ASHWORTHARCHITECTS

2303- The Orangery Suite Repointing

LIME POINTING METHODOLOGY

PERFORMANCE IN USE

The hardened mortar should have:
- Adequate vapour permeability
- An appropriate degree of capillarity for the proposed use
- A water absorption rate not significantly greater than the host substrate
- An elasticity that reflects the built condition and scale of the works
- Sufficient tensile strength to suit the construction requirements
- Compressive strength to suit the construction requirements (usually quite low)
- A bond strength sufficient to achieve a good wind- and water-tight bond, never greater than the host masonry, nor so feeble as to result in the separation of the mortar, leading to capillary ingress of water at the masonry/mortar interface.

EASE OF USE

The mortar should:
- Have appropriate workability characteristics when fresh to allow the work to be undertaken correctly
- Remain workable for a sufficient length of time to allow appropriate finishing
- Achieve an adequate degree of frost resistance at a sufficiently early age to avoid potential
- freeze/thaw risk.

Requirements for protection and curing should be taken into account.

COMPATIBILITY WITH ORIGINAL HISTORIC MATERIALS

The hardened mortar should:
- Have a vapour-permeability similar to, or greater than, that of adjacent historic materials
- Be visually compatible with surviving mortars and/or with the original appearance of the building
- Reflect the historic integrity of the original materials and methods of construction where practical.

CHOOSING THE RIGHT BINDERS AND AGGREGATES

Lime binders are available in a wide range of types, suitable for different applications and locations.
REFER TO ROSE OF JERICHO report and recommendations ref: Test Report No. 5678.

WORKING METHODS

Pointing is a 'top-down, bottom-up' process. Clearing out and preparation of joints should always be carried out from the top down, and pointing should be carried out from the bottom up to take account of the effects of gravity.

Any cementitious or other non-original and inappropriate mortars should be carefully removed, avoiding damage to adjacent masonry. If a cementitious mortar cannot be removed without damaging the masonry, consideration should be given to leaving it in place. Defective lime

mortars (those which are friable or have become detached from the adjacent masonry) should be raked out to a sufficient depth where sound mortar exists. However, care should be taken to ensure that sound, original lime mortars are left in place, in accordance with the principle of minimum intervention.

Where masonry is relatively impervious and a suction bond may be difficult to achieve, joints may need to be raked out further, (say) at least twice the depth of the joint width, to provide a level of mechanical anchoring of the new mortar into the joint.

Hand tools such as plasterers' small tools, half hacksaw blades and specially made steel hooks can be used to avoid damage to the stone arrises and widening of the joints. Large chisels and any tools wider than the joint width itself should not be used. The use of power tools is frowned on by many conservators, but they should not be completely disregarded. There are some power tools available now which can be used successfully to remove existing mortars (particularly where cementitious),such as those with oscillating blades. However, where historic masonry is concerned they should only be used by the most highly experienced craftsperson owing to the ease and speed with which they can damage masonry.

All loose and friable material must be removed prior to placing new mortar, as it requires a sound surface to adhere to. A stiff bristled brush should be suitable for clearing stone surfaces of unwanted material, followed by lightly spraying water (not under high pressure) into the joints to remove any remaining dust and debris. Preparation of the wall surfaces generally should include thorough cleaning down and removal of all loose material, dust, etc, and damping down before starting work.

Control of suction between the new mortar and the substrate is required. The more absorbent the stone or brick, the more wetting down it will need, in order to prevent water being drawn from the newly-placed mortar into the stone. If too much water is lost, the mortar will shrink excessively, become friable and ultimately become detached from the substrate. Impervious stones may require minimal or no damping down.

For re-pointing, the mortar should be sticky but not wet. A suitable mortar should stick to the underside of an inverted hawk (or trowel). An appropriate pointing tool should be chosen to suit the width of the joint, thus preventing spreading of mortar or staining on the masonry faces. The mortar should be firmly pressed into the depth of the joint with the pointing tool. Where pinning stones exist (normally found in rubble-stone mortar joints over 10-15 mm) they should be hammered in any joints to force the mortar well back into the depth of the joint and to reduce the volume of mortar present in one location.

In general, when mortar has stiffened up, it should be firmly compacted into the joints by beating with a stiff bristle brush. This will help eliminate any initial shrinkage cracking and ensure that the mortar is fully compacted into the joint with a good bond to the surrounding masonry. The surface should then be lightly scraped back with the edge of the pointing tool or similar, to provide a rough, open- textured surface which is ideal for carbonation and curing, and for maximum evaporation of moisture from the joints once fully cured.

Overworking the surface of the mortar will result in surface latency caused by lime particles being 'worked' to the surface, and forming an outer crust which may restrict carbonation of the mortar behind. This can also result in lime leaching if subjected to rainfall before the mortar has sufficiently cured.

Sample panels of pointing should always be produced at an early stage in the contract, as these will serve to clarify final details of specification, define the standards of workmanship and finish, and provide control samples for guidance of the contract work.

CURING AND PROTECTION

All mortars require adequate protection until they are fully cured, and inadequate protection is a common cause of failure in lime work. These mortars should not be expected to cure as quickly as cement-based mortars.

In drying conditions, new lime pointing will need to be dampened regularly (by lightly spraying) to prevent rapid drying. Over-rapid drying will result in shrinkage cracking due to rapid loss of water and will inhibit curing because the lime will only react with carbon dioxide in the presence of moisture. For hydraulic limes, retention of moisture within the mortar for the first few days is critical to ensure that the hydraulic set takes place because its hydraulic constituents react with water itself: thereafter, the remaining carbonation set requires cyclical light damping and slow drying.

The length of time required for the mortar to cure is also variable and will depend on environmental conditions, type of mortar used, its finish, and the mass of mortar in any one location. Curing can be accelerated by good working practices with pinning out and finishing joints (as described above).

Adequate protection can usually be achieved by close covering the new work with hessian and polythene sheeted panels placed against the face of the new work.