Final Conservation Report for the Memorial to

Henry Vaughan

The Church of St Ffraid - Llansantffraed– Brecon

Elliott Ryder Conservation

Report prepared by:

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FINAL CONSERVATION REPORT FOR THE MONUMENT TO HENRY VAUGHAN † 1695

The Church of St Ffraid, Llansantffraed, Diocese of Swansea and Brecon.

The Works

Elliott Ryder Conservation were commissioned by Dr Mervyn Bramley on behalf of the Brecknock Society and the PCC to undertake the conservation of the memorial to Henry Vaughan. Works included a detailed clean of all surfaces to display standard, re-joining of an historic fracture, consolidation, filling and pointing.

There were no additional works included over and above recommendations included in our initial conservation report of February 2014.

The works were carried out under the Henry Vaughan Grave, Restoration and Access Project and funded through the Brecknock Society, with kind assistance from the Brecon Beacons Trust, the Vaughan Association and a Public Appeal.

Client

The Brecknock Society and Museum Friends in association the PCC of St Bridget's Church, Llansantffraed-juxta-Usk

Faculty

The works were carried out under the Grant of Faculty issued by the Diocesan Court of Swansea and Brecon on 18th April 2014

Period of Works

Work commenced on-site on Tuesday 27th May and was completed on Wednesday 4th June 2014.

Conservators / Assistants

Kieran Elliott ACR (Accredited Conservator/Restorer)
Anna Barnes

Sequence of Works

Works were carried out in a single phase, with cleaning of the memorial being completed before re-instating the rejoined sections followed by filling and pointing.

Film and Processing

Kieran Elliott and Susanne Ryder were responsible for all digital photographs.

The names St Bride, St Bridget and St Ffraid all refer to the same root name.

The Works

The memorial was cleaned using a weak solution of Synperonic A7 (non-ionic surfactant) and de-ionised water. The slab was separated, moved away from the plinth and re-joined. The slab was re-bedded solidly, the resulting break edge filled, with the horizontal joint between the slab and the plinth pointed in a sympathetic mortar.

1 Monument Description

1.1 The memorial comprises of a simple, largely rectangular slab with an incised inscription thought to have been applied much later after Vaughan's death. It has a heraldic shield with three naive, low-relief winged figures. A low-relief roll moulding is visible around the perimeter with a small ovolo moulding on the edge with small fillet top and bottom. The head of the slab is slightly curved with a central flat section with flanking returns.

2 Condition Assessment

2.1 A finger-tip assessment of the slab and plinth was carried out prior to cleaning and it became apparent surfaces were in a sound enough condition to undertake the necessary cleaning using stiff nylon stencil brushes.

2.2 Carving and lettering was still crisp, it is understood that the incised inscription in particular had been re-carved historically to sharpen up its appearance. This would seem to be the case as the rounded centres of several 'R' and 'P' letters were missing, seemingly having been removed by chisel, to leave a flat surface. Stone of this type and hardness would not deteriorate that way naturally.

2.3 The few random springing laminations were noted and cleaning proceeded carefully in those locations, before 'surface' (not deep) consolidation.

3 Cleaning Trials

3.1 Due to the achieved patina of age, efforts were made not to adversely affect this, by using sympathetic techniques and materials. The use of a masonry biocide was not deemed appropriate (more of which later) nor the use of low-pressure steam. The biological growths were reduced because not only are they visually disfiguring, but they retain moisture at the surface of the stone accelerating a range of decay mechanisms.

3.2 The slab and plinth were dry brushed to remove all organic debris from the over-hanging Yew tree. Surfaces were then pre-dampened with clean water and paper towelling applied to the surface, this was further wetted with the surfactant solution which was allowed to soak into the sandstone before cleaning commenced. The use of paper towelling or any compress, keeps the active ingredient on the surface being cleaned. The sandstone is fine/medium grained and not significantly porous.

3.3 Once the active ingredient and compress had been in contact for a suitable dwell time, paper was peeled back to reveal the stone surface. The dirt was agitated with soft nylon bristle-brushes and the liberated dirty liquid soaked up with dry paper towelling to prevent re-distribution around the slab. Two beakers of clean water were employed to prevent dirty water being applied to the slab. Water was constantly changed as surfaces gave up dirt readily.

