ON THE RECENT DISCOVERIES AT THE EAST END OF THE CATHEDRAL CHURCH OF DURHAM.[1]

By JOHN BILSON, F.S.A.

The historian of the Norman Conquest, in his chapter on the effects of the Conquest on Art, says that it is to Durham "that we are to look for the highest degree of perfection that has ever been reached by round-arched architecture in its Northern form. . . . Among examples of the specially Norman style, none, either in our own island or beyond the sea, can compare with the matchless pile which arose at the bidding of William of Saint Carilef. . . . The designer of such a pile, whether Bishop William himself or some nameless genius in his employ, must rank alongside of Diocletian's architect at Spalato, of Saint Hugh's architect at Lincoln. And the church of Durham not only stands thus pre-eminent as an example of Norman art; it holds a place instructive above all others in the history of Norman art. No building more thoroughly supplies the hatchet to their argument who cannot rise above a purely chronological arrangement of architectural works. The work of William of Saint Carilef was far in advance of all contemporary buildings."[2]

This last statement is especially true, not only of the decorative features to which Mr. Freeman seems more particularly to refer, but also of the constructional elements which are the basis of the design of all mediæval architecture. In the choir aisles of the work of William of Saint Carilef we find, not the unribbed vault of Roman origin, but the ribbed vault, the design of which dictated the plan of the piers and wall-shafts, each separate rib being supported by a separate shaft carried up from the floor to receive it. The vaulting of the nave is, considering its date, a still more remarkable construction.

[1] Read in substance at the Scarborough meeting of the Institute, July 22, 1895.

[2] Freeman's *Norman Conquest*, v., 629–631.

Erected between the death of Flambard (1128) and the accession of Geoffrey Rufus (1133),[1] it presents, so far as I know, the earliest example of the introduction of the pointed arch in order to solve the difficulties of the construction of a ribbed groined vault over an oblong space. The design of the vault is no longer based upon a semi-circular transverse rib, as in the transept vaults, but the diagonal ribs are made semi-circular, and the pointed arch follows in the transverse arches, almost as a matter of necessity, though here of a somewhat awkward form.[2] So remarkable at such an early date is this innovation, that more than one writer on Durham has attributed this vaulting to an impossible period in the thirteenth century. But documentary and architectural evidence combine to prove that at Durham, before 1133, the builders adopted a new expedient, which was destined to revolutionise vaulting construction, and which had the most important influence in the development of Gothic architecture. The method was, says Viollet-le-Duc, the sole innovation of the first constructors of Gothic vaults.[3]

But these considerations lie outside my present subject, and my only reason for introducing them here is to show how important it is that we should be able to complete the plan of the whole of this most remarkable church. With the exception of the eastern termination, the church remains, in all essential features, as it was built during the forty years from its commencement by William of Saint Carilef in 1093. Recent discoveries have enabled us to complete the ground-plan, at any rate, of this eastern termination.

[1] No other conclusion seems to be possible from the passages in the continuation of Symeon, which state that Flambard built the nave "usque testudinem," and that in the interval between Flambard's death and the accession of Geoffrey Rufus the monks completed the nave. Of Flambard the continuator says, "Circa opus ecclesiæ modo intentius modo remissius agebatur, sicut illi ex oblatione altaris et cœmeterii vel suppetebat pecunia vel deficiebat. His nanque sumptibus navem ecclesiæ circumductis parietibus, ad sui usque testudinem erexerat." *Symeon of Durham, Historia Ecclesiæ Dunhelmensis Continuatio*, cap. i, Rolls Series, Ed. T. Arnold, vol. i, p. 139. After Flambard's death, "Vacavitque episcopatus per quinquennium. Eo tempore navis ecclesiæ Dunelmensis monachis operi instantibus peracta est." *Symeon*, p. 141. See also *Durham Cathedral*, by the Rev. William Greenwell, 4th edition, pp. 35-37. The architectural details of the vault and the character of the masonry of its ribs fully confirm the date assigned to it.

[2] The transverse arches are struck from centres considerably below the springing line.

[3] *Dictionnaire Raisonne de l'Architecture Française*, iv, 35.

Before describing what has been found, it may be well to give a brief outline of the history of the Norman church.[1] It was commenced by Bishop William in 1093, after his return from exile, Aldhun's church having been pulled down in the previous year.[2] The work was pushed forward with great rapidity, and, although we have no documentary evidence as to the extent of Carilef's work, it seems probable that, when he died in 1096, he had completed the choir, the crossing piers, the eastern side of both transepts, and one bay of the nave arcade and triforium immediately west of the crossing,[3] and that in the interval between his death and the accession of Bishop Flambard in 1099, the monks finished the western side of the transepts. Flambard, who on his accession found the church finished as far as the nave,[4] completed the nave up to the vault, which was added between his death in 1128 and the accession of Geoffrey Rufus in 1133. The church was now practically finished. With the later Galilee and the upper part of the towers we are not now concerned.

We have no actual record of the erection of the transept vaults, but they are clearly a little earlier than the nave vault. The walls of the clerestory of the choir still show the lines of the Norman vault, which was evidently of the same character as the transept vaults.

[1] I here merely state the conclusions generally accepted. Details of the history and references to the authorities on which these conclusions are based (other than those here quoted) will be found in Canon Greenwell's admirable guide to the Cathedral.

[2] So says Symeon, though we should have expected that at least part of Aldhun's church would be left standing until the choir of the new church could be used for worship. "Ecclesiam xcviij anno ex quo ab Alduno fundata fuerat, destrui præcepit, et sequenti anno positis fundamentis nobiliori satis et majori opere aliam construere cœpit. Est autem incepta M. xciij Dominicæ incarnationis anno, pontificatus autem Willielmi xiij ex quo autem monachi in Dunelmum convenerant xj tertio Idus Augusti, feria v. Eo enim die Episcopus, et qui post eum secundus erat in ecclesia Prior Turgotus cum cæteris fratribus primos in fundamento lapides posuerunt. Nam paulo ante, id est, iv Kal. Augusti feria vi, idem Episcopus et Prior, facta cum fratribus oratione ac data benedictione, fundamentum cœperant fodere. Igitur monachis suas officinas ædificantibus, suis Episcopus sumptibus ecclesiæ opus faciebat."—*Symeon*, lib. iv, cap. 8, p. 128.

