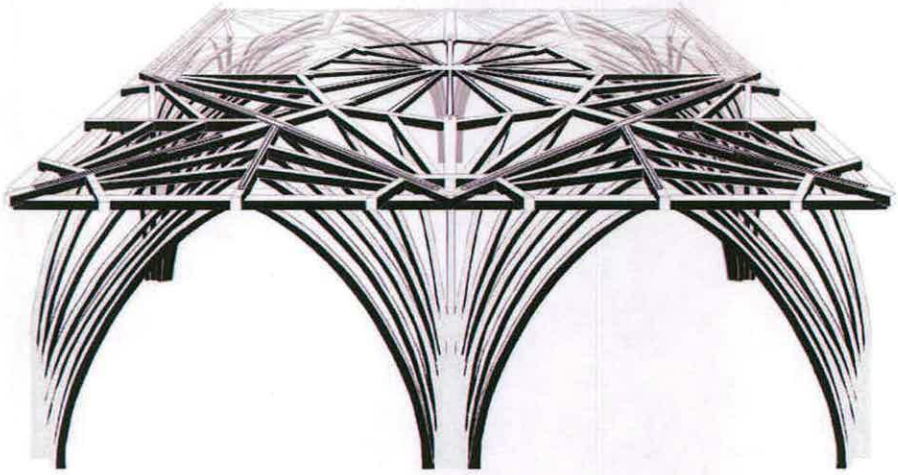
PETERBOROUGH CATHEDRAL VAULT OF THE CROSSING TOWER

A STUDY OF THE LATE FOURTEENTH-CENTURY TIMBER FRAME

by

Richard Bond



Historical Analysis & Research Team
Reports and Papers 82
2003

ENGLISH HERITAGE

Nature of Request

A request was received from English Heritage's Ancient Monuments Laboratory for assistance with recording and analysing the timber-framed vault of the Crossing Tower at Peterborough Cathedral. A drawn record of the vault and advice on the phasing of the timbers used in its construction was needed as an accompaniment to a tree-ring dating analysis of the vault structure. The tree-ring analysis was undertaken by Ian Tyers and forms part of a large-scale dendrochronological study at Peterborough Cathedral being carried out by Sheffield University and funded by English Heritage.

The drawings in this report *(figs 1-7)* are by the author, copyright English Heritage.

The Historical Research and Conservation Support Team is part of the Historic Buildings and Areas Department of English Heritage, based at 23 Savile Row, London W1S 2ET

Produced and published by English Heritage,
23 Savile Row, London W1S 2ET

Tel. 020 7973 3747
Fax: 020 7973 3001
e-mail: richard.bond@english-heritage.org.uk

Contents

List of Figures

1. Introduction

The central tower of the original Norman abbey church at Peterborough was completed between 1155 and 1175. It is likely to have developed structural problems, and was replaced with a new tower and octagon in the fourteenth century. The Victoria County History[1] suggests that the alteration was carried out *c.*1330, or at around the same time as the octagon was constructed at Ely as a replacement for its central tower, which collapsed in 1322. The supporting masonry for the octagon at Ely was completed by 1328, and the timberwork of the great lower vault was being painted in 1334-5.[2] Following the recent tree-ring dating analysis of the vault timbers, it is now know that the medieval vault at Peterborough was constructed from timbers felled in, or soon after, 1371 *(Tyers, 2003).* This revised dating of the vault framing suggests that the alterations to the tower may not have been carried out in *c.*1330, as has been supposed, but at a rather later date, perhaps at around the same time the Perpendicular central porch was added to the west front, in *c.1380.*

Like Ely,[3] the rebuilt tower at Peterborough had a vaulted lantern surmounted by an octagon. The lantern was of single storey, and the octagon was made of wood, and was covered with lead and embattled. The octagon was removed by Dean Kipling (1798-1822) but is recorded in various eighteenth and early nineteenth-century views of the cathedral.

