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RECENT OBSERVATIONS ON THE TOWER OF HOLY TRINITY CHURCH, BOSHAM

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A watching brief undertaken when the tower of Holy Trinity Church, Bosham, was repaired in 1988 revealed that the Anglo Saxon tower of this important, former minster, church, which may originally have been a two stage west annexe, survives intact from plinth level to corbelled eaves course though it has been altered and repaired on several occasions. Soon after the Conquest the tower was heightened by the addition of a new belfry stage which included at least two windows and a finely carved corbelled eaves course. Later alterations include the rebuilding of the south-west quoin at an as yet unknown date, the insertion of three new windows in the belfry and the erection of the present spire probably in the 15th century.

INTRODUCTION

The church of the Holy Trinity, Bosham, is of considerable importance historically since it was probably on this site that Christianity was first preached in Sussex in the 7th century A.D. and it was from here that Earl Harold set sail in the middle of the 11th century on the journey which placed him in William of Normandy's power—an unfortunate relationship which led a few years later to the Battle of Hastings.

The histories of the church and the adjoining college have been discussed by Dallaway (1815), Macdermott (1906), Peckham (1953), Salzmann (1973) and Gem (1985); and descriptions of the church have been made by Macdermott (1906), Godfrey (1951), Taylor & Taylor (1965), Hare (1972 and 1973) and Gem (1985). Charcoal burials found under the church in 1981 may be of pre-Conquest date (Aldsworth & McCann 1984).

The opportunity to examine the tower in close detail was afforded in 1988 after a decision had been taken by the Parochial Church Council to undertake repairs. The tower was repaired between 1903 and 1905 when the spire was re-shingled and a new ringing chamber created by the insertion of a new floor (Macdermott 1906). In 1913 the external elevations were rendered over and rough-cast but this was removed from the lower two stages in 1933 at which time the rubble walls were repaired and repointed. The works undertaken in 1988 comprised the stripping of the rough-cast render from the upper stages, the repair and replacement of stones in the quoins using limestone from Jaumont in France (Figs. 1 and 2), and the rendering of all four external elevations leaving exposed only the architectural details.

A watching brief was undertaken by the writer, on behalf of West Sussex County Council, throughout the operation and this led to the discovery of a number of previously unrecorded features. Drawings at a scale of 1:20 were prepared for all four external elevations and these were used as the basis for a detailed survey of the fabric. This included, with assistance from Mr Bernard Worssam, formerly of the British Geological Survey, a study of the stone types used in construction. Internal elevations were also examined and a small trial hole was

excavated outside the north-west corner in order to relate the original ground level to the present floor level in the tower. A set of drawings and photographs detailing the observations has been deposited in the West Sussex County Record Office.

DISCUSSION

As a result of its position at the head of one of the channels that make up Chichester harbour, the church has always been exposed to the prevailing south-west wind and it is this aspect of the tower that has suffered most from exposure, weathering, and repair. It is away from this aspect that the earliest features are best preserved.

Four main periods of construction, alteration, and repair are discernible and it is proposed to discuss these in order.

Period 1 (Pre-Conquest)—the original three-stage tower
Period 2 (Early Norman *c.* 1080–1110)—the new belfry stage
Period 3 —Repair to south-west quoin
Period 4 (Late medieval and probably 15th century)—new belfry windows and probable erection of present spire

In view of the great range of stone types used in the tower these are discussed in a separate section.

Period 1—Pre-Conquest (Figs. 1–6)

The surviving pre-Conquest features in the *external elevations* comprise the remains of a probably plinth course, long-and-short quoins, five single-splayed windows, two string courses, one single belfry window, two double belfry windows, and a corbelled eaves course with corbel table (Figs 1–4).

At the base the three stage tower measures 6.27 metres (20 ft. 7 ins.) north-south by 7.13 metres (23 ft. 5 ins.) east-west externally and it is 13.87 metres (45 ft 6ins) high from top of the plinth course to top of the corbel table.

A small excavation at the north-west corner encountered a step, about 13 cms wide, at a depth of 76 cms (2 ft. 6 ins.) below present ground level (i.e. at 4.13 metres above Ordnance Datum) and this probably continues around the base to form an original *plinth course*. The original floor was probably at the level of the top of the plinth but the present floor of the tower is a little above this.

Where they survive the *quoins* are built in a variation of the usual long-and-short style which has also been noted by Taylor and Taylor (1965) in several other Sussex churches. The south-west quoin has been rebuilt from about 2 metres above the level of the plinth course but the north-west one is complete. With the exception of a single slab of green sandstone low down in the south-west corner and two pieces of ferruginous sandstone high up in the north-west corner, the quoins are built entirely of Bembridge limestone and Quarr stone laid in a bed of lime-based mortar containing crushed brick which gives it a pink appearance. The sources of stone are further discussed later but in order to distinguish them from similar types used in subsequent alterations and repairs to the tower the materials from the Isle of Wight in this phase of construction are referred to as Bembridge limestone 1 and Quarr 1.

Two styles of diagonal tooling were noted on the quoins though these appear in no particular pattern across the building and therefore the difference between the two may not be significant. They comprise short marks made with a chisel blade about 3 cms (1 inch) wide and long narrow grooves up to 8 cms (3 ins.) long, made with either a wider chisel or the same narrow blade used in a different way. The occurrence of traces of original pink mortar or render over some of the tooling marks suggest that much of the original working on the stone surfaces is original and that the quoins may have at least in part formerly been covered by render.

The change of use from stone to flint for the *rubble infill* at approximately the same level in all four walls is particularly noticeable though it is partially masked by later repairs on the west and

south sides. In general the coarse, lime-based, mortar in which the rubble is set appears to be consistent throughout this part of the tower although where inspected in 1988 it was obscured in many places by traces of later render and repointing. The lowest parts of all three external elevations of the tower and the west wall of the nave are built of large pieces of stone, mostly Bembridge limestone and Quarr stone, but from about 2 metres above the plinth course the infill comprises small pieces of stone laid in no regular pattern. As well as incorporating re-used Roman brick and tile it also includes pieces of *Ditrupa* limestone and Bath stone—the latter evidently forming part of repairs undertaken as late as 1933. The rubble infill changes from predominantly stone to flint at a point about 1 metre below the second string course i.e. at third floor level, and this, the only floor showing any signs of antiquity in the present structure, represents the position of the original belfry floor. Above this point the rubble continues in fairly regular courses of flint with a few pieces of stone as far as the corbel table. The change also occurs in the west wall of the nave but slightly higher, approximately half way up the round-headed doorway, and is also visible inside the tower though partly obscured by later repairs.

There are five *round-headed windows* in the first two stages of the tower, each with a single, internal splay—one each in the north and south elevations of the first stage and one each in the north, south and west elevations of the second stage. On external evidence they would all appear to have been inserted at a later stage but it is more likely that they are in fact original openings whose external faces were rebuilt using a source of Quarr stone assigned to Period 2. A close examination of the fabric revealed no other evidence for original openings, either windows, doors or put log holes, in the first or second stage.

The two *string courses* may both have been square originally though they now differ in detail. The top of the first string course is 5.07 metres (16 ft. 8 ins.) above the plinth and survives complete on the north and south elevations and in a defaced form on the west elevation. The wall faces step back a few centimetres above the string course which now has a wide chamfer on its upper face. The top of the second string course is 9.47 metres (31 ft) above the plinth and 4.4 metres (14 ft. 5 ins.) above the first string course and it survives intact on the north elevation and in a defaced form on the west and south elevations. Again the wall face steps back above the string course which now has a wide chamfer on its lower surface.