3.4 After cleaning it became clear splashes from a previously used biocide had splashed over the plinth leaving isolated areas much cleaner than we could achieve even using phosphor-bronze brushes and water. This was halted swiftly has the soft metal brushes disrupted the sandstone surfaces unacceptably. The biocide had killed and slowed down biological growths, with the remaining green areas showing biological growths on a microscopic level, below the

surface. On a macroscopic scale, these isolated areas did not look as clean as the remaining surfaces. This differential will even-up in time and to prevent this situation happening again it would be necessary to carefully apply a biocide to all surfaces by brush or roller, so that every thing was covered uniformly.

4 Conservation Works

4.1 The two twisted copper-alloy wire fixings that had been used to join the fracture were removed carefully with the aid of small chisels and a 'Dremel' micro-drill using a carborundum disc. These fixings and the joint had been filled with a very fine pourable (now brittle) material that had the appearance and characteristics of 'Ciment Fondue' a casting material developed in the 1970's. The sides of these channels were rounded and would not have held onto the subsequent filling medium properly in the long-term. As a result the channels were dove-tailed with the aid of the 'Dremel' using a diamond disc and shaped carborundum heads to create an inverted 'V' shape.

4.2 Once free from fixings, the thick inappropriate bedding mortar was removed from around the perimeter of the joint between the underside of the slab and the plinth. This was only superficial and was loosely attached making it easy to remove by teasing out with a chisel. The lower half of the slab was moved away from the upper and rollers placed beneath to facilitate its removal away from the plinth. Once free it became clear the slab immediately beneath the carved memorial panel was a single piece of tooled stone and was in a solid condition. Both upper sections were moved to aid removal of the bedding medium, with nearly a whole 25 litre bucket of now rich soil removed and discarded. Two 25 litre buckets of cementicious pointing mortar were removed from the massive, inappropriate joint.

4.3 The unnecessarily thick joints had completely obscured the true thickness of the slab, which revealed it was significantly thicker than first thought. This meant the slab was heavier than initially anticipated but more importantly meant the slab could be re-joined with dowels in the centre of the slab (bed height) rather than flat metal bar set just below the surface of the bottom bed as had been envisaged previously. This meant it was not necessary to flip the slab to reveal the bottom bed and a far stronger join was possible.

4.4 Three 10mm diameter, stainless-steel (316 marine-grade) threaded dowels each 150mm long were set into corresponding dowel holes in both sides of the break. The dowels were secured into position with an external grade epoxy-resin, which was also applied to the break edges to make for a strong bond. The slab had three ratchet straps applied to help achieve the correct alignment and prevent any movement whilst the conservation grade resin was polymerising. These were released after 24 hours, when the retained resin samples had reached full strength.

4.5 To achieve correct alignment for the break edge, the exact height of the letters were recorded with callipers and replicated on letters bisected by the fracture and the horizontal mouldings on the long sides positioned such that they were level.

4.6 Upon movement of the slab, it became clear much of the bottom bed has delaminated historically, making it very uneven with now very different bed heights in each of the four corners ranging from 74mm (south-east) to 92mm (south-west). The top bed of the slab is not flat from side to side with the south-west corner kicking up. With a string run along the top bed from side to side along its longest side there is gap of 7mm and 11mm on the south and north sides respectively. Joining the slab with the string flat along the slab would have produced a massive gap between the letters bisected by the fracture and would have had little or no contact along the break edges. These discrepancies made bedding the slab difficult as the plinth is largely level along its long and short axis's. A compromise was arrived at which meant there is still a small degree of lean down to the north elevation (8mm out of true level) but means water will not sit in the incised lettering or winged angels.

4.7 The repair mortar that was used to fill the fracture was designed to be compatible with sandstone and similar in texture (particle size) such that it is similar to the host stone with regard to wetting/drying and relative strength. The only external quality material compatible with sandstone is natural hydraulic lime (not lime-putty which is incompatible) this is a brilliant white powder and has a massive impact on even strongly coloured stone dusts as were employed on the slab repair medium. Although the filling currently looks pale in comparison to the host stone, it presents a strongly alkaline surface which will attract biological growths and tone down relatively quickly, especially in its position beneath the over-hanging Yew tree. Please refer to paragraph 7.3 in our initial conservation report.