The second tower was itself taken down in 1885-6, and rebuilt to the original design using as much of the original material as possible. The present vault structure therefore represents a Victorian reconstruction of an original late-medieval timber-framed structure. The late-nineteenth century restoration was overseen by the project architect, Pearson, however it was Irvine, his clerk of works, who had the task of actually dismantling, renewing and reinstating the timber frame. Further repairs and strengthening works, including the construction of the existing roof over the vault, were carried out by Moore in the 1920's. Irvine approached his task with considerable caution and sensitivity. Although a great many of the original medieval timbers were repaired or replaced with new machine-sawn timbers, precautions were taken from the outset to ensure that the reconstructed frame followed the design of the original medieval frame as truthfully as possible. Before the frame was taken apart, the timbers were individually numbered to allow their correct repositioning during the rebuilding stage.[4] Similarly, at the re-assembly stage, care was taken to ensure that the medieval timbers were replaced in their original positions using their original carpentry joints (and in many cases using the same peg-holes as before, also). Thanks to Irvine's cautious and skilful restoration, there still exists enough evidence to allow a reconstruction of the late fourteenth-century vault structure *(figs. 1-7).*

[1] VCH, 1906, p.439
[2] Maddison, 2000. P.70
[3] Hewett, 1985, P.114-122
[4] In some areas Irvine used Roman numerals to record the positions of the timbers prior to dismantling the frame, for example the ring of timbers forming the central octagon. In the case of the wall and corner posts, on the other hand, he used a system of coding based on letters rather than numbers.

2. *Architectural Description*

The vault compartment is square in plan, with side walls approximately 10.4 metres wide. The vault framing consists of two main elements: an upper framework of four corner beams with four diagonal beams halved across them, with a secondary framework of rib beams radiating inwards from the corners and middle of the walls; and a lower framework of eight sets of curved ribs, their tops morticed into the undersides of the upper rib beams, and their bases running downwards to corbels in the corners and middle of the walls. Timber posts extend upwards from the corbels to support the outer ends of the corner beams, diagonal beams and transverse beams, and in the spandrels between the posts and the ribs are short horizontal rib ties, or struts. (Neither the posts nor the rib ties appear in the drawings produced for this report). The underside of the vault is decorated with a series of carved timber bosses. These appear to have been attached using slip tenons, and are located directly over the intersections of the framing pieces. In the centre of the vault is a large, carved head and shoulders effigy of 'Christ in Majesty', the backing-plinth of which is hewn from the same piece of timber as the central east-west beam of the upper floor frame. Radiating outwards from the centre of the vault are sixteen rib beams (including the main east-west beam) their outer ends supported on an encircling framework of timbers laid out in the shape of an octagon. Attached to the underside of the central octagon is a secondary framework of short, non-structural timbers, arranged in the shape of a star.

As well as being a backing frame for the vault ribs, the upper framework acted as a base frame for the original octagon structure. There are no known drawings or views to show precisely how the octagon stood in relation to the vault framing, however an arrangement along the lines of the reconstruction drawings *(figs 5 & 6)* seems probable. In the tops of the corner beams there appears to be a long mortice, or pair of mortices (the openings are presently concealed), which may have been fixing points for the wall frames of the octagon. At the same point but higher up, the tops of the octagon walls may have been connected to the corners of the tower with external timber braces, or shores.

The upper framework appears to have been boarded over originally, to allow visitors to walk around inside the octagon and look out over the surrounding landscape. Eighteenth and nineteenth-century views of the cathedral show that the octagon included a pair of windows on both its northern and southern sides, and it seems likely that there would have been other windows besides these. The corner beams, the diagonal beams, and the intermediate wall beams supporting the ends of the outer rib beams all have a raised fillet on their upper faces, which the floorboards would presumably have been butted up against originally *(fig. 7)*. A series of small mortices cut into the upper face of the timbers forming the ring of the central octagon frame may have been for a low railing. This may have been to prevent people from walking over the central section of the vault frame, which, unlike the rest of the upper framing, received no direct support from the main corner and diagonal beams, or the timber ribs below.

The timbers of the central octagon ring are attached to the corner beams by means of lap-dovetail joints. The joints are unpegged. The outer ends of the diagonal beams are halved over the ends of the central rib beams extending inwards from the midpoints of the walls. As originally constructed, the outer ends of the timbers of the upper framework were held in place between a lower and an upper wall plate. The wall plates were not in the same vertical alignment, the upper plate being set inwards of the lower plate. In the present construction the upper wall plate is missing and the timbers forming the lower plate have all been renewed.