Hare (1972 and 1973) suggested that the earliest work in the tower belongs to a two-storeyed west annexe without external doorway. No evidence was seen in the quoins to support this view in 1988 but the change of use from stone to flint just below second string course level may indicate the addition of a belfry stage before the Conquest.

The third, and final, stage of the pre-Conquest tower was rendered and roughcast in 1913 and the removal of this in 1988 revealed a number of details. The distance from the top of the second string course to the top of the corbel table is 4.4 metres (14 ft. 5 ins.) so the third stage was the same height as the second stage. The flint rubble infill continues throughout this stage and traces of an *original render* were observed over it. The render was in particularly good condition on the north side of the west wall and here three distinct surfaces were recorded and preserved in situ. The original pink mortar of the north-west quoin and coarse buff mortar of the rubble infill was overlaid by a hard buff-coloured render (Fig. 1 Render 3). On its lower side this was at least partially overlaid by a soft pink render containing fine brick dust (Render 1) and in turn this was overlaid at least in part by another pink render containing coarser brick dust (Render 2). It is not clear whether these represent three successive phases of rendering or simply three patches of render applied in one programme of work using slightly different mixtures.

There are the remains of at least three *belfry windows*, one each on the north, south, and west sides all built with the distinctive pink mortar

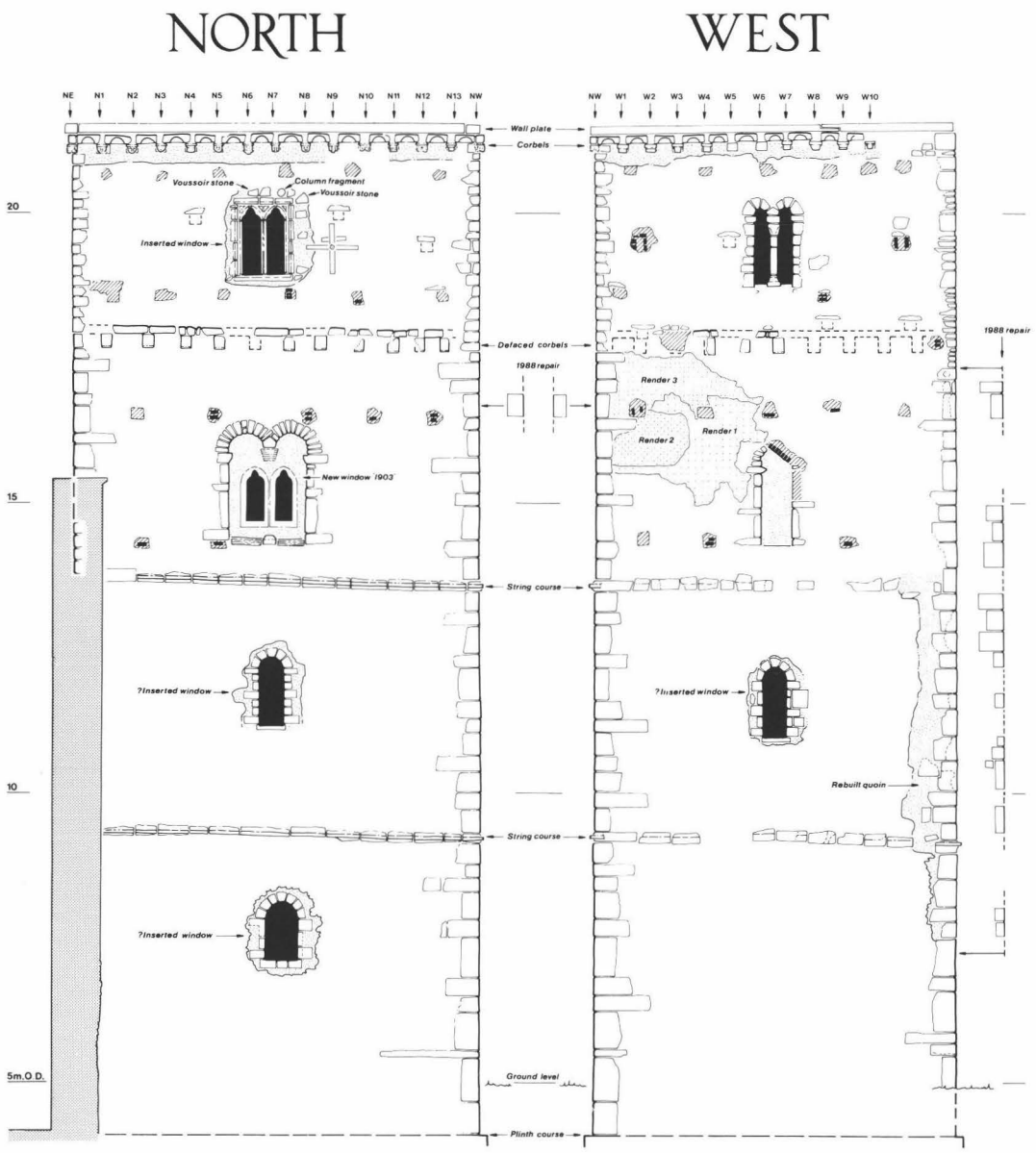

Fig. 1. General drawing of the north and west elevations of the tower showing the main features. The extent of stone replacement in 1988 is indicated. Other recent repairs are shown diagonally hatched and comparatively modern bricks are shown solid black.

