

Response to questions from Historic England, to be read in conjunction with the previous heritage impact report:

1. Drying and shrinkage cracking

The base coat product Terrix® RD-LB is purely based upon dolomitic hydraulic lime which is the only binder and has a moderate to eminent set.

In order to limit cracking during drying out, Terrix have introduced natural cellulose micro-fibres into the mix which, when soaked in water, slowly release the water into the mortar, thus slowing down the drying out process. As a result, there is no need to keep dampening the surface of the plaster whilst it dries to reduce the occurrence of shrinkage cracks. These fibres also provide strength in tension to counteract the shrinkage which is similar to the animal hair that is added to traditional mixes.

2. Lime plaster composition

To clarify, base coat does not contain the potassium glass or its polymerised version, it is the sprayed finish coat that contains this (refer to item 5 below). Nor does the base coat plaster contain gypsum or any other pozzolanic binding agent which may have a detrimental chemical reaction or sulphation effect upon the fabric. The avoidance of gauging with gypsum prevents potential efflorescence (crystallisation of calcium sulphate salts) in the surface layers in the long term. Instead, the bond is formed by the natural hydraulic lime only.

3. Adhesion to substrates

Adhesion of the Terrix base coat to ceramic (brick) substrates is no greater than or equal to 0.35N/mm² (MPa). This is a value that will not cause damage to the ceramic layer in the event of the need to remove the plaster. The adhesion could be reduced to 0.3N/mm² if necessary but no lower, otherwise it will not bond to the wall properly and we will be back to square one. The superstructure of the Town Hall is robustly constructed in well-bonded hard-fired clay stock brickwork and the adhesion level would have to be at least 0.8 N/mm² to cause any damage to the substrate and therefore we are confident that the original masonry fabric can easily withstand the interface with a hydraulic lime plaster with an adhesion of a maximum of 0.35N/mm².

4. Coefficient of water vapour diffusion resistance

The value of the μ coefficient for the Terrix RD-LB base coat product is less than 20. When designing wall layers the diffusion resistance should decrease to the outside surface of the wall so that any moisture is encouraged to dry-out to the outside. In our case, the diffusion resistance factor (μ) for the brickwork masonry is approximately 10. This arrangement reduces the risk of water vapour condensation in the wall and damp internally as, since vapour transmission always takes place from the higher pressure area to the lower pressure area, the moisture from the room will be transported to the outside of the building..

The standard Terrix RD-LB plaster base coat product is quite resistant to water in its liquid state penetrating through it and they have confirmed that this water resistance is normally enhanced with water repellent additives including alkaline earths and zinc soaps. This is mainly beneficial for use in external renders in the European context to mitigate frost damage due to extreme freeze-thaw cycles. They have confirmed that these added performance modifying agents can be omitted from our internal base coat plaster mix if desired whilst retaining all the properties of the plaster except the enhanced resistance to water absorption.

In the case of a cracked or highly porous external wall layer, which could lead to saturation and water ingress, the possibility of water transmission through the plaster to the inside would be undesirable as it would lead to damage to the internal layers (paint) and excessive internal moisture

levels (damp). It is a well-known phenomenon that a saturated wall will transport moisture more readily than a dry one. However, saturation of the masonry is not generally the case at the Town Hall as the walls are well bonded, thick masonry faced in a relatively resilient stone masonry with narrow joints and will clearly be in good condition and generally very dry following the repairs. So, in this case, we propose that these additives can be removed in general, to provide a more compatible porosity overall without risk of significant damp, as this should improve the thermal and permeability performance of the wall as a whole and be more compatible with our long-term conservation-based specification principles. However, where the masonry is still likely to be saturated in any local areas at the time of applying the finishes due to not having been given the opportunity to dry out properly following the repairs, then the project team may use their reasonable and professional discretion to retain the water repellent additives in the base coat plaster, just in those very limited instances, to avoid the risk of damage and deterioration in the first few years of full occupancy without any significant overall detriment to the long term sustainability.

5. Terrix PL-SX-S finish coat (spray plaster) on base coat

Dolomite is used as a filler in this product. The binder in this product is based upon a polymerised potassium silicate which sets predominantly through water evaporation. Potassium Silicate mineral has been successfully used in fillers and paints on historic surfaces for decades. Unlike traditional finish plaster though, it is not gauged with Gypsum so it does not suffer from damaging mobilisation and evaporation of salts. The setting process in Potassium Silicate binders is reversible, so the use of this product is not recommended in areas with a permanent relative humidity above 85% (e.g. swimming pools or excessively damp buildings), but this is not the case at the Town Hall.

6. Polymer-silicate

Potassium water glass is the binder in silicate products. Terrix uses a modified version of potassium glass (silicate) in their finish plaster coat and interior paint products. The most significant advantage of silicate products is that the adhesion to the substrate is not achieved mechanically but through a chemical bonding, which means that there is no risk of peeling off and cracking. Another advantage of silicate is its high vapour-permeability but, at the same time, as silicate products are of mineral origin, there is no surface electrostatics that can attract dust and dirt. Finally, from the point of view of historical buildings, silicate plasters and paints can survive several hundred years in an intact form and have been used widely for many years on UK listed buildings.

Typically, the biggest problem contractors face when applying silicate-based products is their instability during application (i.e. sensitivity to temperature, humidity, air movement or light) which leads to discolouration. The 20-year-old Terrix technology that polymerises potassium provides a product with all the advantages of silicate but without the disadvantages associated with the application. Polymer-silicate is, however, still a natural mineral-based product and does not contain any artificial plastics or additives.

7. Finish coat applied to existing retained plaster and modern impervious paint layers

With Terrix we have developed a method of reinstating the breathability of existing surfaces which have been covered with numerous layers of modern impervious plastic paints over the past 60 years or so. This method involves lightly scarifying the existing surfaces to remove 40% of the surface area of the modern layers to provide a key and a suitable level of porosity. These prepared surfaces can then be seamlessly finished with the same spray applied the finish plaster coat as proposed for the new base coated areas. Reference has been made in the heritage impact assessment report previously issued to the paint analysis reports prepared in 2015 and 2019 which adequately record the historic paint schemes found in an agreed representative number of spaces across the site prior to the removal of the defective plaster. In addition to this analysis and record we have agreed that,

as a further mitigation of this proposal, where in the refurbishment areas we have discovered good examples of the original paint which has not been obliterated by the prevalent modern plastic layers, we should retain these areas of the exposed original decoration as the final finish for visual record and as points of interest. I think this is a positive proposal, as it will provide fascinating snippets or 'exemplars' of the original decorative design left for posterity and conservation. This will be easily achieved by careful selection of locations where it is feasible to appropriately present the original painted surfaces and omitting the scarify and topcoat specification in these specific areas. A suitable area for this approach will be either where the original finishes are of sufficient heritage interest and are already exposed in good condition or where the modern paint is so detached that it can be easily removed without further damage, and it can just be cleaned and touched-in to a reasonable appearance for retention. The selected locations can be recorded as part of the building record along with a commitment to retain these for permanent display and conservation. It should be noted that in the spaces defined very high significance restoration areas this approach of retaining, reinstating, and conserving or restoring appropriate historic decoration schemes is the chosen approach generally. This additional mitigation proposal is in the areas defined as refurbished or unique purpose spaces.