TRIAL INVESTIGATIONS

Church of St Mary Abbotts Ann HLF Repairs & Other Works

for

PCC St Mary's Church Abbotts Ann

Architects
Consulting Engineers
Project Managers
Surveyors

PICK EVERARD

322 High Holborn
London
WC1V 7PB
Phone 0345 045 0050
consultants@pickeverard.co.uk
www.pickeverard.co.uk

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Document History

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A series of trials and investigations were carried out at the Church as part of the Development Phase of HLF funded repair works at the Church of St Mary Abbotts Ann.

This report describes the findings during:

1. Surface Water Drainage Investigation, Tracing & Clearance

2. Stonework: partial dismantling to investigate the methods of construction including the presence of ferrous cramps. The sampling of mortars, obtaining matching stone, and testing repair methods – piecing, mortar repair and sheltercoat consolidation.

3. Roof Structure: opening 4No sections of gutter to investigate the conditions of truss bearings in the Chancel and Nave roofs.

4. Factors affecting the provision of scaffold were also investigated.

1. SURFACE WATER DRAINAGE

Two contractors were invited to tender for the work of tracing, recording and clearing the surface water drains leading from the Church. They were also asked to remove 2No water butts from the south of the Church and break out sufficient of the brick base to establish if it covers a cistern.

Lanes
Complete Drainage Ltd

Complete Drainage Ltd was awarded the contract and visited the site on We4dnesday 18th February 2015.

A high-pressure water jet was used to clear the drains of debris. They also carried out a CCTV survey of six of the drains as far as the soakaway; the seventh had an 'S' trap connection and could not be probed or jetted. However, the drain was running well and the contractor has no concerns about its efficacy.

The downpipe which ran into the water butts was connected directly to the outfall drain when the water butts were removed.

Subsequent to the tenders being issued the old boiler housing was dismantled leaving the downpipe curtailed at high level. This was also connected to the adjacent drain.

The findings of the investigations are summarised below.

There are currently 7No downpipes serving the Church: The three on the north side empty into catchpits which are each connected to soakaways; The southeast downpipe on the Chancel also drops into a catchpit whose outlet runs to a nearby soakaway. The other three downpipes on the south side run into the ground and are connected directly to drains leading to soakaways.

	Downpipe /Drain	Hopper	Down-pipe	Catchpit/ Connection	Drain Material	Drain Direction /Distance	Soak-away	Comment
1.	Nave NW	Cast iron octagonal	UPVC, diverted	Raised Catchpit	Cast Iron	1.52m North	Cleared	Downpipe, Catchpit & Drain to be moved. Insert Catchpit New cast iron downpipe.
2.	Nave NE	Cast iron octagonal	UPVC	Raised Catchpit	Cast Iron	1.67m North	Clear	Insert Catchpit New cast iron downpipe.
3.	Chancel NE	Cast iron rectangular dated	Cast iron	Raised Catchpit	Cast Iron	1.90m North	Blocked	New soakaway needed. Insert Catchpit.
4.	Chancel SE	Cast iron rectangular dated	Cast iron	Raised Catchpit	Cast Iron	1.82m SE	Clear	Insert Catchpit
5.	Vestry	Direct connection to gutter	UPVC	Direct connection	UPVC	3.04m East	Clear	Same Soakaway as '4' New Catchpit needed. New cast iron rainwater goods.
6.	Nave SE	Cast iron octagonal	UPVC, diverted	Direct connection	Cast Iron	0.83m South	Clear	Downpipe/Drain disrupted by introduced Boiler Housing. New Catchpit/Drain needed. New cast iron

								downpipe.
7.	Nave SW	Cast iron octagonal	UPVC, diverted	Direct connection	Fireclay/ Cast Iron	South? 'S' trap prevents access	Runs well: Clear	Downpipe/Drain disrupted by introduced water butts. New Catchpit/Drain needed. Remove 'S' trap. New cast iron downpipe.
8.	Stair Tower	New direct connection to ci gutter	New cast iron	New catchpit	New fireclay	Join extg waste drain	N/A	New trapped Catchpit/Drain needed. New cast iron downpipe
9.	Tower	Direct connection to lead sump	Cast iron	Pipe runs down Nave north roof slope at west end and empties into parapet gutter.				Roof section to be leaded downpipe to empty onto lead of roof. Removed pipes to be reused for other RWDP's.
	General. Downpipe No1 was diverted just below the hopper to avoid the War Memorial when it was fixed to the wall below. The pipe and connection is prone to blockages and will be replaced as a straight drop. The War Memorial is to be moved to the next brick pier. Raised brick catchpits encourage dampness in base of walls: New self-contained fireclay catchpits to be inserted and connected to drains. On south side new catchpits allow future rodding. No traps to be fitted to surface water drains. It is proposed to insert a new downpipe in the re-entrant area between the SW wall of the Nave, S wall of the Tower and E wall of the Stair Tower. Because of restricted space this will have to connect to the waste drain and so need to be trapped. The catchpit will be fitted with a baffle that is removable for rodding.							

