

## Managing Eighteenth-Century Building

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At the end of the seventeenth century building in England was in a state of change. Architecture was becoming established as a professional activity and new architectural ideas were being introduced from the continent. The Fire of London led to the introduction of early building regulations and a relaxation of guild control over the building trades to enable tradesmen from outside London to be drawn to the capital for urgent reconstruction. The demand for building materials for this work put a strain on supplies and softwood began to be imported from Norway as an alternative to oak, the traditional structural timber. Although men like Robert Smythson and Inigo Jones had, at their different times, operated as architects on a national scale, this was to become common practice by the early decades of the eighteenth century. With the rebuilding of St Paul's Cathedral and other major public or royal building projects after the Restoration, larger firms of contractors who could manage work of this scale were needed. Such changes pose a variety of questions about the structure and organisation of the building industry that was emerging to take on such major building projects. The surviving records of work carried out provide most clearly a picture from the clients' point of view.

The building of the Queen Anne churches is, as Colvin has pointed out [1], one of the best documented episodes of English architectural history. The problem that London faced was a spread of suburbs into what had been rural parishes. New churches were therefore urgently needed to provide for the growing population and a Commission was appointed in 1711 to both direct this task and redraw the parish boundaries where necessary. Although the programme fell far short of the 50 churches that were originally intended, it was a major undertaking for the period, involving at its height more than £20,000 of building work per year and drawing upon the services of the major architectural figures and the principal contractors of the day. By the time the programme was eventually wound up [2] it had built, or rebuilt, 13 churches, ten of which survive as some of London's finest buildings [3].

The purpose of this essay is to look at the responsibilities of the surveyors and the problems that confronted them in managing the building programme, the tasks that they undertook and their relationship to the Commission that employed them. The minutes of the commissioners and the contracts and accounts for the various churches, together with numerous other miscellaneous documents now at Lambeth Palace Library, give a detailed view of the way in which the churches were designed and built [4]. By that time the management of buildings by professionals was not new, having been the function of surveyors, who were an established profession which looked after both the construction of buildings and the management of property. It was the first of these tasks that was now being taken over by the newly emerging profession of architects although those acting as such were still called surveyors. Architects were

finding a niche for themselves between the design skills of the craftsmen and the management skills of the surveyors, providing a wider range of design skills than the former but a more limited range of services than those of the latter. In this building programme we find that the means by which the designer of each church was chosen are not always clear nor, in some cases, is the division of responsibilities. Also we find that cost control was inadequate and became a major concern affecting the progress of work, and that there were ineffective means of ensuring both progress of work and quality of workmanship.

Before considering the way that the Commission managed its affairs it should be noted that there were considerable changes during its life. It was appointed in 1711 following the Tory election victory and originally included four architects, Wren and his son, Vanbrugh and Archer, who were not reappointed when the Commission was reformed at the beginning of 1715. By that time the Whigs had returned to power so the Commission could not count on the support of a sympathetic government, presumably a factor that commissioners would have had in mind when faced with the high costs of churches by then undertaken.

The architects who were members of the Commission in its early days and the surveyors whom they appointed came from a variety of backgrounds. Sir Christopher Wren and his son were professional architects while Vanbrugh and Archer were amateurs. Both Hawksmoor and Dickinson, who were the first surveyors appointed by the Commission, were former pupils and assistants of Wren. When Dickinson resigned, Gibbs obtained the post but his nationality, religion and politics were against him and he was soon replaced by John James. There could scarcely be a greater contrast between these two. Gibbs, originally intended for the priesthood, had received his architectural education in Rome under its leading architect and was appointed as surveyor only four years after his return from Italy. Although John James was to go on to develop a substantial architectural practice [5], he had begun his career as a carpenter, apprenticed to Mathew Bankes and working largely at Hampton Court. At the time of his appointment he was a master carpenter with contracts for the carpentry work at two of the Commission's churches. Thus many architects were amateurs, who might have had little or no formal training, or begun as pupils, or 'risen from the ranks', having begun as tradesmen. There was nothing in England like the centralised school of architecture that had appeared in France under Louis XIV.

The building programme presented a new problem of organisation because a number of buildings on different sites were being put up at much the same time. The rebuilding of the City churches after the Fire of London had been managed by the individual vestries and each of the various sites under the Office of Works had its own clerk of works. In this programme the Commission managed all its sites through the agency of only two surveyors, with several buildings in hand at any one time. St Alphege, Greenwich was begun in the third year of the Commission's life, in 1713. The following year two further churches were begun and four others were started the year after that. There was then a pause before the beginning of work on St George, Bloomsbury in 1717 and St James, Hanover Square in 1721. At Greenwich it took three building seasons to see the work from the digging of the footings up to the roof. Four seasons was the more normal time for this and were all that was required to the roofing of the Limehouse, Wapping, Strand and Hanover Square churches. Although five seasons were required to take St John, Westminster from foundations to roof this can be explained by the problems with the poor ground. However, Bloomsbury and the expensive Christ Church, Spitalfields took much longer for their basic construction to

be completed since they were affected by the financial problems of the Commission. Between 1714 and 1718, when Greenwich, Deptford, Westminster, Limehouse, Wapping, the Strand and Spitalfields churches were all on the books, the annual value of work completed generally exceeded £20,000.

