

<b>Derby Diocesan Association of Church Bellringers Consultant's Report</b>	<b>Report DDACB 0806</b>
<b>Church of St Giles at Great Longstone Comments on Bell Improvement Proposal</b>	<b>Issue Date 18/12/06</b>

## **1.0 Introduction**

Church Warden Mr Mike Hirst requested the opinion of DDA Bell Consultants Robin Lyon and Mike Banks on a local proposal to improve the bell installation at St Giles Church Great Longstone. This report sets out the views and recommendations of the Bell Consultants following their inspection on 7th December 2006.

## **2.0 Overview of Bell Installation**

The six bells are installed in a stone built tower of small internal cross section (less than 2.5 X 2.5 metres). In order to fit six bells into the limited space, bells 1, 2 and 4 are mounted above bells 3,5 and 6. The bells are rung from the ground floor in a ringing room having a ceiling height of about 4.75 metres that ensures the sallies do not reach the ceiling on backstroke.

Between the ringing room and bell chamber there is a clock room having a low ceiling height of about 2 metres. This room is largely occupied by the clock case. The clock is of some interest being of chair-frame construction. Its weights fall in the northwest corner of the tower in a wooden box extending to the ground floor, further limiting space in the ringing room. This clock is a historical asset and clearly should not be compromised by any proposal for improving the bell installation.

## **3.0 Summary of Local Proposal**

Ian Sterritt (Tower Captain), John Thorpe (Peak District Bells Advisory Representative) and local ringers made the proposal to the PCC in June / July 2006. With an estimated cost of £1400, the proposal addresses bell installation problems that make the bells awkward to ring. Training of new ringers is nearly impossible and the bells are unattractive to competent ringers.

The problems stem directly from the small cross sectional area of the tower as follows.

- Poor installation design has failed to allow for the limited space available in the ringing room. The very close proximity of ropes 4 and 5 to the tower walls makes ringing of these bells hazardous.

- The two-tier installation means the upper bells (1, 2 and 4) sound much quieter in the ringing room than the lower bells (3, 5 and 6). This makes accurate striking of the bells difficult. There is a perception that bell 3 shouts and that its tone is different to that of the other bells.

The solutions proposed are as follows.

- An improved ringing circle is to be achieved by use of additional pulleys in the clock room to draw the ropes to better positions. The new positions are arranged to avoid clock room floor beams and one pulley for bell 3 would be mounted on a clock-winding shaft.
- Sound balance in the ringing room would be improved by use of sound attenuation for the louder lower bells and by use of a sound pipe to increase the sound levels of the quieter upper bells.

#### **4.0 Typical Design Objectives**

In assessing the proposal, the following criteria have been used.

##### **4.1 Rope Circle.**

- It must be possible for each ringer to have good sight of all of the other ropes and so ideally the ropes should fall in a perfect circle with all equally spaced. This is seldom achieved in practice and most effort goes into preventing three or more ropes from falling in, or near to, a straight line.
- Ideally there should be a clear area around each ringer of 600 mm radius although this is not always possible. This gives space to allow a trainee ringer to lose control of the rope without tangling with adjacent ringers and gives room for an instructor to be present in a position where control of the rope can be quickly re-established.

##### **4.2 Sound Levels in Ringing Room.**

- Each of the bells should be clearly audible to enable its ringer to strike the bell accurately, but not so loud that verbal communication by an instructor or a conductor becomes difficult.
- Ideally the sound levels of all bells should be more or less equal but this is almost never achieved.
- As a general rule, the objective in ringing rooms is for individual bell sound levels to lie between 68 and 72 dbA.

## 5.0 Inspection Measurements and Comments

### 5.1 Rope Circle.

The internal dimensions of the tower were measured in the ringing room and clock room. Also the position of each rope was established by measuring its co-ordinates in relation to two datum walls in the ringing room. Since the ropes fall vertically, these positions could also be translated to the points at which the ropes pass through the clock room floor. Figure 3 shows a plan view of the clock room with the underlying beam positions shown in blue (taken from the proposal). The red circles show the existing rope penetrations of the floor and the green circles show the proposed new positions.

Drawing of rope 1 will probably require the rope box in the bell chamber to be slightly repositioned. This would be doubly beneficial since this box currently rubs on the headstock of the bell below.

The proposed use of additional pulleys to bring about these rope offsets appears to be acceptable, but with one proviso. In the proposal, offset of rope 3 is achieved by means of a pulley built around the right hand winding shaft of the clock. As stated in section 2.0 the clock must not be compromised and so the pulley box should be attached to the inside of the clock case at the position shown in figure 3. Care should be taken to keep the rope, rope channel and pulley box outside the swept volume of the clock-winding key. A corresponding ceiling pulley will have to be fitted to the clock case roof.

It is probable that drawing of rope 5 will interfere with the opening of the existing clock case door. This will require further thought.

Conventional “narrow” pulley boxes can be used throughout since, as noted in section 2.0, the sallies do not pass into the clock room on back stroke. The following table summarises the requirements.

