



Atelier MB
Urban Architects

Job
Job ref:

Science and Industry Museum – Fire Strategy Remediation Works
2002

Science and Industry Museum Manchester

Project Ref: 2002

Repair Specification

Date: April 2023

Issue: **Rev C (C41/385A updated).**

To be read in conjunction with:
AtMB full tender package including:

2002 Methodology Document series by
AtMB,
2002 Methodologies - Supplementary
Details Relating to Historic Fabric by AtMB,
2002 NBS Specification by AtMB,
and associated Neo Fire Surveys which
provide the exact scope of works.

Covering:
Great Western Warehouse
Station Building
1830s Warehouse

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MASONRY

Masonry - General method of repair/restoration to brickwork and stonework:

1. Carry out full survey of brickwork area under consideration. Survey to be carried out by suitably skilled masonry expert – to be agreed with contractor.
2. Determine location and severity of surface deposits.
3. Determine whether such deposits risk causing physical damage/deterioration to the historical fabric if left undisturbed and/or the soiling needs to be removed to leave clean dust free surfaces to adhere standard fire stopping details (in accordance with Rockwool installation recommendations). Examples of such soiling include paint and mastic.
4. Where works are necessary in line with 3 above, carry out cleaning methods as outlined below. Presumption towards non-invasive cleaning.
6. Identify areas requiring repair work and carry out repair in accordance with methods set out below. Presumption towards non-invasive repair.

Cleaning Masonry

Cleaning of brickwork surfaces is only to be carried out where necessary – as outlined above.

Staining will not be cleaned for aesthetic reasons.

Soil sampling is to be undertaken to determine material.

Once cleaning is determined to be necessary, site trials will be carried out utilising the weakest mix/abrasive/pressure and proceeding cautiously until the lowest impact solution is determined that removes the stain/crust.

C40 CLEANING MASONRY

To be read with Preliminaries/General conditions.



GENERALLY/PREPARATION

110 SCOPE OF WORK: Areas highlighted in the AtMB Methodology documents and cross referenced with the Neo reports which illustrate photographs/plan locations.

150 ELECTRICAL EQUIPMENT AND SUPPLIES: Ensure that all electrical supplies serving external equipment have been disconnected and that, unless specified otherwise, fittings and associated cables have been removed.

155 VENTS AND GRILLES: Protect but do not seal up ventilation grilles, air bricks, or other ventilation openings without first seeking instructions.

160 PROTECTION: Provide and maintain throughout the cleaning works, effective protection and sealing to prevent:

- Ingress of water, cleaning agents, debris and dust into the building via windows, doors, vents and other openings.
- Damage to all components and finishes that can reasonably be protected during cleaning procedures, including lightning conductors, roof coverings, flashings, rainwater goods, glass, metal work, services equipment, signage and pavings.
- Staining of surfaces from ferrous or other reactive metals.

165 PROTECTIVE MEMBRANES/BOARDS:

- Use approved protective boards, sheeting, films, sealants and sealing tapes that do not stain protected materials and that can be readily removed after cleaning without damaging or staining the protected material.
- Do not use temporary fastenings into components, masonry features and fittings without approval. When fixing into masonry, locate fastenings in joints.

175 CONTROL AND DISPOSAL OF WASH WATER AND DETRITUS

- Disposal: Safely. Obtain approvals from relevant Authority.
- Control of wash water: Collect and divert to prevent ingress and damage to building fabric and adjacent areas.
- Above and below ground drainage systems: Keep free from detritus and maintain normal operation.

180 COLD WEATHER

- Cleaning procedures using water: Do not use when air temperature is at or below 5°C. Protect damp surfaces from frost.
- Chemical cleaning agents: Do not use when surface temperatures are below those recommended by manufacturer.

190 CLEANING GENERALLY

- Operatives: Appropriately trained and experienced for each type of cleaning work.



- Evidence of training: Submit on request.
- Control of cleaning: Confine cleaning processes and materials to designated areas. Prevent wind drift.
- Detritus: Remove regularly. Dispose of safely.
- Monitoring: Frequently check results of cleaning compared to approved trial samples. If results established by trials are not achieved, seek instructions.
- Modifications to cleaning methods and materials: Seek instructions.

WORKMANSHIP GENERALLY

210 HEALTH AND SAFETY: Take all necessary precautions to protect site operatives and the general public from health hazards associated with the materials and procedures for the cleaning method(s) used.

220 CONDITION OF SURFACES: Before commencing cleaning of each area, ensure that surfaces are in a suitable condition to be cleaned and that:

- Walling and associated features/components are stable and that preparatory repair works are complete.
- Fixtures and fittings have been removed.