Slip tenons were employed throughout the construction of the medieval timber frame.[5] In the south-west quadrant of the vault frame where the medieval structure has been left relatively intact, such joints are found in many of the medieval timbers, but not in any of the late nineteenth-century replacement timbers. The use of slip tenon joints would have aided the task of putting together the vault framing within the close confines of the surrounding stone tower. Other late-medieval buildings are known to have employed slip tenons in their construction, for example Frindsbury Barn in Kent, tree-ring dated 1403, where they facilitated the fitting of boarded infill panels, which formed an integral part of the wall framing of the barn. At Peterborough, the ends of some of the fourteenth-century timbers have been broken away to expose the sides of the slip tenons. This presumably happened whilst the frame was being dismantled prior to the taking down of the tower in the late nineteenth century. In most cases the damage appears to have been only slight, however, and Irving was able to retain the timbers using the original tenons or a replacement set of slip tenons. That slip tenons were used in the original medieval construction, and not introduced for the first time by Irving in his reconstruction of the vault, is further suggested by the fact that, in some instances, the joints have more than one set of peg holes each; i.e. there is a first set of holes dating from the original medieval construction, the original pegs now missing; and alongside these holes is a second set dating from the nineteenth-century reconstruction, with the peg or pegs *in situ*.

[5] A slip tenon is defined as 'a loose tenon morticed into two touching pieces of timber'. Such joints are sometimes also referred to as a 'free', 'buried' or 'slipped' tenon joints (Alcock *et al.* 1996)

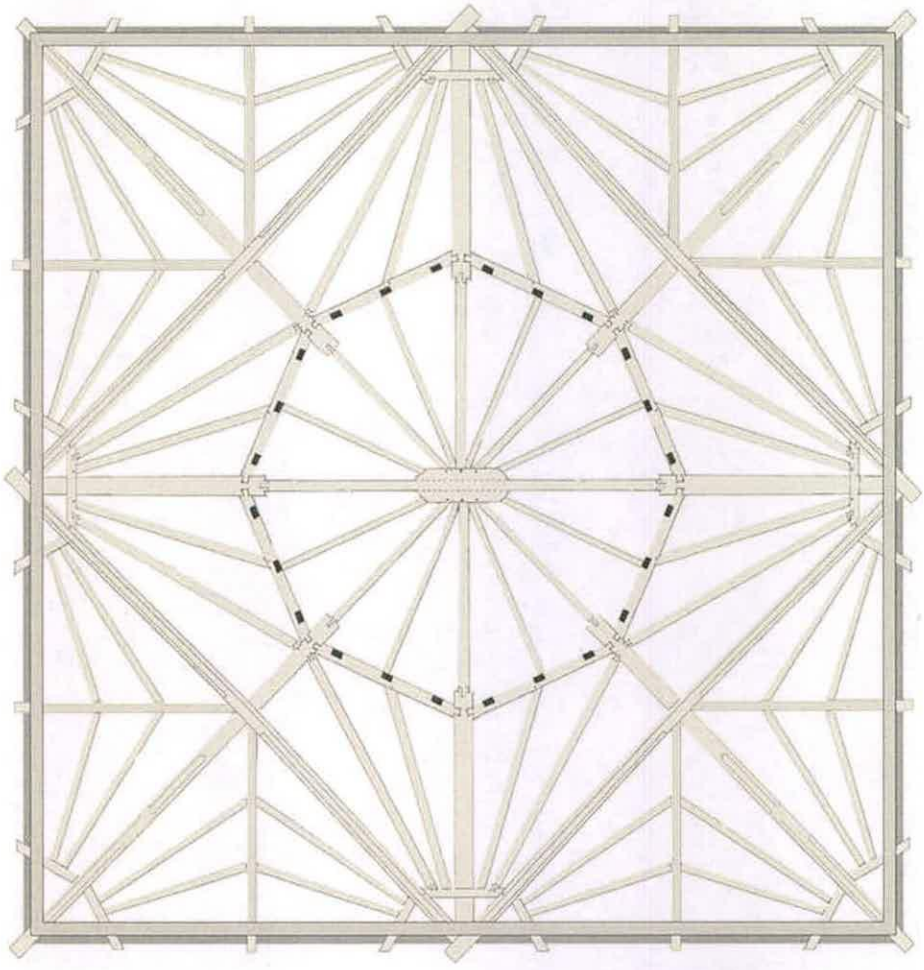
3. Bibliography

Alcock, N. *et al. Recording Timber-Framed Buildings: An Illustrated Glossary.* Council for British Archaeology, 1996

Hewett, CA. *English Cathedral and Monastic Carpentry.* Philimore, 1985

Maddison, J. *Ely Cathedral: Design and Meaning.* Ely Cathedral Publications, 2000

