Final Conservation Report for

The Monument to Evan Beavan

Holy Trinity Church – Preston Wynne

Hereford Diocese

Elliott Ryder Conservation

Final Conservation Report for the Memorial to Evan Beavan †1814

The Works

There were no unexpected works additional to that of our original submission except for complete replacement of the articulated, long side fluted block. This was in pieces within the core. Upon dismantling the monument, it was found the stone fragments of the previously whole block were delaminated, in numerous pieces, saturated with soluble salts and beyond practicable repair. This section and only this section was replaced with a newly carved block.

Period of Works

Works were undertaken over a prolonged period, with the dismantled smaller elements stored within the church with the kind permission of the PCC. The larger side panels and lid were stored adjacent to the surrounding wall.

Conservators/Assistants

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Sequence of works

The monument was dismantled and elements made safe for storage within the church and outside for larger elements. A new re-enforced concrete slab was cast, upon which to re-build the dismantled elements. The 4 tall plinth blocks and thinner overlying moulded course were both bedded and secured to one another with new fixings, after which the internal void was filled with Limecrete to give a solid base upon which to build the internal supporting core. Once the base was cured the core was built from Celcon blocks. The side panels and pilasters were bedded and secured to the core and one another before the final, horizontal, fluted course was also secured to the core. The lid was then manoeuvred onto the core such that it bore most of the substantial weight of the slab. The 'whole' was then pointed to fill external joints and support fillings were inserted into vulnerable previously springing areas of laminating stone.

The Works

After systematic dismantling, works involved removing expanded and actively corroding iron-fixings and replacing them with bespoke marine-grade stainless-steel fixings set deeper. The monument required completely dismantling down to ground level, due to structural instability from lack of any proper foundations. Areas of vulnerable delaminating stonework were tacked and surface filled to slow-down the ingress of rainwater.

Conventional cleaning of the whole monument was not deemed appropriate, as the whole had achieved a patina commensurate with its age, however some works were done to remove loose moss and algae from the opposing dedication panels, to make them legible once again.

1 Condition

1.1 The north long-side fluted block was inside the tombchest, several key architectural features were missing upon dismantling – most notably the south-east external mitre above the pilaster. The tall side panels (several of which were badly laminated) were moved away from the area and stacked against a nearby wall such that they could be rain-washed over the winter and dry-out slowly over the spring – summer.

2 Groundworks

2.1 Work was done to excavate soil down to a suitable depth (150mm below ground level) in which to form a new cast base, giving a slightly larger footprint for re-building. During excavation a small network of animal burrows adjacent to the plinth blocks became clear. Several largish slabs of thin stone were discovered acting as the foundation for all of the overlying stonework, little wonder these could not bear the overall imposed load in the long-term.

2.2 A pre-made timber former was inserted into the oversized hole and made level with road pins secured externally, cement was then inserted by hand and tamped flat. Visqueen heavy-duty polythene (DPM) was placed at the bottom of the shuttering to ensure moisture-retention in the concrete and aid workability. Re-enforcing mesh cut to size so as 100mm back from the eventual edge of the concrete was placed on bricks to ensure it was midway vertically in the concrete. Concrete was poured and tamped with smooth edges applied around the perimeter. After several weeks the shuttering was removed.

2.3 The top-bed of the slab finished just above ground level on the north elevation, with the south elevation ground sloping away, leaving the upstand of the slab exposed.

2.4 Once the concrete padstone was hard enough, the process of re-building began. The bottom two courses were bedded in traditional mortar onto the concrete slab re-using existing channels and holes that were adapted (made deeper). Blocks were fixed to one another with stainless-steel fixings secured with an external-grade resin. The bedding mortar for both lower courses was allowed to harden before inserting Limecrete into the void. This was necessary as the plinth blocks were much deeper (front to back) than expected and would have compromised the new supporting core, making it too narrow. The bottom-beds of the plinth blocks were not worked flat, meaning the height of the bottom joint varies widely as the joint is as thick as the high-point of the plinth block bottom bed.

3 Conservation & Restoration

3.1 Insubstantial iron fixings with tiny turn-downs were found in the top and bottom beds of the whole memorial. All corroded metal was removed, much of it fell out or was easily removed but several sections which had expanded into the sockets had to be drilled or cut out. This was slow work as the side panels were relatively thin and we could not risk bursting the stonework and damaging the edges which would be seen. All of the original fixing holes were widened/deepened to accommodate new, more substantial stainless-steel fixings.

