this has not occurred demonstrates the longitudinal stability of the roofs, each of which is contained between an external gable and the rear of the triforium. The same stability is also apparent in the other direction, across the width of the aisles, for the structure is not tied into the stonework at all. The outer end of each tie beam rests on the wall, as is normal, but the inner simply rests on a crude low brick pier constructed on top of the vaulting; the beam is neither halved over the pier nor attached to the triforium wall, so that it is only the weight of the lead-covered roof which prevents outward slippage.

Throughout the roofs of this period the larger timbers are irregularly shaped

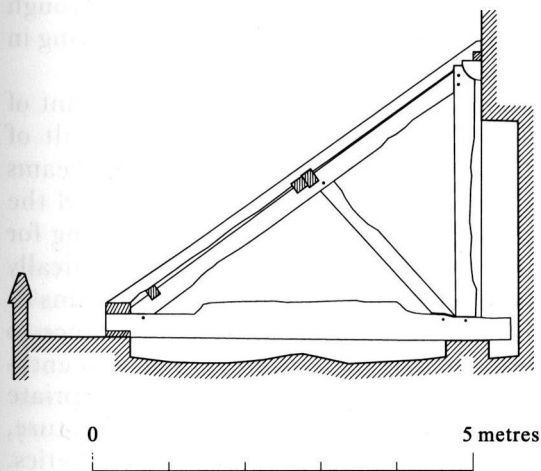


Fig. 5
Specimen aisle truss.
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and often poorly finished, as is so often the case at this date. The reason may relate to cost or to the difficulty of obtaining trees of sufficient girth to permit squaring while retaining scantling large enough to act as tie beams. A similar desire for economy is evident from the re-use of medieval timbers as common rafters: their date is apparent not only from their dimensions, but also from redundant mortices and, more particularly, matrices for lap joints. The last is usually a sign of early date and suggests that the re-used timbers could have been salvaged from the original thirteenth-century roofs of this part of the building. Such economy is not uncommon in the seventeenth and eighteenth centuries, and comes as no surprise given that the Minster was relatively poor at the time of the transept restoration. None of this, however, means that the materials used were inadequate: what mattered above the vaults was function rather than appearance.

This point is worth further consideration in the light of what at first appears to be a tangle of very oddly-shaped timbers below the tie beams in the south-west transept. Here, the eighteenth-century work involved more than replacement of the roof itself, as the south gable was tied back into the main structure of the Minster in order to forestall any repetition of the outward movement of the gable of the north transept (Fig. 6). The structure put in place consisted of two large square anchoring timbers placed across the transepts with their ends firmly embedded in the east and west walls of the third and fifth bays from the gable. They are approximately 50 cm (18 inches) below the tie beams, and are braced together by two timbers placed at an angle and bolted into their upper surfaces; these two braces are curved and were cut from a single timber, split lengthwise and selected so that each brace would rise from the cross beams to pass immediately under the third tie beam from the gable and thereby assist in the prevention of north-south movement. Beside each of the braces, a large square timber is notched over the cross beams; to the top of each is bolted a curved timber which extends to the gable, bending up under the second tie beam from the wall (around which it is notched) and over the first one. The end of each beam is embedded in the gable wall and has an iron strap bolted to its upper surface; the latter extends through the wall (including the passages to the stairs in the corners) before terminating in an iron plate against the external elevation.

Although this arrangement at first appears very crude, partly on account of the unusual and irregular shape of the timbers, it was clearly the result of considerable ingenuity, and was constructed with extreme care. The two cross beams are set at exactly the same height, and are absolutely level; both they and the outer linking timbers are of large section and are properly squared, allowing for precision in setting out and jointing. The remaining timbers were specifically selected for their shape, so that the structure could be linked to the tie beams as well as to the cross beams, thereby providing the greatest possible resistance to outward pull from the gable. Where it really mattered, therefore, the eighteenth-century workmen could obtain 'good' timber, and could choose material appropriate to their purpose, even if it looks odd to our eyes. As with the main roof structure, what mattered in this little-seen part of the building was function, not aesthetics.