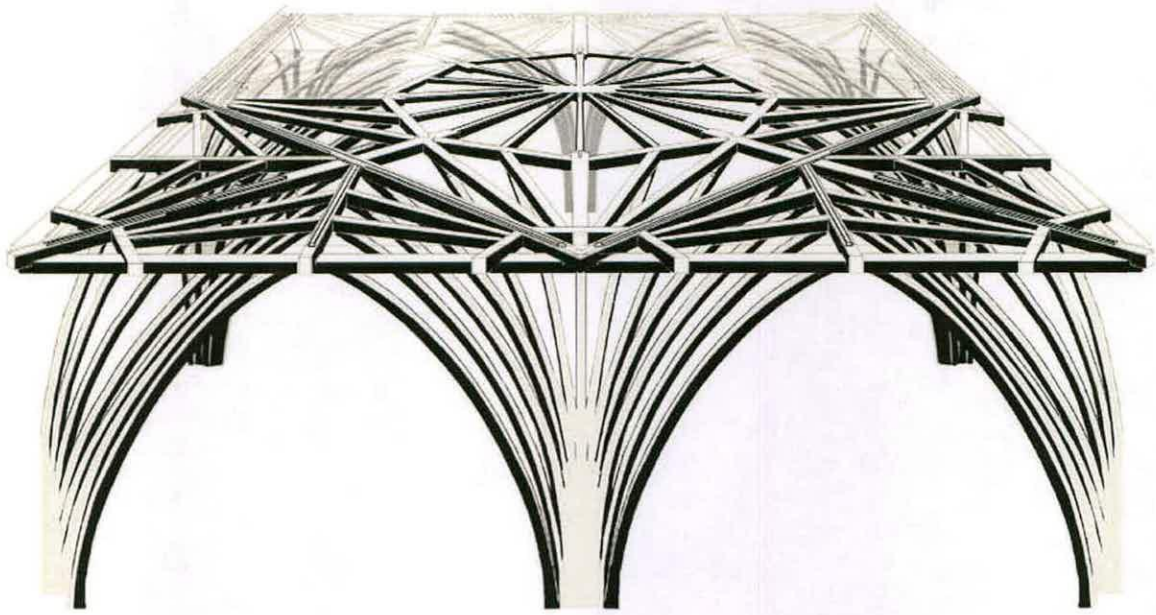
Victoria County History, *Northampton.* 1906