230 TRIAL SAMPLES(S):

Prepare trial samples for each of the following cleaning methods in locations agreed with the CA: Clause C40/332/340/342/412

Record details of materials and procedures for each sample as specified in the relevant method of cleaning clause.

Provide the CA with a copy of trial sample records

Make arrangements to enable the CA and all other interested parties including Conservation Officers and other Heritage where listed. The CA should ascertain and take note of the agreed level of clean that all the interested parties have approved.

Obtain approval before commencing cleaning.

240 TEMPERATURE CONDITIONS:

- Do not use water based cleaning procedures when air and surface temperatures are 5° C or less. Protect damp surfaces from frost during drying out periods.
- Do not use chemical cleaning agents when surface temperatures are below those recommended by the manufacturer.

250 CLEANING GENERALLY:

- Use operatives who are skilled and experienced with the equipment, materials and procedures for the type(s) of cleaning and surfaces specified. Provide evidence of their training and experience to the CA on request.
- Confine cleaning to designated area(s)/surfaces. Do not allow cleaning agents or residues to stray onto adjacent or protected surfaces.
- Clean, collect and safely dispose of debris from scaffolding, ledges, etc. at the end of each day. Prevent debris falling to lower levels.



- Prevent marking of cleaned areas from dirt and debris splashing up from scaffold boards.

260 MONITORING:

- Regularly monitor effects of each cleaning procedure against the degree of cleaning established by approved trial sample(s). Seek instructions immediately, wherever:
 - Disruption to the surface occurs.
 - Anticipated level of surface cleaning is not being achieved.
 - Discolouration or stains are revealed by cleaning.
- Do not modify cleaning procedures or materials without approval from the CA.

270 RECORDING CLEANING METHODS:

- Maintain records of cleaning methods used for each area/surface. Include details of equipment type, cleaning agent, ambient temperature conditions and other variables as specified in the relevant method(s) of cleaning clause(s).
- On completion of cleaning, provide copies of records to the CA.

280 CONTROL OF WATER:

- Provide suitable temporary catchment boards/sheeting, gutters, etc. to collect wash water and divert it to suitable discharge points. Location of catchment area(s): to approval
- Do not let wash water build up at outlets or above levels of flashings or anywhere where there is risk of it penetrating and causing damage to the building fabric.
- Ensure that water does not penetrate interiors and damage finishes, etc.

Monitor interior of building and seek instructions when any signs of damp appear internally.

CLEANING METHODS

It is important that a small test sample of paint removal and cleaning of the brickwork is performed in an inconspicuous location for approval by the Contract Administrator.

310 BRUSHING AND SCRAPING: Before commencing any other methods of cleaning, remove loosely adhered deposits and growths using suitable corrosion resistant brushes and scrapers/spatulas that do not abrade or gouge the surface. Do not use brushes with steel bristles.

TOOLING to remove thick encrustations of dirt is not permitted.

310A Mechanical Removal of cement mortar from Brickwork
Where cement mortar will not come loose with brushing and scraping alone and needs to be removed to facilitate installation of standard fire stopping details only.

312 SURFACE BIOCIDES



- Types: Registered by the Health and Safety Executive (HSE) and listed on the HSE website under non-agricultural pesticides.
- Compatibility with surface: Free from staining or other harmful effects.

TOOLING: to remove thick encrustations of dirt carbon and limescale etc. it is recommended, providing that:

The work is carried out by skilled and experienced stone masons.

The original surface/detail is not removed unless agreed otherwise with the CA.

322 ABRASIVE CLEANING EQUIPMENT

- Not permitted.

330 ABRASIVE BLOCKS not permitted.

PRODUCTS/ EQUIPMENT

332 WATER SPRAY (MOUNTED NOZZLES)

- Equipment:
 - Spray/ Nozzle types: Fine and Subject to site trials .
 - Nozzles: Position and direction adjustable, relative to surfaces and profiles.
- Controls: Time clock .

340 DRY AND WET ABRASIVE CLEANING – STONEHEALTH TORC SYSTEM as required after DOFF cleaning – seek instructions before proceeding.

Equipment type Submit proposals. To be agreed on site.

Nozzles: Submit proposals. To be agreed on site.

Abrasives: Subject to site trials. Trial test to be provided at a location to be approved.

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Work to be carried out by an approved Stonehealth approved subcontractor.

Apply abrasive at the lowest pressure that will remove deposits whilst causing the minimum of abrasion to the surface(s). Where deposits are ingrained seek instructions.

