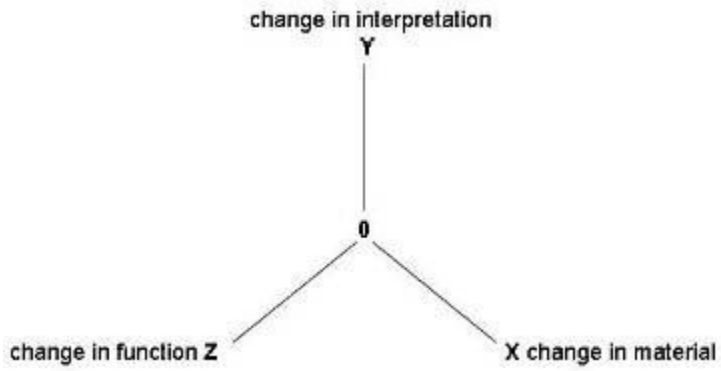
SUMMARY OF THE CONSERVATION TREATMENTS TO COOPER'S ROW, LONDON CITY WALL, UK, 2013-2015

Jonathan Kemp*

Preamble

To understand the nature of archaeological and architectural conservation we must consider how, as with many other examples of cultural heritage, there cannot be any fundamental or absolute principle of authenticity to guide any preservation work undertaken. We can examine this contention by hypothetically plotting any cultural object at any given time along at least three axes, where each axis nominally describes variables emanating from the impossible-to-return-to ground zero of an object's origin. In my example, the z-axis plots any significant change to an object's function, the y-axis any change in how the object is interpreted, and the x-axis plots any change in original material:



By playing around with this thought experiment it soon becomes apparent that objects, at any point in their history, do not fit neatly into the either/or categories of being authentic or non-authentic when plotted along these axes, and, furthermore, that changes plotted along multiple axes will give each object a unique varied topology, with its edge undulating both nearer and further away from its ground zero of origin. For example, in

* Independent Conservator with over twenty years of UK and international experience as a senior sculpture conservator working on a range of movable and immovable artefacts made of stone, plaster, fresco, ceramic, artificial stone and some metals, dating from between .2000 BC to the 20th Century. He has been a senior sculpture conservator at the Victoria & Albert Museum, London, and has trained and taught stone conservation to both under- and post-graduate students and interns from various countries and institutions. He is the current Editor of *The Journal of the Institute of Conservation*. http://jk-conservation.com j@jk-conservation.com

Europe, a panel of stained glass described as medieval tends to comprise of little original glass, still less original lead – as the priority for its conservation is often taken to be the preservation of the authenticity of its design. Yet if the panel is plotted schematically along the axes in the thought experiment above, and its co-ordinates joined up as an outline (its topological edge), then this shape is going to be pretty far away from the ground zero of the panel's origin, especially when this outline is compared with one, say, drawn for a gravestone that has remained pretty much untouched in its original setting.

Furthermore, no one object will have the same co-ordinates at any given time in its history, and objects in museums can never retrieve anything like their pre-accession co-ordinates as not only are they manifestly displaced but their co-ordinates invariably change whenever they are conserved or redisplayed. Objects in their original context, like the section of the London Wall under discussion in this article, change dramatically as they deteriorate and are re-configured and re-used in various ways by subsequent users.

The point of this thought experiment is to show that any sense of authenticity is always going to be a ride along a trajectory from which, at any one point, the object will have stronger or weaker genealogical links to its origins. And once this notion of authenticity as being 'vectorized' is established and the care of an object is framed in this way, it becomes more apparent that the preferences of, in the case of Cooper's Row described here, conservators, archaeologists, and heritage authorities invariably alter the co-ordinates (and topology) of an object at any given time, so that it begins to appear that any cultural object always can be said to exist in something like a collaborative production often over a long and drawn-out timescale.

Thus the concept of authenticity commonly articulated in the conservation of autographic arts seems undermined as it appears that all autographic works always have an allographic component, especially as when an object is considered between two points in its history, each version's qualities will necessarily be different, yet each will still be considered as 'the object.'

Ultimately, and for the purposes of this article, such a reframing is intended to shift any notion of assigning truth-value away from this difficult concept of authenticity, always problematic in archaeological conservation, and more onto a strategy of documentary notation, as authenticity becomes a matter of the (play of) accuracy with which the present cultural apparatus plots an object and provides a commentary on how its particular interpretation relates to that of its predecessors.