Some idea of the scale of operations that this figure represents can be gained by comparing the church building programme with other major undertakings. Work began on the rebuilding after the fire of the 50 City churches in 1670 and 42 churches were completed by 1686. The average cost of these churches was £5275 which roughly translates to £14,000 per annum [6]. The coal tax had financed expenditure on both these and St Paul's Cathedral and, because progress on the latter was occasionally held up for shortage of money, annual expenditure varied from under £6000 to well over £30,000. The average was a little over £21,000 per annum during the 35 years of the project [7]. During much the same period the annual expenditure of the Office of Works rose from an average of £20,000 per annum under Charles II to £45,000 per annum in the reign of William III [8]. From 1714 to 1727, a period which largely corresponds with the building of the bulk of the Queen Anne churches, expenditure ran at an average of just over £27,000 per annum [9]. However, this involved much work outside London and included maintenance as well as new work. While expenditure on the churches was uneven these comparative figures show the building programme to have been the major one of its time.

#### **Finding Sites**

The Commission began work in late summer 1711 with the fairly simple task of deciding how many churches should be built and where. These were optimistic times and 50 churches were proposed, but even finding sites for such a large number was a difficult task that taxed the capabilities of the Commission. Land was needed not only for the churches themselves but also for associated burial grounds, while other property might have to be acquired to ensure adequate approaches. The records present a picture of both the surveyors and members of the Commission travelling hither and thither in an attempt to find suitable sites. They may have imagined that the task would be easier than it actually proved because at the end of the first year they were draughting a letter to the Queen informing her that more time was needed [10]. Eventually in January 1713 the committee formed a number of two man sub-committees each with the task of selecting a site for a particular church [11]. However, the stipulation that the churches should be free standing and that each should have the principal axis properly orientated east-west [12] must have limited the choice of sites. Moreover, as the churches were also to have porticos, the aspect of the sites would have to be considered as much as size and orientation. Aspect would have been an even greater constraint if regard was paid to Vanbrugh's suggestion "that they be placed, to be fairly viewed at such proper distances as is necessary to shew their exterior form to the best advantage . . ." [13]. In the event it was not always possible to obtain the ideal, as the designs of the Bloomsbury and Hanover Square churches show [14].

One of the tasks in selecting sites was to ensure that the ground would provide an adequate foundation for the churches, a consideration that was an immediate problem at Westminster. Dickinson was first sent to look at the site and open the ground [15] but his report, which did not make any definite comment on the ability of the ground to carry a building, does not seem to have satisfied the commissioners. Hawksmoor then visited the site in the company of two bricklayers and conducted further tests.

What stands out in Dickinson's report [16] is the wetness of the site because he mentions springs from the gravel. These might have been expected because contemporary maps show a drain along Millbank and down both sides of what is now Horseferry Road. Hawksmoor considered that the ground was "capable to bear ye fabrick of the proposed church or any such like public building" [17]. Poor ground here and later at Spitalfields alerted the commissioners to the problem of ensuring proper foundations. They eventually decided that future designs should include a cross section and details of the ground conditions, and at the same time ordered Hawksmoor to provide an auger for their use [18]. But, perhaps because of the problem of obtaining sites, they seem to have been prepared to accept poor ground. In considering the site for the proposed church at Cripplegate, after the surveyors had given an adverse report on the ground conditions, they were asked to consider how the design might be modified to allow for this [19].

### Controlling Design and Costs

A discussion of the design of these churches is beyond the scope of this paper, but some aspects of design were to have an effect upon construction. Although the surveyors may have expected to design the churches, they had competition both from the architect members of the Commission and elsewhere. In the event Archer was the only non-surveyor whose designs were built and the separation of design from supervision of construction that this created was not without its eventual difficulties. Designs generally were not complete at the time contracts were let, but were modified and refined during construction. This seems to have been partly responsible for problems with costs although the Commission eventually sought to prevent changes by ordering definitive models [20].

Considerations of cost control present difficulties of both changing expectations and changing attitudes. The costs of St Paul's Cathedral, whose basis of funding the 50 churches had inherited, had for many years run ahead of the receipts from revenues. The fortunes of that building project had ebbed and flowed with changes of monarch and political power, but eventually all the money had been found. Now the new Commission was beginning its work, not only on a tide of Tory success, but with the magnificent example of the cathedral so recently completed. In such circumstances it is hardly surprising that architectural ambition should have outweighed financial caution. Nevertheless the optimistic estimates of cost that were made must raise questions.

Where, for example, was the money spent in the churches? Most of it was in the masonry, as one might expect. By the time that Greenwich was ready for the joinery work and carving, about £13,000 had been spent on the church, of which £6600 was due to the mason (i.e. about half) and £2300 to the bricklayer [21], but the sums going to the two trades vary with different churches. With a similar amount spent on Bloomsbury the roof was not yet on and over £9000 had gone to the mason with less than £2000 to the bricklayer (Figs. 1 and 2). Similar discrepancies appear in the rates at which money was spent on the two trades for the different buildings. Such figures may be accounted for by the relative complexity of the plans, a factor that affected costs of other trades on the different churches. The roof carpentry at Deptford, not a simple structure by any standards, cost about £1000 while the cost of the roof at Greenwich, where the unusually large span necessitated unusually complex trusses, was about £1400. But the largest differences were in the expenditure on masonry. At

Greenwich this ran to less than £8000 while at Westminster it was over £18,000 (Fig. 3) although some of the difference may be accounted for by the separate construction of the tower at Greenwich whose cost is not included in these figures.