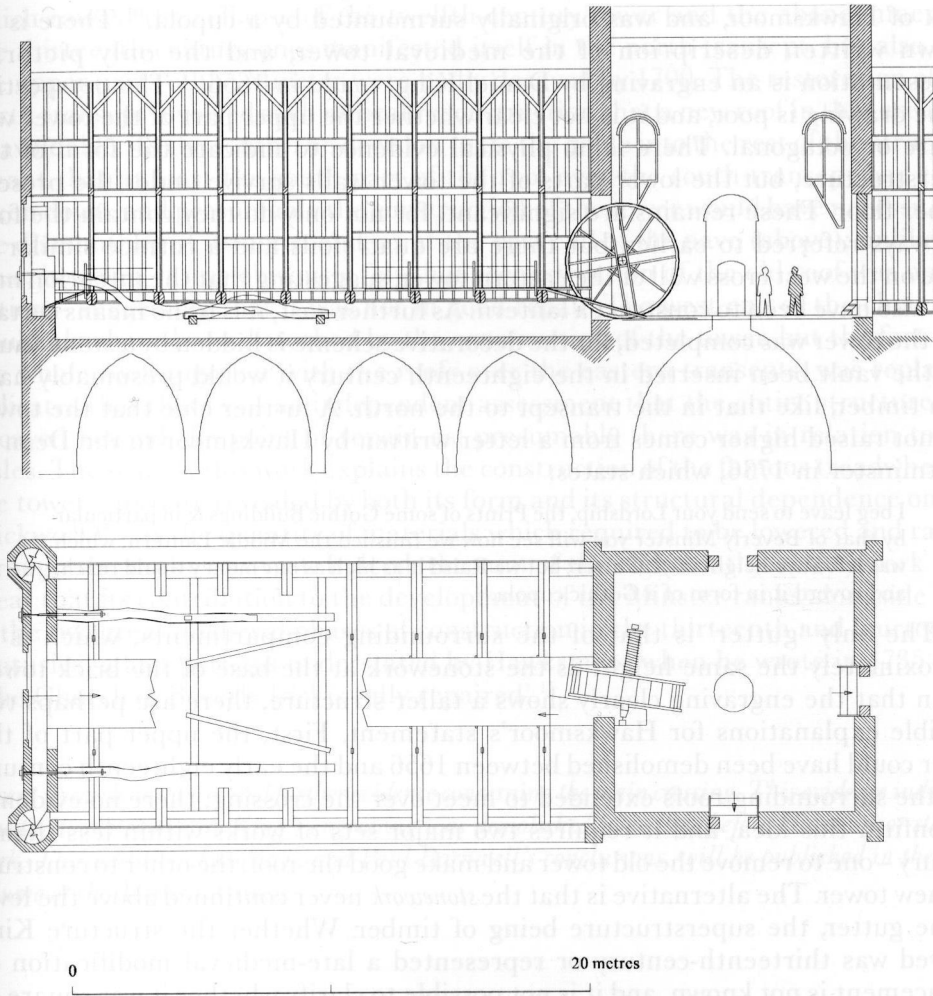


Fig. 6

Plan and long section of timbers tying the gable of the south-west transept into the main structure.

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THE CENTRAL TOWER

During the course of the programme of investigation which was required to understand the roofs, various pieces of evidence emerged which are relevant to the area now occupied by the eighteenth-century central tower, as a result of which it may be possible to add to the story of this part of the building, though in more tentative fashion.

The existing tower, which is constructed of brick and faced with stone, is the

work of Hawksmoor, and was originally surmounted by a cupola.¹⁰ There is no known written description of the medieval tower, and the only pictorial representation is an engraving by Daniel King, made in 1656.¹¹ The perspective of the drawing is poor, and it is not clear whether the upper part of the tower was square or octagonal. There is no physical evidence to indicate the form of the superstructure, but the lower parts of the tower walls survive under the present timber floor. These remains are significant, for not only do they contain the four stairways referred to earlier, but there are quatrefoils and a cornice similar to those on the west cross wall of the eastern tower, suggesting that the intention may here also have been to construct a lantern. As further east, it is by no means certain that the tower was completed, for the decorative scheme is hidden by a stone vault; had the vault been inserted in the eighteenth century it would presumably have been timber, like that in the transept to the north. A further clue that the tower was not raised higher comes from a letter written by Hawksmoor to the Dean of Westminster in 1736, which states:

I beg leave to send your Lordship, the Prints of some Gothic Buildings & in particular by that of Beverly Minster you will see how we finished the Middle Lantern, which was left at ye height of ye Gutter; but we Raisd it as high as our money would reach, and coverd it in form of a Gothic cupola.¹²

The only 'gutter' is that of the surrounding compartments, which is at approximately the same height as the stonework at the base of the brick tower. Given that the engraving clearly shows a taller structure, there are perhaps two possible explanations for Hawksmoor's statement. First, the upper part of the tower could have been demolished between 1656 and the early eighteenth century, and the surrounding roofs extended to meet over the crossing; there no evidence to confirm this idea, and it requires two major sets of works within less than a century – one to remove the old tower and make good the roof, the other to construct the new tower. The alternative is that the *stonework* never continued above the level of the gutter, the superstructure being of timber. Whether the structure King showed was thirteenth-century or represented a late-medieval modification or replacement is not known, and it is not possible to clarify whether it was square or octagonal. What may be suggested, however, is that the plan for the thirteenth-century Minster incorporated two towers of similar design, neither of which was completed owing to fears concerning stability – one was abandoned, while the other may have been completed with a relatively light-weight timber structure.