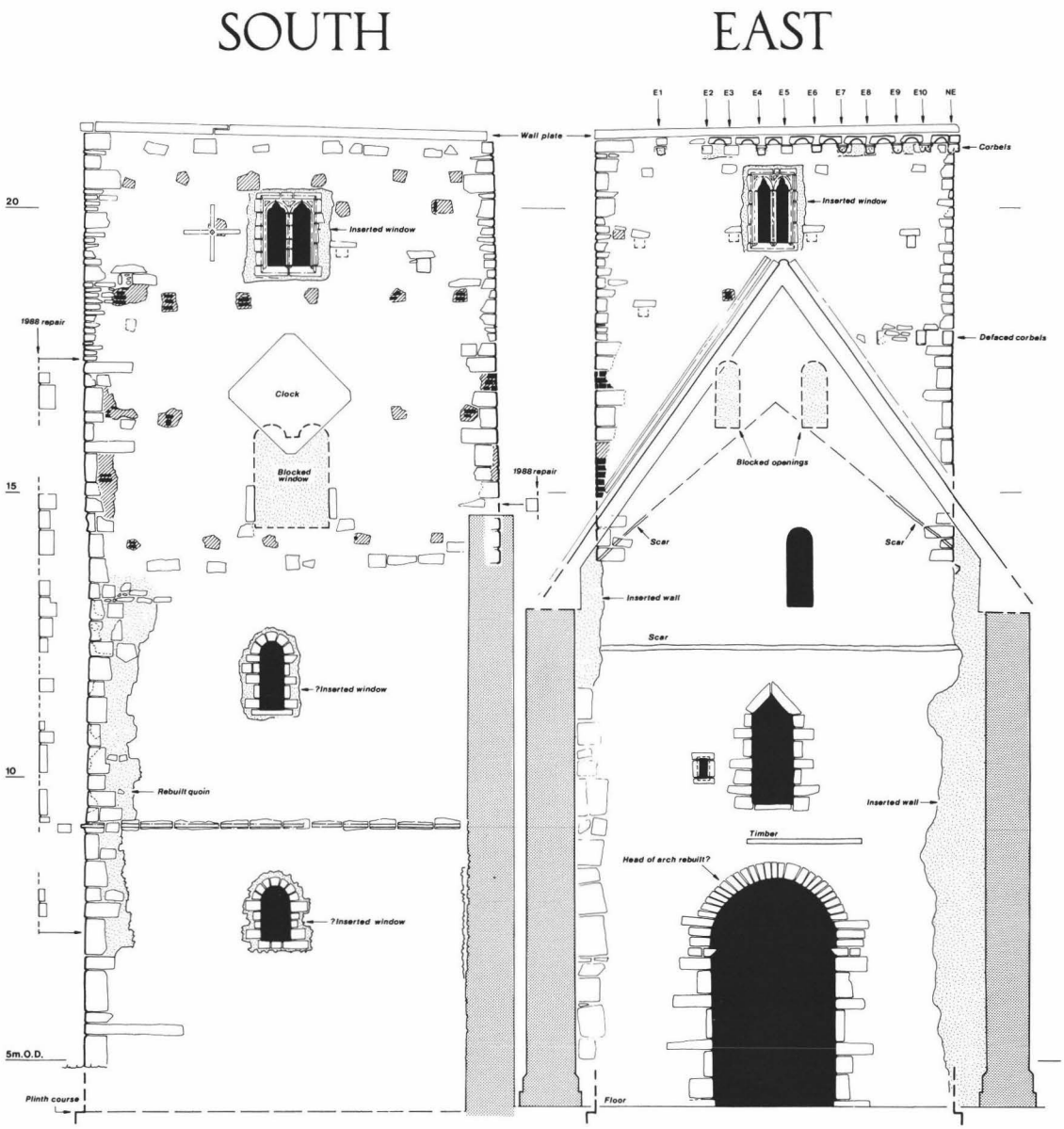

Fig. 2. General drawing of the south and east elevations of the tower showing the main features. The extent of stone replacement in 1988 is indicated. Other recent repairs are shown diagonally hatched and comparatively modern bricks are shown solid black.

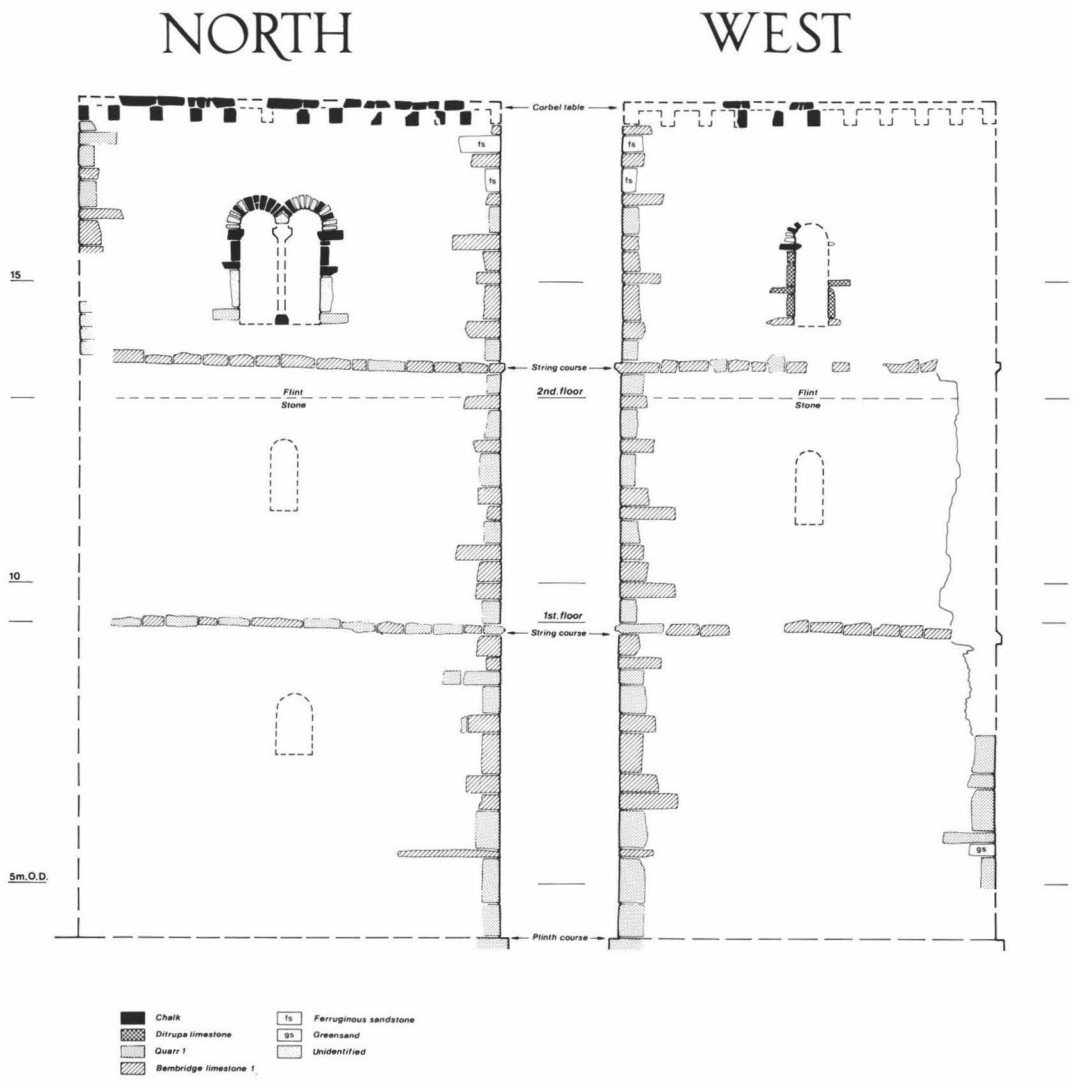

Fig. 3. The north and west elevations of the tower showing only the pre-Conquest (Period 1) features.

seen in the quoins and the corbel table, but there are two other openings below the present roof of the nave and these may also have provided light to the belfry. Set in the centre of the north wall are the remains of a double round-headed window built with long-and-short jambs, and protruding imposts, in a mixture of stones including Quarr, greensand, and hard chalk. The central shaft is missing, although its base survives. A modern window of two lights inserted into the opening is dated 1903. Immediately opposite to this in the south wall are traces of another window which must have been similar in form though only fragments of the jambs survive externally. Internally, however, the flint jambs are still visible though the opening has been completely blocked with a mixture of stone, brick and flint; work attributed by