[3] I do not intend to imply that Carilef completed the whole height of the choir, though it appears to be certain that his work extended as far as the top of the triforium stage.

[4] "Porro prædecessor (Willelmus de S. Carilefo) illius (Rannulfi), qui opus inchoavit, id decernendo statuerat, ut Episcopus ex suo ecclesiam, monachi vero suas ex ecclesiæ collectis facerent officinas. Quod illo cadente cecidit. Monachi enim omissis officinarum ædificationibus operi ecclesiæ insistunt, quam usque navem Rannulfus jam factum invenit."—*Symeon, Continuatio*, cap. i, p. 140.

A story told by William of Malmesbury,[1] in connection with the translation of the body of St. Cuthbert into the new choir in 1104, affords ground for the supposition that the apse vault at least, if not the whole choir vault, was then completed. However this may be, the whole church was vaulted from end to end before 1133—in itself a sufficiently remarkable fact.

Bishop Pudsey commenced the erection of a Lady Chapel at the east end of the church, presumably beyond the Norman east end, but the work was abandoned, and the existing Lady Chapel, or Galilee, was ultimately built by Pudsey at the west end of the church. Fragments of Pudsey's eastern chapel have been found at different times near where he proposed to build it, and other fragments were found in the recent excavations. The Norman east end is said to have been in an unsafe condition as early as Pudsey's time, but was only removed when the eastern transept, or Nine Altars, was built.[2] The greater part of the eastern transept would probably be erected before the Norman east end was removed, in order to avoid interference with St. Cuthbert's shrine, which stood in the apse, and which continued to occupy the same position until its destruction at the Dissolution.

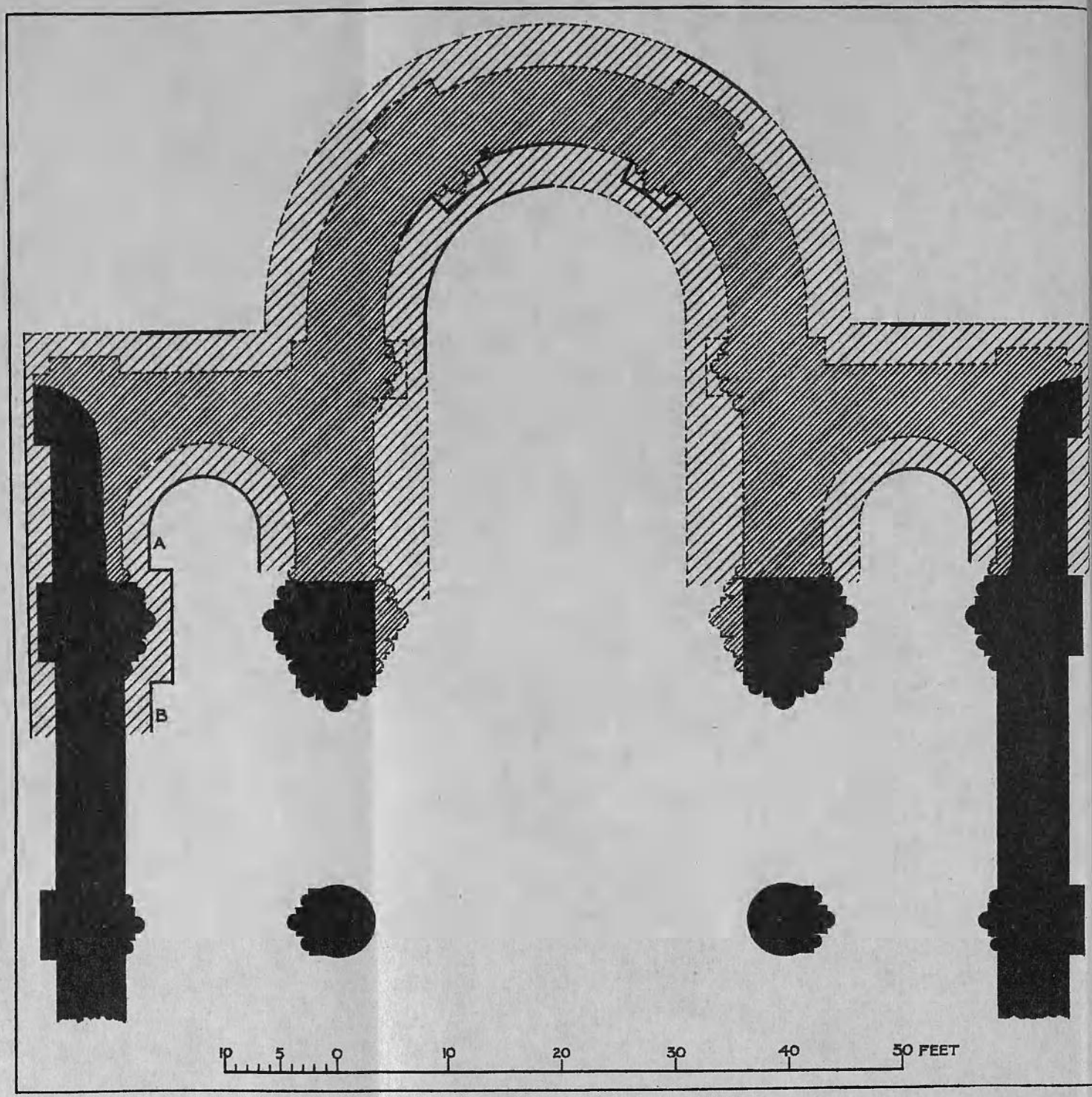
Before the recent excavations were commenced it was known that the Norman choir terminated eastward in an apse, and part of the outer face of the apse foundation was seen in making a grave in 1844.[3] It is curious, however, that almost every writer on Durham was inclined to believe that the apse was surrounded by an ambulatory.[4] This opinion was based on the apparently sufficient reason that, on the outside of both choir aisles, the Norman work extended one bay east of the great arches which cross the choir and aisles between the choir and its apse. The

[1] *Gesta Pontificum*, Rolls Series, Ed. Hamilton, p. 275, lib. iii. § 135.

[2] An indulgence of 1235, from Hugh Northwold, Bishop of Ely, speaks of the *stone vault* over St. Cuthbert's shrine as being then full of cracks and threatening ruin.—Raine's *Saint Cuthbert*, p. 100, and appendix, p. 7.