4.8 The two different repair mediums were based on 1 part NHL 3.5 with 2.5 parts crushed purple sandstone dust (of two different particle sizes) and slate dust to darken the purple coloured dust as far as possible.

4.9 The springing laminations were consolidated by introducing a weak acrylic resin solution (5% Paraloid B72 in Acetone : I.M.S, 50 : 50) by pipette. Three cycles were injected in total and were successful in re-bonding the de-laminating layers, such that they were solid. The consolidant will slow down, not prevent, water entering these areas. Work was also done to several of the letters in the upper inscription which displayed laminations and the potential for springing and eventual loss.

4.10 The memorial slab is smaller in terms of its footprint than the plinth beneath, and present problems with regard to filling. The joint was pointed to leave as much of the original stone slab moulding exposed as possible, in accordance with current best practice. Over filling joints accelerates deterioration with water collecting behind 'feathered edges' as was witnessed in the mortar removed, despite being too hard for the host stones.

5 Maintenance Considerations

5.1 If it is known when the Organic Patio Cleaner was applied to the slab and plinth, it would be prudent to allow a period of five years (in total) to elapse. Having spoken to the chief chemist for the Wykamol group, who produce conservation grade materials and whose materials we use, compatibility of the materials is unknown and should be avoided until the original material is exhausted. The slab should then be treated with a conservation grade material, applied evenly every five-ten years to slow down (not prevent) the colonization of biological growths over this important piece of commemorative art.

5.2 Serious consideration should also be given to the application of a bespoke, de-mountable protection or cover to prevent water pooling on the slab during months when there is a risk of frost. A raised cover would have the added benefit of allowing the slab to still be seen during autumn/winter months, instead of being completely enveloped within a close fitting breathable membrane. Several individuals and a small group of Dutch tourists had come specifically to view the memorial during our short time on site and would not have had visual access had it been covered.

5.3 The memorial will be closely inspected after twelve months and then after five years or sooner (at no cost) by Elliott Ryder Conservation. This is part of our on-going maintenance commitment, to evaluate the condition of all works undertaken and the success of treatments/materials carried out.

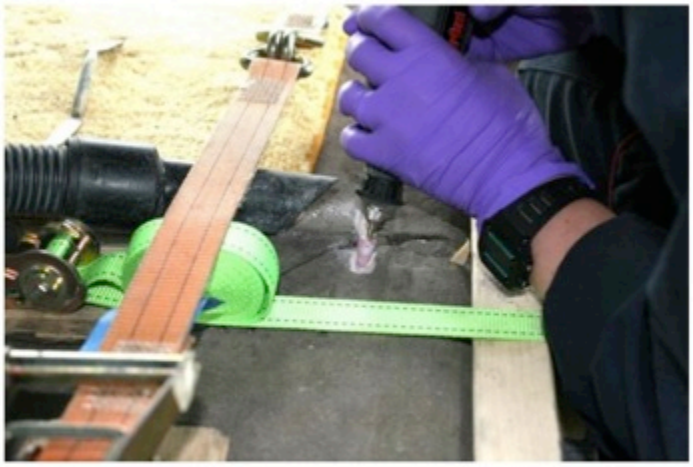
General views of the top incised inscription slab during cleaning on the left and with all treatments completed on the right. Note the laminar structure of the stone slab is much more pronounced after cleaning, with light and dark banding. Note how uniformly colonized the un-cleaned upper section is, this will happen again relatively quickly, causing the new alkaline surface of the hydraulic lime filling medium to blend in with adjacent sandstone surfaces.

Cleaning in progress to the lower section of the slab. The surfactant (which has a mild biocide effect) is painted onto paper toweling to keep the active ingredient in direct contact with the biological growth. Paper is then peeled back and algae removed with stiff bristle brushes and constantly changed clean water with dirt/debris absorbed onto dry paper toweling.

