

Derby Diocesan Association of Church Bellringers Consultant's Report	Report DDACB 04/06
Church of St Michael & All Angels, Hathersage - Inspection of Bells	Issue Date 06/08/06

1.0 Introduction

The inspection was requested by the Church Warden Mr. Mike Worstenholme on behalf of the PCC in his email to Mike Banks on 20th. July 2006.

Mike Banks and Robin Lyon carried out the inspection on Wednesday 26th. July 2006.

2.0 General

The six bells (four of which are scheduled for preservation by the Council for Care of Churches) are housed in a tower at the West End of the Church. The tower, which has a spire recessed behind battlements, appears to be of sound stone construction with no obvious signs of structural weakness when viewed from the outside. There is a large louvre fitted with slates on each aspect, at the belfry level. There is a large stained glass window at the ringing chamber level on the Western aspect and a single clock face below the louvre on the South.

The nave has been screened off at the West End of the church and the ringers' gallery, clock room and belfry are all accessed through the lockable door in the screen. Access to the ringers' gallery is gained by climbing the spiral staircase located in the left hand corner and access to the clock room and belfry by climbing the steep stone spiral staircase located in the South West Corner.

3.0 Ringers' Gallery (see Figure 3)

The ringers' gallery is reached by climbing the 11 steps of the metal fabricated spiral staircase. The area, almost square in section, is clean, carpeted and illuminated by four floodlights fitted high up in each corner. The lights in the South West and North West are at present working. The ones fitted in the South East and North East corners were not functional at the time of the inspection.

The six ropes fall in an acceptable circle and a rope guide rail is fitted 4.1 metres from the gallery floor level. The ceiling height was measured at 5.2 metres, located in which is a trapdoor which can be remotely opened by a rope and pulley system fitted on the South wall of the gallery. A large stained glass window is recessed into the West Wall. The floor of the Ringers' Gallery ends 530 mm. short of the window supports and this potentially dangerous gap is well protected by steel cable wires that run across the entire width of the window wall. The sanctus bell rope falls between the steel cable barrier and the window to the ground floor area.

The East end of the gallery is open to the main body of the church. A balustrade, of acceptable height and constructed of glass and steel, runs North – South across the entire width and forms one side of the spiral staircase.

4.0 Clock Room (see figure 2)

The clock room is reached by climbing 29 stone steps of the spiral staircase in the South West corner of the tower. The area almost square in section is illuminated by a single incandescent light bulb. A small window is fitted in the West wall and there is an opening into the church on the East Wall. The sill height to this opening is 0.75 metres and the wall thickness was measured at 660mm. Running down the entire length of the South wall is the wooden clock case. The floor of wooden construction contains a trap door measuring 1210mm

x 1160mm which can be raised and lowered from the Ringers' Gallery. The wooden ceiling is 2.610 metres above the floor. Running East - West are the lower sections of the two 'I' section foundation beams. All ends are keyed into the walls. Running East – West against the North Wall is another 'I' metal beam of smaller section which supports part of the wooden belfry floor.

5.0 Bell Chamber (see Figure 1)

The Bell chamber is reached by climbing a further 14 steps.

The area is illuminated by one floodlight and one incandescent bulb, which give adequate lighting for everyday use. On the North and South walls immediately above the apex of the louvres two cracks extending upwards were observed. There was some bird debris, the situation probably being made worse by the repair work that had been carried out on the South louvre to the supports and fitting of new slates. The wooden floor appeared sound and was fitted within the section of the foundation beams. Some thought had been given to soundproofing the louvres as when being rung full circle the open throat of the bells is above the lower level of the louvres.

See under further recommendations.

6.0 Bell Frame

The three steel 'I' section beams supporting the low sided frame are fixed to the two foundation beams running East – West and keyed into the North and South walls. The frame appeared to be rigid and in a good state of repair. The sanctus bell is mounted on a metal frame attached to the main beam running North South at the West end of the tower. In no way does it interfere with the ringing or any movement required around the main framework of the bells.