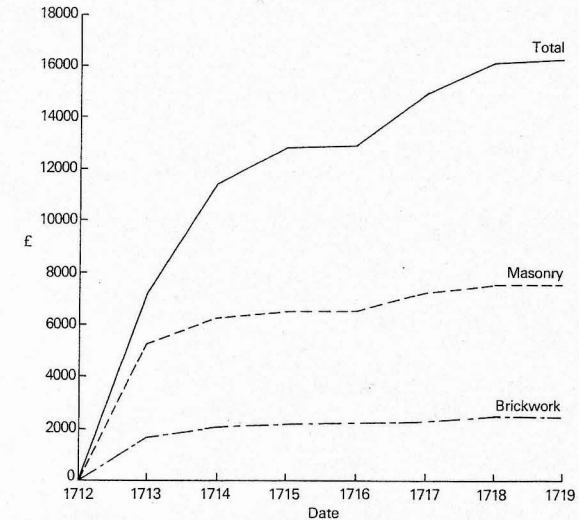


FIG. 1. Cumulative value of work at Greenwich church.

Given the commissioners' ambitions it was inevitable that the churches would be expensive and their costs were eventually to cause problems. The commissioners started cautiously enough with Hawksmoor's design for Greenwich, asking him to prepare estimates for alternative materials; the roof in fir compared with oak and a cornice in timber compared with stone [22]. But then the Commission was intent on building fine stone churches and it was readily agreed that Deptford should be built of Portland stone [23]. Four years later the realities of costs influenced designs for the church being contemplated for Cripplegate because it was decided that the bulk of the masonry should be ragstone for which masons' estimates were ordered [24]. Possibly in the early days the Commission was over-optimistic about the money that they expected the tax to bring in because it was not until 1718 that they voiced the first serious concern over costs [25]. In March of that year the commissioners made the decision not to begin any new churches until they had discharged the contracts on those in progress. This had a dramatic effect on the rate of work, which by then had been running at over £20,000 per year, because in that year the value of work completed was little more than £1500. Several churches were then nearing completion and the decision effectively postponed the start of St George's, Hanover Square and slowed work at Spitalfields and Bloomsbury (Fig. 4) which between them had received some £10,000 worth of work in the previous season. The problems for the contractors of organising work under these conditions may well be imagined.

Without any comparative designs surviving it is difficult to say to what extent financial considerations may have affected the design of these churches. Alternative

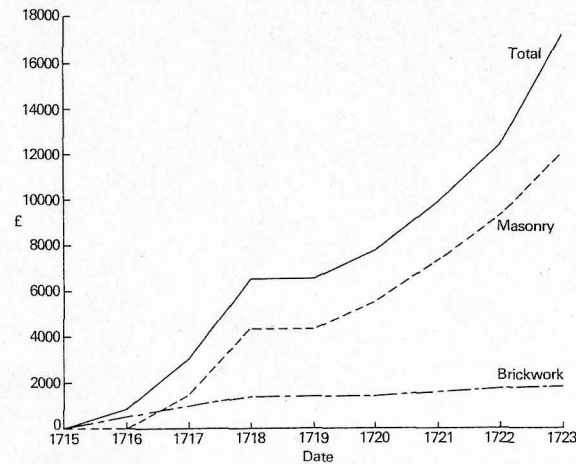


FIG. 2. Cumulative value of work at Bloomsbury church.

designs and estimates were sought for other churches as well as Greenwich, although it seems likely that when, in 1713, Hawksmoor was asked to prepare estimates for alternative designs at Deptford, costs would have had little influence on their choice. However, when James presented his plans for Hanover Square in 1720 he was instructed to contract the expensive parts [26] and the forms of the last two churches, those at Old Street and Horsley Down, as well as the sum set aside for St Giles [27], clearly reflect a tightening of the purse strings. Inevitably, perhaps, they did this initially by restricting expenditure on the lesser but more easily controlled items, i.e. the decorative parts including carvings, altar pieces and reading desks. While a detailed comparison could be made of the tenders for carpenters' work for roofing, because the total quantities of materials could be calculated in advance, no such estimate could be made for masonry because the designs were often changed as work progressed. Annual values of work at Hawksmoor's Spitalfields and the modest Strand church by Gibbs (Fig. 5) give the most dramatic contrast in expenditure. The Strand church was completed quickly to a fixed design while Hawksmoor continued to develop his extravagant ideas.

#### Technical Design Considerations

Where construction is based upon well established practice, much may be left to the craftsmen so that the task of the architect may be confined to the visual form of the building. Technical design becomes an issue where there is either some novel aspect of construction or unusual circumstances. Both of these were to be found at Westminster where the foundations presented difficulties and where the form of the church dictated an unusual roof structure. Archer may have been the architect but the design for the footings of the church was settled between Hawksmoor, Vanbrugh and Wren.

In spite of Hawksmoor's favourable report on the ground at Westminster, the design of the footings was not a simple affair and the two Wrens together with

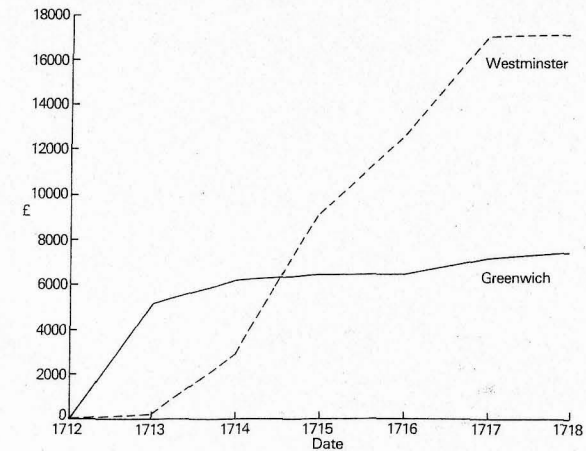


FIG. 3. Comparative cumulative value of masonry work at Greenwich and Westminster churches.