[3] Archæological Institute, Memoirs of Newcastle meeting, 1852, i, 238.

[4] Billings' *Durham Cathedral*, pl. v. *Lectures on Mediæval Architecture*, by Sir G. G. Scott, ii, 127. *History of English Church Architecture*, by G. G. Scott, jun., 108. *Durham Cathedral*, by the Rev William Greenwell, 4th ed., p. 29. *The Cathedral and Monastery of St. Cuthbert at Durham*, by Gordon M. Hills, *Journal British Archæological Association*, xxii, 202. *The Builder*, lxiv, 427 (article by C. C. Hodges). A hint of the real plan is given in Raine's *Saint Cuthbert*, p. 94.



PLAN SHEWING THE RECENT DISCOVERIES AT THE EAST END OF DURHAM CATHEDRAL.

conjecture was a perfectly natural one, though it has proved to be erroneous.

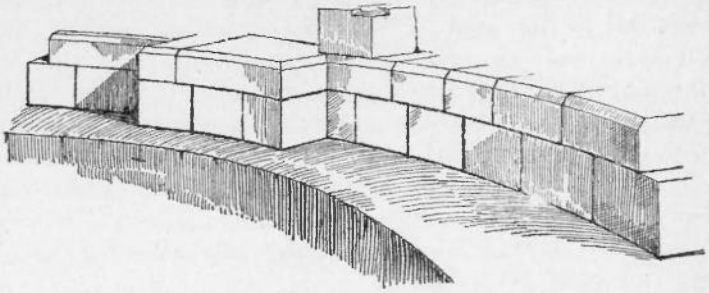
The accompanying plan (Plate I) shows the recent discoveries[1] in relation to the existing Norman choir, omitting the eastern transept (or Nine Altars) and the eastern bay of the choir which was reconstructed in the thirteenth century when the eastern transept was built. The Norman work which still remains is shown in solid black, all to the east of this (except what has just been found) having been removed at the erection of the Nine Altars. The lighter shading shows the plan of the foundations below the floor level, and the darker shows the walls above the floor. The parts which actually remain are shown by strong lines, as distinguished from those parts which are conjectural, shown by dotted lines. The wall-arcades are omitted, in order to avoid confusing the plan with unnecessary details.

Of the great apse which formed the eastern termination of the choir, the inner face of the northern half was found to be standing, for a length of about 18 feet, to a height of two courses above the floor level, the upper course being a chamfered plinth which formed the sill of the wall-arcade. In this length occurred the plinth of one of the clusters of shafts which divided the semicircle of the apse into three parts.[2] The lower stone of the corresponding plinth on the opposite (southern) side was also in position. On the south side of the northern plinth, the base of one of the shafts of the internal wall-arcade of the apse was found in position, and proves that this arcade was of the same character as the wall-arcades in the choir aisles. The

[1] Although it was hoped that the exact form of the Norman east end would soon be settled by excavation (Canon Greenwell, *ut sup.*, p. 57), which, in fact, had already been determined on, the recent discoveries were initiated accidentally. In January, 1895, some slight excavations were being made in connection with a proposed new method of heating, under the direction of Mr. C. Hodgson Fowler, F.S.A., the Cathedral architect. One of these was made in the south choir aisle, near its eastern end. Canon Greenwell noticed some peculiarity in the masonry exposed beneath the floor, and told the workmen to go deeper, and to extend the excavation further to the east. This was done, and the result was the discovery of the foundation of the southern apse. This was followed by the excavation of the foundations of the northern apse, and of the remains of the great choir apse. Mr. Hodgson Fowler, under whose superintendence the excavations were carried out, has made full drawings of what was found, which, it is to be hoped, he will be induced to publish. Most of the masonry uncovered has been made permanently accessible.

[2] The plan of these clustered shafts shown on Plate I is conjectural only.

accompanying sketch shows what remains of the inner face of the apse. From the level of the bed on which the stone floor was laid, and from the fact that the top of the plinth is at the same level as the top of the corresponding plinths in the choir aisles, it is clear that the floor of the apse was at the same level as the floors of the choir aisles, which again are at the same level as the floors of the nave



PLINTH OF INNER FACE OF CHOIR APSE.

and transepts. We may safely assume that the shrine of St. Cuthbert occupied the same position as it did after the erection of the Nine Altars. It stood, therefore, with its west end on the centre of the chord of the semicircle of the apse. The high altar would no doubt be placed immediately to the west of the shrine. As the floor of the apse would be at the same level as the floor of the choir itself, the altar would only be raised above the general floor level by the steps which may have immediately surrounded the platform on which it stood.

The remainder of the inner face of the apse (beyond what has been described above) and the whole of its external face had been removed to make way for the Nine Altars work, but both the outer and inner faces of the masonry foundation below the floor level were exposed during the excavations for a considerable distance. The total thickness of the foundation was about 14 feet 6 inches. Assuming that the wall of the apse was 7 feet in thickness (the normal thickness of the choir walls), it would stand, as we should expect, over the centre of the wide masonry foundation. In the excavation, on the outer face of the apse, a quoin-stone of a chamfered plinth was found, though not in position. This has been placed

on the foundation wall in such a manner as to indicate that it is not *in situ*. This stone is slightly convex on the face, and clearly belongs to the plinth of one of the external buttresses of the choir apse. From the width of this stone, it appears that these buttresses had the same projection as the buttresses of the choir aisles (about 16 inches).

The internal width of the choir apse was (as nearly as can be ascertained from what remains) about 2 feet 4 inches less than the internal width of the choir[1] itself, and the apse walls were therefore set in about 14 inches on each side from the face of the choir walls. How this was managed, and what was the exact plan of the wall-piers on the springing-line of the apse, and of the oblong bay which intervened between the apse and the great sanctuary arch, cannot be determined with any certainty. My plan of these parts is merely a suggestion of a probable arrangement.