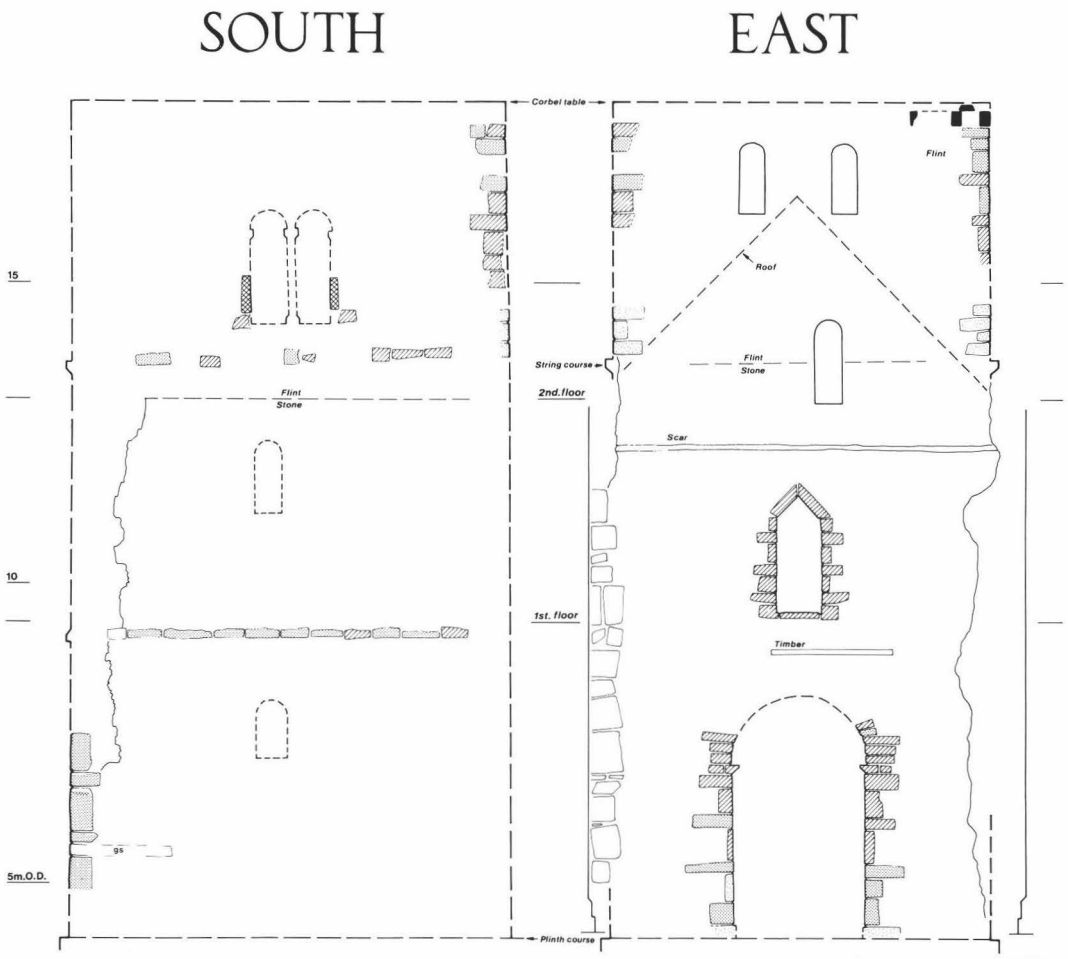

Fig. 4. The south and east elevations of the tower showing only the pre-Conquest (Period 1) features. For key see Fig. 3.

Macdermott (1906) to the 1903–5 restoration. Set in the middle of the west wall are the remains of a single round-headed window built with long-and-short jambs in chalk, Bembridge limestone, and *Ditrupa* limestone. This, too, appears to have been blocked in the 1903–5 restoration at which time a number of new put-log holes were inserted into the upper part of the tower and then blocked mostly in brick.

The two *round-headed openings* now just below the nave roof in the east wall are cut straight through the wall without any splay and are built of flint and stone with heads each cut from a single piece of stone. The south one of the two has been repaired in brick and both have been blocked. There is no obvious indication that they have been inserted and it seems logical to assume that the two openings were intended to light the tower above the nave roof level. In Grimm's drawings of the church dated 1782 (BL Add Ms 5675 f.47) both these windows are shown and the southern window appears to be open. On three mid-19th century illustrations in the church, attributed to R. Ulsdell (1845), J.

Coney (1846) and C de Puris (1851), only the southern one is shown and in all three cases it is shown open.

The original *corbel table* was traced around the north-east corner, along the north elevation and for a short distance along the west elevation. It comprises the remains of a series of chalk corbels each averaging 18 cms (7 ins.) wide and 25 cms (10 ins.) high set between 35 and 50 cms (14–18 ins.) apart and supporting a course of chalk blocks 13 cms (5 ins.) deep on which the original roof must have been supported. All the stones are set in the distinctive pink mortar noted in the quoins and the belfry windows. The corbel table has subsequently been cut back to the face of the wall so it is impossible to suggest its original finished form but many of the corbels carry traces of a chamfer on the lower part of the face indicating perhaps that they carried some form of decoration.

The surviving pre-Conquest features on the *internal elevations* of the tower and nave comprise the tower arch, a triangular-headed doorway at the original first floor level, and a round-headed doorway at the original second floor level. At first floor level is a squint which was probably inserted in Period 4. Also discussed here is the evidence for floor levels and the roof of the original tower, the relationship between the tower and the nave, and the form of the original roof of the nave. The internal elevations of the tower up to present third floor level and the west wall of the nave have been repaired and repointed in recent times so the relationship between openings and wall could not be ascertained (Figs 5 & 6).

The *tower arch* has jambs built of throughstones in long-and-short style carrying square imposts each with a simple chamfer. These support a round-headed arch apparently built in two phases. Three large stones on the south side and five large stones on the north may be original but the remainder is built of small voussoir stones. The continuing use of Bembridge limestone 1 and pink mortar for this apparent rebuild would appear to imply that, if it is not original, then it was a pre-Conquest alteration. For the sake of clarity the extent of the rebuild is shown on Fig. 8. Above the tower arch is a *triangular-headed doorway*, built using pink mortar, with a stone sill, dressed-stone jambs, and a head formed from two large blocks which pass through the full thickness of the wall. Further up and slightly north of centre is a *round-headed doorway* with jambs of stone and flint rubble and a head cut from a single piece of stone.

Within the original part of the tower there are now three *floors*. The first is a modern insertion built on rigid steel joists set into the east and west walls. The second floor is also a modern one supported on timber joists and corbels of Purbeck stone but it represents the approximate position of the first floor of the pre-Conquest tower. Set one in each of the north face of the tower and the west wall of the nave at this level are timbers which may have formed part of the original floors though the latter could equally well have been associated with a gallery which existed at the west end of the nave until removed in the middle of the 19th century (Macdermott 1906, 21). The present third floor is the only one showing any signs of antiquity and this occupies the position of the original pre-Conquest belfry floor. A piece of timber set into the north wall may be part of the original structure though the present floor is supported by beams and braces now set on Purbeck stone corbels in the east and west walls, and joists set in the north and south walls. The arrangement of the joists at the south-east corner suggests the former existence of a trap door. Since the present floor cuts across the bottom of the round-headed doorway in the west wall of the nave it seems likely that this floor level was raised by about 10 to 15 cms when the stone corbels were inserted, probably in the 18th or 19th centuries.

On evidence of weathering and the size of stones in the lower portion of the west wall of the nave inside the tower, Macdermott (1906, 11–12) suggested that the wall may be a remnant of an old outside wall of a former church before the

tower was erected. If this were the case then the tower arch would have to be seen either as an original west door or a later insertion and no evidence to support either of these suggestions was noted in 1988. An attempt to establish the original relationship between tower and nave by a close examination of the external rubble walling at the junction of the two proved inconclusive. It now seems likely that the sequence of building can only be ascertained in an excavation at plinth course level, since above ground the relationship has been masked by the insertion of the north and south arcades and later repairs. On the internal elevation of the west wall of the nave alterations connected with the insertion of the north arcade are quite clear, whilst on the south side the internal quoin is made of large blocks of stone and this is probably the original junction between tower and nave.