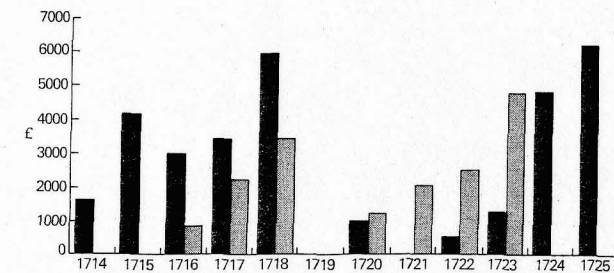


FIG. 4. Annual value of work done on Spitalfields (dark tone) and Bloomsbury (light tone) churches.

Vanbrugh examined the ground with the surveyors to discuss their design [28]. Presumably this was beyond the competence of the amateur architect Archer whose design was to be built. Hawksmoor later described these foundations in some detail:

The first floor of timbers was laid in chanells in ye clay parallel to ye walls of ye church.

2. The second tire of timbers was laid down diagonally about 2ft. 6ins. assunder and ye spaces between them were filled full of rubble works of Kentish rag, flints chalk and mortar intermixed well rammed and forced together.

3. The third tire of timbers were laid diagonally across ye foresaid second tire and well filled with rubble works as last described.

4. Above this there is a stratum of paving stones under ye breadth of each wall upon which ye brickwork begins [29].

As we might expect from Dickinson's report, the principal problem was the wetness of the ground, indeed timbers could not have been used in the foundations in this way unless they were below the water table. There are items in the bills of the first season for pumps used by the bricklayer and for channels made by the carpenter to carry the water away. That Hawksmoor visited the site with the bricklayers suggests that he at least wished to discuss with them the practicability of working in such wet conditions.

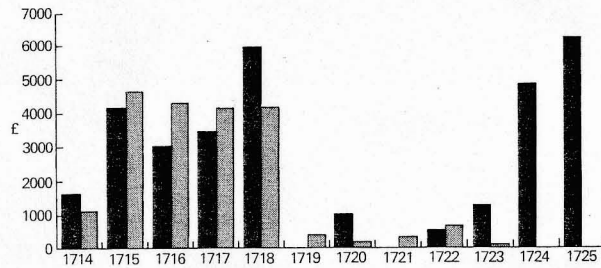


FIG. 5. Annual value of work done on Spitalfields (dark tone) and Strand (light tone) churches.

It is not clear whether the form of foundation at Westminster was used elsewhere but the need for pumps at Wapping and a drain at Spitalfields, and a report mentioning poor ground at the Strand, show that Westminster was not the only wet site. Elsewhere, bearing conditions must have been somewhat better because St John's was to suffer considerable settlement that is only too apparent today. There is hardly a true vertical or a true horizontal line to be seen in the building and movement was noticed at a very early date. In a progress report in June 1714 Hawksmoor reported that work had begun on the plinth but advised that work on the walls should proceed slowly to "allow the mortar to set and avoid cracking and settling" [30]. It is clear from the present condition of the fabric that building work was at a pace that allowed the building to settle as weight was added in order to minimise cracking in the completed work. This was remarkably successful because, in spite of the distortions visible elsewhere, the cornice line is almost level [31]. It was in October 1721 that the surveyors were able to report that movement appeared to have ceased [32] but problems with the foundations may have had an effect on the final form of the building because in 1716 there were discussions about the towers. In May 1716 Archer presented a model of these and opined that the foundations would be adequate to bear them [33], but a week later Hawksmoor was deputed to inform him that they were to proceed no higher than was necessary for the completion of the roof. In the event towers were built to a modified design [34].

Although all the churches have vaulted undercrofts this was not part of the basic principles that the commission had laid down initially, having been suggested by Hawksmoor as late as April 1714 when the shell of Greenwich was completed. Hawksmoor argued that the vaulting would be "extremely beautiful as well as

convenient viz for keeping the pavement dry, for preservation of the pews..." [35]. Although it was agreed that all churches were to have undercrofts the digging of the soil and the construction of the brickwork for subsequent churches was again carried out separately from the footings of the walls. At St Paul's Cathedral trouble had occurred with water getting into the vaulting of the crypt [36] and it may be that delaying the building of the undercrofts until the completion of the roofs of the churches was seen as a way of avoiding such a problem.

Apart from the footings, the roofs required more than normal consideration. Spans were large (about 70ft at Greenwich) and the buildings were far from simple in form. Regrettably few of the original roofs survive intact but Deptford with its Greek cross plan is an example where the use of simple trusses resting on parallel walls was not possible. We can only speculate on the form of the roof of St John's—long since destroyed—but Archer's original proposal was clearly unusual, possibly adopting de l'Orme's method of laminated timbers to support the ceiling. A number of his sketch designs survive [37] and the carpenters' proposals include unique items. In the event this design was not built because Jeffs, who was in partnership with James, died before work on the roof had begun, by which time James had replaced Gibbs as a Surveyor to the Commission. With James withdrawing to avoid a conflict of interest [38] new tenders were sought and the work went to John Grove. The eventual contract does not contain reference to the same timbers but includes the words "... according to the manner expressed in a proposal by him..." [39] not found in any other contract. This suggests that Grove was offering his own design rather than adopting Archer's and the probable use of the former's design here must raise the question of the authorship of other roofs. Although their forms were not always novel, the spans were large and this would have presented a difficulty in itself. When James tendered for Greenwich he was not above challenging the adequacy of Hawksmoor's design, remarking that,

I think it my duty to acquaint the Honorable Commission that I can't think the disposition of the timbers in the model sufficient to sustain so great a weight as must descend upon ye frame... [40].