This underlies the wider need for collaboration throughout such works in archaeology so both archaeologists, conservators, and heritage workers all share in such

future plottings of their interventions. In the light of the caveat introduced here, a summary of the recent conservation works, including recent documentary material, and without reference to a principle of authenticity, is provided in the rest of this paper.

Introduction

This summary article is concerned with the conservation repair work undertaken on a stretch of the ancient City Wall of London, 'Cooper's Row', located at The Grange City Hotel, 8-10 Cooper's Row, London, EC3N (Figure 1).[1] The article incorporates information from an unpublished 2012 Condition Survey by David Odgers and elements of the unpublished 2013 report by Guy Hunt of L-P: Archaeology,[2] the main contractor for archaeological works for the client, Grange Hotels, who are responsible for the upkeep of this section of the Wall.

Figure 1 - Cooper's Row, London - west elevation during conservation works. **Photo**: the author, 2013

[1] https://www.grangehotels.com/hotels-london/grange-city/about-this-hotel/ (accessed December 4th, 2015).

[2] http://www.lparchaeology.com/ (accessed November 17th, 2015).

Figure 2 - Detail from Robert Walton's "England's Glory" map of 1676, showing the extent of the London City Wall (the dark black line), and annotated in red by the author to show the approximate location of Cooper's Row.

The article sets out a record of the conservation methods and materials employed during the works to this section of the wall between 2013 and 2015. A summary of the treatments is included below, with each year's program of works consisting of 40, 30, and 30 days per year respectively.

The London City Wall is a Scheduled Ancient Monument, that is, a monument of national importance, and consists of the standing remains of mostly Roman and Medieval sections of the wall. The section under discussion, Cooper's Row, is so named because of the streets relation to coopering, the making of barrels and casks, either because of a tavern, *The Cooper's Arms*, or the bonded warehouses for storing wine and spirits that used to be built onto the wall from at least the XVIIth to the mid-XXth century (Figure 3). In 1962, Joseph Barber and Company's warehouse was demolished and the site of 8-10 Cooper's Row redeveloped to make way for Midland House, an office block. This development included a patio area that, for the first time in several hundred years, left the Cooper's Row section exposed as a free standing artefact.

Figure 3 - 'Bonded warehouses in Cooper's Row', image from *The City of London: A Record of Destruction and Survival*, Corporation of London, 1951, p34

The section of the wall survives to a height of approximately 10.6m. The lower section of 4.4m, is Roman, with characteristic red tile and Kentish ragstone courses extant. On the east elevation the red sandstone plinth which marks the Roman ground level can be seen (now sitting slightly above the modern paving). During the medieval period the wall was heightened by approximately 6.2m with irregular masonry consisting of the ragstone, Reigate stone, chalk, and other random stones including Caen. There are a number of openings used as loopholes by archers which were accessed by a now absent walkway, the scar of which can be seen on the west elevation. The medieval courses are ill-defined and, in addition, there have been a number of other later amendments when the section here became incorporated into both the bonded warehousing and domestic buildings.

Summary of Previous Work[3]

Several phases of mainly undocumented repair and conservation have been executed to the section in the 20th and 21st centuries. In the 1960s the Ministry of Works (MoW) surveyed the section and undertook a programme of remedial works which

[3] Guy Hunt from L-P Archaeology summarises the antiquarian observation of the wall at this location in Hunt, G. 'Along the Eastern Defences: Excavations at 8-14 Cooper's Row in the City of London, EC3', *Transactions of the London and Middlesex Archaeological Society*, v.61, p.41-80, 2010. All works from 1999 onwards are managed by L-P Archaeology on behalf of the client, Grange Hotels.

included the removal of all the post-Medieval brickwork, such as from the bonded warehouses, which has left the medieval random chalk infill exposed. A general regime of re-pointing was then executed, including around the chalk infill, with a hard cementitious mortar used by the MoW as a means of both consolidation and (undocumented) reconstruction.