CONCLUSION

Perhaps two main conclusions may be drawn from recent survey work at Beverley. The first concerns the compromise of the thirteenth-century design in relation to the towers, and the second the scale of the eighteenth-century work above the vaults, which has never fully been commented upon.¹³ The dramatic story of the restoration of the main north transept, and the obvious addition of the present central tower have overshadowed the less visible parts of the work. The need for such a major programme of renewal indicates that not only had the kind of instability

which caused the collapse of the twelfth-century tower and the abandonment of the thirteenth-century ones manifested itself in the north transept, but also that the upper parts of the Minster were badly decayed by 1700. The restoration of the north transept involved such radical reconstruction that a new roof in that area was unavoidable. To the south, the decision to tie the gable into the rest of the structure meant that at least the south part of the roof over the south transept had to be taken down, and presumably the construction of the tower would have necessitated the dismantling of its north end, as at the east end of the nave (above); unlike the nave, however, it was obviously felt that reconstruction of the old roof was not an option – suggesting that it was not in good repair. The west end of the choir roof would also have been disturbed by the construction of the tower, but the fact that the whole roof, together with the roofs over the eastern transepts, was replaced, indicates that there was an independent assessment that the entire structure was decayed beyond the point of repair, as, presumably there was in relation to the aisles. The scale of this work explains the construction of the famous treadwheel in the tower – its date revealed by both its form and its structural dependence on the brickwork¹⁴ - as the quantity of materials which required to be lowered and raised through the vaults was vast. Indeed, the sum of the eighteenth-century work is so great that its contribution to the development of the Minster ranks alongside that of the two great medieval phases of construction in the thirteenth and fourteenth centuries, a fact perhaps understated by Hawksmoor when he wrote in 1735 that ‘The Church of Beverly [*sic*] is fully repaired’.¹⁵

Recent research has uncovered further evidence concerning the main crossing. This evidence indicates that the tower shown on King’s engraving was demolished some time before Hawksmoor started work. This additional research, and Paul Barnwell’s conclusions, will be published in the next volume of the Transactions.

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1. The following account is almost entirely derivative, the main recent works on the history and development of the Minster being, Morris, R.K., and Cambridge, E., 'Beverley Minster before the early thirteenth century', in Wilson, C., ed., *Medieval Art and Architecture in the East Riding of Yorkshire* (Leeds, 1989), 9-32; Hoey, L., 'Beverley Minster in its thirteenth-century context', *Journal of the Society of Architectural Historians*, 43 (1984), 209-24; Wilson, C., 'The early thirteenth-century architecture of Beverley Minster: cathedral splendours and Cistercian austerities', *Thirteenth-century England*, 3 (1989), 183-95; Hall, I., 'The first Georgian restoration of Beverley Minster', *Georgian Group Journal* (1993), 13-21.
2. Pace, R. Willis in a note contained in Petit, J.L., 'Remarks on Beverley Minster', in *Memoirs illustrative of the history and antiquities of the County and City of York communicated to the annual meeting of the Archaeological Society of Great Britain and Ireland, held at York, July 1846* (2 vols, London, 1848), vol. 2 (unpaginated), n. 7.
3. Hoey, 'Beverley Minster in its thirteenth-century context', 212 n. 13, is mistaken in thinking there are only two staircases.
4. Pace Bilson, J., 'Notes of an Address to the Archaeological and Architectural Society of Durham and Northumberland', *Transactions of the Durham and Northumberland Architectural Society*, 4 (1893), lxi, and *idem*, 'Beverley Minster', *Architectural Review*, 3 (1989), 202.
5. Hoey, 'Beverley Minster in its thirteenth-century context', 212-13.
6. Wilson, 'The early thirteenth-century architecture of Beverley Minster', 194-5.
7. *Ibid.*, 185 n. 9; Hall, 'The first Georgian restoration of Beverley Minster', 19.
8. The drawing in Hewett, C., *English Cathedral and Monastic Carpentry* (Chichester, 1985), 27 Fig. 24, is inaccurate in showing the plate below the tie beam.
9. Hall, 'The first Georgian restoration of Beverley Minster', esp. 17-19, contains a succinct account of the restoration of the transept.
10. There are several illustrations of the Minster with the cupola; the most easily accessible reproduction is of an engraving by Walsh in Brown, P., *Old Beverley*, Fig. 13.
11. Reproduced in *ibid.*, Fig. 12.
12. Letter of 19 January 1735 (1736 New Style), Westminster Abbey Muniments 34573, quoted in Downes, K., *Hawksmoor* (London, 1979), 260 Letter 161.
13. Almost the only comments on the eighteenth-century roofs are contained in *The Victoria History of the Counties of England, History of the East Riding*, 6 (London, 1989), 234; Hewett, C.A., *English Historic Carpentry* (Chichester, 1980), 247, and *idem*, *English Monastic and Cathedral Carpentry*, 75.
14. Hewett, C.A., *English Cathedral Carpentry* (Chichester, 1974), 70-1, and *idem*, *English Monastic and Cathedral Carpentry*, 199, commented upon the post-medieval form of the wheel, but not on its structural dependence on the eighteenth-century brickwork.
15. Westminster Abbey Muniments 24804, quoted in Downes, *Hawksmoor*, 259 Letter 151.