Hawksmoor was certainly capable of designing his own roofs [41] but the question is not whether he was capable but whether in fact he did so. With much else to attend to in his duties as surveyor, Hawksmoor might well have accepted a roof design from a carpenter whom he knew to be competent. Similarities between the roof of Hawksmoor's Christ Church, Spitalfields and Archer's St Paul's, Deptford suggests that both designs might have been by Grove, the carpenter.

### Tenders and Payments

Early in their deliberations the Commission decided to contract separately with individual workmen [42]. Notices were put in *The Gazette* to advertise their requirement for particular trades as work was advanced to a suitable stage. While masons, bricklayers and diggers were required first, glaziers and plasterers were not sought until the building was covered in. The trades submitted their tenders or 'proposals' and work was then let to the lowest bidder. Smiths and plumbers were paid simply by the weight of materials which they used, the latter receiving more for milled lead than for lead used in cramps. Brickwork was paid by the rod with a higher price for work requiring scaffolding.

Prices in bricklayers' proposals include figures for either supplying the bricks

themselves or for laying bricks supplied under a separate contract with the Commission. It is found that bricklaying contracts were let under both arrangements. Masons were paid by the quantity of stone laid, with different rates for different classes of work. Carpenters provided details of the sizes and species of timbers that they were to use but were paid by the square (100 sq. ft). Because carpentry work was fairly complex, roofs, floors and galleries all needed pricing separately against details of the sizes of the timbers specified [43].

Since all tenders were simply for the rates at which work was to be charged, the completed work had to be measured for payment. This might be done from time to time, sometimes when the tradesmen requested payment, but the formal record was made at the end of each season's work [44] and entered in the Books of Works for each church. The surveyors' task was to measure and record the work and also to enter in the record any daywork items, i.e. tasks which involved work not priced in the contract and for which the surveyors were empowered to agree the rates. These were mostly small scale items such as the cutting of completed stonework by the masons to allow the carpenters to fix their beams, or the smiths to fix their window frames. The largest amount of daywork payments tended to go to the carpenters.

There were occasional difficulties with the prices agreed when tradesmen complained about rising prices or other unforeseen problems and requested additional payments. Hughes & Tufnell, the bricklayers at Westminster, petitioned for an amendment to their contract because of a rise in prices or possibly because of difficulties with the ground. Grove claimed that the complexities of the roof of Westminster church were greater than he had anticipated and as a consequence he was out of pocket by some £300 [45]. At Limehouse and Wapping, the bricklayers complained that the height of the towers was causing a problem for their labourers [46]. Because they were paid on a piecework basis, the height to which they had to carry the materials restricted their earnings and the bricklayers therefore requested additional payment for the men. It seems curious that this difficulty was not anticipated because masons were already paid extra per ton for all stone to be raised above 40 ft. In cases where there were disputes about payments the surveyors' task was to examine the work and make recommendations to the Commission about the sums that should be paid to the contractors. This seems to have been generally accepted although, to settle a dispute with the joiner at the Strand, arbitrators were appointed and the prices to be paid were decided by them [47].

### Site Supervision

Having appointed the workmen, the surveyors needed to give them some direction. Initially site supervision involved setting out the foundations and dealing with any problems associated with the ground conditions. At the Strand, for example, a water pipe had to be diverted and additional work needed to be agreed for this [48]. As the work progressed detailed designs would be needed from time to time and the progress and quality of the work monitored. As well as providing such day to day instruction that the workmen might require the surveyors were asked to provide monthly reports on the progress of work at each church. These are valuable records of events, bringing to the attention of the Commission the need for contractors to be found for work that would soon be required, as well as commenting on the progress of work and noting any defects. When the churches neared completion the surveyors were also asked from time to time to assess the extent of work that remained to be done on each church and

to estimate the costs. The surveyors also had to report on complaints from local property owners who might claim losses caused by the building operations.

In spite of the obvious value of the monthly reports it seems that their preparation may have drawn too heavily on the surveyors' time because they were not consistently produced. There are gaps in the sequence and the Commission had occasionally to repeat their requests for them. Early in 1718 John James advised that an assistant be appointed for each church. What he recommended was someone to carry out the tasks that today would be recognised as those of a clerk of works. He should, argued James, keep a tally of the materials delivered, see to the proper measuring and mixing of mortar and look after the materials stored on site. The only response of the Commission to this suggestion was to remind the surveyors about the need for the monthly progress reports. But there were other reasons for having someone assigned to each site. Problems of security arose as buildings neared completion and it was recommended that watchmen should be appointed to keep out the mob and prevent vandalism [49]. The Book of Works for the various years for each church includes payments for watchmen so the Commission clearly acted upon this advice from their surveyors. However there is no record of payments for clerks of works. Given the difficulties that the Commission occasionally had with progress and with standards of workmanship the failure to appoint clerks of works seems rather short sighted.

### Quality Control

Appointing tradesmen individually should have given the Commission adequate control over workmanship and progress of work through their surveyors, but this was not always easy to ensure. Hawksmoor was responsible for drawing up the contracts and schedules of work to be done and the most detailed in terms of workmanship are those for the bricklayers which specify the quantities to be used for the mortar and its proper mixing. Plasterers' contracts also controlled the proportions of the mix and required specimens of laths and nails for approval. It was specified at quite an early date that masons should indicate in their proposals the type and thickness of stone that they would use [50]. The records suggest that the greatest care was taken with the appointment of contracts for Greenwich but this may simply have been because it was the Commission's first building and that the pattern was adopted elsewhere but not specifically recorded. At Greenwich the tradesmen were interviewed by the Commission before being appointed [51]. When the plumbing contract was let, the plumber was asked for "£1000 security for his performance of the . . . plumbing work in a good and workmanlike manner" [52] so that the commissioners would be able to exact a penalty for poor quality work. At Greenwich, also, Hawksmoor was concerned whether those who had tendered for plastering fully understood the standards of workmanship required and suggested that each be asked to plaster trial areas [53].