An assessment on the condition of the wall was commissioned by L-P Archaeology in 1999 as part of the current owner's plan to transform Midland House into a luxury hotel. This assessment was undertaken by T. Strickland, a Roman military archaeologist, and J. Hartley, a structural engineer, and designated a series of numbered zones which have been used in all recent surveys, with each prefixed with either *R*, denominating a Roman section, or *M*, a Medieval section (STRICKLAND; HARTLEY, 1996). A photogrammetric survey was also commissioned from the Ironbridge Trust, and this stone by stone survey forms the basis of the drawings reproduced here:

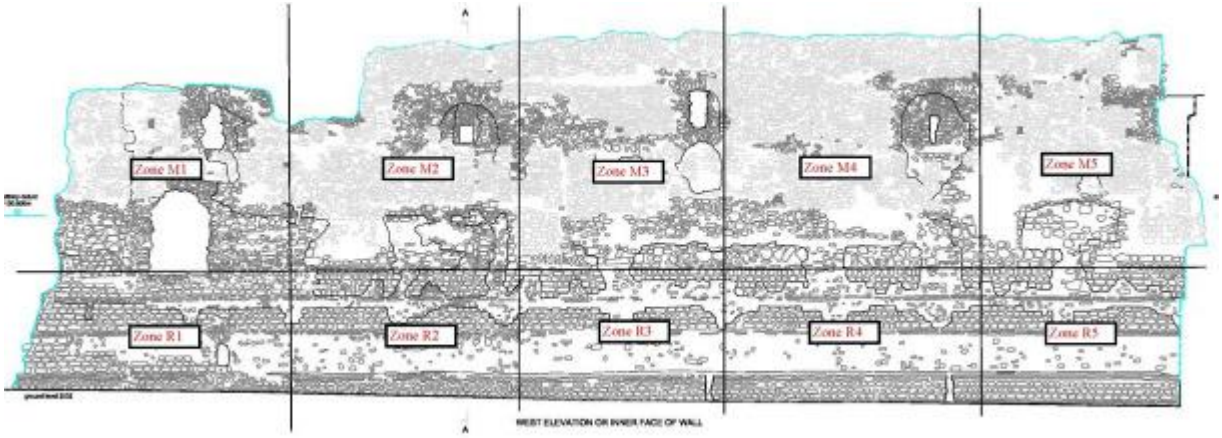


Figure 4 - West elevation of wall showing zones and stones

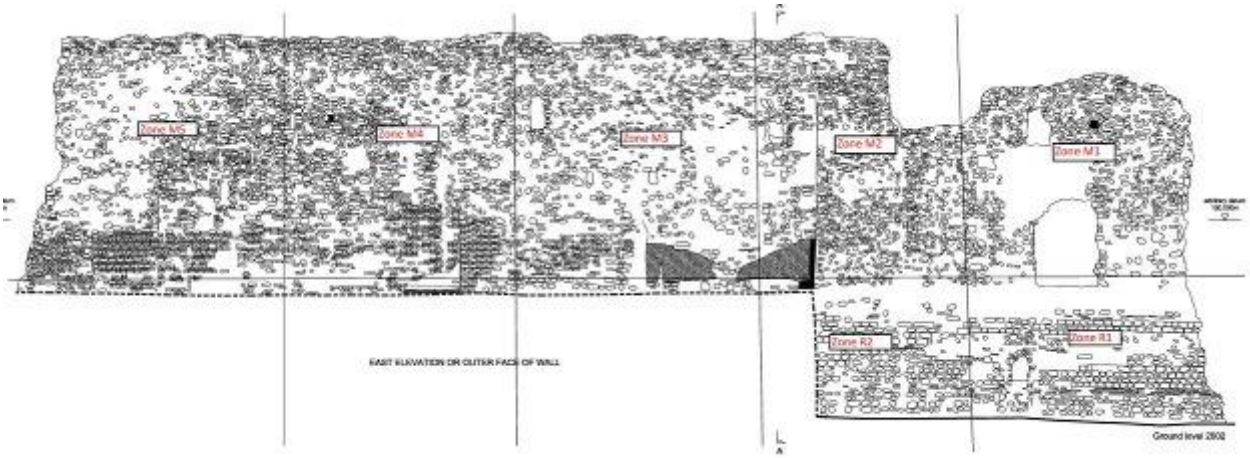


Figure 5 - East elevation of wall showing zones and stones

Based on the Strickland & Hartley report, remedial conservation work was specified and Scheduled Monument Consent sought, before being undertaken in 2001 by Nimbus Conservation Ltd. Conservation works included the partial removal of the 1960s cement mortar and re-pointing in a lime mortar, as well as vegetation removal and cleaning. Additionally, areas of the exposed chalk blocks were consolidated with limewater and lime washes.