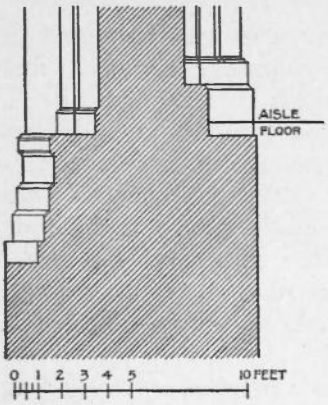
Of the terminations of the choir aisles everything had necessarily been removed, at the time of the building of the Nine Altars, to some distance below the floor level.[2] But the masonry foundations remain, and in both cases are apsidal on the inside and square on the outside. The apse at the end of the south aisle has been only partially excavated, but the apse of the north aisle has been entirely cleared out. Its width, north to south, between the foundation walls, is 9 feet 8 inches. It is not quite central with the aisle, the object being doubtless to give a broader set-off to the (higher) choir wall than to the (lower) wall of the aisle. The foundation of the apse of the south aisle seems to have been set out in the same manner.

Some surprise has been expressed at the great width of the foundations of these aisle apses, but all the walls have a very wide masonry foundation. The outer face of the foundation of the north aisle wall may be seen in the eastern bay, next to the Nine Altars, and the inner face was exposed during the recent excavations, when it was

[1] I should perhaps say that I use the term "choir" to mean the two great double bays of the eastern arm of the church, without reference to the ritual choir.

[2] The general floor level of the Nine Altars is 2 feet 8 inches below the floor level of the choir aisles.

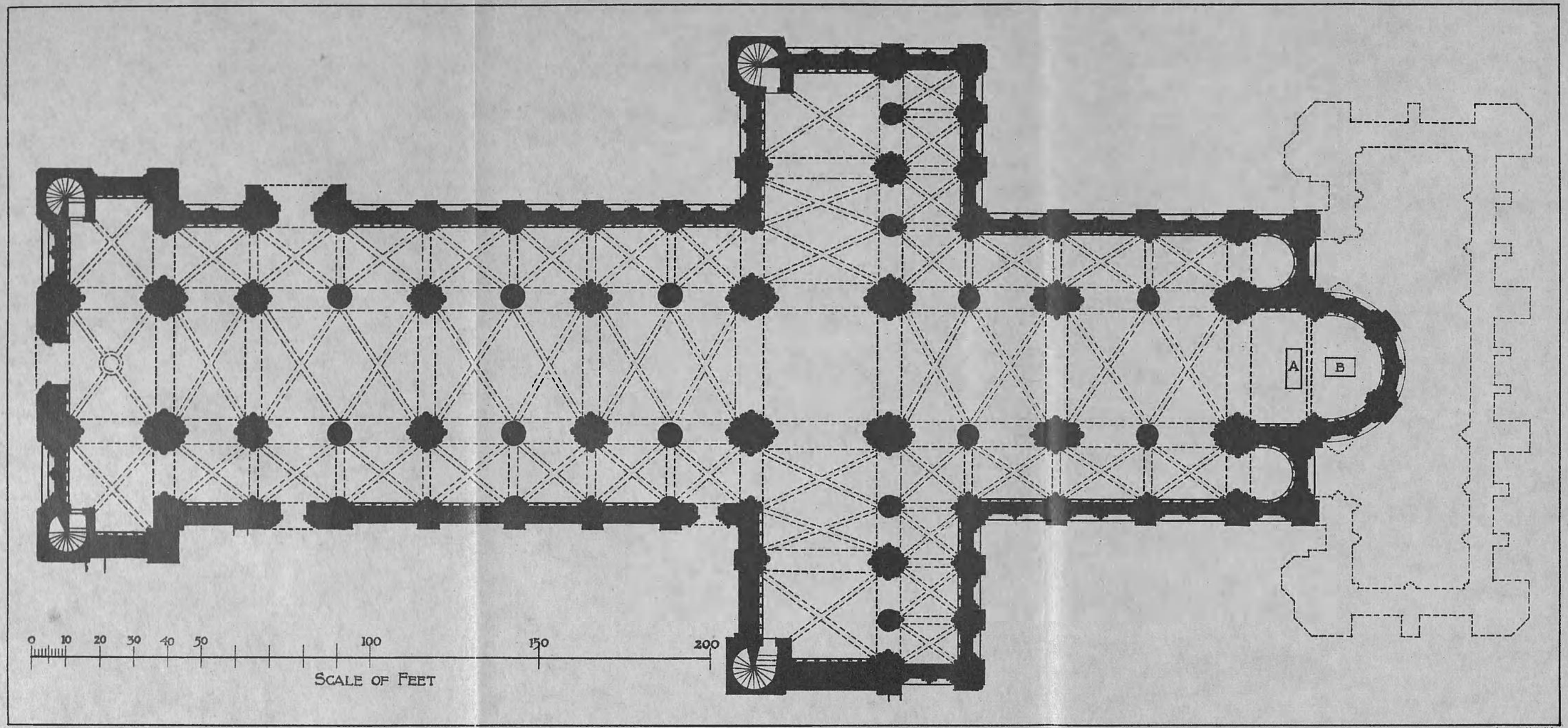
found that this inner face (at B on Plate I) was exactly in line with the inner face of the apse foundation on its northern side (at A). The foundation wall of this aisle was found to be 10 feet 10 inches in thickness, being made sufficiently thick to receive the projection of the buttresses and their plinths on the outside, and of the vaulting shafts and their bases on the inside, as shown on the accompanying section.[1] The thickness of the foundation of the apse at the end of the north aisle is 12 feet 11 inches (east to west), and of the apse of the south aisle 13 feet 1 inch. In neither apse do the walls show any indications of junctions of masonry, as would have been the case if (as has been suggested) the outer and inner faces of the apse foundations were of different dates. The depth of the apse foundations was ascertained only in the case of that of the north aisle. Here the bottom of the masonry is 14 feet 3 inches below the level of the aisle floor, and the wall is built on the solid rock. Subsequent excavation further to the west has shown that the foundation of the wall of the north choir aisle goes down to nearly the same level as that of the aisle apse, and that it is also practically built on the rock, which is here sloping away towards the east. The facts that the foundations of aisle wall and apse wall are of corresponding width, are in exactly the same line, and are of practically the same depth, sufficiently prove that both belong to the same work, and that the aisle apse foundations are part of the original eastern termination of Carilef's church.



SECTION OF FOUNDATION OF WALL OF NORTH CHOIR AISLE.

The recent excavations have thus demonstrated the general arrangement of the plan of the eastern termina-

[1] The set-off on the inside was not wide enough to receive the greater projection of the wall-pier which supported the main arch across the aisle in front of the apse. The foundation of this pier does not go down so low as those of the aisle and apse walls, but it is bonded into the wall at the back of it. The explanation is simply that, in laying the lower courses of the foundation work, the greater projection of this pier (compared with that of the ordinary vaulting-shaft) was overlooked.