No evidence was seen in 1988 to indicate the form of the pre-Conquest roof of the tower other than the fact that it must have been supported on the corbel table.

On the east face of the west wall of the nave are several features which indicate the former position of the nave roof, suggested by Macdermott (1911, 36) to have been lowered in the 15th century to a flat pitch and then raised to its present level in 1865. The lower pitch is shown on numerous 19th century illustrations of the church and is represented by scars on the wall representing the shape of the roof.

On the east face of the tower is the surviving dripstone course protecting the junction of the south slope of the present nave roof and the tower. This is probably a medieval feature inserted after the tower was heightened at the end of the 11th or the beginning of the 12th century though its counterpart on the north side, shown on mid-19th century illustrations, has since been removed. No evidence was found to indicate the position of the *pre-Conquest nave roof* although this ought to be dictated by the lowest level to which the quoins of the tower survive; the position of the second floor if this existed at this time; the corbel table of the tower; and the position of the two round-headed openings. It would be possible to accommodate a roof of about 45 degree pitch standing on a wall plate slightly lower than the present one, with the horizontal scar on the west wall of the nave equating with the tie beam level and with its apex rising a short distance between the two-round-headed windows in the belfry stage.

Period 2—Early Norman circa 1080–1110 (Figs. 7 and 8)

This period of construction and alteration is distinguished by the use of small blocks of stone, mostly Quarr, for the quoins, openings, and corbel table all set in a buff coloured mortar. Much of the Quarr used at this time, henceforth called Quarr 2, contains smaller fossil shells than the material used in Period 1—the significance of the difference is discussed later. The principal alterations made at this time are the addition of a new belfry stage, with at least two windows, and the replacement of the external frames of the five single-splayed windows in the earlier part of the tower.

The new *belfry stage* added a further 3.3 metres (10 ft. 9 ins.) to the height of the tower measured from the top of the original corbel table, which was defaced at this time, to the top of the new corbel table. The tower now measured 17.17 metres (56 ft. 3 ins.) in height from plinth course to the top of the corbel table. The *quoins*, which are constructed almost entirely of Quarr 2, show no signs of building change, apart from on the rebuilt south-west corner, but changes in the rubble infill, which are best seen on the north elevation and internally apart from on the south side, may indicate three phases of building. Immediately above the original corbel table the rubble infill is mostly of stone up to the level of the window sills but above this it gives way to regular courses of flint. Internally the junction of the two is marked by two courses of larger stones (Figs 5 & 6). Externally the last few courses of flint rubble at the top of the tower are laid in a grey lime-based mortar which is quite different from the buff mortars used lower down, and this

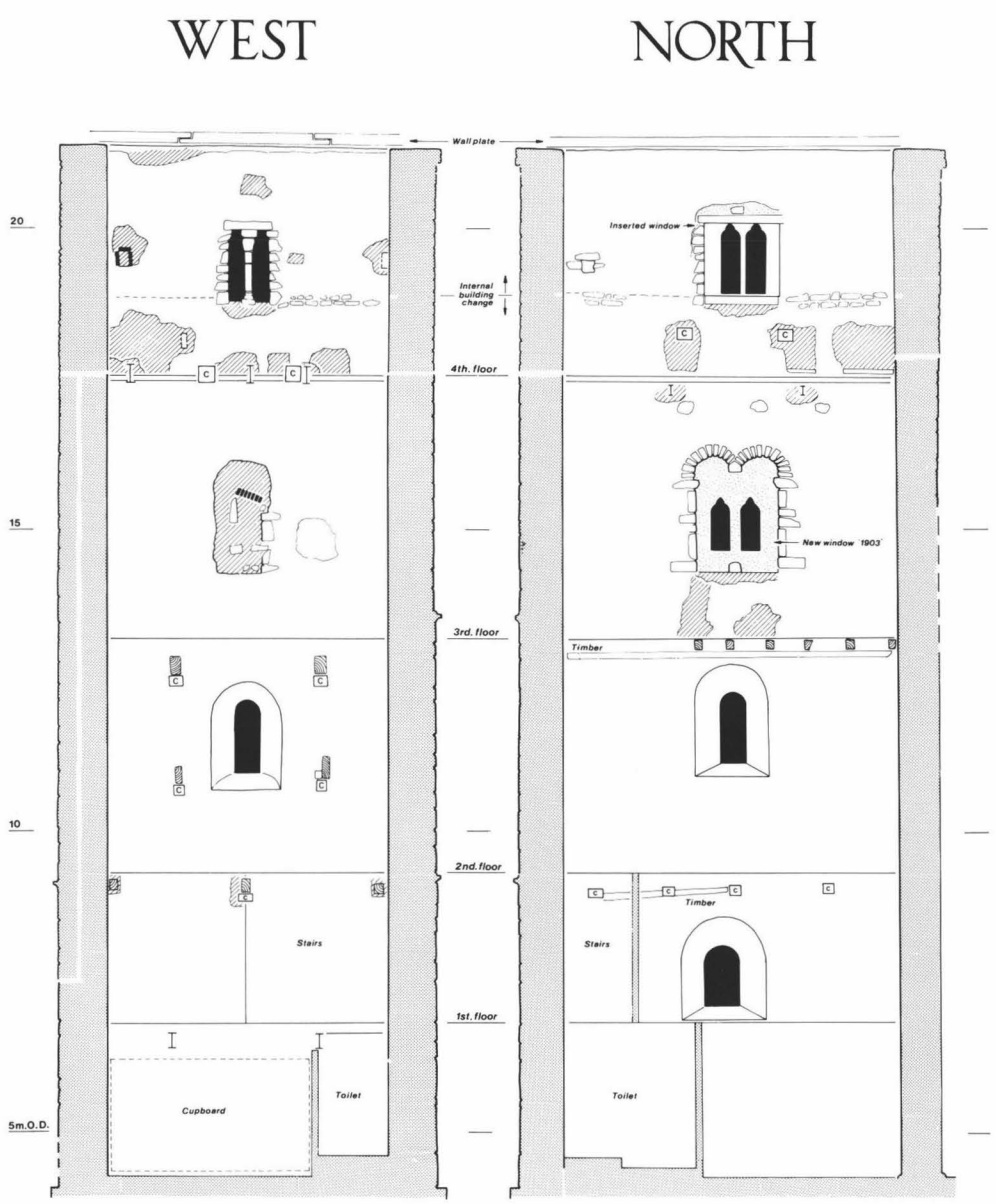

Fig. 5. The north and west internal elevations of the tower. Recent repairs are shown diagonally hatched whilst the inserted Purbeck stone corbels are distinguished by the letter c.