Peterborough Cathedral
Vault of Crossing Tower

Figure 1

Plan of vault framing from above

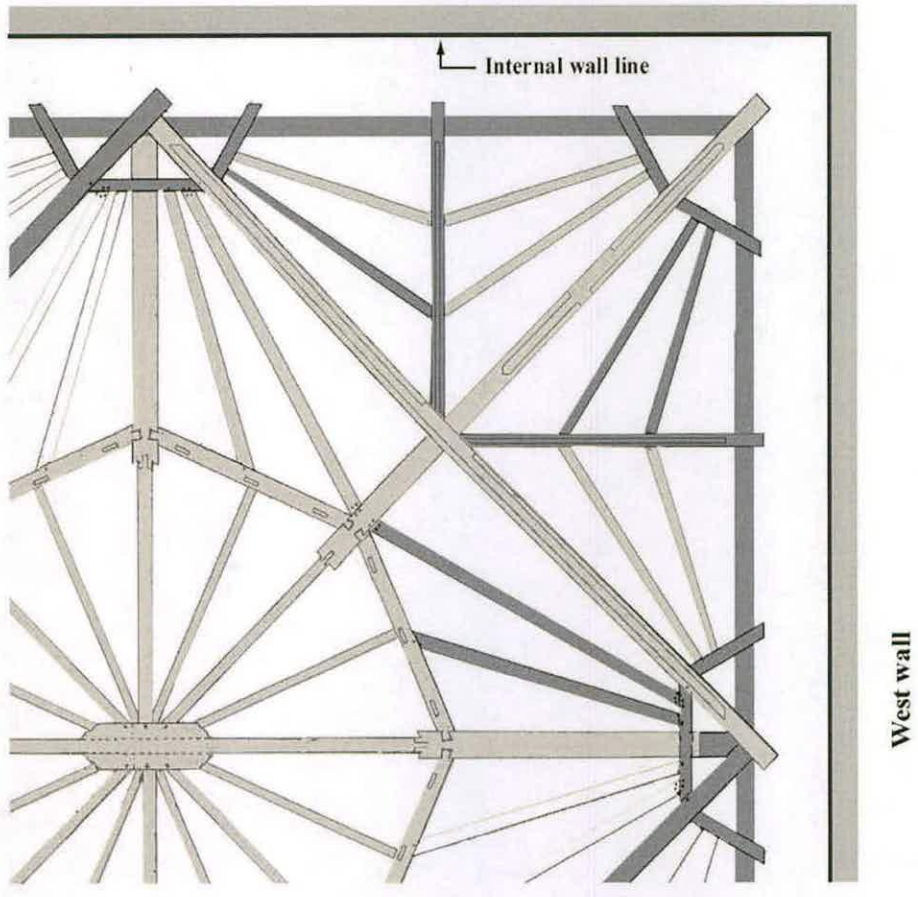


Peterborough Cathedral
Vault of Crossing Tower

Figure 2
Perspective view of vault framing

Late-C14th timbers

Late-C19th replacement timbers

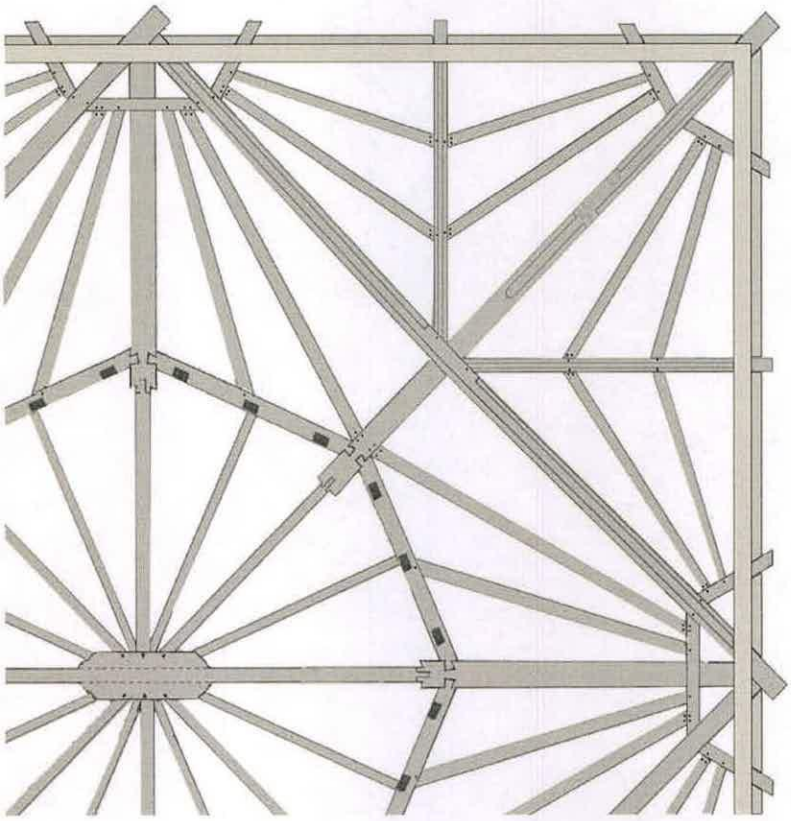


Peterborough Cathedral
