NICHOLSON ENGINEERING

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Church of St.Peter & Paul Medmenham

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Customer Charter

We are ourselves active members of our own churches and have between us served variously as Churchwarden, Ringing Master, Organist, Fabric Officer and PCC member. As such we know, understand and appreciate the unique nature of any work to churches and the often conflicting requirements which exist when working on a historic building which is also a living place of worship. We also appreciate the essential need to undertake any work to the very highest standard, both in offering only the very best to the Glory of God and in recognising that our work is likely to have to stand the test of time over the decades and centuries to come. It is our privilege to work upon some of the nations' finest and most historic buildings small and large and to become part of the history of the communities we serve.

- ❖ The quality of the service we offer is second to none. Our Managing Director Andrew Nicholson is freely available to discuss your requirements or concerns before, during and after any work is complete.
- ❖ We are pleased to welcome visitors to our works to view our facilities and to see work in progress. It would be wise to make prior arrangements before visiting.
- ❖ We promise that, unless the specification has been changed by mutual agreement, when a quotation is accepted and dates agreed the price offered will be the price you pay.
- ❖ We insist on using only the very finest materials and equipment available.
- ❖ Only the casting and tuning of bells is sub-contracted, all other work being under the care of our own dedicated and skilled team of craftsmen.
- ❖ We will ensure that any disruption to your place of worship is kept to a minimum while we are working there. We recognise that funerals may occasionally have to take place while we are at the church and will ensure that materials are stored as discretely as possible and that work ceases while the service is in progress.
- ❖ We will at all times treat your place of worship with the care and respect it deserves.
- ❖ Upon completion of any work we will clean away all mess and rubbish from the site and leave all as we found it.
- ❖ We will conform to all current Health & Safety regulations while we are working at your church.
- ❖ Upon completion of any work we will fully test all and leave ready for use. Where any new equipment has been installed we will provide instruction on its care and use.
- ❖ Our work carries a full ten year guarantee on all new parts, the only exceptions being those parts liable to wear and tear unless failure has been due to faulty workmanship or materials. Our guarantee assumes that any installation will be subject to proper maintenance. We are pleased to offer maintenance contracts.
- ❖ Whilst we may not initially be the cheapest available, we offer true long-term value for money and superlative standards of service and workmanship.
- ❖ We take great pride in offering work of the very highest quality and guarantee total satisfaction to all our clients.

Report

GENERAL

Access to the church is gained via gravel paths leading to the south porch, there being one step up to the porch and another up from there to the nave door. A further gravel path and then a grassed area lead round to the tower west door, the door being more than wide enough for any of the bells to pass through and with one low step/threshold.

The church has a three-stage tower positioned conventionally at the west end of the building. There are diagonal buttresses to the south-west and north-west corners. There is a straight buttress at the east end of the north wall. At the east end of the south wall is a stair turret leading up as far as the second floor chamber. The tower does not appear to have the benefit of a lightning conductor.

The ground floor chamber previously served as a ringing chamber, though at about 10' tall on the west side it is somewhat shorter than ideal for the easiest rope handling. On the east side the ceiling steps down to only 8' up from the floor which would be far too short for safe rope handling. Although clearly no longer in regular use, the tower west door appears to still be capable of being opened if required. The east tower arch is closed off from the nave by an oak screen which incorporates wide double doors, three steps leading up to the nave aisle. In the north-east of the chamber is a toilet compartment alongside which is a kitchen area in the north-west corner. The toilet effectively blocks the route previously taken by the rope to the treble bell. The ropes to the other two bells would have fallen close to the kitchen area. The position is now such that in their current arrangement none of the bells could be rung from this chamber. On the south side is a range of cupboards. A door in the south wall leads to the stair turret.