7.0 The Bells

The six bells are hung for full circle ringing on ball bearings. The Details (taken from "The Church Bells of Derbyshire" by Pat Halls and George Dawson) are as follows

Bell No.	Diameter mm. (ins)	Weight cwt	Date (approx)	Founder
1	686 (27)	3-3-14	1729	Daniel Hedderly
2	714 (28.125)	4-0-24	1729	Daniel Hedderly
3	759 (29.875)	5-0-10	1659	J. Scott of Wigan
4	813 (32)	5-3-6	1520	R Seliok II Nottingham
5	851 (33.5)	7-3-6	1657	J. Scott of Wigan
6	1038 (40.875)	11-2-10	1617	Paul Heathcote Chesterfield

Bells 3,4,5, and 6 are scheduled for preservation by the Council for Care of Churches. All six bells retain their canons (the loops on top which allowed the bells to be strapped to their headstocks). Clock hammers strike Bells 1,2,3 and 6. All the bells have had their cast in crown staples removed. The cast in crown staple was a wrought iron loop which was cast into the inside of the crown of ancient bells at the time of casting the bell. This loop formed the pivot about which the clapper rotated. The wrought iron corrodes with the passage of time, expands and can crack the bell. Their removal is highly desirable and was probably carried out when The Whitechapel Foundry rehung the bells in 1967. They are replaced by drilling a hole axially in the crown and fitting an independent crown staple held in place by a captive nut on the top of the headstock.

All the bells have been quarter turned about the vertical axis to present an unworn surface to the clapper and show minimal wear at the strike point with the clapper.

8.0 Bell Fittings

8.1 Headstocks

The metal headstocks all appeared to be in excellent condition. The bells are connected to the headstock by four bell-holding bolts with the head of each bolt being within the bell. The shaft of each bolt then passes through a profiled block of wood, which sits on top of the cannons, and then through the fabricated headstock where it is secured by two nuts.

All the bolts appeared tight but it was noticed that on Bell No 2 the wooden block had split, but not through any of the bolt holes, so the rigidity of the assembly was unaffected.

On Bell No 5 it was apparent that the bell holding bolts have, at some time, since the last painting session been slackened off to allow the insertion of a wooden packing piece to be fitted between the wooden block and the headstock on the pulley side of the bell. It is thought that this may have been carried out to alter the hang of the bell about its vertical axis position. The bolts appeared to be tight.

There were signs of rusting on several of the bell holding bolts and this should be attended to.

8.2 Bearings

All are self-aligning ball bearings with no sign of lubricant loss from the shaft seals. (It should be noted that the bearings are sealed for life and under no circumstances should they be regreased) Ball bearings tend to last a very long time in this sort of application with the added bonus that eventual failure is benign. Their condition can only be properly assessed following a full strip, however a rough check was carried out by feeling each bearing for 'rumble' whilst the bell was swung through an arc of approximately 10 degrees either side of its 'at rest' (down) position and no obvious defects were observed or felt.

8.3 Gudgeon Pins

These are the supporting pins projecting either side of the headstock into the bearing housing. Each gudgeon pin is secured to the headstock by four bolts and all appeared to be tight.

8.4 Clappers

The clapper is carried by an independent crown staple located through a central hole in the bell and headstock. It is understood that the clappers were replaced 10/12 years ago. Of cast iron construction and fitted with nylon bushes at the pivot point the wear on the strike face of all the clappers was minimal.

On Bell No's 1,3 and 4 the pivot bearing wear was acceptable but there appeared to be some wear in the fork on the nut side and this should be investigated. On Bell No 4 the crown staple nut requires tightening.

On Bell No 2. There appeared to be some wear in the bolt side of the fork.

On Bell No 5 the clapper was tight in the headstock and there was minimal wear in the pivot bearing.