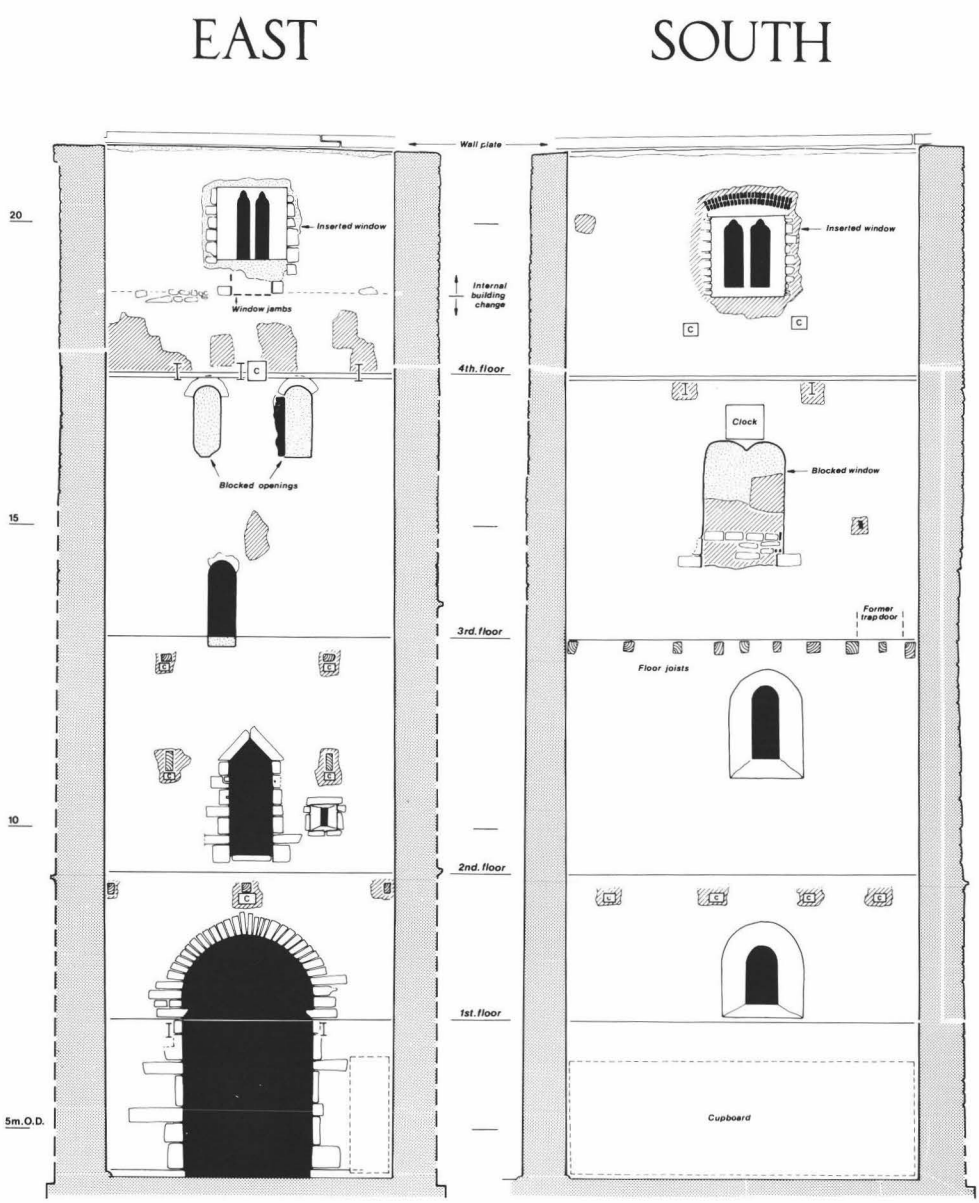

Fig. 6. The south and east internal elevations of the tower. Recent repairs are shown diagonally hatched whilst the inserted Purbeck stone corbels are distinguished by the letter c.

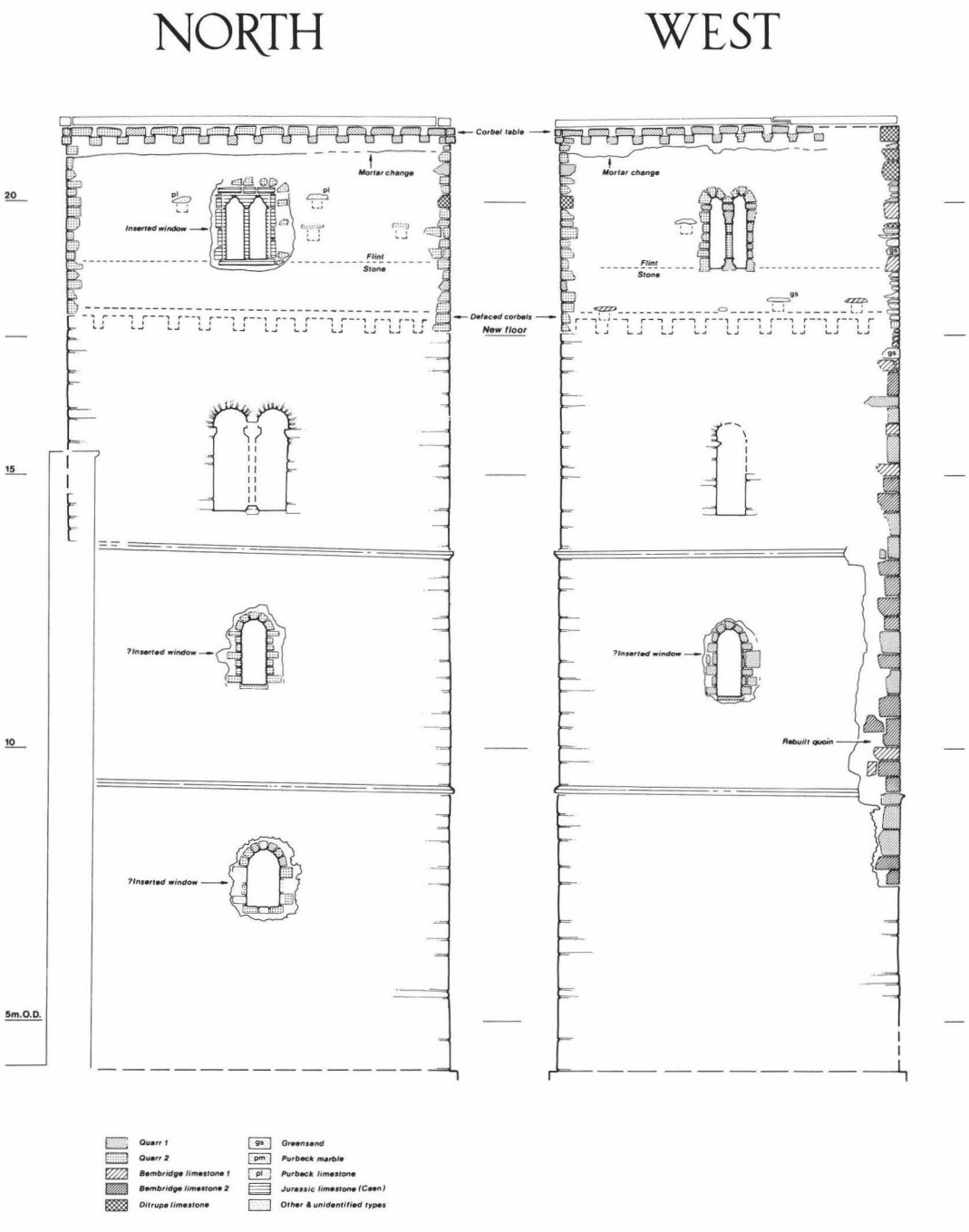

Fig. 7. The north and west elevations of the tower showing in detail the post-Conquest (Period 2) and later features.