Quality of work depends in part on the quality of materials used and at Limehouse there were difficulties with the quality of the lead on the roof. It was found to be cracked "in many places which shows it to be harder temper than lead should be that passes through the mill and I fear that the summer's heat will show us yet worse effects of it" [54]. The response of the Commission was to ask the plumber to supply a 20-year guarantee [55] although whether this could have been enforced any better than now is questionable. It was the quality of brickwork that gave the greatest problems and in part this was also a problem of materials. The first intimation of trouble came at the end of 1713 with a complaint by a local resident that the bricklayer

had used poor quality bricks at Westminster [56] although the work had been measured and the bricklayer paid only a week before the letter was received. When Hawksmoor and Gibbs (who had only just replaced Dickinson as surveyor) went to report they agreed that not all the bricks were of the best quality but were reasonably content with the adequacy of the work [57]. The Commission then asked the surveyors to draw up proposals for brickmakers, recognising the possibility that they might have to deal directly with them in order to ensure the quality of materials. The quality of the bricks at the time was being adversely affected by the adulteration of the clay with 'Spanish', i.e. ashes. The practice had apparently begun after the fire of London when the dunging of the brickfields with ashes led to the chance discovery that it made the bricks easier (and hence cheaper) to fire. The brickmakers had continued the practice although now coal ashes were used. The irony was that the brickmakers were encouraged in this practice by the high price of coal for firing the bricks, the price being inflated by the tax levied for the building of the churches in which the poor quality bricks were used. The commissioners obtained prices for bricks both with and without the use of Spanish but the surveyors disapproved of the former because of the problem of ensuring that the brickmakers used no more than the permitted amount [58]. Meanwhile the bricklayers currently employed were to present the bricks that they were using for the approval of the surveyors [59].

In spite of several attempts to improve matters, problems over the quality of brickwork continued to dog the Commission. In the spring following the initial episode at Westminster there were continuing discussions with the bricklayers, agreement only being reached in April [60]. No details of this have been recorded but it is possible that it concerned the picking out of bad bricks. Bricks must be properly fired but, as temperatures within the clamp or kiln will vary according to position, not all bricks will be 'burnt' to the same extent, as the surveyors' report made clear. Although the contracts with the bricklayers stipulated that they were supposed to pick out the poorly fired bricks which would then be replaced by the brickmakers, it must have been a time consuming operation which seems to have been avoided on many occasions.

Two years later, in 1715, the Surveyors complained about the bricklayers who had the contracts for Spitalfields, Limehouse and Wapping [61] and they were discharged. At the same time the surveyors were asked to consider how to ensure better standards. Whatever the results of their deliberations one can imagine their frustration when, scarcely a month later, the bricklayers were successful in a petition to have their contracts reinstated [62]. Perhaps the Commission had in mind the delays that would inevitably occur if they had to seek new contracts because a delay would also affect the masons whose work had to proceed together with the brickwork. This had been a problem at Deptford following the Westminster episode when the masons complained [63] that they were being held up because the Commission had put a stop to work while they investigated the quality of bricks being used there. They did, however, take the precaution of writing to all the bricklayers at that time to warn them about the conditions of their contracts.

A year later Goodchild & Sleemaker, the same firm, were in trouble again over the quality of their bricks and by now they were working on five churches. Again the surveyors were asked to consider how to keep the bricklayers to the letter of their contracts but still the problem does not seem to have been solved. When in January 1718 they were about to start on St Luke's, Old Street, proposals were obtained from six firms of brickmakers and there was a discussion about the means of obtaining the best bricks. Poor quality bricks are mentioned in almost every surveyors' report at one

church or another, with occasional comments on the quality of workmanship of bricklayers [64].

Ensuring adequate progress of work was occasionally a problem. This was particularly so with the rebuilding of St Mary Woolnoth on its crowded city site where the scaffolding, which obstructed the street, led to a number of complaints because it remained in place so long. Elsewhere parishioners, impatient to see their new churches completed, were equally prone to voicing complaints about the slowness of work. When progress was slow, tradesmen might be asked for an explanation and in extreme cases the Commission could discharge a contractor and appoint another. This was eventually done at Lombard Street, where the masons failed to respond to requests to complete their work [65]. Presumably there was less reluctance to discharge a contractor for slowness than for poor workmanship. There also were delays in the completion of joinery to which the Commission responded by setting time limits for future work [66], although without penalties these limits could not be entirely effective.

Ironically some of the delays were an indirect result of too rapid commissioning of work on the churches, when the commissioners attempted to build at a rate exceeding the rate of money supply. At Spitalfields the carpenter stopped work on the roof of the nave for want of payment [67]. Delays in construction also caused the plumbers on more than one building to refuse to carry on because of a rise in the price of lead between the time when they tendered and the time when they were able to begin work. With the rate of work so far ahead of the rate of money supply there were frequent requests for payment. The Commission had eventually to ask "whether [the workmen] are content to proceed . . . upon such encouragement as the commissioners, under the present circumstances are able to give them" [68]. It seems that it was not unusual at that time for payments for building work to be delayed and Knoop & Jones [69] have discussed the ways in which contractors might finance the works on which they were engaged. Clearly if the surveyors could not guarantee regular payments to contractors they must have been in a difficult position in attempting to ensure adequate progress. It is more than likely that contractors removed their labour from work on the churches to other jobs where they could be more sure of prompt payment. It is also possible that the poor record of payment to contractors eventually affected the ability of the Commission to obtain tenders. In the early days of the Commission there were several tenders for the various kinds of work on each church. The tenders vary considerably in their presentation which suggests that a range of different sizes of contractor were interested in obtaining contracts. However, in October 1717 the commissioners complained that they had received only one tender for the plumber's work at Limehouse and ordered a second notice to be put in *The Gazette*.