On Bell No 6 the clapper was tight in the headstock and there was minimal wear in the pivot bearing. Special attention was given to the above as the clapper on this bell, when being rung up, is reported to occasionally 'go up on the wrong side' of the bell. The crown staple is secured by a normal type nut surmounted by a castellated nut correctly fitted with a split pin.

8.5 Stays and Sliders

On Bell No 4 it was observed that the slider showed signs of wear at the top edge where the stay rests when 'parked' on the handstroke. The bell was rung up and it was found that the stay fitted to this bell is of the correct length but of wider section. This causes the stay to 'ride up' on the curved section of the slider.

All other stays and sliders were OK

8.6 Pulleys

On Bell No 1 The plastic pulley was deeply grooved and it appeared as if at some time a resin compound had been applied to build the surface up. Although the pulley runs freely some sharp edges from the resin remains and this should be removed by sanding or filing.

On Bell No 2 the single pulley needs greasing.

On Bell No 5 a double plastic pulley has been fitted and one of the pulleys is heavily grooved and should be replaced. The pulley housing rubs against the wheel when the bell is in 'at rest' position.

On Bell No 6 the double pulley requires greasing.

8.7 Wheels

On both Bell No 2 and 6 one of the wooden 'joining pieces' that hold the cheek sections together is missing. This should be replaced remembering to apply glue to one cheek section only.

On Bell No 5 the outer wall of one of the cheek sections rubs against the pulley block when the bell is in the 'at rest' position. As the bell is swung higher the rubbing ceases. The pulley block should be seated further back from the wheel.

8.8 Ropes

All were serviceable but showing signs of wear. It was understood that the ropes were all 'low' at the moment and were due to be raised shortly. This would be of great benefit as the heaviest wear, especially on Bell No 1, was where the rope passes through the garter hole.

9.0 Recommendations

1. The clappers on Bells 1,2,3 and 4 should be removed after marking with indelible marker the orientation of the clapper assembly to the bell above and below the pivot bearing. The bolt through the pivot assembly should now be removed. With both sections separated the following checks should be carried out

- a. Check that the nylon bearing is secure in the housing. If loose the bearing needs to be replaced.
- b. The diameter of the bolt is the same over the entire non-threaded section. If worn then a new bolt should be fitted giving special attention to the length as described in c.
- c. Pass the bolt through the fork and check for excessive movement in either side of the fork. If excessive wear is found the holes should be built up by weld and the holes remachined.

NOTE the non-threaded section should be long enough such that when it is fully inserted both ends of the fork should be entirely resting on the solid section and NOT on the threaded part. On re-assembly a suitable packing piece should now be fitted (washers) and the nut refitted making sure that the nut is now locking on both sides of the fork and not bottoming out on the end of the threaded section.

- d. Pass the bolt through the pivot bearing and check for excessive movement. If excessive movement is present a new bearing should be fitted.

Procedure for removal, refitting and tightening of clapper in headstock

The following operation should be carried out by two people with the bell in the 'down' (at rest) position.

Remove the old split pin which passes through the castellated nut on the headstock. One person should now lie under the bell and mark with indelible marker the clapper face that strikes the bell. After marking the clapper hold it against the sound bow at the centre of the strike point. Using a suitable spanner the castellated nut can now be slackened by the other person. (On this installation there should be no problem but if rust was present on the threaded section then some easing oil should be applied and allowed to soak in.) The person under the bell should now take the weight of the clapper and the nut and washers can then be removed completely from the threaded section. The clapper assembly can now be lowered making sure that the leather washer fitted under the square section of the shaft is still in place. Holding the clapper against the strike point the washers and nut can be refitted to the threaded section of the crown staple. The nut should be run down until the whole assembly is tight. The person underneath can now check that the clapper is hanging centrally.

One of the slots in the castellated nut should now be lined up with one of the holes drilled through the threaded section and a new split pin fitted.