Rope	Ceiling Pulley	Floor Pulley	Additional Rope Draw (mm)
1	Not needed	Not needed	160
2	Not needed	Not needed	0
3	New (mounted on clock case roof)	New (mounted on inside of clock case beam)	210
4	New	New	330
5	Exists	New	270
6	Exists	New	240

**NB** Experience will show where rope channels are necessary.

Figure 1 shows the shape of the existing rope circle and illustrates the deficiencies needing correction.

- As already noted, ropes 4 and 5 are too close to the tower walls.
- Ropes 2,3 and 4 almost lie in a straight line.

Figure 2 shows the proposed optimised rope circle and it can be seen that the new circle is much improved, being more nearly round and with the ropes more evenly spaced. Also free space around each rope is considerably improved giving the following approximate radial clearances:

Rope	Approximate Clear Radial Space Around Rope (mm)
1	>600
2	600
3	450
4	400
5	400
6	450

Given the small cross section of the tower these clearances are acceptable and will enable training of new ringers to be performed in much greater safety.

## 5.2 Balance of Sound Levels.

Sound levels were measured inside the ringing room for each of the bells and the results are given in the table below.

Bell No.	Sound Level In Ringing Room (dbA)	
	Hand Stroke	Back Stroke
1	59	59
2	59	60
3	68	68
4	59	60
5	68	69
6	68	69

As can be seen, bells 3, 5 and 6 are equally loud and just fall inside the preferred sound level range of 68-72 dbA. There is no need to attenuate the sound levels of any of these bells. Bells 1,2 and 4 are very quiet and there is a need to increase their sound levels in the ringing room. It is suggested that bell 3 may appear to shout since, when all of the bells are rung in rounds, bell 3 is preceded and followed by quiet bells.

The proposal intends to use a sound pipe to increase the sound levels of the upper bells in the ringing room. This approach has been used in other towers with varying degrees of success but should move the sound balance at Great

Longstone in the desired direction. It is suggested that underground plastic drainpipes be used since these have thick walls offering the best chance of internal sound reflections. It is best to minimise the number of bends in the pipe.

## 6.0 Notional Costs

The table below gives notional costs assuming volunteers carry out most of the work. Pulley and rope boss costs are taken from the Hayward Mills web site and include VAT, the sound pipe price assumes material is bought from Screwfix and the specialist labour cost is taken from the existing proposal.

Bell No.	Items	£Cost
1	Clock-room floor rope boss	25
	Ringling room ceiling rope boss	25
2	Ringling room ceiling boss	25
3	Clock room upper pulley	100
	Clock room lower pulley	100
	Ringling room ceiling boss	25
4	Clock room upper pulley	100
	Clock room lower pulley	100
	Ringling room ceiling boss	25
5	Clock room lower pulley	100
	Ringling room ceiling boss	25
6	Clock room lower pulley	100
	Ringling room ceiling boss	25
All	Fastenings	25
1,2 and 4	Sound pipe	50
As necessary	Wood for rope channels	30
All	Specialist labour costs	200
<b>TOTAL NOTIONAL COST</b>		<b>1080</b>

It can be seen that, after allowing for contingences, the existing proposal price of £1400 is very realistic.

## 7.0 Recommendations

Overall the proposal for improving the bell installation is technically sound and the estimated costs are realistic. There is, however, no requirement to attenuate the sound levels of the lower bells (as heard in the ringing room) and a more appropriate method is needed for arranging the pulleys which will draw rope 3 in the clock room. In the bell chamber, the rope box for bell 1 will require resetting to line up with the drawn rope.

Advice given free of charge and in good faith, but no liability accepted.

Mike Banks  
Derby Diocesan Association of Church Bellringers Bell Consultant.

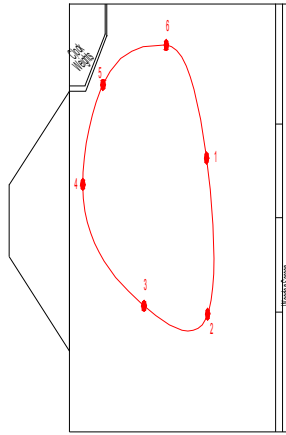


FIGURE 1 EXISTING RINGING CIRCLE

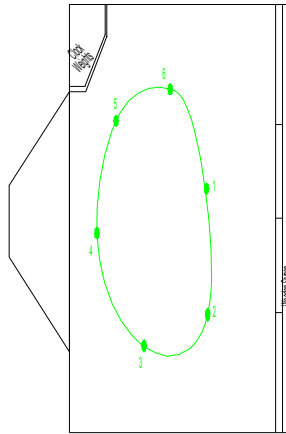


FIGURE 2 PROPOSED RINGING CIRCLE

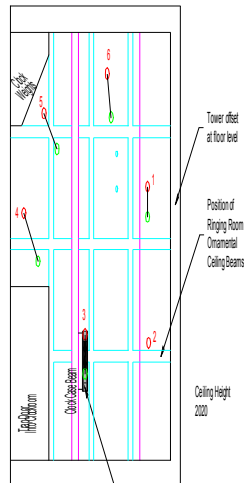


FIGURE 3  
CLOCK ROOM LAYOUT