Vault of Crossing Tower

Figure 3

Plan of south-west quadrant of vault frame from above as existing

South wall

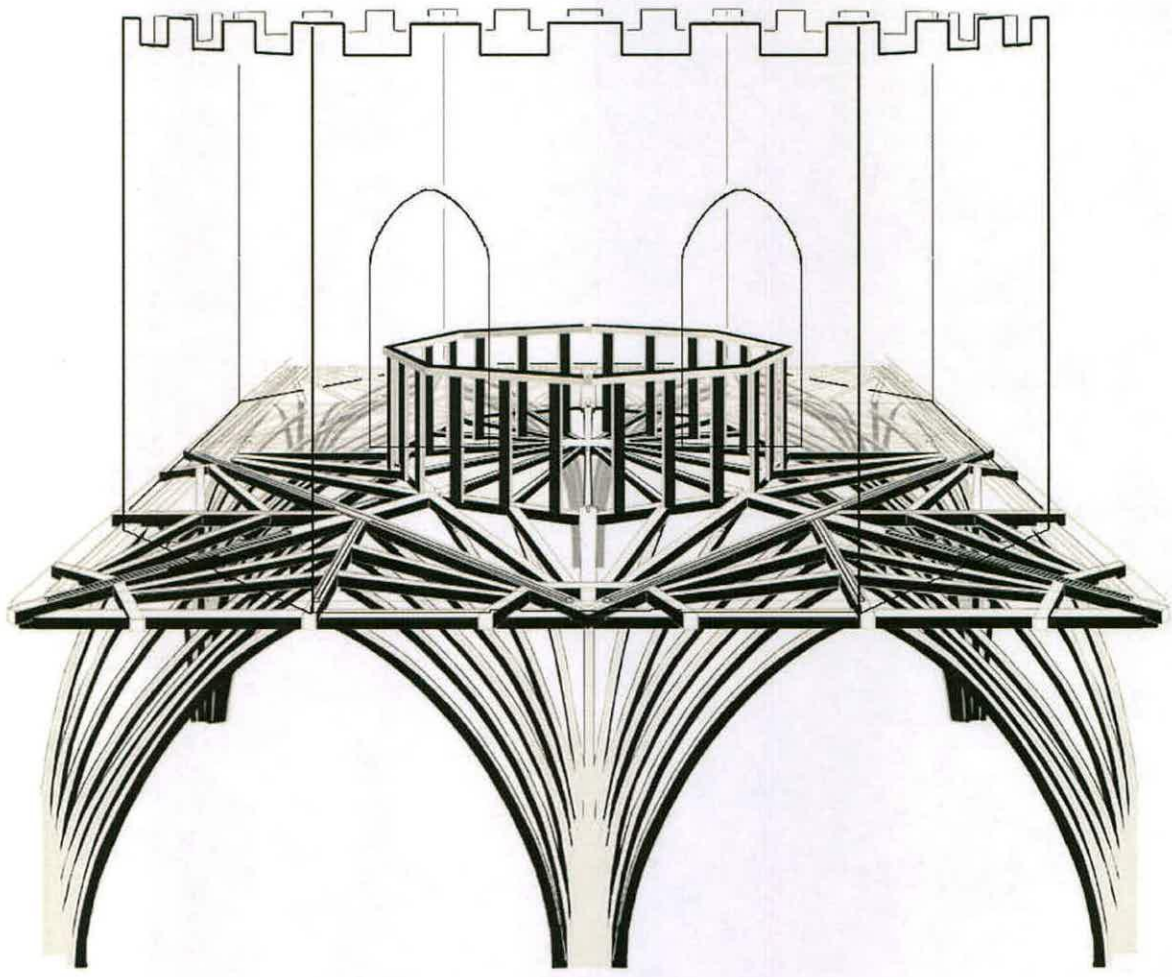


West wall

Peterborough Cathedral
Vault of Crossing Tower

Figure 4

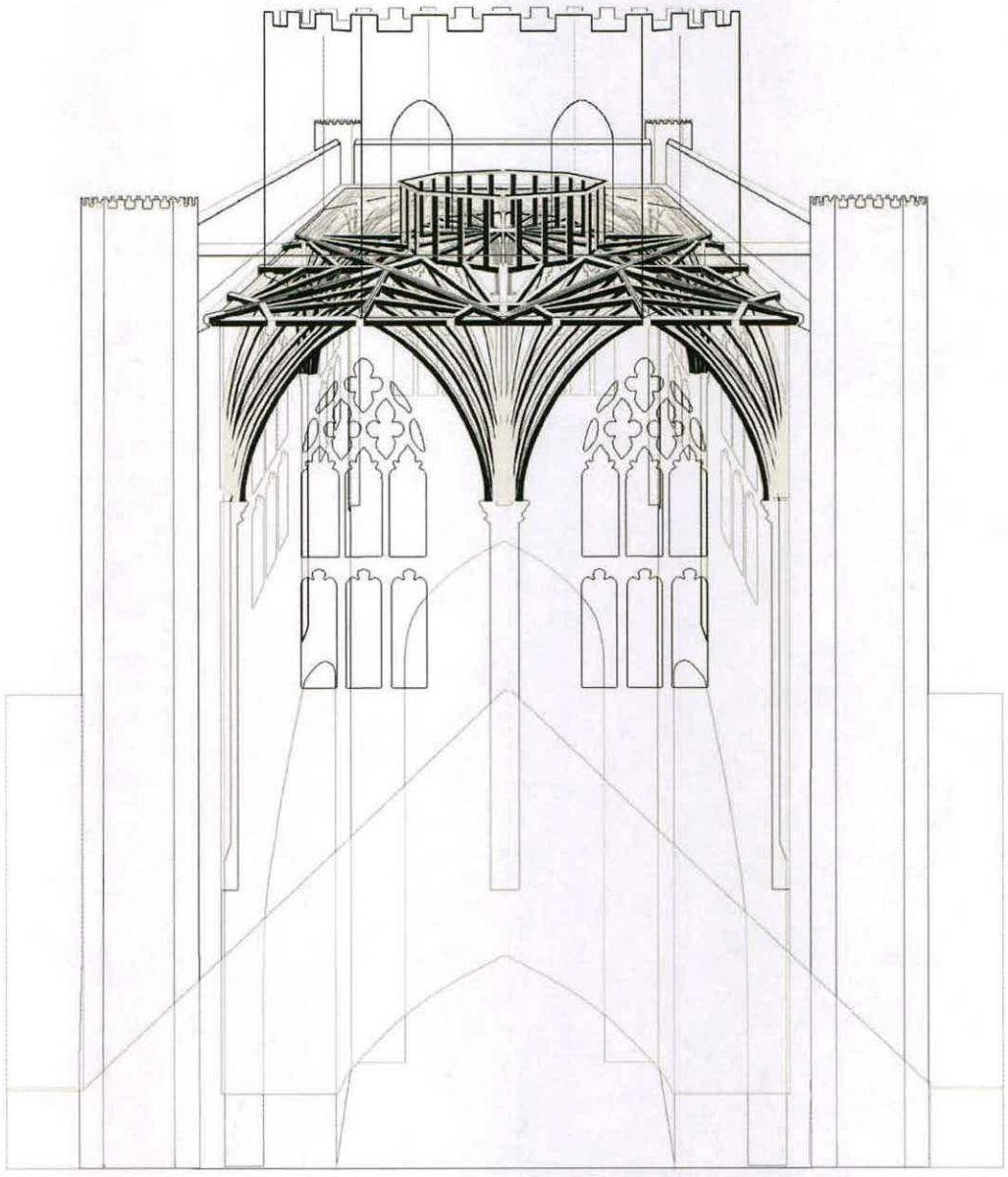
Plan of south-west quadrant of vault framing from above as originally constructed