Any 'play' up, down or sideways felt by moving the clapper should be in the pivot bearing only.

2. On Bell No 6 the nut under the castellated nut should be removed. This will necessitate somebody holding the clapper underneath whilst both nuts are run off the thread. If the hole drilled through the screw section of the shaft is above the castellated nut the distance should be made up by fitting plain washers of a suitable size.
3. On Bell No 4 the stay should be trimmed by removing some wood to avoid the riding up situation.

With the bell in the 'at rest' position and viewing the bell with the wheel on the left. Remove a section approximately 1 inch wide by 3 inches deep from the headstock side of the stay. This is the face of the stay that is at right angles to the slider.

4. On Bell No 1 the 'resin' build up on the pulley should be removed by sanding and/or filing. Serious thought should be given to replacing this pulley if the wear continues.
5. On Bell No's 2 and 6 the pulley bearings should be greased.
6. On Bell No 5 one of the pulleys is badly grooved and should be replaced or a complete new pulley assembly fitted.

The pulley housing is contacting the outside face of the cheek section of the wheel when in the 'at rest' position and needs repositioning. There may be some play in either the pulley holding bracket holes or the location holes in the bell frame which will allow the housing to be repositioned by slackening and then retightening the holding bolts. Failing this the holes should be elongated sufficiently to allow the housing to be repositioned with a clearance being observed between the wheel and the housing with the bell at rest. As a final check the bell should be rung full circle with somebody viewing the raising and

lowering of the bell from within the belfry. Ear defenders should be worn or the clapper 'tied' to comply with standard Health and Safety procedure.

7. On Bell No's 2 and 6 the missing joining pieces between the cheek sections should be replaced using a wood glue applied to one cheek section only. There is the danger that part of a cheek can be broken off if the rope is not kept tight and happens to catch the edge of a section.
8. Raise all the ropes to present a relatively unworn part of rope to the wheel at the garter hole position. This should prolong the rope life by an appreciable amount of time. There is no recognised additive that can be used to prolong the life of a hemp rope.
9. All the Bell Holding Bolts showing signs of rusting should be wire brushed and/or scraped to remove the loose rust and then repainted using, either two coats of 'Hammerite', or one coat of metal primer, one coat of grey undercoat, and one top coat of gloss.
10. The fault in the floodlights fitted in the South East and North East corners of the Ringers' Gallery should be rectified. If it can happen to these two lights there is no reason why it cannot happen to the other two. With the dark evenings approaching the natural light from the window will be reduced and any natural light from the nave of the church will be minimal.
11. Remove bird debris from bell chamber and complete repointing of the louvres.
12. During the next quinquennial inspection, seek the church architect's opinion on the cracks in the stonework on the North and South walls immediately above the apex of the louvres in the Bell Chamber.

10.0 Further recommended work

Two other points were raised during our inspection

- The tendency of the clapper on Bell No 6 to go up on the wrong side.
- Soundproofing of the tower

The tendency of the clapper to go wrong side up on Bell No 6 is not due to any mechanical fault on the clapper itself. It is probably due to some aspect of the Bell Dynamics, which on this installation would be very interesting to evaluate. We would be quite happy to revisit the tower and undertake a proper analysis. The time required in the belfry to obtain all the information would take around 2 hours.

Our ideas on soundproofing could also be discussed during this visit.

11.0 Conclusions

There is nothing that stops any of the bells being rung full circle and all the recommendations can be carried out in house and do not require a faculty.

Advice is given in good faith, no liability accepted.