After liaison with the client by Guy Hunt of L-P Archaeology, in 2012 the monument was re-assessed by David Odgers of Odgers Conservation.[4] Based on the recommendations in his condition survey, an application for Scheduled Monument Consent for the current ongoing conservation maintenance programme was made and granted in March 2013. Further assessments were made by this author in the subsequent years, 2014 and 2015.

Summary of Conservation Surveys, 2013 – 2015[5]

West elevation

In general, the 1960s MoW hard cement-based capping/pointing is deleterious and has caused numerous areas of stone backscaling and delamination through the disruption of the ingress/egress of water from the often softer stones (noticeably on the M-ranges).

Zone R1: Overall this zone is in a reasonable condition and is mainly beneath the modern concrete walkway. Algae and moss infest the horizontal surfaces. Where facing stones have become detached, the underlying core was consolidated at some point using mortar with very large aggregate, which remains sound. There are localised areas of surface spalling and one stone has become detached adjacent to a void where an electricity cable runs through the wall; there has been some run-off from the concrete walkway which has resulted in calcite deposit on one section of the plinth.

Zone R2: Whilst generally sound, there is some localised sulphation in protected areas where facing stones have come away, and there is substantial vegetation on the horizontal ledge at the top of the plinth course. There is some decay to the mortar joints in the plinth area. Algae and moss infest the horizontal surfaces, especially the tiles.

[4] http://www.odgersconservation.co.uk/ (accessed November 13th, 2015).

[5] What follows is a summary of internal conservation condition surveys and reports by the author (2013-2015) and the 2012 condition survey by Odgers Conservation.

Figure 6 - Looking north along zones R3 - R1, west elevation

Figure 7 - Looking south along zones R4 - R5, west elevation

Zone R3: There is no sign of active decay, and all mortars appear sound; there is some minor vegetation on the horizontal surface of the plinth course, more noticeably on the tiles, as well as on a small area beneath a gash in the wall.

Zone R4: There is slightly more deterioration in this area in that less of the facing stone remains, although generally it is well consolidated. There is rather more vegetation on the plinth course and there are some open joints. There is some sulphation in protected areas, and the second level of the Roman tiles exhibit historic damage. There is algae and moss on the upper facing surfaces of the tiles.

Zone R5: This is in good condition, with only minor vegetation to the tile course.

Zone M1: The capping is intact and there is little vegetation except at the extreme southern edge where buddleia has become established. To the north of the doorway, the stonework is sulphated and well consolidated; at the bottom of this section the core is exposed and chalk blocks (just to the north of the doorway) exhibit surface decay. The doorway is sound although it has black sulphation on all areas. The upper opening is also sound but there are a small number of chalk blocks in the soffit that have some surface decay. There are a number of different mortars evident. Sections of the chalk blocks continue to deteriorate despite having been consolidated with limewater and limewash (2001).

Zone M2: Overall this zone is well consolidated at the upper level but cracks in the pointing are being colonised by bio-infestation. The upper opening is a roost for pigeons and has accumulated guano, as have many of the horizontal surfaces on this elevation of the wall. The arch of the opening has some continuing deterioration, and areas of the exposed chalk core continue to deteriorate even after consolidation in 2001 (Figure 10).

Zone M3: There is some cracking between stones and the MoW mortar in this zone (Figure 12). Vegetation has become established on the horizontal surfaces of the V-shaped offset, including moss and buddleia. Just beneath this offset on the extreme north of the zone is an area of exposed core where pigeons are roosting and appear to have pecked at the soft stone; an adjacent area of chalk blocks suffers decay and adjacent areas of the MoW consolidated core exhibit sulphation (Figure 13).