W. Griggs, Photo-lith.

PLAN OF THE NORMAN CATHEDRAL OF DURHAM.

tion of the Norman church. The choir ended in a great apse of five bays, or rather in a semicircular apse divided into three bays, with an oblong bay intervening between the apse and the great sanctuary arch at the east end of the two great double bays of the choir. The aisles terminated in apses internally, but finished square externally in line with the springing of the great choir apse. Plate II shows the general plan of the Norman church, with the original eastern termination as ascertained from the excavations.

I propose now to consider the position which the Durham plan occupies (as regards its east end) in relation to the plans of the corresponding part of the great Norman churches, both in this country and on the other side of the Channel. In order to facilitate this comparison, I have shown, on Plate III, the plans of eight Norman east ends, reduced to the same scale as the general plan of Durham (Plate II).[1]

Confining our inquiry to the larger churches, viz., those whose eastern arms are provided with aisles, we find that the eastern terminations of most of the Norman churches of the eleventh century and the early part of the twelfth conform to one of two general types—(1) those in which the choir aisles are continued round the apse as an ambulatory, generally with radiating chapels beyond, and (2) those in which the choir aisles stop at the springing of the choir apse.

Of the first type, of which the great church of St. Martin of Tours may be considered the prototype, the abbey church of Fécamp appears to be the solitary example in Normandy during the period under consideration. The ambulatory (generally with radiating chapels) was more common in England, and was adopted at Winchester (commenced 1079), Worcester (1084), Gloucester (1089), Tewkesbury (founded 1087), Norwich (1096), and Bury St. Edmunds.[2] The chapel in the Tower of London (c. 1080) also has an ambulatory.

The second type of east end, in which the choir aisles stop at the springing of the choir apse, is more imme-

[1] At the end of this paper I have added some further notes on these plans.

[2] Mr. Micklethwaite's plan of the Confessor's church of Westminster shows an apse with ambulatory. *Archæological Journal*, li, 14.

diately connected with my present subject, and may be said to be the normal plan of the larger churches of Normandy in the eleventh century. We find it in what is perhaps the earliest important church still existing in Normandy, the abbey church of Bernay, founded in the earlier years of the eleventh century by Judith, the wife of Duke Richard II. The choir of Bernay is two bays in length (exclusive of the apse), with aisles finished square, both externally and internally.[1] Dehio and von Bezold attribute the plan to Cluniac influence.[2] M. Ramée's plan of the original choir of the Abbaye-aux-Hommes (Saint-Etienne), Caen,[3] shows the same arrangement. I am not aware whether this plan is based upon any actual remains, but it seems probable enough when we find the same plan adopted in the parish church of Saint-Nicolas, Caen, commenced about 1083, and built under the immediate influence of the monks of Saint-Étienne. The choir of Saint-Nicolas is also of two bays, with a semicircular apse beyond; the aisles are finished in line with the springing of the apse, square externally, but with shallow apsidal recesses internally. The abbey churches of Cerisy-la-Forêt (Manche), Lessay (Manche), and Saint-Georges-de-Bocherville (Seine-Inférieure), and the priory church of Saint-Gabriel (Calvados) follow the same plan. So also does the abbey church of Montivilliers (Seine-Inférieure), except that its choir is three bays in length, instead of two as in the other examples. It seems probable that at Cerisy and Lessay the ends of the choir aisles were finished with square recesses internally, but the triforium stage at Cerisy has apsidal recesses at the east end.[4]

The motive for giving the ends of the aisles a square exterior is sufficiently obvious. The aisles were necessarily covered with lean-to roofs, and the square exterior made it possible to finish the roof with a half-gable,

[1] See plan and notice by G. Bouet in the *Bulletin Monumental*, vol. xxxi. p. 95. The apse at Bernay has been destroyed. M. Bouet's plan shows a polygonal apse, but the original form must have been semicircular (as shown in Dehio and von Bezold's reproduction of Bouet's plan).

[2] *Die Kirchliche Baukunst des Abendlandes*, by G. Dehio and G. von Bezold, p. 272.

[3] *L'Histoire générale de l'Architecture*, by Daniel Ramée. The plan is reproduced in Ruprich-Robert's *L'Architecture Normande*, p. 63, and in Fergusson's *History of Architecture*, 2nd ed., i, 514.

[4] See notes on the plans at the end of this paper.

clearly the most natural and satisfactory plan. In the few examples of choir aisles with apsidal terminations, both externally and internally, the aisles were either finished with a half-gable, against which the apse roof abutted, as at Sainte-Trinité, Caen, or an attempt was made to continue the lean-to roof over the apse, with anything but a satisfactory result, as at the church of Guibray, at Falaise.

We have no complete example remaining in England of the plan under consideration. But, although the plans of Norman churches in England were much more varied than those of Normandy, sufficient evidence remains to prove that this type of eastern termination was by no means uncommon. Professor Willis' conjectural plan of Lanfranc's choir at Canterbury shows a choir of two bays, with semicircular apse beyond, and with aisles finished square in line with the springing of the apse.[1] The choir of Lincoln as built by Remigius (c. 1075–1092) followed this plan.[2] There is some evidence that the original east end of Ely (commenced by Abbot Simeon, c. 1080) was of the same type, though with a choir of four bays.[3] When Abbot Paul, who was related to Lanfranc, and had been a monk of Saint-Étienne, Caen, began to rebuild St. Alban's in 1077, he adopted a choir of four bays (double the usual number in Normandy), with an apse beyond, and finished the ends of the choir aisles square externally with apses internally.[4] The aisle apses at St. Alban's seem to have resembled those at Durham in their great depth from east to west. It is not unlikely that Abbot Paul's plan was the precedent followed by Carilef's architect at Durham in 1093. The plan of Peterborough (commenced in 1117) was evidently inspired to a considerable extent by the plan of Durham. It has a choir of

[1] *The Architectural History of Canterbury Cathedral*, by Professor Willis, p. 38.

[2] *The Architectural History of Lincoln Cathedral*, by the Rev Precentor Venables, in the *Archæological Journal*, xl, 173. *The Builder*, lii, 755. The foundations show a choir of two bays and an apse. Nothing seems to have been found to indicate the terminations of the aisles, and it has been suggested that the choir was aisleless. It appears to be clear, however, that the plan was of the same type as Canterbury and Saint-Étienne and Saint-Nicolas, Caen.