R.W.Lyon

Bell Consultant to the Derby Diocesan Association of Church Bellringers

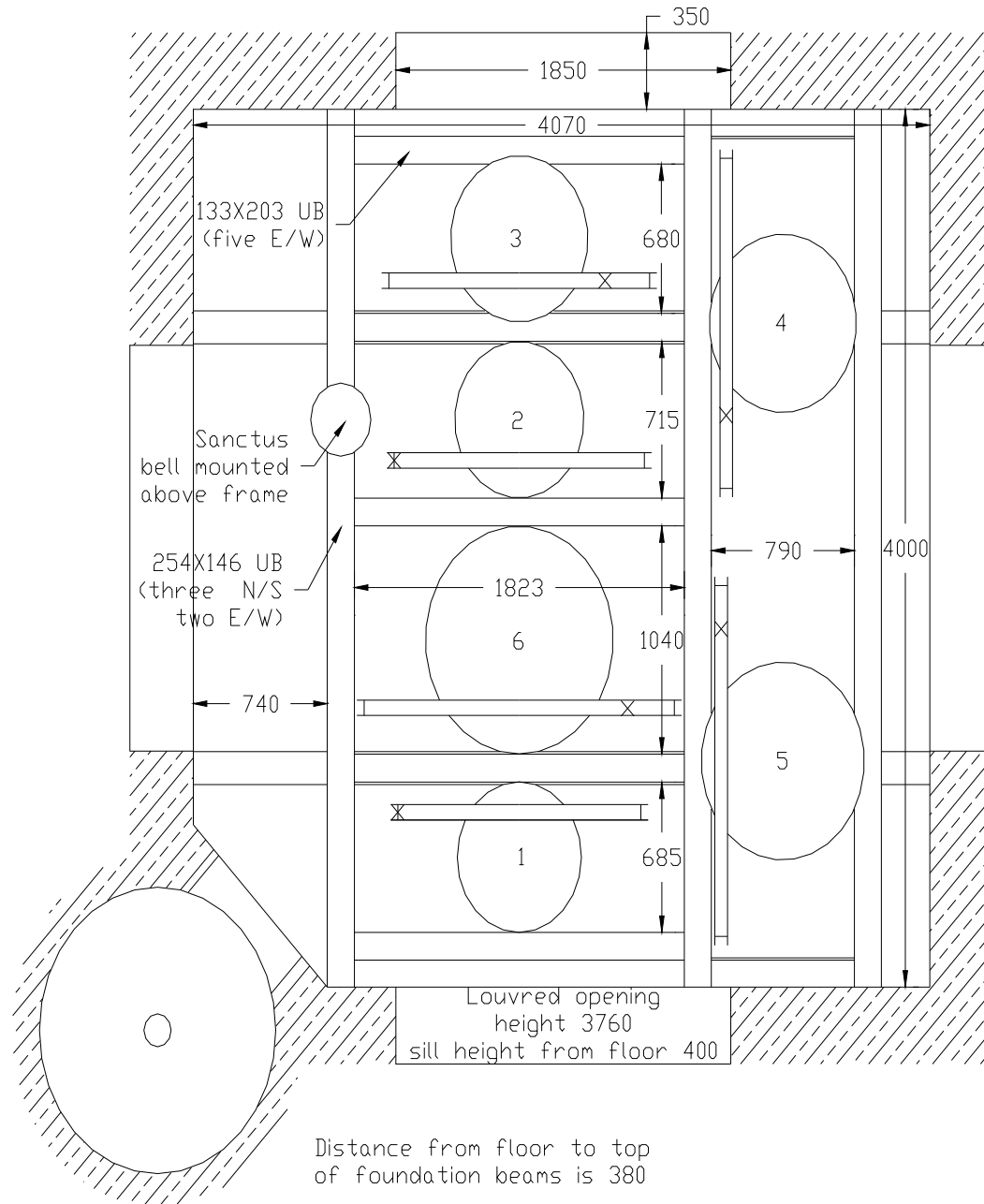


FIGURE 1
BELL CHAMBER

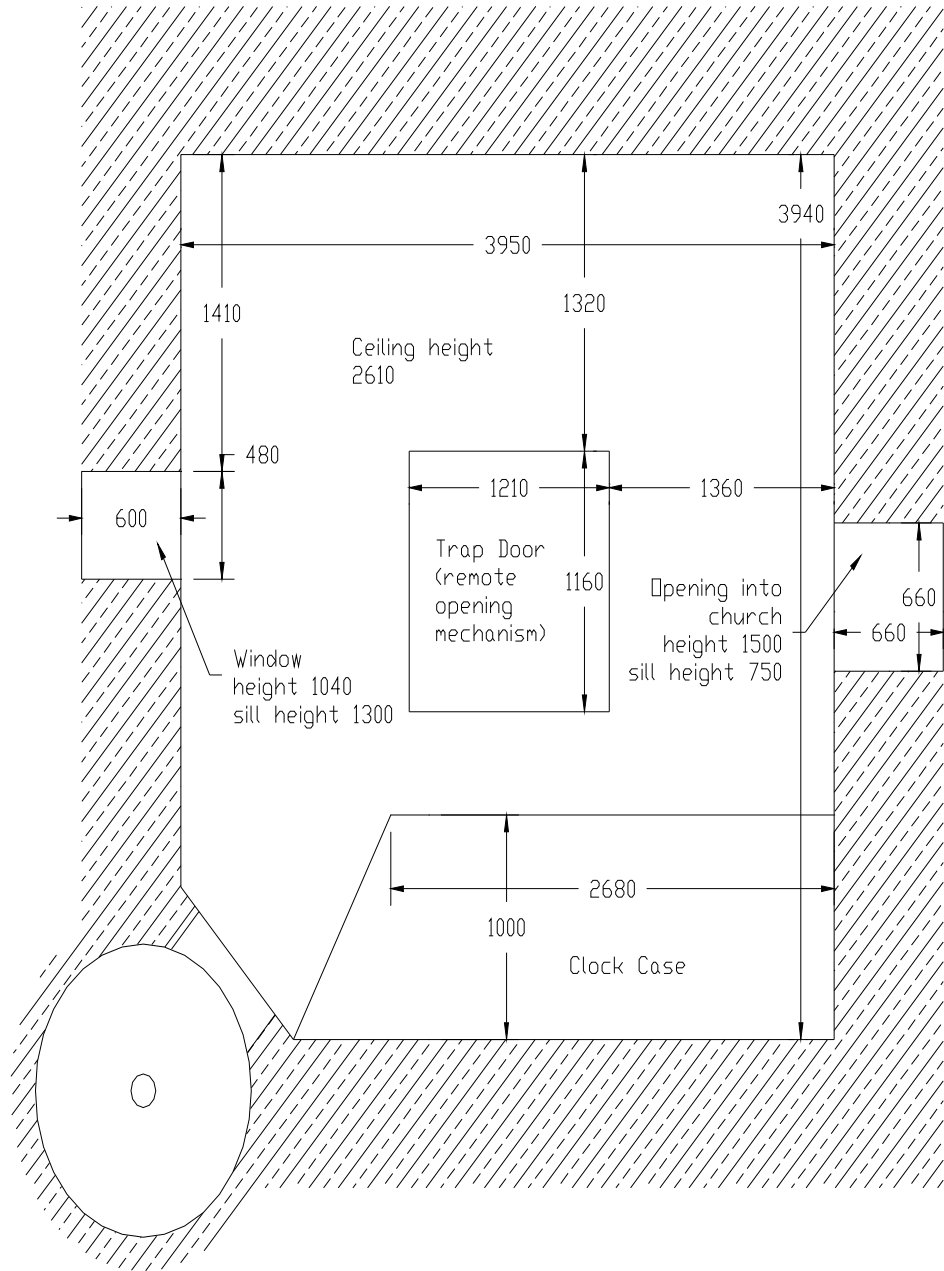


