METHOD STATEMENT #05: NON-STRUCTURAL MORTAR PLASTER & RENDER REPAIRS.

This method statement applies to the routine repair of cracked and spalled plastered and rendered surfaces not involving historic decorative plaster mouldings other than the filling in of non-structural hairline cracks on such mouldings. It outlines the process of hydrating (slaking) lime on site based on traditional methods.

This will be the way most of the lime used on the site will be prepared, although propriety pre-packaged hydrated lime may be used from time to time for small repairs, or when unslaked lime is not readily available.

A. Lime Hydration (Slaking) & Lime Putty Preparation:

This specification is for the preparation of a sample batch of 100litres (approximately 100kg) of slaked lime. This will be increased where necessary to meet specific requirements. Before beginning the slaking process, gloves, full-length overalls, eye protection and dust masks will be worn by all participants to protect against the alkalinity of the product, which is mildly aggressive to human skin and leather. The process will be conducted in a well-ventilated area.

The following process will be followed:

i) Fill a 200 litre (44 gallon) drum with 50L (quarter full) of clean water after ensuring that the drum is clean and free of oil/grease.

ii) Add about 15kg of unslaked lime (approximately one third of the volume of the water) to the water. Stand well back and wait for the reaction to commence. The mixture will start to 'boil' almost immediately, building in intensity with a low rumbling sound while releasing heat, steam and lime particles into the air. The lower portion of the drum will become very hot.

iii) While wearing the proper protection, start stirring the mixture with round wooden poles, timber thatching laths or narrow planks while the hydration continues.

iv) Allow the mixture to cool down after the boiling subsides. The lime/water mixture should now have a thick, creamy consistency. Water will migrate to the surface of the mixture forming a thin film. If the result of the hydration process is a semi-dry, crumbling coagulating mass, too little water has been used and more water needs to be quickly added while continuing to stir the mixture, otherwise design strength of the material will be reduced. This is however unlikely to happen if the abovementioned lime/water mixing ratio is observed. Some unslaked limes are more volatile than others during slaking, absorbing more water in the process.

v) Leave the mixture to stand under cover for about a day and then cover the drum with plastic after ensuring that there continues to be a thin film of water over the surface of the mixture. If necessary, top up with a small amount of water. The hydration will continue slowly for a few days, although this will be imperceptible after the first few hours. Hydrated lime under a few millimetres of water will keep for days, even weeks without hardening. Ensure that the surface is kept topped up with water during this period. Storage for longer periods requires the material to be sealed in containers.

vi) The hydrated lime slurry is now lime putty. Leave to stand for 30 days if at all possible to 'mature,' during which time the drum should remain covered and the mix kept under a thin layer of water. The purpose is to isolate the mixture from atmospheric carbon dioxide which is the primary agent responsible for hardening the mixture. Once hydrated and wet, lime putty will remain soft and workable for prolonged periods of time provided they are properly stored in sealed containers.

vii) After no more agents from the hydration process are being released from the mix, transfer to a clean metal oil drum or alkali resistant sealable plastic buckets. Lime putty stored this way can keep for years, developing improved workability and adhesive properties the longer it is kept.

B. Preparation of Coarse Stuff

Coarse stuff is a mixture of slaked lime and clean builders sand. This forms the basis of all lime mortar, plaster and render mixes. The most traditional lime/sand mix is 1 part hydrated lime to 3 parts sand. This will be the guide mix used on historic fabric within the site, Stronger mixes could be prepared for render coats and other applications subject to endorsement by the ELC appointed heritage professionals, the purpose being to improve durability and weather resistance where necessary.

i) Combine clean, sharp sand with mature, wet lime putty to the desired proportion needed. Where light coloured sands are used, special care will be taken to ensure that the sand is thoroughly mixed with the lime as visual evidence will be unreliable. The purpose of a thoroughly mixed preparation is to avoid weak spots when the mix is applied.

ii) Add only enough extra water to ensure that the mix remains stiff but workable and not sloppy to avoid shrinkage cracks after application.

iii) Store in sealed alkali resistant containers until required. Coarse stuff stored for long periods will be stiff when opened and will require 'knocking down' with timber paddles to recover workability.

C. Hairline Cracks: Application of Lime Putty Mix

Ensure that wall surfaces contain no loose material and have been properly cleaned and wetted before application. For cleaning out cracks, clean, compressed air (ie. containing no oily compressor residue) may be used. For fine cracks (up to 2mm wide), the lime putty will be applied directly with a spatula using pressure to iron in as much of the mixture as possible. Lime putty applied into wide cracks and holes can shrink dramatically as it loses moisture and will therefore not be used for such wider cracks. Coarse stuff for such applications will be used instead (see D below). During the hardening period (approximately 3 days depending on the thickness of the application) the mix will be kept moist using nebulous sprays applied at least 3 times daily as in **Method Statement #01B** (read with Figure 02) to ensure proper curing.

D. Wider Unreinforced Cracks: Application of Coarse Stuff

i) Widen the crack to approximately 30mm (or wider, depending on the application) using a sharp wide plugging chisel and a 5kg hammer. No cold chisels will be used as their wedging action can cause unnecessary damage to the fabric. A small diamond power disc saw or even a small angle grinder could be used, but only if/where authorized by the ELC appointed heritage professionals. Plaster chases will be to the full depth of the plaster, and at least 15mm deep, whichever is deeper.

ii) Clean out all loose material using a stiff bristle/nylon brush. No ferrous wire brushes will be used under any circumstances. This will be followed by cleaning with a softer square paintbrush to remove finer material. Thoroughly rinse the chase to remove any remaining loose particles.

iii) A clean square face should be left at the back of each chase. In the case of stone substrates, stone faces will not be cut into. Wherever possible the edges of the chase will be undercut to afford the repair material an improved key.

iv) Deep tamp the coarse stuff mix into the chase after ensuring that the crack is still damp (but not wet – there should be no evidence of surface water). Existing excess wall fabric is to be cut back to the back face of the chase, which is then to be filled with the remaining mixture.

v) Strike flush with adjoining wall surfaces and smooth off with a timber float and then a slightly damp (not wet) sponge if the surfaces are uneven. The purpose will be to match as closely as possible the surrounding finish. Steel floats will therefore not be used for finishing work. The mix will be applied as stiffly as possible to minimize shrinkage. Once applied, however, it will be kept keep moist as in C to ensure proper curing.

E. Plaster and Renderwork

Where the application of larger areas of replacement plaster and renderwork is required, the following guide process will be followed:

i) Wet the wall at least 3 times daily for one day prior to plastering and then again immediately before the application. Ensure that the wall surface is damp, but with no visible surface water present.

ii) Apply a scratch coat of 1 part hydrated builders lime to 3 parts sharp clean, builder's sand to a thickness of about 10mm, Key and keep moist. Once the scratch coat has stiffened, apply the render coat. When applying the render coat, the, existing surface contours of the surrounding wall will be followed and flat, plumb surfaces and sharp corners avoided. The purpose will be to retain as much of the historic character of the element being plastered as possible,

ii) Apply a mix of 1 part hydrated builder's lime to approximately 2,5 – 2,8 parts sharp clean builder's sand using a wood float. Finish using a wood float and, for uneven surfaces, smooth with a slightly damp sponge to retain this undulating character. Exterior applications will, wherever possible, be completed in one operation to avoid joints susceptible to weathering. For interior applications that cannot be completed in one operation, the plaster edge is to be cut off at a rake to provide a key and completed the following day.

ix) Newly plastered and rendered surfaces will be kept wet for at least the following three days using nebulous water sprays applied as in **Method Statement #01B**.