2. STONEWORK

Two contractors were invited to tender for the work of dismantling selective parts of the building to establish the method of construction and, particularly, investigate the presence of cramps. Also to trial piecing in matching stone, carrying out mortar repairs and consolidation of weathered surfaces using sheltercoat. They were also asked to sample and analyse the original mortar and suggesting a suitable match for making repairs.

Because the cost of the proposed work was prohibitively expensive the extent of the work was reduced, omitting one area of work and sharing access scaffold with the roof investigation contractor.

Taking into account the reductions the final submitted prices were:

AF Jones Stonemasons Ltd	£3,425
Wells Cathedral Stonemasons	£2,674

Consequently Wells Cathedral Stonemasons Ltd was engaged to carry out the works and so they commenced on site 10th March 2015 after erection of the scaffold on 9th March 2015.

A disturbed section of parapet at the NE corner of the Nave was dismantled down to the level of the cornice, setting aside the coping, stone and brickwork of the wall face and core.

A brick was removed from the wall next to a decayed section of the roll moulding.

A cement patch was removed from the adjacent pilaster on the expectation that a ferrous cramp was present.

Mortar samples were taken for analysis to ensure the repair mortars provide a close match.

The following observations were made:

The stonework and brickwork of the parapet is generally sound and no cramps were present in the sample area.

A number of the coping stones had been replaced using matching precast concrete units.
The stone used is Chilmark, (currently available from Chicksgrove Quarry) not Bath as per the description set out in the Listing Description.

Removal of the parapet revealed the top surface of the cornice. The projecting stones are cramped together with ferrous straps approximately 75mm back from the face of the parapet. They are set in lead which has fortunately protected them and there are no signs of corrosion-induced cracking or failure in the cornice. They were treated before the parapet was reconstructed over them.

The removal of the adjacent brick revealed that the roll moulding was bedded in the wall for half a brick's depth. The mortar around the roll moulding is the original lime-based mortar suggesting that decay in the roll is either due to incorrect cutting of the stone, or localised water washing.

The removal of the cement patch revealed the head of a ferrous cramp set into the stone joint. The schedule will include for all such patches to be removed and the cramps replaced using stainless steel.

Proposed matching mortar mixes are still awaited so the areas dismantled were made up using a similar generic mix used regularly by Wells Cathedral Stonemasons.

3. ROOF INVESTIGATIONS

A price was negotiated with Mark Hinton Ltd, the contractor responsible for clearing the gutters and carrying out regular maintenance and repair of the roof. He was able to suggest savings reducing the cost of the scaffolds which he shared with the stonework contractor.

The work required opening the parapet gutters at two positions over the Chancel and two positions over the Nave. Lifting the gutter supports allowed inspection of truss ends representative of the four different constructions.

Lead parapet gutters run along the north and south sides of the Nave and Chancel: the Chancel gutters have three bays to the west and one small bay to the east falling to a single lead-lined sump. The bays are of acceptable length but have inadequate falls and steps.

The north Nave gutter is divided by two sumps with two bays in the centre and two in each of the outer sections. The falls are good but the steps not adequate and the bays of the centre section are much too long.

The south Nave gutter is divided by two sumps with four bays in the centre and two in each of the outer sections. The falls are good and the bays are of acceptable length but the steps are barely adequate. Also, as noted below, the base of the gutter was made up using a cement screed which encased structural timbers.

The lead was turned back at the NW and SW ends of the Chancel gutters and the boards cut back to expose the bearings of the west truss.

In the SW corner of the Chancel the gutter boards and supports were heavily decayed and had been largely lost. This left the lead unsupported and the void filled with frass and decayed material. The detritus was cleared away to expose the structural timbers.

The Truss end is supported clear of the parapet wall and, although it has a considerable number of beetle flight holes they are clearly of great age and not active. The timber is very hard and could not be readily penetrated by a drill.

In the NW corner of the Chancel a supplementary gutter board has been introduced. This comprises two layers of plywood totalling 50mm thick. Its removal exposed the remains of the earlier boards and open eaves space. Again there was a considerable amount of debris and frass in the void and there was also a section of timber cut from the medieval moulded wallplate which was very badly decayed by beetle. All was cleared away to expose the truss end. The back of the parapet wall was hollowed out below the gutter but it was not clear why.

