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Ref: AH/vm

7th April, 1995

Mr. Phillip S. George,
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Dear Sir,

Great Gransden - St. Bartholomew's Church

Following our visit on Saturday 11th, February, to inspect the bells, we must apologise for the excessive delay in rendering this report.

The Bells:

Form a ring of 6 in the approximate key of F as follows:

Bell	Diameter	Strike Note	Approx Weight	Date	Founder
Tenor	3' 7 3/8"	* 359½ c.p.s.	14-0-0	?	In Question
5th	3' 2"	403 (1½^{b})	9-3-0	1658	Bryan Eldridge
4th	2' 11¼"	452½ (3#)	8-0-0	1895	John Taylor & Co. Loughborough
3rd	2' 8 3/8"	488 (8½#)	6-0-0	1658	Bryan Eldridge
2nd	2' 6¼"	550½ (11¼#)	5-1-0	1854	C & G Mears, London
Treble	2' 4¼"	596 (3^{b})	4-2-0	1883	John Taylor & Co.

* F International Pitch = 349 c.p.s.
F Old Concert Pitch = 360 c.p.s.
F# International Pitch = 370 c.p.s.

None of the bells are listed for preservation by the Council for the Care of Churches.

All the bells appear sound, although as can be seen from the table above, their strike notes are only approximately in tune. The treble and 5th are both a little flat with respect to the tenor, whereas the 4th, and to a greater extent the 3rd and 2nd, are noticeably sharp.

There is some uncertainty concerning the founder and precise date of the tenor. Regardless of who made it, it is a poor casting with a great number of moulding seams, both inside and out, which suggests that the mould was not properly dried at the time of casting. It was not tuned, and indeed remains uncut to this day. The 5th bell has been skirted slightly. That is to say, the lip of the bell has been chipped away, with the purpose of raising the strike note.

Continued:

The 3rd bell has been chip tuned (to flatten it's strike note) and the 4th, 2nd, and treble have all been machine tuned for the same purpose. Tonally, the tenor, 4th and treble are quite fair, whereas the 5th sounds a little 'watery'. The 2nd bell sounds 'panny' and the 3rd sounds conspicuously poor.

All the bells were cast in cannons, or supporting loops, and these remain intact on all but the 3rd from which they have been removed. The cannons are conventional in style although those upon the tenor are somewhat squat and those upon the treble and 4th are of the late 19th century angular pattern.

The tenor, 5th, 3rd and 2nd were all made with castin type clapper staples, however these have been removed from all but the second and centre holes drilled for independent staples. Centre holes are also to be found on the treble and 4th.

The tenor, 5th and 3rd have been turned through 90° to present fresh surfaces to the clappers, whereas the 4th, 2nd and treble remain unturned. Indentation is again occuring although this is not serious for the present with the exception of the 2nd which is heavily indented. Carillon hammers are fitted and in the case of the tenor, 5th and 3rd, these now strike on the outsides of the bells immediately behind the indents on the inside.

The Ringing Fittings:

These all date from 1895, and were made by George Day & Son of Eye of Suffolk. they are now exactly 100 years old, and in only fair condition.

The bells hang from elm headstocks with shield type gudgeons on the 5th, 4th, and 3rd, and cast iron gudgeon boxes upon the tenor, 2nd and treble. In the case of the latter three, these run upon double row self-aligning ball bearings in let-in housings, and supplied by John Taylor and Co. in the early 1950s. The shield type gudgeons still run in the original plain bearings. There are now traces of woodworm and denaturing in most of the headstocks, and especially in the 3rd and 5th.

The bells are secured to their headstocks with conventional forged supporting iron work. This is rusty, although safe to the present. All bolts appeared tight.

The clappers are of wrought iron and of only fair shape and proportion. They incorporate boxtops and these run upon the obselete castin type independent staples. They are now well worn both at the points of swing and impact.

The wheels are in fair condition and well graded for size. They are, however, somewhat larger that one would expect to find given the sizes of the bells. the bellropes are in fair condition, and incorporate pre-stretched polyester top ends on all but the 5th. They drop plumb over single pulleys, mounted into the bases of the bellpits. All pulley sheaves rotate freely but are now well worn.

Conventional stays, sliders and runner boards are fitted, and these are all in a serviceable condition.

Each bell is struck with two gravity hammers from a Carillon machine, and additionally the tenor has a third hammer for striking the hours from the clock. Due to lack of sufficient barring off, the hammer heads have nibbled away at the wheel spokes upon the treble, 4th and 5th.

Generally, the timberwork is in fair condition (with the exception of the headstocks) however all iron and steelwork is now very rusty. Indeed the exposed threads are barely intact.

The Bell Frame:

The bell frame is of oak, and is dated 1658. It is a substantial structure set diagonally within the tower and arranged to house all six bells upon one level. The 3rd and 5th swing diagonally in the South-West to North-East direction, whereas the treble, 2nd, 4th and tenor, swing diagonally in the North-West to South-East direction. Due to lack of space, the outer corners of bell pits nos. 1, 3, 4, and 5 project into the sound openings.