Peterborough Cathedral
Vault of Crossing Tower

Figure 5

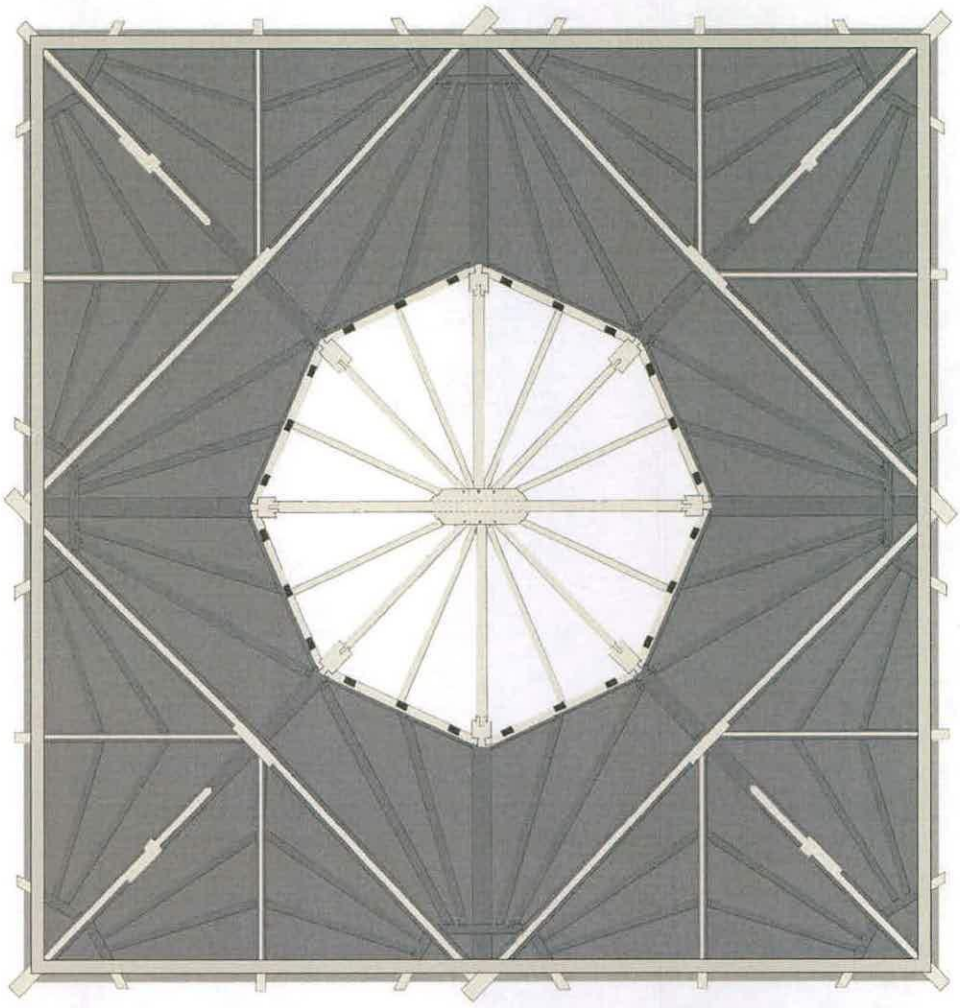
Perspective view of vault framing with Octagon structure *in situ* (reconstruction)