As with the SW corner the Truss end is supported clear of the parapet wall and, although it has a considerable number of beetle flight holes they are clearly of great age and not active. The timber is very hard and could not be readily penetrated by a drill.

The lead of the bay immediately east of the NW sump on the Nave gutter was turned back and the gutter boarding removed to expose the truss end.

This was set into the masonry of the wall which had been built quite tightly around it. The end of the truss is damp, soft and decayed throughout its section. Although the wallplate and bearing are set inside the roof and away from the gutter it is likely that decay has spread through the interior of the section.

The lead of the bay immediately east of the SW sump on the Nave gutter was turned back exposing underfelt and cement screed laid to falls. The truss end appeared to be encased in this screed so the latter was cut away.

This revealed an inserted plate, introduced into the truss to support the foot of the principal rafter when the tie beam was cut back from the wall. The plate bears on a wallplate that is fully encased by the cement screed although it, and the inserted plate appear sound. The inserted plate has been severely cut down and back to allow the gutter line to be maintained leaving very little bearing. There is an inner wallplate visible from within the roof which supports the tie beam end but it is not clear how far the support of the truss relies on the bearing of the inserted timber. As noted, the end of the tie beam had been cut back, clear of the south wall and treated with a mayonnaise paste.

It is recommended that the following works be included in the Specification:

The Chancel gutters should be opened, all remaining boarding removed and the voids cleared. New gutters should be framed up and boarded out to the correct falls, steps and bay lengths whilst ensuring the area below is contiguous with the main roof space. Provision should be made for the repair of one truss end but it is hoped that this will not be required.

The boarded north gutter of the Nave should be removed, exposing all structural timbers. It is proposed to cut back the masonry from around the decayed timber and secure the six truss ends by plating the tie-beams with stainless steel angles bearing on padstones cast into the wall. A new gutter should be framed up and boarded out to the correct falls, steps and bay lengths whilst ensuring the area below is contiguous with the main roof space.

The screeded south gutter of the Nave should be broken out and removed, exposing all structural timbers. It is proposed to secure the six truss ends by plating the tie-beams with stainless steel angles bearing on padstones cast into the wall. A new gutter should be framed up and boarded out to the correct falls, steps and bay lengths whilst ensuring the area below is contiguous with the main roof space.

4. SCAFFOLD ACCESS

The church is situated at some distance from the road with the only available access along a narrow pedestrian path. This means that deliveries to site will, in most cases involve double handling.
The access scaffold and temporary roof will require a considerable amount of material to be brought to the building involving a considerable amount of work and expense.

Any savings that can be made in this part of the work will mean more is available for the repair of the building.

Discussions were therefore held with the scaffolding contractor who provided access for the trials.

He agreed that the use of a Haki type system to cover the temporary roof would save transporting large amounts of corrugated sheeting but thought the only way to make major savings would be to establish a delivery point which was closer to the building and suggested the use of the field.

The PCC know the owner and tenant using the land and may be able to negotiate use of the field for short periods at the beginning and end of the contract.

The field runs down the hill from the footpath to the river and its lower section is a water meadow which can become very boggy. The entrance to the field is quite close to the damp area and care is needed to keep to dry ground. To ensure this is the case it may be prudent to remove a small hawthorn tree opposite the gate. There is an avenue of mature trees halfway up the slope and care should be taken to ensure their root systems are not damaged by vehicles. It is also occasionally used for grazing and this would probably cease while contractors were based in the area.

Until the PCC can confirm acceptance of the use of the field the Specification will include the use of the Car Park and resulting double handling of material.

5. PHOTOGRAPHS

5.01 Site of Stonework Trials

5.02 Iron cramp exposed below cement fill

5.03 Section of Parapet dismantled (cramps in cornice)

5.04 Brick removed next to decayed roll moulding

5.05 Interior of Chancel roof

5.06 Medieval wallplate reused

5.07 Beetle decay in rafter

5.08 Old mortice cut in principal rafter

5.09 North end of Nave roof truss built into masonry

5.10 South end of Nave roof truss cut back and treated. Plate inserted to carry foot of principal rafter

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5.11 NW corner of Chancel gutter opened.

5.12 SW corner of Chancel gutter opened

5.13 Decayed off cut of wallplate recovered from void in NW corner of Chancel

5.14 Cement screed cut away to expose end of inserted plate and wallplate bearing beneath.

5.15 Masonry cleared away from N truss end over Nave: Timber found to be damp and soft.