### Discussion

Problems created by the over-ambitious beginning, with an original intention to build 50 churches and design guides that presaged magnificent but costly building, were aggravated by too rapid a building programme that was far beyond the resources available. Although the over-running of costs was partly a result of the scale of the churches it seems curious that estimates were not better. With only outline designs, the estimates could not have been precise but the sheer volume of the buildings should at least have suggested the magnitude of costs. Reliance upon the architects to produce estimates for their own buildings would tend to lead to optimism. In the early days of

the Commission, at least after the start of Greenwich church, there seems to have been an almost unspoken collusion between the architects and the Commission over the costs; a collusion made easier since the architect for two of the churches was also a member of the Commission.

While construction was supervised by the surveyors, with architects among the commissioners and two major churches designed by one of them, there must have been some division of responsibilities. Working arrangements were certainly not clearly defined initially and the surveyors had to be given specific instructions about working under Archer's direction at Westminster [70], while the latter appears to have seen fit to supervise the work of Hawksmoor at Greenwich [71]. Pragmatic working arrangements may have gradually developed during the working life of the Commission. With the surveyors designing most of the churches the division of responsibilities was not a serious problem but in the early days working arrangements must have been affected by personality differences and personal ambition. Archer's ambitions had already led him into criticisms of Wren's management at St Paul's and one might well imagine that with Hawksmoor's close association with Wren he might have shared in that ill feeling. This situation changed with the reforming of the Commission in 1715 but not necessarily entirely to the surveyors' advantage.

How well the surveyors were able to manage the progress of work can be seen in their reports. With several churches in progress at the same time the amount of work was considerable. The level of detail given by the architects to their designs was not markedly different from that expected today. Design details had to be produced, measurements had to be made and disputes over payments settled. Complaints from those adversely affected by the building work needed to be investigated and reported upon. Small wonder that they were unable to keep a constant eye on progress and quality of work and requested the appointment of clerks of works for each church. The method of separate contracts should have given the Commission more control that, in the event, they were able to exercise. The method of employing the contractors separately was by no means the only method of contracting at the time and may well have been uncommon. In other cases churches might be built by contracting with one firm, often a carpenter, who would then employ the other trades [72]. The commissioners were able to use their method because the scale of work on which they were engaged necessitated the employment of full time surveyors to oversee the work, draw up contracts and measure and certify the work as it was completed. Thus there was an organisational structure to handle the many separate contracts and this was essential because of the extended design process adopted for the churches.

Difficulties in exercising control over contractors seem to have been partly the result of inability to match payments to the work produced, a situation that could not have encouraged the contractors even on prestige work. Partly it was also inadequate staffing, with two surveyors proving inadequate for the tasks expected of them. This was probably not apparent in the beginning but unfortunately by the time the work load had risen to a level where additional staff were clearly needed the Commission was in no mood to authorise additional expenditure and even reduced the salary of the surveyors.

The principal problem was with the quality of brickwork. Here there were changes taking place in methods of quality control which had formerly been in the hands of the trade organisations, the guilds, who in theory had the power to search for and destroy inferior materials. By the beginning of the eighteenth century the guilds were losing some of their traditional powers and were no longer able to perform this function [73].

The Company of Bricklayers and Tilers wrote to the Commission in 1714 and explained their particular difficulty [74]. There was, therefore, a fundamental change in practice taking place from self regulation by the various trade organisations to more direct control by the client or his surveyor through the building contract. At this early date the new method of control was not fully effective. It was clearly not impossible to obtain good quality brickwork and good quality bricks. Wren's Piccadilly church completed only a few years earlier and Gibbs' Marylebone chapel started in 1721 are both of brickwork and testify to the quality that could be obtained. But, of course, in these cases brickwork is used as the finishing material and not simply as a structural core to a masonry building. Good quality may be more easily obtained if the result is visible so effecting a pride in the work and the eventual reputation of the bricklayer. Where brickwork is simply so many bricks laid for so much money it presents a problem that even today is all too familiar to those concerned with quality control. Some positive control must be exercised but to exercise one's powers to improve quality may adversely affect production. In a building industry with interdependence of trades, one trade may suffer because of the delinquency of another. Two and a half centuries of 'progress' have done little to change that: plus ça change plus c'est la même chose.

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#### References

- [1] H. Colvin, 'Fifty New Churches', *Architectural Review*, 107 (1950), pp. 189-96.
- [2] In 1733 the Surveyors ceased to be retained on a regular salary by the Commission which itself met for the last time in 1758.
- [3] St. Luke, Old St. and St. John, Horsleydown do not survive; St. George, Wapping is only a shell after wartime bombing; St. John, Smith Square was restored as a concert hall; St. Anne, Limehouse was restored after a fire in the nineteenth century; St. Alphege, Greenwich was restored after being gutted during the war.
- [4] Of recently catalogued records at Lambeth Palace Library (E. G. W. Bill, *The Queen Anne Churches* (1979)), the part of the collection most relevant to this study comprises minute books of the Commission and those of a Committee which they appointed from among their members, the Book of Works for the various buildings and the Book of Contracts, together with several volumes of miscellaneous documents, particularly the reports of the Surveyors.
- [5] S. Jeffrey, 'English Baroque Architecture: the Work of John James' (Ph.D. thesis, University of London, 1986).
- [6] Figures from Sir L. Weaver, 'The Complete Building Accounts of the City Churches', *Archaeologia*, 66 (1915), pp. 1-60.
- [7] *Wren Society*, XIII (Oxford, 1936), p. 10.
- [8] H. Colvin (ed.) *The History of the Kings Works, 1660-1782* (1976), V, p. 41.
- [9] *Ibid.*, p. 97.
- [10] Text in minutes for 18 Dec. 1711, Lambeth Palace Library 2690/30.
- [11] L.P.L. 2693/49.
- [12] Consideration of design principles is outside the scope of this paper. See Colvin, 'Fifty New Churches'.