Zone M4: In this zone, there is minor vegetation on the wall head and higher levels, with most of the wall surface covered in algae. There is a large arched opening which has some decay to stones in the soffit. Pigeons use the 'putlock' holes and there is brown staining and guano deposits evident (Figure 11). There is some ongoing decay of the exposed chalk, and also deterioration to some of the facing stones and one section of detaching MoW mortar.

Zone M5: This zone is generally in good condition, but with some vegetation established, including buddleia. The vertical faces of the wall remains well pointed and consolidated but with algae on all areas and pigeons nesting in the putlock holes. At the lower level, there is a continuous band of chalk blocks, many of which have some surface decay including spalling, and other areas of the MoW consolidated core which are heavily sulphated (as on zone M3 shown in Figure 13).

Figure 8 - Looking north along zones M2 - M1, west elevation

Figure 9 - Zone M3, west elevation

Figure 10 - Detail of M2 showing active chalk decay, plant/bio-infestation and putlock hole, west elevation

Figure 11 - Detail of M4 opening covered in guano, west elevation

Figure 12 - Detail of cracks between stones and MoW pointing, west elevation

Figure 13 - Detail of chalk decay, sulphation and MoW cement pointing, zone M3, west elevation

East elevation

Generally this elevation is in a much better condition in part because its aspect and the lack of pigeons nesting, although access for survey is very restricted. Much of the elevation appears to have been extensively re-pointed/remodelled.

Zones R1/R2: Stonework is generally good and the tile courses preserved and in place. However the pointing, although re-pointed in places, is generally missing with large voids present. There is some exposed core to the north end adjacent to the pedestrian walkway.

Zone R3/R5: The condition of the ashlar appears good. Sandstone foundation stones are visible along most of the wall. The pointing is missing along much of *R1/R2* with very deep voids apparent (Figures 14 and 15) There is some vegetation on the horizontal surfaces, including buddleia

Figure 14 - Detail of pointing losses and voids, east elevation

Figure 15 - Looking south along R3 - R5, Roman sandstone foundation, east elevation

Zone M1: The north end of this zone is sulphated but in good condition. The area around the opening is sound and the area around the upper opening was consolidated as part of the works in 2001 and seems stable. There is no vegetation on the horizontal ledges but there is some irregular staining caused by water run off (Figure 16).

Zone M2: This section contains some irregular constructions including the remains of a spine wall, stone tile facings, brick and concrete inserts and the studs of reinforced concrete beams. The masonry wall itself has some vegetation both on the wall head and on its vertical face. Pointing appears to be intact. There is some minor surface decay to the lower level.

Zone M3: There are periodic bio-infestations, including vegetation, on the horizontal surfaces of the brick/concrete structure and also on the brick offset, the wall head and the

vertical face. The upper section of the masonry is irregular and the pointing is deleterious in places (Figure 17).

Zones M4 & M5: The stonework appears to be sound, albeit with vegetation on the lower levels.

Figure 16 - Looking north along zones M1 - M2, east elevation

Figure 17 - Looking south along zones M3, M5, east elevation

Conservation Treatments - 2013-2015[6]

After the specification of conservation works was agreed with the then English Heritage (now Historic England), work began in April 2013, and has continued, with appropriate amendments to the specification, in the subsequent years, 2014 and 2015.

Based on the 2012 Odgers Report, conservation treatments executed in 2013 - 2015 were aimed at addressing.

a) Bio-infestation

Where cycles of plant/moss infestation and higher plants are periodically evident, and where vertical surfaces on both elevations, more so on the west, being prone to

[6] Conservation works were supervised by the author, Dr. Jonathan Kemp of Jonathan Kemp Conservation. Jane Sidell, the regional Inspector of Ancient Monuments, monitored the works on behalf of English Heritage (now Historic England).

algaic or cyanobacterial greening. Furthermore, by 2013, buddleia had taken root in various places. Treatment to bio-infestation included the hand removal of all higher plants (including the buddleia), with the excavation of any extant root systems and re-pointing in lime mortar where any large gaps/disturbances were made. In 2014 specialist rope-access conservators removed two buddleia plants (zone M2, east elevation) that were inaccessible in 2013, and re-pointed the areas disturbed in removing their roots.