[3] *The Architectural History of Ely Cathedral*, by the Rev. D. J. Stewart, p. 29.

[4] For an account of the remains of the foundations of the east end, see *The History of the Architecture of the Abbey Church of St. Alban*, by J. C. and C. A. Buckler, 1847.

four bays and an apse, and its east end shows signs of advance on the Durham plan. The great apse at Peterborough is proportionately much less in depth from east to west than that of Durham, and its division into five bays is better contrived. The aisle apses, too, are of much less depth, and do not project eastward so far beyond the sanctuary arch.[1] They bear a general resemblance to the apsidal recesses of the Normandy churches rather than to those of St. Alban's and Durham. The abbey church of Selby (early 12th century) also shows signs of Durham influence, and had a somewhat similar eastern termination, with a choir two bays in length.[2] The abbey church of Romsey (first half of 12th century) presents the only complete example in England of aisle terminations of the kind under consideration.[3] The choir aisles are four bays in length, with apses at the east end, finished square externally. The choir is only three bays in length, the eastern bay of the aisles being continued by a transverse aisle across the square east end of the choir, with two arches which gave access to an eastern chapel.[4]

[1] The inner line of the foundation of the apse at the end of the south choir aisle at Peterborough is now indicated by a step in the pavement. I am indebted to Mr. J. T. Irvine for details of this plan.

[2] *The Architectural History of Selby Abbey*, by C. C. Hodges, in the *Yorkshire Archæological Journal*, xii, 344.

[3] With regard to choir aisles terminating in apses internally, with square exteriors, I have confined my remarks to examples in England and Normandy, but it may be of interest to mention a few instances in other countries. Ruprich-Robert (*L'Architecture Normande*, note to p. 60) suggests that the plan came from Lombardy, and refers to examples from the province of Como. S. Abondio, near Como (11th century), has double aisles terminating eastward in this manner. S. Fidelio and S. Jacopo, Como (both 12th century), have single aisles similarly finished. S. Maria del Tiglio, near Gravedona (end of 12th century), is a church of a single span, but has apses of this kind flanking the principal eastern apse. See plans of these churches in *Étude sur l'Architecture Lombarde*, by F. de Dartein, plates 75, 82, and 88, and page 339. Apses of the same kind, however, are to be found in several churches in the south of France, illustrated in H. Revoil's *Architecture Romane du Midi de la France*, some of which appear to be of a much earlier date than those quoted above. St. Quenin de Vaison (Vaucluse), probably of the Carolingian period, has small apses recessed in the wall flanking the principal apse, and placed obliquely (vol. i., pl. xix). The principal apse of the conventual church of Vaison is finished square externally, and is attributed to an even earlier date (vol. ii, pl. xxi). Apses of this kind flanking the principal eastern apse are found in the church of St. Pierre de Maguelonne (Herault) (vol. i, pl. xliv), and in the abbey church of Montmajour, near Arles (vol. ii, pl. xxxi), while the Cistercian church of Thoronet (Var) has two such apses on the eastern side of each transept (vol. ii, pl. xiv). See also plans in Dehio and von Bezold's work. The practice of recessing an apse in a straight wall is, of course, found in Roman work, both Pagan and Christian, and was frequent in the East.

[4] Paper by the Rev. J. L. Petit in the Winchester vol., *Archæol. Inst.*, 1845. Plan in *The Builder*, Abbey series, lxix, 236.

The consideration of these analogous plans suggests questions as to the details of the Durham plan, the answers to which must necessarily be open to doubt, on account of the scanty nature of the remains of the east end. Still it may be of interest to discuss some of these points, though we may arrive at no certain conclusions.

There can be no doubt whatever that all three apses were covered with stone vaults. The most probable form of vault for this date would be a semi-dome, and it is most likely that the aisle apses were so covered. But in a church which exhibits vaulting constructions so much in advance of most contemporary work, it is impossible to say what expedient may have been adopted in vaulting the choir apse. We cannot even say positively whether the plinths which project on the inside of the apse carried vaulting-shafts, or whether they supported a series of great wall-arches over the lower windows, such as we find at Saint-Nicolas, Caen,[1] Cerisy-la-Forêt, Saint-Georges-de-Bocherville, and (in a less marked degree) at Lessay. Possibly one at least of the shafts which stood on each plinth was carried up as a vaulting-shaft, and received one of the ribs on the surface of a semi-dome; while the oblong bay in front of the apse may either have been covered with a barrel-vault, or (perhaps more probably) with a quadripartite vault, as the choir itself certainly was before the existing vault was built in the thirteenth century.[2] But whatever may have been the form of the vault, there can be little doubt that the cracks which, we are told, had rendered the east end unsafe before the commencement of the Nine Altars were caused by the thrust of the vault on walls insufficiently abutted. The nature of the foundations forbids the assumption that the failure of the apse was due to settlement; indeed, if this had been the cause of the weakness, it would have shown itself in other parts of the church. The thrust of the choir vault was counteracted by the semicircular arches (or rudimentary flying buttresses) beneath the roof

[1] This apse is illustrated in detail in Pugin and Le Keux's *Architectural Antiquities of Normandy*, plates 18 and 19.

[2] In the plans of the Normandy apses (plate iii), it will be noticed that immediately west of the curved walls of the apse there is a broad wall-space (corresponding more or less with the depth, east to west, of the apsidal ends of the aisles), which is covered with a barrel-vault. This wall-space is analogous to the oblong bay at Durham.

over the triforium, but the walls of the apse had no such abutment—hence, doubtless, their failure.[1]

I have already mentioned that the internal width of the choir apse was about 2 feet 4 inches less than that of the choir itself. In connection with this fact the manner in which early Norman apses were roofed is worthy of attention. In Normandy, apses of this kind were invariably roofed at a lower level than the choir, the roof of the apse abutting against the gable, which formed the eastern termination (externally) of the choir itself. The same treatment is also found in some Norman churches in this country, and is in fact common to the Romanesque styles in all countries. The apse is thus treated as a separate architectural feature, attached, as it were, to the eastern gable of the choir, and very generally of less width than the choir. The question is naturally suggested, Was the Durham apse roofed in this manner? If so, the choir gable must have been at the springing of the curve of the apse (*not* over the great sanctuary arch), and there must have been another great arch at this point to carry the gable. In his conjectural sketch of St. Alban's,[2] Sir G. G. Scott shows the choir roof continued over the apse, as at Peterborough, where the apse is of the same width as the choir, though it is not certain whether this was the case at St. Alban's. The break between apse and choir at Durham *may* have been disguised by stair-turrets flanking the apse, but of these there is no evidence either way. The usual position of such turrets is in line with the great sanctuary arch, but it is almost certain that there were no turrets in this position at Durham.[3] On the whole, I am inclined to think that the roof of the apse abutted against a gable, as in the Normandy examples, but, in view of the scanty nature of the evidence, I merely put this forward as a possible conjecture.