3.2 Several of the side elements had delaminated on their rear internal surfaces, these laminations were removed as they were beyond practicable repair, would have necessitated horizontal fixings spanning between the two elements - that risked shattering the carved outer surface. Once the resin had polymerised and the joins effected, channels were cut into the rear surfaces at right-angle across the fractures, with an angle grinder. Stainless-steel flat bar was cut to a suitable length and set into the channels with epoxy resin to strengthen the fractures further. In the case of the thin elements the large panels could not have been manoeuvred without the fractures failing such was the weight involved. The resin within all joined surfaces and support fixings were allowed to polymerise fully before being handled/manoeuvred further.

3.3 The south, long-side, fluted block was replaced with a new piece of stone, which helps bear a little of the weight of the lid. It is formed in 2 separate pieces stuck together with an external grade resin. The upper fluting having been formed by a vertical milling machine (and not chiselled, adding shock into the stone) with the lower bull-nose moulding formed with a masonry router. The rose motifs at the corners and midway along its length where carved by hand, with the fluting also finished by hand so it didn't look so 'machine-cut'. Carving it by hand completely would have been much more laborious and therefore prohibitively expensive.

4 Re-building

4.1 The lowest two horizontal joins between the concrete pad and moulded plinth and thin overlying moulded course, were bedded and pointed with a conventional coarse bedding mortar, with a NHL 3.5 binder.

4.2 The tomb-chest is top heavy, given the size and mass of the overlying lid. The fixings across the mitres of the four corners had been too small and corroded significantly. There was no internal supporting core, usually constructed from brick in that period. Therefore the tomb-chest was re-built with a new internal lightweight block core to support the substantial lid and secure the side panels against. Celcon Thin-bed® blocks were used with Celfix® mortar, which gives very fine joints and enables structures to be built and bear weight quicker than conventional blocks. Unfortunately the bottom-bed of the lid was not remotely smooth and very irregular in texture. This meant lead shims were required in the joint between the top bed of the core and bottom bed of the capstone. This was to ensure the capstone was parallel with the four underlying panels and the core, took the weight of the capstone evenly.

4.3 It was established where new additional restraint fixings could and would be employed to secure the four side elements back to the core. Existing fixing sockets at the mitres were deepened and widened to ensure more solid, deeper fixings, with slots ground into the top-bed of the side panels. These were all de-dusted to ensure a solid bond with the resin employed. As there were no useable dimensions prior to dismantling, the heavy fragile side elements were offered-up individually and secured temporarily with wedges against the core and a ratchet strap around the top to determine their locations. The side elements (which were not all the same height) were positioned on small stacks of lead shims to achieve correct alignment. Once this was achieved, bespoke stainless-steel restraint fixings were fabricated ready for final fixing.

4.4 Individual slabs were raised up on crowbars and a coarse bedding mortar applied beneath, the same height as the lead stacks, but kept back from the front face. Once all four sides were bedded on mortar and in correct alignment, the fixings were secured into position with an external grade epoxy-resin. Securing the four sides to one another and each panel back to the supporting core firmed everything up, whilst the bedding mortar hardened. The top-bed of the internal core was built to be higher than the top-bed of the side elements such that it bore the considerable weight of the lid and not the thin side elements, which must have contributed to some of the fracturing witnessed in the underlying thin panels made from a particularly laminar stone.

4.5 The internal mitres or corners were filled from the rear with traditional coarse mortar to ensure rainwater could not easily enter the core of the memorial. All external joints were pointed as far as possible to exclude rainwater.

4.6 On the south-east corner the external mitre was missing before dismantling. Indenting new stone here would have compromised the appearance of the memorial, plus there was very little bearing for it such was the extent of deterioration to the top-bed of the pilaster beneath.

4.7 Once the whole memorial was built, vulnerable edges/laminations had coloured mortar support fillings (Lithomix®) inserted into and along their lengths to provide strength to previously tacked (with resin) edges. No attempt was made to recreate missing mouldings or areas of lost stonework.