In 2013 a ThermaTech© super-heated water cleaner was used from a boom lift ('cherrypicker') on the west elevation to clear the cyanobacteria, algaic and moss infestations. This operation, as well as removing all extant bio-infestations, effectively sterelised the treated surfaces which, when combined with the annual application of an Historic England approved boron-based biocide (Wykabor 10) has led to, in subsequent years, a dramatic lessening of such infestations (Figures 18 and 19).[7] In 2014 and 2015 cleaning was executed using only conservation-grade steam cleaners.

Figure 18 - The author using conservation-grade Thermatech© equipment on the west elevation

Figure 19 - The author using conservation-grade steam cleaning equipment on the west elevation

[7] Wykabor10 is a borate based biocide of disodium octaborate and benzalkonium chloride and such chemically based biocides were endorsed by Historic Scotland after their extensive research program on stone cleaning in the late 1990s including the effects of biocides on sandstones. Cameron, S., D.C.M. Urquhart and M.E. Young, *TAN 10 - Biological Growths on Sandstone Buildings: Control and Treatment*, Historic Scotland, 1997.

b) Pigeons

Works in 2013 ensured that all the putlock holes used as nesting areas by pigeons were closed by the fabrication of handmade galvanised mesh cages. One nesting hole on the East Elevation was closed off in the 2014 works, having been unreachable during the 2013 conservation season (Figures 20 and 21). Extensive guano deposits were removed in 2013 using trowels and the ThermaTech© super-heated water cleaner, and in subsequent years using trowels and conservation-grade steamcleaners. Although pigeon activity has declined over the period 2013-2015 because of the blocking of the nest holes, there is still a significant build up of guano deposits in the major openings and ledges of the wall. Some newer sites for such deposits were noted in 2015 as the birds habitual roosting areas were made inaccessible.

Figure 20 - Pigeons nesting in putlock holes, west elevation

Figure 21 - Pigeons denied access to putlock holes by galvanised wire cages, west elevation

Guano deposits are thus a continual problem for the wall, both aesthetically (uppermost in the client's mind) and deleterious from a conservation point of view both because of its acidity and because it contains nitrate and phosphate compounds that provide a nutritive substrate for colonisation by heterotrophic micro flora and cyanobacteria.

The client's pest controller was consulted with regard to periodically flying a hawk as a deterrent for the pigeons, but the patio area was determined as being too small. Other methods of pigeon deterrence will be considered, including the use of sonic devices and/or optical gels that are processed by a pigeons eye to appear as fire.

c) Decay of chalk blocks

Between 2013 – 2015, three different areas on the west elevation of approximately 1m² each have been used to trial different consolidants to strengthen the delaminating and friable chalk blocks.

In 2013, on an area in zone M4, six applications of Calosil nanolime E25, a preparation of 25g calcium hydroxide in 1 litre of ethanol, were applied by pipette (for six hours, using a total of 1.5 litres).[8] Even though the application protocols had been strictly followed, white blooms appeared on the chalk. This area still suffers from scaling and continuing loss, with a penetration failure of the consolidant evident through probe tests along with a continued scaling given the presence of fresh chalk debris.

In 2014, second test area was divided into four parts on zone M2 using Calosil nanolime in two suspensions of different concentrations of 5g/L and 25g/L (Calosil E5 and E25 respectively) (Figure 22). On three parts, after pre-wetting with water, three applications of the lower concentration (E5) were followed by three of the higher (E25), applied wet on wet using a large syringe. On the fourth part six applications of E5 only were used. Subsequent examination in early 2015 showed white blooms, penetration failure and the presence of fresh chalk debris (Figure 23).

Figure 22 - Applying Calosil E25 by pipette

Figure 23 - Nanolime deposits ('bloom') to substrate surface associated with solvent evaporation/penetration failure

[8] For a technical description of the nanolime consolidant used please see http://www.ibz-freiberg.de/download/pdf/nanomaterialien/CaLoSiL_EN.pdf (accessed November 7th, 2016).