FIGURE 2
CLOCK ROOM

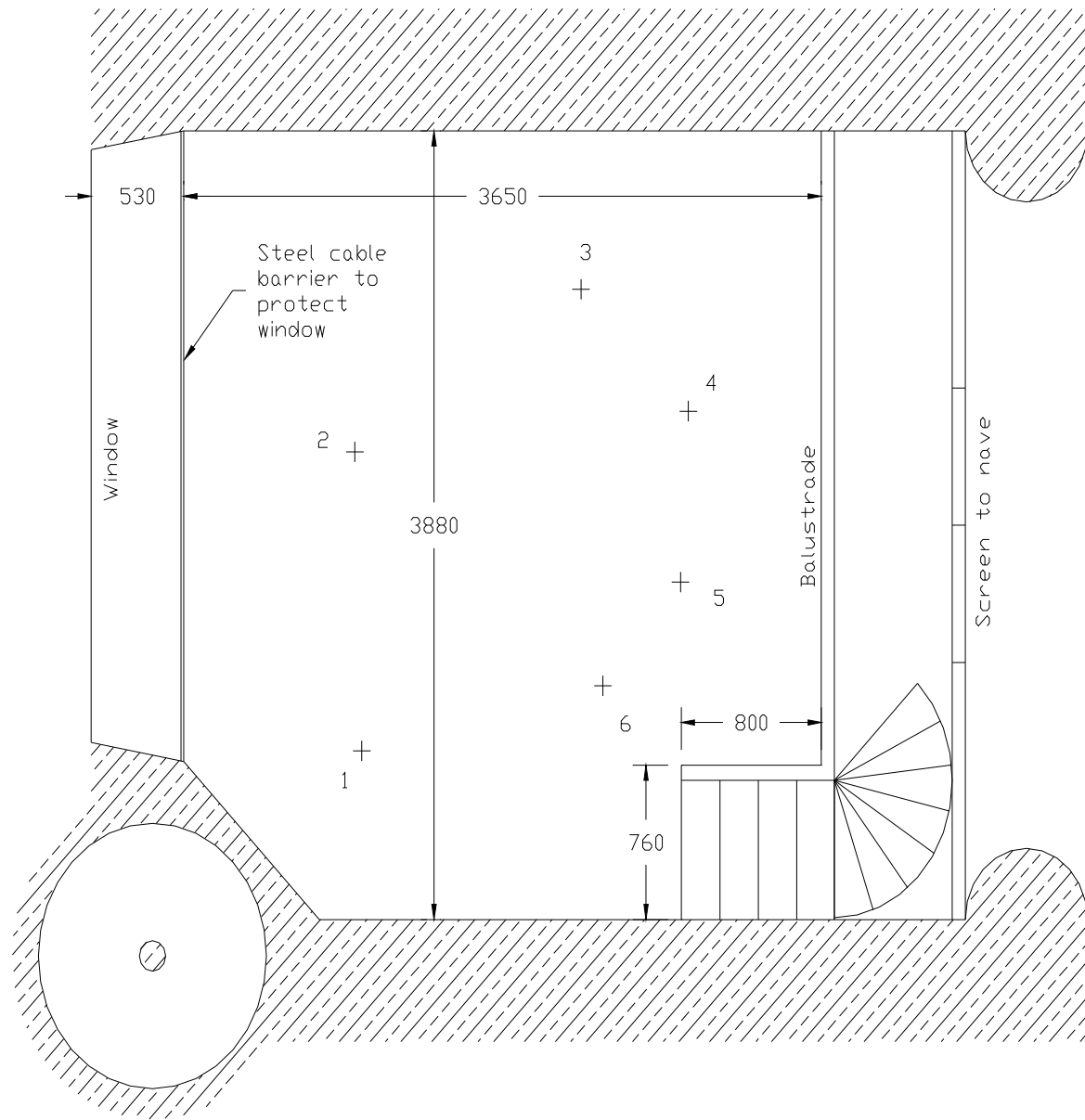


FIGURE 3
RINGERS' GALLERY