4.8 After the internal core and external elements had settled into their new positions, the resulting joint lines were pointed. Demarcation lines (clean/dirty lines on the edges of stonework) indicated there had been relatively fine joint-lines between elements. A gunnable pointing mortar was applied into the joints, the horizontal bed joints which were kept consistent on the lead shims. This gunnable material is based on NHL3.5 being initially much more fluid than conventional mortar before hardening and achieving the same relative strengths as a conventional mortar. Traditional mortar applied by even the smallest spatulas into such thin joints cannot get back as far into the gap and therefore makes for a weaker surface or ‘dummy’ joint in the long-term.

5 Conservation Works

Cleaning

5.1 Limited cleaning was undertaken to the monument and only the dedication panels displaying the historic, genealogical information. Wooden modelling tools were used to remove loose mosses hiding the inscriptions on both long panels in particular. Flat scrapers and scalpels were employed to remove loose mortar and soil debris from the break edges and mating surfaces of joined elements. Other exposed elements of the memorial were not cleaned, as this was not the intention of the project.

5.2 Pointing/Mortars

5.2.1 The material employed for pointing the fine joints was Masons Mortars FAPM - Fine Ashlar Pointing Mortar® and was applied using a mortar-gun with different size needles, depending on the thickness of the degraded stone arrisses. The thixotropic mortar was inserted, excess material struck off level with the adjacent stonework and mortar pressed home, both processes with a spatula.

5.2.2 The more traditional, coarse mortar for the bottom two horizontal joints was in the ratio of 3 : 1 (aggregate to binder) with local Bromsgrove Sharp and Bromsgrove Building sand (2 : 1) with an NHL3.5 binder.

6 Maintenance Considerations

6.1 The memorial is in its original location. It now sits atop a wide, re-enforced base of the right proportions for the footprint of the sub-base. For this reason the mortars should be monitored on a quinquennial basis at least, to ensure they are performing their architectural function of slowing-down, not preventing the ingress of moisture into the architectural elements.

6.2 The lid should now be shedding rainwater away from underlying elements below as designed to do but is actually directing rainwater onto the slightly projecting stone plinth and concrete perimeter (it is an insubstantial overhang and design flaw). The outer edge of the cast slab is chamfered slightly downwards to direct water away from the bottom-bed of the plinth, which was wicking moisture up into the monument prior to dismantling, as the 'whole' had sunk into the ground due to the woefully inadequate foundations. That said the memorial as a whole is in a much better state of preservation than it was – badly misaligned elements on an uneven surface and its re-erection/conservation has ensured its long-term future.

6.3 Elliott Ryder Conservation will monitor the condition of the memorial (free of charge) after twelve months, as part of our on-going maintenance commitment, and report back to the PCC with any findings.

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The lid being manoeuvred off the effectively loose side elements, the majority of insubstantial iron fixings, beneath, either having failed completely or corroding/expanding into the narrow, shallow channels, causing some splitting of stonework.

The 8 tombchest elements were precarious once the overlying weight was removed, being too thin (front to back) in design/manufacture. The ratchet-strap is to stop loose elements moving during dismantling.

The inside of the tombchest after removal of the lid, which weighed a little over 300kg. One of the corner pilasters (top left) had sheared down its natural, transverse bedding planes, as had both long panels. The 5 main fragments of the long, fluted block were found to be beyond practicable repair and so a new replacement section was carved.

The corner pilaster that sheared, due to poor quality stone and expanding iron fixings. Note the vertical laminations in the neighbouring panel, showing the slab is *face-bedded* – at 90 degrees to its stronger '*natural'* bedding plane.

Mortar was completely missing from the internal mitres (you can see through both vertical joints) allowing easy access for weathering and more importantly moisture, acting against the iron fixings.

The plinth courses, showing detritus within the void, which was higher than external ground level. Fractures through thin individual blocks, had been exploited by point-loading caused by lack of proper foundations and uneven settling of blocks into the soil.

The top bed of the lower plinth course, highlighting the forces exerted by corroding, expanding iron fixings, having split 3 separate blocks.

Another corner or mitre which has been damaged by an iron fixing.

The extent of foundations beneath the plinth, highlighting why there was such settlement of the plinth course which was effectively sinking into the ground, leading to many of the structural problems witnessed before dismantling.

A new re-enforced (steel mesh in the centre of the mass) concrete slab, designed to spread the weight of the whole tombchest over a larger, flat footprint. The ground slopes downwards – with the level of the slab just above ground level in the foreground, with exposed concrete to the rear upstand.