A new approach was therefore tried. After discussion and site visits by both Professor Norman Weiss and his associate in MCC Materials,[9] Irving Slavid, it was agreed with Historic England that samples of the chalk, scavenged both from the site and an adjacent part of the wall at Tower Hill, could be taken back to MCC's lab in Massachusetts, USA, for testing with their hydroxylating conversion treatment, Conservare HCT. HCT was developed as a pre-treatment applied before the use of ethyl silicate based stone consolidants on limestones. The mineral composition of stone such as marble and limestone lacks a hydroxyl group (OH anion) to which silicate polymers can bond (Weiss et al. 2000). The application of HCT promotes reactions between calcium ions and hydrocarboxylate ions in conjunction with tartaric acid, precipitating calcium tartrate tetrahydrate (CTT) on calcite grains, which can also provide a consolidation effect when used by itself (Figure 24).[10] English Heritage had extensively trialled HCT on various historic sites with limestone in England (*The Reigate Stone Trials*), and Weiss confirmed to the author that it would be suitable to trial on chalk even when subsequent testing found that it has twice the absorption rate of the Reigate stone, at 26.75%.

Figure 24 - Visual comparison of untreated control chalk specimen (left) and HCT +OH100 treated chalk sample (right) after micro-abrasion tests (courtesy of Irving Slavid, MCC *)*

After testing with Conservare HCT, MCC reported that using the HCT treatment alone when compared to a control showed either no change or even worse results after testing for abrasion resistance. However, samples treated with HCT followed by an ethyl silicate, Conservare OH100, exhibited approximately 100% strength increase.

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[9] http://mcc-monument-conservation.com/ (accessed November 16th, 2015).

[10] cf. (WEISS; SLAVID; WHEELER, 2000); (WHEELER, 2005); (CORREIO; MATERO, 2008).

A test area of approximately 1m² was selected on the west elevation (Figures 25 and 26) and, following MCC's lab protocol, four applications of the HCT were applied to saturation by brush in succession after drying between each (HCT is rapidly absorbed). This was followed by one application of Conservare Finishing Rinse (aqueous calcium hydroxide, which insolublizes any excess of water soluble tartrate ions that can interfere with silicate formation) and, after drying, three sprayed saturating applications of Conservare OH100 ethyl silicate consolidant. After 21 days the author executed tape tests on two different blocks (Figures 27 and 28) from the treated areas, which confirmed the consolidating effects noted in the lab tests by MCC. Future testing will increase in the number of applications of the OH100 to achieve the full saturation of the chalk with the ethyl silicate.[11]

Figure 25 - Before HCT + OH100 treatment

Figure 26 - After HCT + OH100 treatment

Figure 27 - Tape test on chalk before HCT + OH100 treatment

[11] For details of long term trials of the Conservare HCT consolidation treatment see (WEISS; SLAVID, 2002) - http://mcc-monumentconservation.com/conservation/wp-content/uploads/2011/04/Reigate-Trials.pdf (accessed September 28th, 2014).

Figure 28 - Tape tests on chalk after HCT + OH100 treatment

d) Decayed pointing

West elevation

Each year remedial and support lime mortars have been executed. Areas from previous capping and pointing regimes were beginning to fail (both from the 1960s and the 2001 works). A survey was executed in 2014 to assess this in more detail, with such areas annotated with where *significant* and *minor* disruptions to the pointing were (see Figures 29 to 31). One chalk block that had fallen out from the wall near the walkway arch on the west elevation was also re-bedded. Sulphation to the MoW works will not be removed.

Support lime mortars have been primarily executed to areas of s*ignificant* loss/decay including zones M1-M3 and to some of the Roman red tiles R2– R5. The pointing mix is as cited in the Class Schedule Monument Consent (CSMC):

Hydraulic lime (NHL 3.5)	x 1 part
Chardstock sand	x 2.5 parts
Portland stone dust	x 0.5 part