The frame is of conventional construction, with top and bottom horizontal members, with diagonal braces and jack braces between. The wheel side bottom timbers on the 5th and 3rd bell pit bear directly upon the belfry floor and additionally upon the cills of sound openings. The bottom members of pit 1, 2, 4 and 6, which intersect at right angles, are halved in. The eight corners of the bell frame all bear onto the cills of the eight sound openings. The centre section of the frame appears sound and is heavily constructed. The outer frame sides and in particular the corners of the bell pits where they fall close to the sound openings, are well decayed.

The centre section of the frame is supported by six beams, approximately 9" square, and spanning the tower East-West.

Three or four vertical bolts have been inserted which run from the top members of the bell frame right through to the belfry floor beams under. Additionally, some flat bars have been bolted to the top timber joints and sundry timbers have been spiked to the outer framesides.

At the time of our visit, the tenor, 5th, 4th, and 3rd bells were rung up singly. During this time we were able to measure approximately 1/32" of horizontal movement with the tenor bell rung, and virtually no vertical movement. When the 5th bell was rung, the wheel side frame side stood almost rigid, however the stay side frame side deflected horizontally by at least 1/16". When the 4th bell was rung the wheel side frame stood rigid, whereas the stay side frame side moved a little over 1/8". When the 3rd was rung, the wheel side frame stood rigid, whereas the stay side moved between 1/32" and 1/16". It will be observed that movement within the centre of the frame is restricted whereas the outer frame sides all move considerably. This is partly due to decay and partly due to lack of proper support and anchorage to either the tower walls or the timber foundation.

The Tower:

Is of masonry construction, and stands conventionally at the West end of the Church. Access to the ground floor ringing chamber is via an arch in the East wall from the body of the Church or alternatively, a door in the West wall from the churchyard outside. A spiral staircase in the South-West corner gives acces to the first floor chamber, second floor clock and carillon chamber, and third floor belfry.

The first floor is some 24' 6" above the ground which creates a ringing chamber considerably taller than optimim. To overcome this, a rope guide has been installed at a height of approximately 14 feet.

The first floor chamber, which has a height of 14' 5" from the first floor to the second floor, was formerly the ringing chamber. The pendulum from the clock hangs down in a box adjacent to the North wall. All ropes are drawn a little out of plumb in this chamber, however, no pulleys have been fitted to smooth their passage.

The second floor chamber contains both the clock, which is sited in the North-West corner, and a carillon machine which stands centrally and immediately over the access trapways. Autowind units have recently been fitted to the clock by Thwaites and Reed Ltd., and similarly the carillon machine has been converted to direct electric drive. The machine is triggered from the clock and plays tunes every three hours.

As with the first floor chamber, all bell ropes are drawn a little out of plumb, however, trunking has been fitted for guidance purposes.

The door from the spiral staircase is set below the second floor level and indeed, the cill is level with the tops of the windows in the chamber below. to accomodate this, a small stairway rises from the cill of the door up to the second floor level. At this height, the tower measures 13' 6" North-South by 12' 3" East-West. The spiral staircase chamfer in the South-West corner measures 3' 7".

Some vertical cracking was observed around the spiral staircase.

Access into the belfry is a little difficult, in that the bellframe blocks the doorway from the spiral staircase. The bells hang level with eight sound openings on all four walls, the cills of which are approximately level with the belfry floor. This floor is some 14' 6" above the second floor. At this level, the tower measures 13'8" North-South, by 12'6" East-West. The tower roof is approximately 14' above the top members of the bellframe. A ladder gives access to the roof.

The openings are louvred against the worst of the weather, and wired against birds The louvres however, are too far apart to be effective. To overcome this, polythene sheeting has been fitted over most openings but this is now in a poor condition. Generally, the belfry area is reasonably clean, with the exception of a build-up of rubble around the edge of the bellframe and between the bottom members and the tower walls. This will undoubtedly hold moisture in contact with the base members of the bellframe, thus accelerating decay.

Some movement was felt in the tower structure when any one bell was rung.

Conclusions:

It is now 100 years since the bells were last re-hung with new fittings, and although it is apparent that routine maintenance has been undertaken, the time has now come when major works are again required if the bells are to remain in a good and usable state. The fittings are in an only fair condition, with all frictional parts now being well worn. The wheels are somewhat oversized, although we suspect that this was undertaken to compensate for the handling difficulties normally associated with an excessive draught of bell rope. The bellframe is an old structure, made all the more interesting by the fact that it is dated. It is massivly constructed and stands reasonably well in the centre section which contains the 2nd and tenor bells. Due to considerable decay coupled with lack of proper support, the outer corners of the four outer pits deflect excessivley when the bells are rung, and this will undoubtedly be having an adverse effect upon the go and handleability of these bells. The comment particularly applies to bell no. 4.

The bells themselves are mixed for age, founder, tone and tune.