Peterborough Cathedral
Vault of Crossing Tower

Figure 6

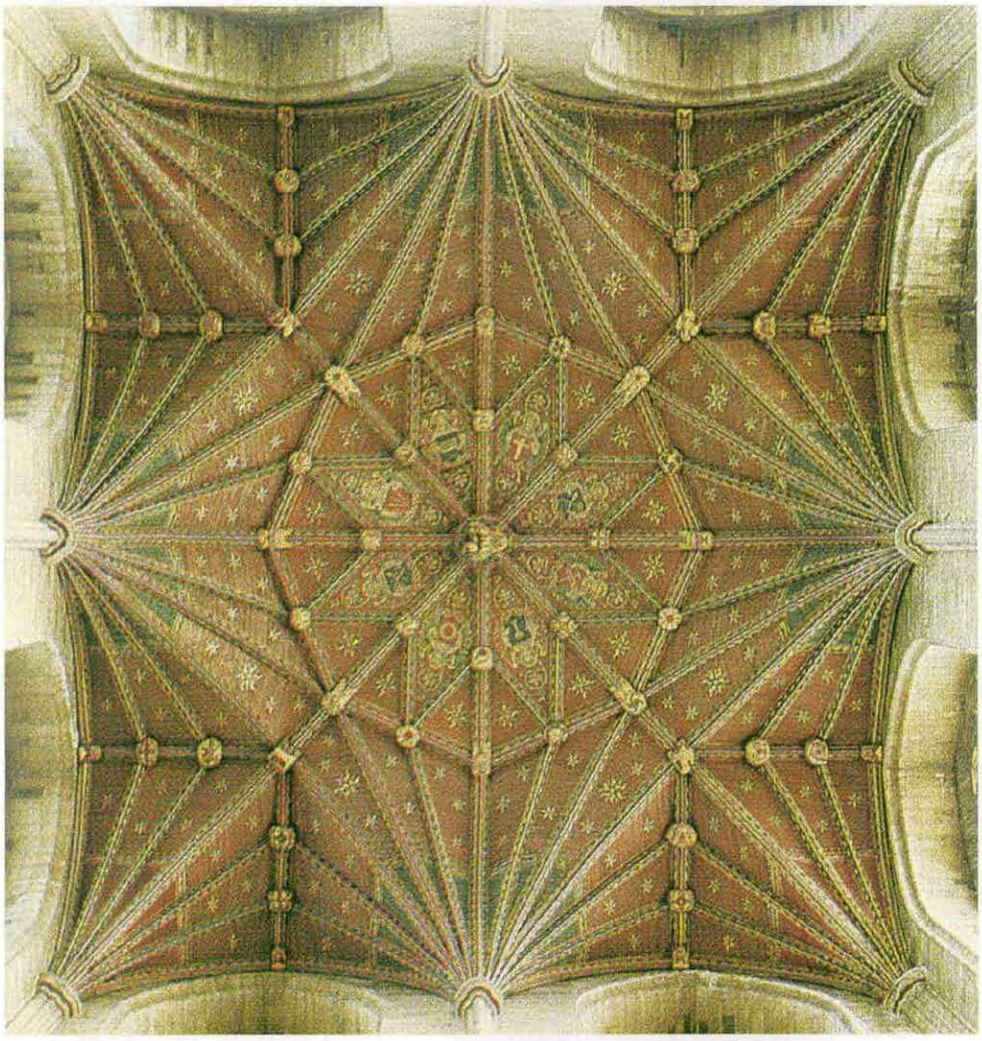
Perspective view of Crossing Tower
as it may have appeared in the late fourteenth century
(reconstruction)



Peterborough Cathedral
Vault of Crossing Tower

Figure 7

Plan of vault framing from above showing original floor layout (reconstruction)



Peterborough Cathedral
Vault of Crossing Tower

Figure 8

View of vault from floor (guidebook photo)