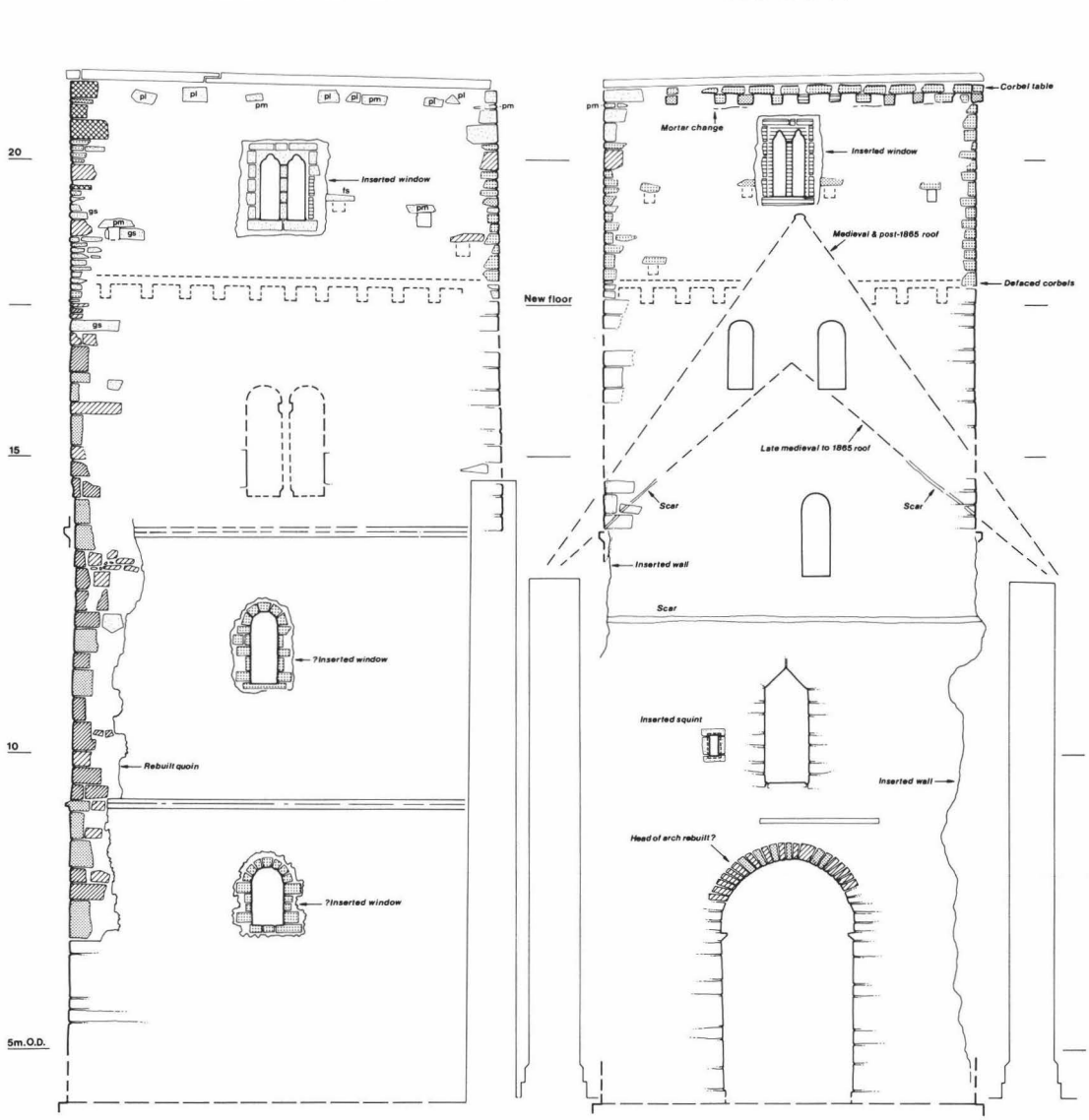

Fig. 8. The south and east elevations of the tower showing in detail the post-conquest (Period 2) and later features. (For key see figure 7).

seems to incorporate the new corbel table though the difference was not observed internally. The significance of this mortar change is not easy to determine but it could mean either that the corbel table was an afterthought or, more likely, that it has been re-set at a later date. Traces of a number of contemporary *put-log holes* are distinguishable in the fabric though their pattern is confused by later insertions using Purbeck marble (Period 4) and, more recently, brick.

Only one complete *belfry window* survives from this period of alteration and this is set in the middle of the west wall. It is a double round-headed opening with mid-wall shaft, all built of Quarr 1 & 2, except for a through-stone slab of greensand. The mid-wall shaft is cylindrical, with a capital in the form of a chamfered cubic and a distinctive base with a hollow between a thin upper and a rather thicker lower roll, standing on a square plinth. There are traces of the former existence of other windows of the same type in the east and north elevations. That in the east wall survives in the form of two large *in situ* stones, 64 cms apart, on the internal elevation which may originally have formed the lowest course of the jambs of a window of similar dimensions to that in the east wall. In the north wall are several re-used stones, including a column or shaft fragment and two voussoir stones, used externally as fill around the inserted Period 4 window, and these may derive from a window in this or another wall.

The *corbel table*, which has been removed on the south elevation and at the south-west and south-east corners, comprises a series of finely carved corbels and flat stones, with curved recesses, on which the roof was supported. No evidence was seen to indicate the original form of the roof. The carved corbels, scarcely mentioned by previous writers, deserve special mention since, together with the one surviving belfry window, they provide the only dating evidence for this phase of construction. The carvings comprise a mixture of geometric designs and faces, mostly human but possibly with one or two animals included. In three cases (Figs 1 & 2 E10, N10 & N13) they are carved with double human heads and at the north-east and north-west corners there are on each three human heads. Two on the east elevation (Fig. 2 E5 & E6) appear to be of Caen stone but the remainder are of Quarr stone. Their nearest parallel locally appears to be the series on the external elevations of the aisles of the nave and presbytery of Chichester Cathedral, though many of these are now only visible in the roof spaces above the later chapels which adjoin them. They appear to belong to the first phase of construction of the cathedral for which the earliest recorded date is a dedication of 1108. The commencement of this work is usually attributed to Bishop Ralph Luffa who was elected to the See in 1090 or 1091, but Gem (1981) has argued on stylistic and comparative grounds for a commencement date for the earliest works of not later than the 1070s or 1080s.

The form of the remaining belfry window in the west elevation would also appear to suggest an early post-Conquest date for the addition of the new belfry so a date of between *c.* 1080 and *c.* 1110 would seem likely for the belfry addition. The church was evidently very wealthy and considered of great importance at the time of Domesday Book. It was granted to the Bishop of Exeter in the time of King Edward and confirmed in his possession by William in 1086. Macdermott (1906, 15–16) has suggested that Bishop Warlewaste, Bishop of Exeter from 1107 to 1137, whose dowry included Bosham, was responsible for many alterations and additions to the church and it is possible that the new belfry can be ascribed to him although a date bracket of 1107–1137 is probably too late for the window capital. Richard Gem has suggested to me that in his view the addition to the tower is probably the same date as the insertion of the chancel arch and the eastward extension of the chancel, works which he regards as falling in the period of Osbern as Bishop of Exeter (1072–1107).

The five *round-headed windows* in the north and south elevations at first stage level and the north, south and west elevations at second stage

level may have been inserted but are more likely only re-built externally at this time.

Period 3

At some stage after the tower had been heightened the *south-west quoin* was rebuilt from a little above present ground level to the eaves. The limit of this repair is readily distinguishable up to the level of the second string course but above this it spreads across the west and south elevations.