The bottom-bed of the lower plinth course is not flat and undulates significantly, as it was built straight onto the soil footprint. This meant the bed joint varies significantly but the top bed of the plinth is level, parallel with the concrete slab.

The uneven nature of the plinths bottom bed required packing with coarser mortar and slate packing to ensure the weight of the blocks were evenly supported. All internal mitres were pointed with less-coarse, traditional mortar to minimise the ingress of moisture into the tomb chest.

During dismantling it was observed many of the blocks were out of correct alignment, caused by uneven settlement and iron fixings.

The tomb chest was re-built plumb and level, using original, critical dimensions as a guide only, to ensure correct position of overlying elements. Channels and turn-down holes in blocks were widened slightly and made deeper by drilling. This would only have been possible with rudimentary hand-drills in a 1820’s workshop, however the turn-downs were cut by chisel and shallow as a result.

The uneven nature of the thin, upper plinth course, meant Limecrete was cast in two layers to provide a solid, level base for the necessary supporting, internal core. Not cutting the stone pieces overhanging at the rear would have meant a very narrow (side to side) block work core and put unnecessary pressure on the rear of the very pieces, that had just been repaired.

On the left, the first layer of Limecrete inserted before the thin upper plinth course is bedded, which were fractured due to uneven settlement. The orange ratchet-strap is to prevent unwanted movement in blocks when inserting the Limecrete. On the right the two short sides were repaired after the break edges were cleaned and additional stainless-steel fixings secured into them to provide additional support.

All bespoke stainless-steel fixings were secured with an external-grade resin, incorporating much deeper turn-downs in the blocks. All internal mitres were pointed with traditional mortar to deter moisture ingress even further. On the right, the lightweight Celcon block core, built on the second layer of Limecrete, finished level with the top bed of the, upper plinth blocks.

Three of the four pilasters in place to determine the finished height of the internal core, including all bed-joints in the block work.

The core nearly completed, with a single course still to be applied to the top bed, to finish slightly higher than the top-bed of the fluted course, such that the core bears the majority of the lid weight.

The long panels were secured first to allow positioning of the corner pilasters and short panels, which were by no means uniform, obviously being cut by different hands.

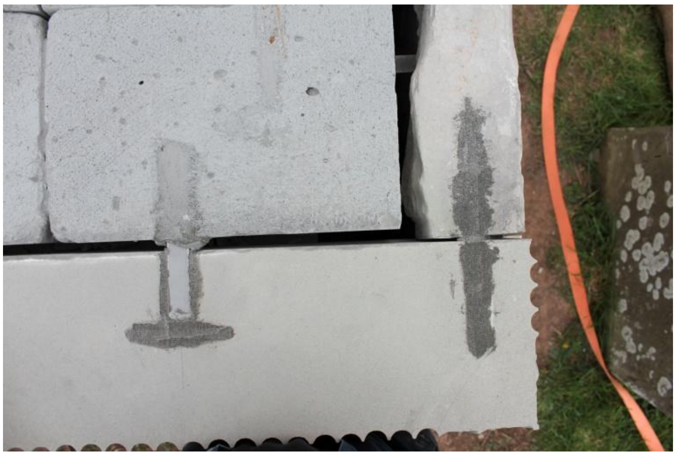
The internal depth of the pilasters (which were all different) dictated the internal dimensions of the supporting core. Bespoke stainless-steel fixings were used to secure the side panels back to the core and the pilasters back to neighbouring side panels.

The majority of the side panels are too thin for purpose (front to back) with insufficient bearing for the much deeper, overlying fluted blocks. Some stone was so eroded and/or thin, it was not possible to install traditional dog-cramps, so slots were ground into the stone instead and secured with an external grade resin.

Although some corner blocks were thick enough to incorporate traditional fixings, the poor-quality stone slabs are delaminating. Note the *masons marks* on the top-bed of the pilasters, which determined how much the stonemasons were paid, from the amount of work they had carved.

The tomb chest elements secured into position, with bespoke fixings in their top-beds. Note the biological growths still in place on the long panels, which covered the historic, genealogical information.

The thinner, albeit no less substantial fluted course in place and also secured back to the supporting core.