with the addition of washed pea gravel where mortars exceeded 15mm thickness

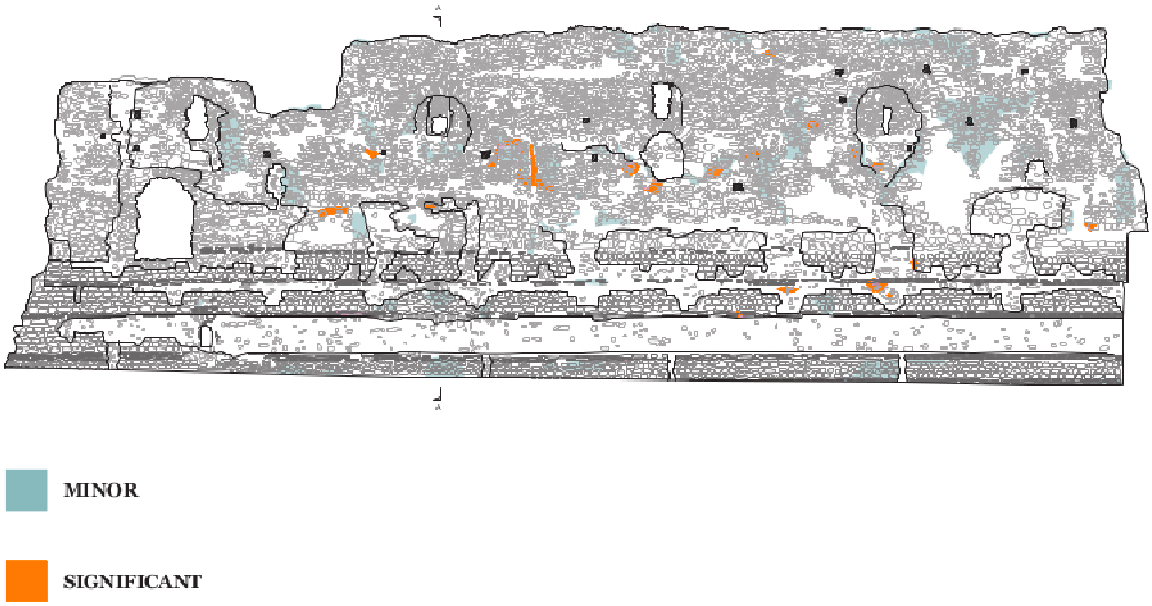

Figure 29 - Coopers Row - Pointing condition survey, west elevation, September 2014

Figure 30 - Minor: losses to ragstone caused by mitigated water egress due to hard cement pointing, west elevation

Figure 31 - Significant: losses/voids to/around ragstone due to hard cement pointing inhibiting water egress, west elevation

Figure 32 - a) Roman sandstone foundation above modern ground level, east elevation; **b)** Roman sandstone foundation with lime mortar/ragstone infill to modern ground level, east elevation

East elevation

Historic pointing losses to the lower levels of the east elevation were evident with large voids regularly interspersed between the Roman block work (some approximately 200mm deep) (see Figures 14 and 15) In 2014 and 2015 the lower Roman courses to a height of approximately 2m were re-pointed using the CSMC lime mortar with Kentish ragstone fragments used as infill.

Historic England had requested some “time-trials” test areas in order to calculate the cost in person-hours to remove all the cement pointing and re-point using lime mortars - two test areas were executed in 2015 (Figures 33 and 34) for raking out/re-pointing to approximately 16 hours per 1m². Each elevation of the wall is approximately 600m² and, as such, has significant cost implications for the client.

Figure 33 - 1m² “time test” area before raking out and re-pointing, east elevation

Figure 34 - 1m² “time test” area after raking out and re-pointing, east elevation

Future Conservation Works

Bio-infestation

Removal of bio-infestations and continued biocide treatments will be carried out as a regular maintenance item with the idea to feed forward into a maintenance/treatment schedule to be executed by the clients in-house staff (after appropriate training and after approval by Historic England).

Pointing

In general terms, given the timescales and costs involved for full re-pointing in one season, it is more likely that re-pointing will continue slowly as part of the regular maintenance programme of 30days/year. Further time trial tests will be carried out using

small angle grinders to reduce the 16 hours per m². However, working on the east elevation is problematic, so for re-pointing of the M zones a full scaffolding is required.

Chalk Blocks

Further tests will be made with the Consevare HCT combined with a fuller saturation of the OH100 ethyl silicate applied in two sessions with 21 days in between each. The more prosaic method of brushing back of all loose material followed by the application of subtly toned/colour matched lime washes as a sacrificial layer will also be reconsidered.

Pigeons

There has been a significant lessening of pigeon activity since the 2013 works. However, this is somewhat mitigated by the continuing use by pigeons of the large openings, as evidenced by the significant deposits of guano encountered each year. Methods of further pigeon deterrence should be reconsidered, including the use of sonic devices and optical gel deterrents that trick pigeons into thinking that they are flames.

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