The upper inscription still to be cleaned, highlighting the contrast between treated and untreated surfaces.

The upper slab has been cleaned, with the south elevation of the plinth showing cleaning in progress, using the same technique and materials as the carved surfaces. Note the thickness of the massive joint at the right-hand corner.

The insubstantial, twisted copper-alloy fixing removed from the viewer's right-hand side of the slab. The bottom of the channels were rounded and no good for holding onto newly placed repair mortar.



One of the channels being 'dovetailed' to provide a better key for the repair mortars. Note the ratchet straps were applied around the slab in both axis's during curing of the epoxy resin used to prevent any unwanted movement.

Consolidation of the laminating surfaces in progress. The water-clear acrylic resin was applied by pipette with the capillarity of the laminations drawing the consolidant into the fissures, effectively bonding both surfaces together after polymerization of the resin.

The slab having been cleaned, prior to removal of the lower section. Note the dark material either side of the slab is some of the soil which it was bedded on

Both sections having been removed to reveal the sound surface of the slab immediately beneath, which was heavily tooled with no obvious signs of factures, laminations or geological faults. Note the top bed of the lower slab has been removed of all soil and water washed to provide a clean, flat surface for re-bedding the re-joined slab.

The three 10mm diameter, threaded stainless-steel dowels (each 150mm long) prior to marrying up with the lower section and securing with epoxy resin. Note the uneven nature in the thickness of the slab from side to side. Note also the sound condition of the underlying slab, which is wider and longer than the historic carved slab above.

Two repair mortars based on a hydraulic lime binder using the same stone dust as the host stone were selected to be similar in terms of texture and colour, but weaker than the historic stone, which was vivid in colour once cleaned. The disparity in colour between the filling medium and the cleaned surfaces will diminish once the slab begins to be colonized by biological growths. Note dental tools and small spatulas were used to pack the mortar deep into the vertical fissure, which was much smaller this time due to the quality of the join.

The join after filling was complete. Mortar was inserted to prevent water pooling in the lettering. The filling medium comprises of crushed/sieved purple sandstone dust, red sand and hydraulic lime NHL 3.5.

The join between the upper slab and the plinth. The slab was leveled on strips of lead to provide solid, uniform support and then slate fragments packed in around the whole perimeter to provide additional support and something solid against which to apply the pointing mortar. Note the splash marks on the upstand of the plinth caused by uneven application of a previous biocide.

More slate fragments in the west elevation joint, note although the historic slab and plinth are parallel and largely level, the angle of the railings gives the impression of a lean, which is misleading.

The completed works from the north elevation, note the joint between the slab and plinth has been recessed so as not to create ugly, wide joints and to reveal as much of the moulded edges as possible. The mortar is designed to be weaker than the historic stonework.

The joint to the south-east corner, note the uneven thickness of the joint is directly related to the historic loss of material from the bottom bed of the slab which has delaminated significantly over time.

List of Sub-contractors Materials and Suppliers

Material	Supplier	Address	Contact Number
Synperonic A7 Paraloid B72 Acrylic Resin	Conservation Resources	Units 1, 2 & 4 Pony Road Horspath Ind Estate Cowley OXFORDSHIRE OX4 2RD	01865 747755
Acetone Industrial Methylated Spirits	Lab 3	Unit 1 Ross Road Business Centre Northampton NORTHAMPTONSHIRE NN5 5AX	0870 4445553
Akepox 5010 Epoxy Resin	CRL Laurence	CR Laurence Europe / UK C Babbage Avenue Kingsway Business Park Rochdale OL16 4NW	0800 0421 6144
Cotton Wool	Clayton First Aid Ltd	Chiddingstone Causeway Tonbridge KENT TN11 8JP	01892 871111
NHL 3.5	Ty Mawr Lime	Llangasty Brecon POWYS LD3 7JP	01874 658249
Building Sand	Robert Price	Canal Road Brecon POWYS LD3 7DT	01874 622101
Purple Sandstone (Dusts)	Cadw	Tintern Abbey	
Stainless-steel Dowelling	Newgate Stainless Ltd	Victoria Mills Cleckheaton W YORKS BD19 5DR	01274 852040