[1] See Viollet-le-Duc, *Dict.* iv, 26, on the failure of Romanesque vaults. Mr. J. T. Irvine informs me that the apse vault at Peterborough cracked and thrust out the walls, and was consequently removed in the thirteenth century, when the old vaulting-shafts were lengthened upwards to the flat wooden ceiling which replaced the vault.

[2] *Lectures on Mediæval Architecture*, ii, 100.

[3] There was a stair in the aisle wall on each side from the floor of the triforium to its roof, but there is no indication on either side of any staircase in the choir walls.

I have already noticed incidentally the great depth of the apses which terminate the aisles. They extend, in fact, beyond the sanctuary arch as far east as the end of the oblong bay of the central span. This is the only point in which the east end of Durham differs from other analogous examples, except St. Alban's. It is possible that the necessity of providing space behind the high altar for the shrine of St. Cuthbert at Durham, and for that of St. Alban at St. Alban's, may have led the builders of these churches to allow greater length between the sanctuary arch and the great apse, and that the great depth of the aisle apse may have been the result of the same cause.

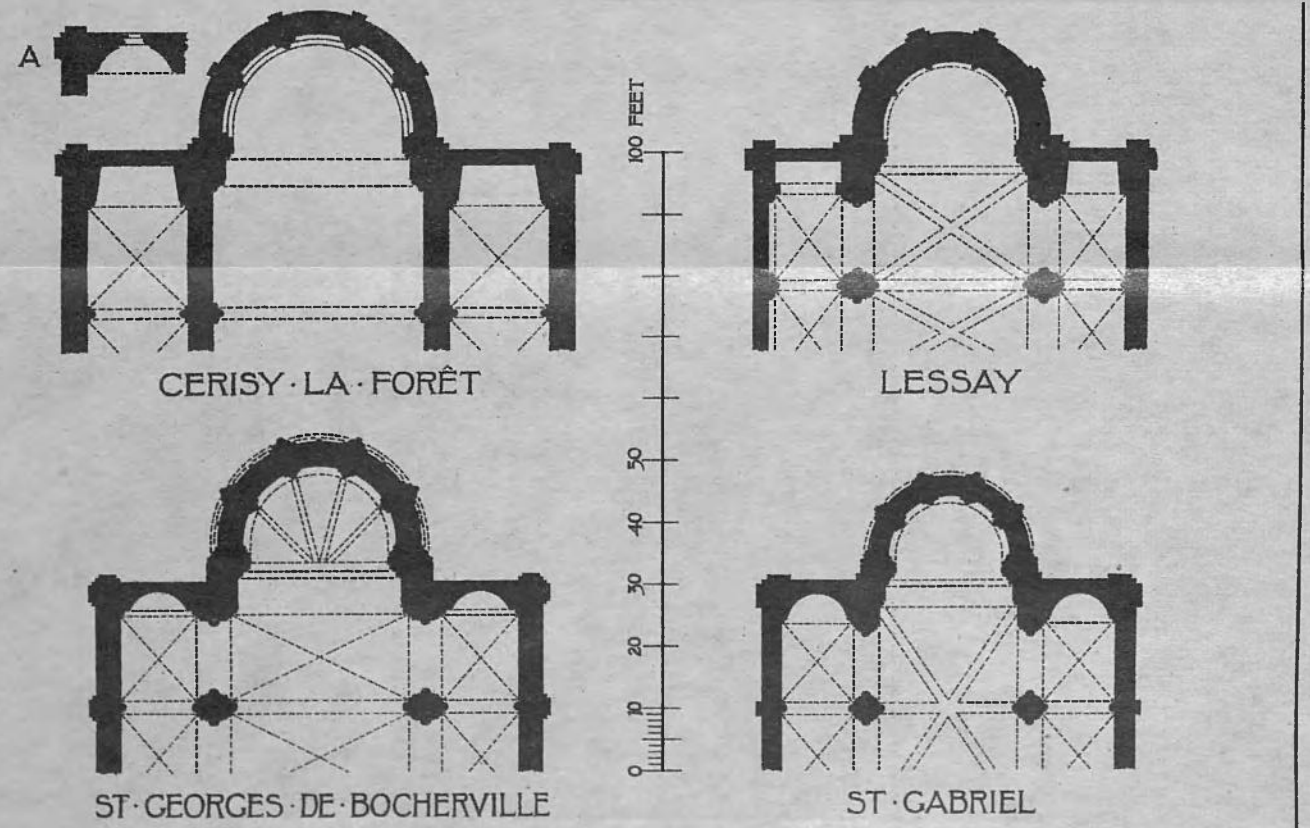
I ought not perhaps to conclude this paper without referring to a theory which has been advanced—that the foundations of the smaller apses which have been discovered at the ends of the choir aisles do not belong to Carilef's church, but are part of the church erected by Bishop Aldhun in 996-999, and that they may possibly be the foundations of apsidal chapels on the east side of the transept of that church. The only arguments which (so far as I am aware) have been urged in support of this theory, and which have not already been dealt with above, are that some of the masonry on the inner face of these smaller apses is constructed of stones which are longer in proportion to their height than is usual in Norman masonry; that these stones are not axed diagonally, but exhibit tooling of a kind which is characteristic of pre-Conquest work, and that fragments of plaster are still to be seen adhering to some of these stones. In no case, however, does any of this plastering extend over a joint, and no plastering is to be found on any stones which are worked on the face to the curve of the apse. All the indications, in fact, are perfectly consistent with the supposition that the Norman builders simply reused the material of the older church, which, we are told, they took down before they commenced the new church, and when we examine the whole of the evidence there cannot, I think, be the least doubt about the matter.