The first floor chamber is about 17' tall and is lit by a large west window. A small pipe organ is positioned on the east side of the chamber, the back of its case being flush with the east edge of a central hatchway framed in the ceiling. It follows that it would be perfectly possible for bells and other large items to pass through the chamber without the need to disturb the organ. On the east side of the chamber is a raised section which effectively consists of a rather flimsy box about 2' tall and occupying most of the available floor area between the back of the organ case and the tower west wall. The box was necessary in order to allow the tower west door to be opened. Part of the roof of the box is of corrugated Perspex to allow some light to filter down into the ground floor chamber. It is thought that the box could be partially or even completely dismantled so as to create a hatchway such that bells and other large items could pass through. The fact that this hatchway would not be vertically beneath that in the ceiling is not considered to be a problem. We were informed that, sadly, the pipe organ is no longer playable and the parish now uses a digital instrument. In their current positions, the three bellropes would fall in a straight line about 30" from the north wall, though currently the position and flimsy construction of the box would prevent the bells from being rung from this chamber.

The second floor chamber is about 9' tall to the underside of the ceiling joists, these joists also forming the foundation for the bellframe above. There are windows to all four sides, that on the east side giving access to the nave roof space. The windows on the other three sides are fitted with crude iron grills to help exclude birds. We noted that there is a sign in the chamber indicating the presence of bats. The organ blower is sited in the south window reveal with trunking taking the wind across and down through the floor, the electrical supply clearly being of some age and now disconnected. The vent pipe for the ground floor toilet

exits via the north window reveal. Hatches are framed centrally in both the floor and ceiling through which it is believed any of the bells might pass if ever required. The ropes to the three bells are drawn over extremely severely to the west with the aid of pulleys to both the floor and ceiling. Rope chutes are fixed between the pairs of pulleys, the pulleys being in poor condition. The degree of drawing over is such that the ease of ringing and go of the bells would be severely compromised and the bells must have been a real challenge to ring full circle. A timber ladder leads up to a man access hatch in the south-west corner; we noted that the ladder is suffering from serious furniture beetle infestation to the point where in our view the ladder is barely safe.

The bellchamber is about 16' tall at the eaves with a low pyramidal roof. There is a roof beam spanning east-west with some space over it which would allow it to be used to support lifting tackle and holes could be drilled horizontally through it in further positions to allow lifting bolts to be fitted. We noted that lifting staples or eyes are nailed to the sides of the beam but in our view these are NOT safe for use. There are sound openings to all four sides, all wired to exclude birds. Although the wire is currently all intact and serving its intended purpose of excluding birds, it is generally now corroded and its life-expectancy is limited. An aluminium ladder leads up to a man access hatch in the south-east corner of the roof.

We saw no signs of any structural distress which might be attributed to the ringing of the bells.

The tower presents something of an architectural puzzle. According to the church guide the tower was constructed in the period from 1400-50. However, the style of the window reveals to the second floor chamber appear to be Norman and their positions and extent suggest to us that this was once the bellchamber of a much shorter tower. This supposition is further supported by the fact that the stair turret finishes at this level. The nave roof was heightened at some point, thus blocking the east window of the second floor chamber, this window now leading into the roof space. The top stage of the tower i.e. the current bellchamber is likely to date from around 1400 when the tower was heightened but without also heightening the stair turret. The tower west window was presumably inserted at around the same time and this and the style of the top stage give the appearance of a perpendicular structure.

BELLS

The church possesses a ring of three bells as follows:

bell	diameter	weight	note	date	founder
Tenor	34 ¾"	7 ¾ cwt	A#	1666	Ellis II & Henry III Knight, Reading
Second	31 ¼"	6 ¼ cwt	B#	1624	Ellis Knight I, Reading
Treble	28 ½"	4 ½ cwt	C#	1691	Samuel Knight, Reading

All the bells were made with canons or supporting loops which they retain and from they are partly still hung, holes having also been drilled between the double canons through the heads of the bells or supporting bolts. The bells were also made with cast-in crown staples, the

crown staple being the part from which the clapper hangs. These staples remain in place and in use and are now fitted with turning plates or blocks. It should be noted that cast-in crown staples and their remains are by far the most common cause of old bells becoming cracked. The staple is of wrought iron while the bell is of bronze and cracks are caused by a combination of differential expansion between the two metals and corrosion and consequent expansion of the wrought iron staple. It is now normal practice to remove such staples and their remains whenever possible.