The top course of light-weight blocks of the core were cut/shaped to provide the largest surface area for the overlying lid.

The lightweight blocks were as wide as possible to provide maximum support. Note the extent of loss to the top arriss or corner of the original fluted blocks, caused by poor quality stone and moisture ingress, corners being the point of greatest evaporation and therefore deterioration.

The heavy and fragile lid being rolled into position. It was removed and stored on a plywood sheet during dismantling, to prevent it snapping, as it is thin and long proportionally. We could not see the centre of the bottom bed was rough stone which kept the slab up out of position.

The slab was removed and roughly worked stone reduced to allow it to sit level on the supporting core. Note the *margins* of the bottom-bed have been 'finished' and are flat/smooth. We could not see this discrepancy when the lid was on the plywood sheet as the timber deformed upwards at the edges.

The lid in its final position after removal of excess material from the bottom-bed. The new fluted stone is the same geologically as the original material but much better quality and will tone-down in the short-medium term.

The tomb chest at the correct height, note the dirty demarcation line on the upstand of the plinth where the stone sat, sinking below ground level, leading to permanent, rising saturation of the stone, notwithstanding poor build quality.

The newly carved section to the rear of the memorial.

One of the short sides before dismantling, note the amount of movement to the lid (on the left) which weighs over ¼ ton. Note also the left-hand pilaster the top of which has fractured and sheared into the tomb chest. Note the large, historic vertical fractures in the plinth blocks caused by no support beneath.

The same elevation after re-building. The lid is positioned equidistant above all four side panels such that it sheds rainwater away from the monument evenly, as was surely the intention of the designer. The concrete pad slopes gently away from the upstand of the stone plinth, so it will never be subject to as much water as previously.

Loss of material to the fluted short block and over-hang on at the left of the tomb chest.

The rear face highlighting the loss of the fluted block into the core, which was broken in sections and was saturated with soluble-salts from being partially submerged in the ground, suggesting the fragments had been like that for a very long time.

The newly carved fluted block, with gun applied pointing mortar applied to all joints to exclude rainwater as far as possible.

A fair amount of conservation was done to the remaining carving on the short side. Loose delaminating sections were secured back to the substrate with spots of resin then coloured mortar inserted to exclude rainwater as far as possible.

List of Materials and Suppliers

Material	Supplier	Address	Contact Number
Carved Tombchest Fluted Panel Woodkirk Stone – Building Grade	Stonemasons of Worcester Ltd	Industrial Estate Unit 2b Everoak Bromyard Road Worcester WR2 5HN	01905 423178
Hydraulic Lime NHL 3.5 Cement OPC Concreting Ballast Steel Re-enforcing Mesh Building Sand/Sharp Sand (both Bromsgrove Quarry) Celfix Mortar	Travis Perkins Ltd	Lower Bridge Street Leominster HEREFORDSHIRE HR6 8EA	01568 612531
Visqueen – Heavy-duty DPM	Travis Perkins - Lampeter	Business Park Unit 1 – 4 Lampeter CEREDIGION SA48 8LT	01570 422521
Celcon Thin-bed Blocks	Travis Perkins - Aberystwyth	Glan Yr Afon Industrial Estate Unit 1 Cae Gwyn Llanbadarn Fawr Aberystwyth CEREDIGION SY23 3HU	01970 625679
Lithomix Repair Mortars Fine Ashlar Pointing Mortar	Masons Mortars Ltd	77 Salamander Street Leith Edinburgh MIDLOTHIAN EH6 7JZ	0131 555 0503
Acetone	Conservation Resources	Units 1, 2 & 4 Pony Road Horspath Ind Estate Cowley OXFORDSHIRE OX4 2RD	01865 747755
Cotton Wool	Claytons First Aid Ltd	Chiddingstone Causeway Tonbridge KENT TN11 8JP	01892 871111
Stainless-steel Dowelling, Flat-bar	Metals 4 U	Armitage Works Sandbeck Way Wetherby N YORKS LS22 7DN	01937 534318
Epoxy Acrylate – Gunnable Resin	V J Technology	Brunswick Rd Ashford KENT TN23 1EN	01233 637695
Akepox 5010 - Knife-grade Epoxy Resin	C R Laurence	Kingsway Business Park Charles Babbage Avenue Rochdale LANCASHIRE OL16 4NW	01706 863600