It is difficult to ascribe a date to this work either on stratigraphic or architectural grounds. The material used in its construction includes re-used blocks of Quarr 1, Bembridge limestone 1, and *Ditrupa* limestone, but it also contains quantities of a re-used soft yellow stone not seen elsewhere in the tower. The original source for this stone will be discussed later but it is perhaps sufficient here to suggest that it may derive from an outcrop of soft limestone on the Isle of Wight henceforth referred to as Bembridge limestone 2.

Period 4—Late Medieval and probably 15th century

To this phase of construction belong the insertion of three two-light trefoil-headed windows in the north, south and east elevations of the upper, belfry, stage. They are made from a yellow-grey limestone, probably Caen stone, that on the south elevation having been mostly rebuilt comparatively recently in a fine-grained Bath stone. These windows can be ascribed to a late medieval period and probably belong to the middle of the 15th century to which date the timber framing of the present spire perhaps belongs. Both Dallaway (1815, 94) and Macdermott (1906, 20) referred to fire damage caused to the spire by lightning on 14 January 1683 but this does not appear to have been serious.

Immediately adjoining the pre-Conquest triangular-headed doorway in the east wall is a small square window with its head, sill and jambs each cut from a single piece of stone, and with a rebate for a shutter on the nave side. Peckham (1953) suggested that this may have been a *squint* for the ringer of the Sanctus bell.

The insertion of a large number of put-log holes in the upper two stages, many built of or filled with bricks, probably relate to the repairs undertaken in the early part of the present century, but in addition to these are a small number of *put-log holes* and other repairs using Purbeck stone and Purbeck marble and these probably date to this period. The absence of contemporary put-log holes lower down in the tower probably indicates that the scaffolding was hung from the tops of the walls. Its purpose was, perhaps, to facilitate the insertion of the new windows and the erection of a new spire.

It is perhaps worth noting here that Macdermott (1906, 20–21) mentioned a proposal in about 1839 to raise the height of the tower by about 12 feet finishing with a parapet cornice and battlements but this work was never carried out.

THE STONE

The range of types of stone used in the construction of the tower is unusually wide for churches in Sussex and requires further discussion but it should be noted that because of the adhering mortar and lichen growth some of the identifications should be regarded as tentative whilst some of the stone has defied identification.

Quarr stone

The source of this shelly Oligocene (Tertiary) limestone, sometimes referred to as 'featherbed stone', to the west of Ryde on the Isle of Wight, has been described by White (1921), Anderson and Quirk (1964), and Tomalin (1987). The stone appears to have been used at Bosham from pre-Conquest times through at least until well into the 12th century. In pre-Conquest contexts in West Sussex it usually contains large fossil shells and is frequently found, as recently at Sompting (Aldsworth and Harris 1988), and Singleton (Aldsworth 1989), in large blocks. However, at Bosham there is a clear

distinction between this material and much of that found in later contexts associated with the addition of a new belfry stage in *c.* 1100. In later contexts the fossil shells are frequently much smaller and consequently the stone has a finer appearance. The blocks of stone used in later contexts are also smaller and these two features together help to distinguish between the first two phases of construction. It seems likely that despite the limited extent of the outcrop of the stone two different quarries were operating during the time that the tower was built and then heightened. If this difference in shell and block size can be observed in closely dateable contexts elsewhere it may eventually be possible to ascribe closer dates to structures built within the period from the pre-Conquest period through to the 12th century.

In this paper the two types are referred to as *Quarr 1* for the stone with large shells and *Quarr 2* for the stone with small shells. As will be seen in the figures Quarr 1 is found in Period 1 and later contexts whereas Quarr 2 is only found in Period 2 and later contexts.

Bembridge limestone

This parchment-coloured Tertiary limestone is exposed in many places on the Isle of Wight and in particular as a wave cut platform at Bembridge and in a series of small pits and coastal sections elsewhere (Daley and Insole 1984). It is distinguished by the inclusion of fossil gastropod casts, as well as by smaller perforations many of which can be seen to be moulds of *Chara nucales*, which give it the appearance of having been attacked by woodworm. The quarrying of this material for querns is known in the 1st century B.C. and it was used for building purposes in the 1st century A.D. at Fishbourne Roman Palace.

The material is sometimes referred to as *Binstead stone*, partly to distinguish it from Quarr stone which is part of the same geological formation and partly because it is thought to have originally been quarried at Binstead. Having personally examined many exposures of Bembridge Limestone on the island the writer is convinced that the layman will have difficulty distinguishing the precise locations from where this material has been quarried. What is particularly noticeable about much of the Bosham material, however, is the large number of pieces which contain larger mollusc holes and some of these may be more recent in origin deriving from the boring of the stone by marine molluscs during prolonged exposure on the beach, an activity which is still occurring at Bembridge. Bembridge limestone is found mostly in pre-Conquest building work at Bosham and in this paper it is referred to as *Bembridge limestone 1* when found in this context.

The Period 3 repair in the south-west quoin includes a variety of stone not seen elsewhere in the tower. It is yellow in colour and is reported by Mr Worssam to be very fine-grained (particles 0.1 mm. or less), with numerous 0.2 mm. and some larger (0.3 to 0.6 mm.) performations as well as some possible gastropod casts. It has a freshwater, Tertiary, appearance, although rather softer than is usual for Bembridge limestone, with the blocks having a tendency to break up at the corners. It has tentatively been identified as Bembridge limestone and in this paper it is called *Bembridge limestone 2.*

Sandstone

There are two large blocks of a ferruginous sandstone in the upper part of the north-west quoin, a large slab of Lower Greensand low down in the south-west quoin and a few other pieces of the same material elsewhere. The precise source for this material have not been identified but it is likely to derive from quarries in West Sussex or on the Isle of Wight.

Ditrupa limestone

The use of limestone from the Calcaire Grossier (Tertiary) formation of the Paris Basin as a building stone in Roman and Anglo-Saxon contexts in south-east England has only recently been recognised (Worssam & Tatton-Brown *in*

press). In West Sussex, the stone was used for some of the columns of Fishbourne Roman Palace and for the 10th-century cross fragment at Pagham described by Tweddle (1980). Its use at Bosham represents an addition to its hitherto known range.

The stone at Bosham is a fine-grained (0.2 mm. particles), porous, whitish to pale brownish grey foraminiferal limestone, with abundant tubes of the marine worm *Ditrupa*. It is used in the jambs of the pre-Conquest (Period 1) belfry windows in the west and south elevations and in later repairs elsewhere, and it may be this material that is used with chalk to form the heads of the north-belfry window. A small re-used block in the outer surface of the south wall of the 13th-century south aisle of the church, under the more westerly of two double-lancet windows, is perhaps the only piece of the stone currently accessible from ground level.

Chalk

The original corbel table is built entirely from chalk. The material is not used a great deal externally in Sussex churches, though it has an extensive outcrop throughout the South Downs. The horizon of the chalk used at Bosham is not known.

Jurassic limestone

There are several pieces of Caen stone used for the Period 2 corbels and the fine-grained yellow-grey Jurassic limestone used in the late-medieval (Period 4) inserted windows in the top of the tower is probably also from the same source. At the top of the south-east quoin there are three blocks of a non-oolitic, quite coarse, detrital-shell limestone, with echinoid fragments. They are also presumably Jurassic but their precise source is unknown.

Purbeck stone and Purbeck marble

These types of stone occur only in comparatively late contexts, for the heads of put-log holes which are probably 15th century insertions, for repairs at the very top of the tower, and for internal corbels.

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