- [13] L. Whistler, *The Imagination of Vanbrugh and His Fellow Artists* (1954), pp. 247–52.
- [14] Design discussed by K. Downes, *Hawksmoor* (1959), pp. 184–9.
- [15] L.P.L. 2690/100.
- [16] L.P.L. 2715/177.
- [17] L.P.L. 2715/179.
- [18] L.P.L. 2690/179. There is no record of their making use of this device.
- [19] The problem seems to have been that they agreed on the site (30 April 1719) before receiving the adverse report (28 May). They eventually ordered an estimate of additional foundation costs on 11 Feb. 1720. See L.P.L. 2714/269.
- [20] L.P.L. 2690/217, 19 May 1715.
- [21] Figures given to nearest £100, from the Books of Works.
- [22] L.P.L. 2690/40.
- [23] L.P.L. 2690/95. No alternative estimates were sought before this decision was taken.
- [24] Estimates were ordered for both ashlar and ragstone, L.P.L. 2690/360.
- [25] L.P.L. 2690/375.
- [26] L.P.L. 2692/129.
- [27] This was to be built for less than £8,000 although the final price was slightly more.
- [28] L.P.L. 2690/91.
- [29] L.P.L. 2715/184.
- [30] L.P.L. 2724/39.
- [31] Survey report by M. Sisson, architect for restoration of the church, c. 1960, personal communication.
- [32] L.P.L. 2724/85.
- [33] L.P.L. 2690/281.
- [34] Archer's design for towers in *Wren Society*, XVII (Oxford, 1940), pt. xl.
- [35] L.P.L. 2724/41.
- [36] J. Lang, *The Rebuilding of St. Paul's Cathedral* (1956), p. 120.
- [37] Bodleian Library, Gough Maps, 23, 68 & 68<sup>v</sup>.
- [38] L.P.L. 2715/192.
- [39] L.P.L. 2703/30-1. When the roof was completed a note in its praise was published in the local newspaper and subsequently copied into John Grove's notebook—BM. Add. Ms. 30092.
- [40] L.P.L. 2728/35.
- [41] e.g. Hawksmoor included roof timbers in his design proposals for St. Giles in the Fields, B.M. Add. 15506. Flitcroft's designs for the same church which also show the roof structure in R.I.B.A. Drg. collection, J 9/3.
- [42] L.P.L. 2690/42.
- [43] It seems there was no standard method of measurement at the time because Jeffs and James, having been successful in their proposal to build the roof of Greenwich, submitted a proposal for the method of measuring their work. L.P.L. 2715/95.
- [44] Work could not proceed through the winter because of risk of frost damage. Walls therefore were roofed over by carpenters, and progress during each year is apparent in the value of work completed. During the life of the Commission the date of accounting was changed from Dec. to March but it has been assumed that the same periods of work were represented.
- [45] L.P.L. 2715/196.
- [46] L.P.L. 2723/49.
- [47] L.P.L. 2716/85. This seems to have occurred because of work not originally included in the contract. Settlement recorded in Book of Works. L.P.L. 2698/17.
- [48] Concern about this was first reported in June 1714 (L.P.L. 2690/171). In Oct. the Surveyors recommended construction of a sewer in the following year, by which time over £1000 had been spent on the footings and drain.
- [49] L.P.L. 2692/103.
- [50] L.P.L. 2690/49.
- [51] L.P.L. 2690/53.
- [52] L.P.L. 2693/66.
- [53] L.P.L. 2724/51.
- [54] L.P.L. 2724/60.
- [55] L.P.L. 2690/390.
- [56] L.P.L. 2690/124.
- [57] L.P.L. 2715/184. It seems to have been concern for this complaint that prompted the Commissioners to first order a monthly report from the Surveyors on progress and quality of work on all buildings in hand.
- [58] L.P.L. 2724/31.
- [59] L.P.L. 2690/137.
- [60] L.P.L. 2690/154.
- [61] L.P.L. 2713/15.
- [62] L.P.L. 2760/211.
- [63] L.P.L. 2713/17.
- [64] L.P.L. 2724/37.
- [65] L.P.L. 2692/151.
- [66] The Greenwich carpenter was asked to complete within a given time; one Deptford contractor was removed and another appointed with a set time limit.
- [67] Surveyors' report for 7 April 1720, L.P.L. 2692/103.
- [68] L.P.L. 2692/108.
- [69] D. Knoop & G. P. Jones, *The London Mason in the Seventeenth Century* (1935), pp. 49–56.
- [70] L.P.L. 2690/140.
- [71] L.P.L. 2690/55.
- [72] e.g. at Marylebone Chapel the contract was with carpenters Tibrell & Phillips but specified all aspects of the building. BM Add. 18238 f.37v.
- [73] For summary of loss of guild power see S. Kramer, *The English Guilds, Studies in their Progress and Decline* (New York, 1927), pp. 185–210.
- [74] L.P.L. 2723/21-2.