In the first place, it is extremely unlikely, on the face of it, that any part of Aldhun's church extended so far east as these aisle apses, and still more unlikely that

transeptal apses could have done so. It is believed that fragments of the work of Walcher, the first Norman bishop, still exist on the east side of the cloister, to the south of the chapter-house, and it is practically certain that the crypt under the refectory was built during Carilef's exile (1088–1091), whereas the new church was only commenced in 1093, after his return. It is therefore most probable that the cloister of the earlier church occupied part of the site of the existing cloister, and that the church itself occupied much the same position in relation to the present church as did the pre-Conquest church at Peterborough (the foundations of which were found a few years ago) to the Norman church there. We know that Aldhun's church was much smaller than the Norman church, and it is therefore improbable that any part of it extended very far east of the present crossing.

But a much more conclusive argument against such a theory is that it involves the supposition that Carilef's architect purposely laid down the plan of his entirely new building in such a manner that his choir aisles were practically central with the transeptal apses of the pre-Conquest church. He must thus be assumed to have allowed the elementary width of his new building and the position of his east end to be entirely governed by the width between the centres of the transeptal apses of the earlier church, and this while adopting a plan for his new church which, as we have seen, was perfectly normal in the latter part of the eleventh century. And the only motive he can have had for tying his hands in this extraordinary manner was the retention of two quite inconsiderable fragments of foundation work, for only the apsidal inner face (and not the square outer face) was supposed to be Aldhun's work. The facts that the sides of these apse foundations are (as I have explained above) exactly in line with the foundations of the walls of the undoubtedly Norman aisles, and that the foundations of both go practically to the same depth, are alone sufficient to dispose of such a theory.

There can, therefore, be no doubt that the foundations recently found belong to the Norman church, and that their discovery has enabled us to determine the general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PLANS OF

NORMAN EAST ENDS.

lines of the plan of the eastern termination of Carilef's noble structure. We may even, by the exercise of a little imagination, call up a picture of the church as its Norman builders left it. It would be foolish to regret the loss of this missing part of the Norman church, since we are more than compensated by the perfect beauty of the Nine Altars. But we may congratulate ourselves on thus being able to add something to our knowledge of the planning of the great Norman churches of the half-century following the Conquest, and on the recovery of the only missing portion of the plan of this preeminently the grandest Romanesque monument in our country.

Notes on the Plates.

Plate I.

Plan showing the Recent Discoveries at the East End of Durham Cathedral.

Described on p. 5, *ante*.

Plate II.

Plan of the Norman Cathedral of Durham.

Based chiefly on Billings' plan. The position occupied by St. Cuthbert's shrine, since the 13th century at least, is indicated at B, and the position of the high altar at A. The 13th century extension at the east end (or Nine Altars) is indicated by dotted lines.

Plate III.

Plans of Norman East Ends.

To the same scale as the plan of Durham on Plate II.

St. Alban's.—Based chiefly on Buckler's plan. Commenced in 1077. Choir of four bays and apse. Aisles covered with unribbed groined vaults. The terminations of choir and aisles have entirely disappeared, and the original plan is indicated only by remains of foundations. Width of choir about 31 feet (assuming that the choir was of the same width as the nave).

Peterborough.—Commenced in 1117. Choir of four bays and apse. Apse only was vaulted originally. Aisles covered with ribbed groined vaults. The aisle apses have been destroyed, but their foundations remain. Width of choir, 36 feet.

Cerisy-la-Foret (Manche).—Abbey church, founded 1030–1035 by Robert le Diable, and finished in the reign of William the Conqueror. Ruprich-Robert thinks that the present church is a reconstruction (consecrated 1150). Choir of two bays and apse. Choir separated from the aisles by solid walls (as at St. Alban's). The clerestory of the

apse has been altered, and the vaults of choir and apse are later. Aisles covered with unribbed groined vaults. The ends of the aisles have been altered by the insertion of late tracery windows, but, as the covering indicates a barrel-vault rather than a semi-dome, the recesses shown on the plan seem to be more probable than apses. In the triforium stage there are apsidal recesses at the east end, covered with semi-domes (plan shown at A). Width of choir, 33 feet 6 inches.

Saint-Georges-de-Bocherville (Seine-Inférieure).—Abbey church, founded 1050–1066, but the existing church seems to be of the first half of the 12th century. Choir of two bays and apse. Choir covered with unribbed oblong groined vault; apse with ribbed semi-dome. Aisles covered with unribbed groined vaults; apses with semi-domes. Width of choir, 28 feet 3 inches.

Saint-Nicolas, Caen (Calvados).—Parish church (now desecrated), commenced c. 1083. Choir of two bays and apse. Choir covered with unribbed oblong groined vault; apse with semi-dome. The high-pitched stone roof over the apse is an addition of the 13th century. Aisles covered with unribbed groined vaults. The ends of the aisles have been altered by the insertion of late tracery windows, but the remains of semi-domical vault indicate apsidal recesses. Width of choir, 28 feet.

Montivilliers (Seine-Inférieure).—Abbey church. Choir of end of 11th century. Choir of three bays and apse. The lower part of inside of apse is concealed by woodwork, and the upper part has been much altered. Aisles covered with unribbed groined vaults; apses with semi-domes. Width of choir, 27 feet.

Lessay (Manche).—Abbey church, of the end of 11th and first half of 12th century. Choir of two bays and apse. Choir covered with ribbed quadripartite vaults; apse with semi-dome. Aisles covered with unribbed groined vaults. The square recesses at the east ends of the aisles seem to be original, though they are shown apsidal on Ruprich-Robert's plan. Width of choir, 24 feet 6 inches.

Saint-Gabriel (Calvados).—Priory church. Choir only remains, of second quarter of 12th century. Choir of two bays and apse. Choir covered with a ribbed quadripartite vault over the two bays, with central transverse rib carrying an undergirding wall; apse covered with semi-dome. Aisles covered with unribbed groined vaults; apses with semi-domes. Width of choir, 22 feet. (This plan is based on Plates 80–82 in Ruprich-Robert's *L'Architecture Normande*.)

The width of the choir given above is in each case the clear width between the walls inside. Where no authority is mentioned, the plans are from my own measurements. General plans of most of the Normandy churches are given in Ruprich-Robert's *L'Architecture Normande*, plates 8, 54, and 93.