



**Sanderson
Weatherall**

Roseberry House
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Stockton on Tees
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Our Ref: DFF/TL/TB1450
12 November 2018

Suzanne Lilley
North York Moors National Park Authority
The Old Vicarage
Bondgate
Helmsley
York
YO62 5BP

Dear Suzanne,

Keepers Cottage, Park Hall, Aislaby – Plastering Works

Further to our discussions last week, I write to advise that I have had an opportunity to further assess the requirements with regard to the hot lime plaster proposal and in doing so, have sought further advice with regard to the suitability of the product.

In this regard I have discussed the matter at length with Coilin Yates who is the Master Stonemason at Conserve and I have also spoken with Roz Artis who is the Director of the Scottish Lime Centre Trust.

In addition to the above I have also undertaken my own research into the benefits of applying hot lime plaster against the previous proposals and have also given due consideration to the requirements of the HSE and the associated best working practices which will need to be considered when dealing with this type of material.

Following my discussions with Conserve, I have been advised that anecdotally the hydraulic lime plaster previously proposed is currently being used at Durham Cathedral and Windsor Palace and that it is considered to be appropriate for applications where there is moisture present as it is in this instance and therefore the hydraulic plaster, will be cured by way of the moisture content within the structure of the subject property. In addition to the above, the previously submitted technical data (copies of which are attached again) indicates that the NHL2 product which we have proposed will be appropriate for the masonry to which is to be applied given both its location and the fact that once cured the strength rating of the product will be significantly less than that of the stone backing to which it is to be applied.

By way of further supporting evidence, I have shown below comments that I received from Roz Artis in which she has confirmed that this type of product is eminently appropriate for the proposed application and will not have any detrimental effect on the actual masonry to which it is to be applied.

One of the basic rules in conservation is that we should be using binders/ mortar mixes that are weaker than the masonry we are applying these materials to. In terms of the type of stone you are intending to plaster, typical strengths (measured by compressive strength) are likely to range from 25-100 MPa (Mega Pascals or N/mm²).

Thus, using any of the air limes (CL90) or indeed natural hydraulic limes as a basis for plastering would not endanger any of these stones. In recent tests by a researcher at the University of Bath, it has been shown that even the strongest of natural hydraulic limes at 2.7 years does not exceed more than 6MPa. And, yes, there is a direct correlation between strength and vapour permeability, where the stronger the mortar is, the less

permeable it is. But within the range of 0MPa and 6MPa the range of water vapour permeability is between 1.3 kg/(m.s.Pa) and 2 kg/(m.s.Pa) ie negligible.

With reference to the proposed product, the NHL2 product has a compressive strength at 91 days of 1.0MPa typical at 6 months @ 10-15°C.

As you are aware we have already considered and discussed the potential for a field drain to the North elevation and indeed this was one of the first points that was raised by Roz when I discussed matters with her. No doubt we will be able to review matters further on Tuesday when we meet, but at this stage the suitability of the field drain is not considered to be appropriate for the location given that the external hardstanding area is sitting immediately above the top of the foundation and therefore we do not have a suitable depth to allow us to excavate further, prior to the installation of the drain itself. If we were to consider this proposal further, then we are likely to create a situation where we will need to consider underpinning the rear elevation, which as you will appreciate, is a cost that my client would not wish to incur.

Whilst we have excavated the earth away from the rear elevation to create a walkway from the rear door, we still have an element of the external area which is sitting below ground level as we have not removed the earth from the rear elevation closest to the Boundary wall in order to avoid disturbing the existing foundations to the wall itself. Accordingly, in this element the application of the hydraulic lime is considered to be ideal to allow the wall to be protected and the lime application to cure.

From my discussions with Conserve it has become apparent, that the process by which the hot lime needs to be mixed needs to be carefully controlled as the application of water to the lime will immediately create a product which is in the region of 100°C and is also likely to include individual hotspots within the plaster mix which are likely to be in excess of 250°C. On this basis Conserve do not manufacture hot lime plaster on the same commercial basis as the other plaster that they provide and have advised that this would need to be made at a weekend under carefully controlled conditions. The quantity therefore that they are able to make in any one batch is limited, which by it's very nature will prolong the manufacture period.

They have advised that once an individual batch has been made, that it will need to be allowed to cool before it is then transported to site and left for approximately two months to allow it to become appropriate for use.

This point has been corroborated by Roz Artis where she has stated;

As for using 'hot' mixed mortar (based on CL90 airlime) quicklime, this material would have to be laid down for at least 3 months, to ensure all risk of popping and pitting has ceased. There is no real technical benefit of preparing a plaster base coat in this way, it is not at risk of frost for example and the increased pore spaces to accommodate water freezing is obsolete (it is the steam from the quicklime and sand slaking that produce these pores).

Whilst I appreciate that we are attempting to maintain the integrity of the original property, the time for the manufacture process alone, creates significant delays to the contract period and creates significant additional costs to my client which he is obviously keen not to bear and are ones that would appear to not outweigh the technical benefits of the hot lime mix.

With regard to the above and the NHL2 product previously proposed, the research that I have conducted tends to suggest that there is little significant difference between the hot lime plaster and it's breathability and that which will be provided by the NHL2 product. This is further supported by comments that have been made by Roz Artis (as noted above) and also Conserve where again Colin Yates was adamant that the material that we are proposing is appropriate for this type of installation and location, particularly given that it is being used on such sites as Durham Cathedral and Windsor Palace.

The properties of a hard lime plaster, consisting of a white putty are the same as those encountered with the NHL2 product, which I have been advised has been extensively tested and analysed.

In contrast, it would appear that the hot lime plaster does not benefit from the same extensive testing, given its relative volatility and indeed there appears to be little benefit to using it unless it can actually be mixed on site and applied hot, a process which I have been advised is likely to leave most of the material on floor due to pitting and popping.

By way of further supporting information, I have enclosed a copy of a document prepared by Conserve, in which they have discussed the benefits of both the hot lime plaster and also the standard hydraulic and non-hydraulic lime plaster products.

I appreciate that we are at odds with regard to the plaster application but at this stage I am trying to balance both the reinstatement of the property using appropriate materials and also the commercial concerns that I have with regard to additional cost to my client by way of Extensions of time and associated increased prelim costs to be made by the main contractor.

I would be grateful therefore if you could review the attached prior to our meeting on Tuesday, to allow us to try and make some progress when we meet and seek to resolve this matter.

If you wish to discuss the above prior to our meeting on Tuesday then please don't hesitate to contact me. I will be out of the office all day undertaking various surveys, but you will be able to contact me on my mobile.

Yours sincerely
for and on behalf of **Sanderson Weatherall LLP**

David F Fairley BSc (Hons) MRICS
Partner – Building Consultancy
Accredited Non Domestic Energy Assessor

Enc

cc A Stevenson Esq
 Helen Webster North York Moors National Park Authority