All the bells have been quarter-turned in order to bring fresh faces to the blows of their clappers. Wear at the current strike points is low and no cause for concern.

The frequencies of the principal and main partial tones or harmonics are as follows, all expressed to the nearest half hertz;

Bell	Hum	Fundamental	Third	Fifth	Nominal
Tenor	240	487	578	709.5	937.5
Second	282	524.5	648.5	818.5	1058
Treble	294.5	620.5	723	883	1192.5

Consideration of the nominal or principal notes shows that they are only moderately well in line. Taking the nominal of the tenor as the keynote or reference point, the second is slightly sharp and the treble is somewhat sharp. It is the alignment of the various partial tones or harmonics which determines the tonal quality or timbre of any musical instrument, bells being no exception. The alignment of the fundamental is the most critical to the tone of a bell and should be an exact octave below the nominal or half its frequency, a sharp fundamental making a bell sound very acid and a flat fundamental imparting a sour quality to the sound. The hum note is the next in importance and should be two octaves below the nominal or one quarter of its frequency, sharp hum notes tending to reduce resonance and fullness of tone, flat hum notes being mercifully rare. The third harmonic should normally be a minor third above an accurately aligned fundamental although some sharpness of this harmonic can be a benefit as it imparts brightness to the sound. The fifth harmonic is generally very weak in amplitude and not normally a major cause for concern. Analysis of the various partial tones shows the following to be the case;

Tenor
The hum note is somewhat sharp, the fundamental is over half a semi-tone sharp, the third harmonic is over half a semi-one sharp and the fifth harmonic is slightly sharp. Given the very sharp fundamental we would have expected this bell to be tonally pretty poor though in fact it is reasonable.

Second
The hum note is just over a semi-tone sharp, the fundamental is a little flat, the third harmonic is somewhat sharp and the fifth harmonic is somewhat sharp. Tonally this bell is very fair.

Treble
The hum note is slightly flat, the fundamental is well over half a semi-tone sharp, the third harmonic is somewhat sharp and the fifth harmonic is somewhat flat. This bell is very similar in style to the tenor and, like that bell, is tonally reasonable if rather mournful due to flat hum note.

The overall musical effect when the three bells are rung together in peal will be fair, if by no means up to the best standards which can be achieved.

All the bells seem to be sound with no obvious cracks, though only complete dismantling would allow a full examination to be made.

None of the bells is listed by the Church Buildings Council as being particularly worthy of preservation.

FRAME

According to the entry in Dove's Guide to the Bells of Britain, the bellframe is said to date from c.1709. Having arrived at the church expecting to find an early C18th bellframe, a good many of which exist around the country, we were therefore astonished to find what shows every sign of being a complete and particularly fine late C14th/very early C15th example. Dating bellframes on stylistic grounds is a notoriously difficult task, there being wide geographical variations in style and execution. It is also not uncommon to find what at first appears to be an early frame but which on further examination turns out to be a C19th copy. We are, however, as sure as we can be that the bellframe at Medmenham is the genuine article. If the opportunity ever presents itself it would be well worth attempting to date the frame using dendrochronology, though we would urge slight caution as some of the timbers appear to have been second-hand when the frame was constructed and likely to be even older. Given the age of the bellframe, its unusually fine design and execution, the fact it remains as built with no obvious signs of reconstruction or alteration and that it is in generally good condition albeit now with some areas of decay, leads us to the opinion that it is of national importance. There are other frames of similar or even earlier date around the country but there are very few indeed as fine as that at Medmenham.