The tower appeared in fair condition, although some cracking was noted in the second floor chamber, as was some deflection when any one of the bells was rung.

This movement, coupled with the movement of the bell frame, the condition of the ringing fittings, and the excessive draught rope will all conspire together, to render the bells less easy to control than they should be.

In spite of all the shortcomings detailed above, we saw nothing at the time of our visit which we considered to be dangerous, and as far as we are concerned, the bells may continue in regular use provided that regular checks are made upon condition of the equipment and the tightness of the various fastenings.

Recommendations:

We believe it important that any programme of works results in an improvement to the sound, go, and general handerability of the bells. To achieve these three ends we recommend that the bells be tuned, the ringing fittings be renewed, and either the bellframe strengthened or alternatively the bells hung with completely new frame work. At the same time it is important that the overall draught of rope be reduced. We understand from our discussions at the Church, that there is a plan to install a ringing gallery at a height of approximately 10 feet. This will reduce the ringing chamber height to some 14 feet which is close to optimum. The rope guide can be removed. We believe that this gallery should be installed, regardless of whether the bells are hung in new framework or not.

In view of the age of the frame, and more importantly the fact that it is dated, we believe it extremely unlikely that a faculty would be granted for it's destruction. It therefore follows that the frame should remain in situ regardless of whether it is used for supporting the bells or not. If the frame is to continue in use, it is important that strengthening works are carried out in order to improve it's rigidity. Vertical tie bolts should be fitted down through each of the main diagonal braces and a variety of blocks, straps and fastenening should be introduced around the outside of the frame to improve the rigidity of the outer frame sides. It is also important to ensure that all dirt and loose rubble is cleared away from the base of the frame to improve ventilation.

Although there is little doubt that the performance of the frame can be improved, we are not entirely convinced that any such repairs will remain effective for a long period, bearing in mind the extent of the decay to be found around the sound opening. Before a decision is taken to reuse the frame we believe it important that the detail of the strengthening works should be carefully discussed between the bellfounder, the Church's architect, and English Heritage who will undoubtedly have strong views on what should be done and how the works should be executed.

Even if the bellframe is strengthened, the tower will still continue to move to the same extent which will lend a degree of unpredictability to the handling of the bells.

If a new bellframe is to be introduced, we suggest that this be placed immediately under the existing structure, and in the second floor chamber where the clock and carillon machine are presently housed. These displaced items should be moved down to the first floor chamber.

The benefits of having a new bellframe are as follows:

1. A completely rigid structure may be obtained with a certainty of a long life.
2. By carrying the loads into the tower at a lower level, tower movement, and therefore ringing unpredictibility, will be reduced.
3. The overall draught of bellrope will be closer to optimum.

We believe that the tower is somewhat stronger in the East-West direction rather that the North-South due to the buttressing effect of the nave. In the event of the bells being rehung in a completely new bell frame, we would propose nos. 1, 2, 3 and 6 East-West and nos. 4 and 5 North-South along the East wall. We have given consideration to the possibility of making provision in the new frame for two trebles to make eight, however, space is a little too short for this to be conveniently done.

WHITECHAPEL BELL FOUNDRY LTD.,

We have prepared two proposals for your consideration. The first covers the cost of tuning the bells and rehanging them with new fittings in the old framework. The price includes the cost of overhauling the carillon hammers and tie bolting the frame. No provision has been made for any further strengthening works, as these can only be properly specified and priced for after the consultations we have referred to. It is likely that the Church is a listed building. If it is, the provision of completely new ringing fittings may be zero rated for V.A.T. purposes. Tax is however chargeable on the repair to the bellframe, the overhaul of the carillon hammers, and the drilling and tuning of the old bells. The precise tax liability is shown at the end of the estimate.

Our second proposal is for rehanging the bells with completely new fittings and framework lower in the tower. Although more costly, the tax liability would be less as the provision and installation of the bellframe together with the new carillon hammers and clock hammer can also be zero rated for tax purposes.

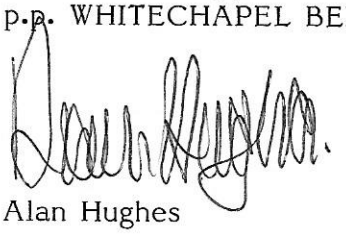
Both estimates specifically exclude all buiders and clockmakers works which are listed in general terms at the end.

We hope that we have clearly covered everything, and correctly interpreted your requirements. If you do have any queries, or would like any further information, do not hesitate to contact us.

We enclose with this report:

1. Estimates covering the proposed works
2. Information on the funding of Church bell restoration
3. Information on Value Added Tax
4. Brief notes on bells hung for change ringing for the benefit of your Church architect
5. A Code of Practice for the Conservation of Bells and Bellframes issued by the Council for the Care of Churches.
6. A booklet about the Whitechapel Bell Foundry.

Yours faithfully,
p.p. WHITECHAPEL BELL FOUNDRY



Alan Hughes

Encs.