The bellframe was built to house four bells, the pit for the largest bell now being empty. The frame is of oak and consists of sills, king posts, massive curved braces, jack braces and short heads all mortised and pegged. Transoms run the width of the frame on both sides to link all the framesides together. The frame is supported by six foundation joists which span north-south.

There is very significant decay to the sill of the west frameside. Fortunately, however, the pit to which this frameside forms the west side is the one which is empty and the decay to the sill is not therefore a serious concern in terms of structural integrity. There are areas of localised decay and beetle activity elsewhere but overall the bellframe remains perfectly capable of supporting the three bells which it currently contains provided no attempts are made to ring them full circle.

In considering full circle ringing, the most important thing to bear in mind is that this bellframe was built something like 200 years before full circle ringing became commonplace. Although the bells are currently equipped for full circle ringing, the bellframe at Medmenham was never designed to cope with the very considerable dynamic loads which full circle ringing generates. Attempts have been made over the years to try and stiffen the bellframe so as to withstand the forces of full circle ringing, these taking the form of a multitude of iron braces and rods. The basic design of the bellframe is such that these attempts to stiffen the

bellframe were doomed to failure. It is only fortunate that the various braces and rods have not seriously compromised the purity of the original design.

Several of the foundation joists show clear signs of re-use, there being redundant mortises cut into them. Whether these joists pre-date the bellframe, however, we on balance think unlikely though it must be a possibility. It seems more likely that the original foundation joists became rotted at their ends and had to be replaced and that second-hand timbers were used. As with the bellframe, a dendrochronological investigation might shed a good deal of light on the age of these timbers.

Overall, whilst the bellframe is an excellent example of a late C14th/early C15th bellframe and is quite capable of continuing to support the static loads imposed by the three bells, it is not in any way capable of coping with the dynamic loads which full circle ringing would generate.

FITTINGS

Stylistically the ringing fittings appear to date almost in their entirety from the late C19th. The exception is the clappers which are much earlier and indeed may even pre-date the bells to which they are now fitted. We are, however, not clear who made the fittings though those with more detailed knowledge of the local bellhanger's of that period might well be able to come up with a maker.

The bells hang from elm headstocks fitted with plate gudgeons running in plain gunmetal bearings housed in cast-iron plummer blocks. The wheels are of traditional timber construction and the pulleys consist of hardwood sheaves running in timber boxes. All the bells are fitted with conventional stays, sliders and runner gear. The clappers are of wrought iron.

The headstocks are suffering from a fair amount of furniture beetle infestation but they remain capable of supporting the static loads of the bells. The strapwork and bolts by which the bells are supported is suffering from surface corrosion but remains essentially sound.

The gudgeon plates are loose upon the headstocks. The gudgeons and bearings are filthy and are also very dry.

The wheels remain in remarkably good condition.

The pulleys are in poor condition and are effectively at the end of their useful life.

The stays, sliders and runner gear remain serviceable, although we did note that the stays are of massive section for these relatively small bells.

The clappers are in poor condition.

RECOMMENDATIONS

BELLS

If the bells ever have to be dismantled for major work, we cannot recommend too strongly that the original cast-in crown staples be cut away, drilled out and entirely removed and central stress-relieving holes drilled through which independent crown staples can be fitted. This is a standard conservation technique by which means the chances of any of the bells becoming cracked in their crowns would be greatly reduced.

Consideration of the basic profiles to which the bells were made and their current tuning figures makes it clear that although currently far below the best which might be achieved, these bells have enormous potential. As part of any major work, there can be no doubt whatever that the musical qualities of these three bells could be transformed by careful and skilful attention under our tuning machines. By this means, not only would all the nominal or principal notes be put into line but the alignment of the various partial tones would be vastly improved.

FRAME

What to do with regard to the bellframe will be determined by the means by which the bells are to be rung.

If the parish wishes to have the bells rung full circle, which has been the traditional way in England for over 400 years, there is no avoiding the need for a new bellframe; to attempt to hang the bells in the current bellframe for full circle ringing would be a huge mistake. The age and importance of the current bellframe means that realistically there is no chance of a faculty being granted for its replacement so it will need to be retained in-situ. However, there is sufficient height in the second floor chamber to house a new bellframe at that level and it will be remembered from the foregoing that this was almost certainly the bellchamber prior to the heightening of the tower c.1400; returning the chamber to its original function would seem to have a certain elegance. There would be more than sufficient space to house the existing three bells and there would enough additional space to allow the bells to be augmented to six should that ever be desired. Although we are advised that augmentation is not currently under consideration, it would make sense to design the new bellframe with the possibility in mind.

If the parish does not wish to have the bells rehung for full circle ringing they could be hung for stationary chiming and things then become much simpler as well as a good deal less expensive. Hanging the bells dead for stationary chiming would be possible in the existing bellframe, it being perfectly capable of coping with that system of ringing. If the bells are to be hung for stationary chiming, we recommend that they be fitted with electromagnetically operated chiming hammers which would be driven by a programmable control unit. The system could be programmed to provide a vast range of facilities the following being but a few examples;

- Pealing of the three bells for regular services, weddings and other such occasions
- Single calling bell or “five-minute” bell
- Slow speed funeral toll of largest bell
- Sanctus

- Angelus
- Hour strike
- Quarter chime

Any pre-programmed sequence could be arranged to operate either automatically at pre-determined times of the day/week/month/year, or manually from the control position. A radio remote control facility could be included which, using a small hand-held transmitter, could be used to start and stop up to four pre-programmed sequences from anywhere in the church and for a short distance outside.

FITTINGS

Whichever means of sounding the bells is to be adopted, entirely new fittings will required.

If the bells are to be hung for full circle ringing, it is very important that the hanging radii, wheel diameters and clapper throws are put into perfect alignment thus making the bells as easy as possible to handle and strike well.

New fittings for stationary swing chiming should be designed so as to minimise any intervention or impact upon the ancient bellframe. We therefore recommend that the chiming hammers be mounted inside the bells where they would be supported from stainless steel independent crown staples. This would avoid the need for hammer brackets or support rails to be bolted to the bellframe. The cables should be taken down through the bellchamber floor into the chamber below where they would be connected to an interface unit thus avoiding the need to run cables around the bellframe. The control unit could be mounted anywhere in the building though for convenience of both installation and use the room at the base of the tower would seem to have much to offer.

RINGING CHAMBER

With the installation of a toilet and kitchen in the base of the tower, its use as a ringing chamber for full circle ringing is effectively at an end. If the bells are to be rung from the first floor chamber as would seem most logical, it will first be necessary to dismantle the existing “box” and install a proper floor running from the back of the organ right across to the west wall and spanning for the whole of the distance north-south. Steps will need to be provided running up from just inside the doorway up to the new floor area. The ringing area which this would create would be sufficient for ringing three bells. The space would, however, not be sufficient if the bells were later to be augmented to six. If six ringers were to be accommodated it would be necessary to remove the organ from the tower or at the very least to move it out under the tower arch and support it on a cantilevered gallery.

CONCLUSION

It is always very sad to see a peal of bells which has fallen out of use as has happened at Medmenham. Rehanging the bells, whether for full circle ringing or stationary chiming, would be perfectly feasible. Either method of ringing would be perfectly viable, though it needs to be accepted that full circle ringing would allow the bells to sound at their fullest. Whichever method of ringing is desired, with the bells restored as outlined above they would in mechanical terms be put into new condition and with proper ongoing maintenance they could be expected to serve the parish well for a century or more before major work is again required. Restoration of the bells would be an exciting project and one with which we would very much like to be involved, allowing the bells to once again sound out to the Glory of God across Medmenham.

I do hope this report is of interest and assistance and that everything is clear. If, however, the reader has any queries, do please let me know.

Andrew Nicholson

4th June, 2018.