For each surface, establish the optimum settings (pressure and abrasive volume), nozzle type and distance of nozzle from the surface. Keep a written record of these variables.

Remove and collect dust and debris from each completed surface as work proceeds and finish by rinsing off thoroughly with clean water using suitable low pressure spray equipment.

Rinse debris/slurry thoroughly from each completed surface with clean water using suitable low pressure spray equipment. Do not allow slurry to dry out on the surface.

342 PRESSURIZED WATER CLEANING EQUIPMENT

- Manufacturer: Submit proposals.
- Product reference: Submit proposals.
- Operational pressure: 1750 kPa (250 psi).
- Nozzles: Subject to site trials.



DOFF STEAM CLEANING Equipment type – Stonehealth DOFF

Apply steam at the lowest pressure and allow when removing paint the appropriate temperature that will remove/soften/loosen deposits without abrading or disrupting the surface(s). If a paint softener is required: see also 415. If removing biological growth it may be possible to be removed at a lower temperature but to ensure that the re-growth does not occur, the full temperature of 150°C should be applied over the whole surface in order to kill off the spores. In such instances there is no need to use a chemical biocide.

For each area/surface, establish the optimum settings (temperature, volume and pressure), nozzle type and distance of nozzle from substrate. Keep a written record of these variables but allow an operator to vary

Assist removal of softened deposits with suitable corrosion resistant brushes and scrapers/spatulas that do not abrade or gouge the surface.

APPLICATION

412 REMOVAL OF LOOSELY ADHERED DEPOSITS

- Timing: Before commencement of other cleaning methods.
- Surfaces: Prevent damage, including abrasion.

CHEMICAL CLEANING – LIQUIDS/GELS (USED AS PAINT SOFTENERS PRIOR TO DOFF)

Chemical agents To be agreed as required. Stonehealth No. 6 Paint Softener or Stonehealth No. 7 and 7S Paint Softener.

For each area/surface, establish the lowest possible concentration of agent(s) and the shortest dwell times, number of applications, ambient temperatures and rinsing water temperatures.

Contain chemical agents and rinsing water/sprays within each treatment area. Do not allow agents or rinsing water/sprays to contact surfaces that are either excluded from cleaning or that have already been cleaned. Prevent wind drift.

Before each application of agent, wet the surface and adjacent areas using clean water applied by low pressure spray. Test for pH of wetted surface as clause 495.

Apply cleaning agent evenly and do not allow to dry out.

Rinse treated surfaces thoroughly and evenly with clean water working from the bottom of each area upwards. Do not use water spray pressures that will drive cleaning agents into, or cause disruption of, the surface material and joints.

Carry out pH testing and neutralisation procedures as clauses 495.

422 BIOCIDES APPLICATION

- Preparation: Damped dry growths.
- Surfaces: Prevent damage, including abrasion.
- Biocide treatment: Appropriate solutions to kill growths and inhibit further growths.
- Dead growths: Remove.

432 TOOLING



- Tooling of surfaces: Not permitted.

462 WATER SPRAY CLEANING (MOUNTED NOZZLES)

- Surfaces: Minimize water run-off. Prevent damage.
- Adjustment of washing cycle and nozzle positions: Regularly to achieve optimum cleaning performance.

472 PRESSURIZED WATER CLEANING

- Surfaces: Prevent damage, including abrasion.
- Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.

482 STEAM CLEANING

- Surfaces: Prevent damage, including abrasion.
- Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.

495 TESTING pH VALUES FOR CHEMICAL CLEANING

- pH indicator: To distinguish pH values between 1-14.
- Testing before cleaning:
 - Clean rinsing water, wetted surfaces and joints: Test for pH. Record as 'control' values.
- Testing after water rinsing and neutralization:
 - Wetted surfaces and joints: Record pH values and seek advice before proceeding

COMPLETION:

Obtain CA's approval of cleaning to each area/surface and before removal of temporary protection.

After removal of temporary protection, thoroughly clean all glazing, window frames, doors, sills and other affected surfaces.

Check that all gutters, hoppers, downpipes and gullies are free from obstruction and debris arising from cleaning works.

Give the CA 5 working days notice before striking each stage of scaffolding, to allow for final inspections.

Complete all necessary documentation, review and record final results with supportive drawings and photographs.



C41 REPAIRING/RENOVATING/CONSERVING MASONRY

To be read with Preliminaries/General conditions.

GENERALLY/PREPARATION

110 SCOPE OF WORK: As agreed with contractor on site.

Where cement based mortar removal has resulted in joints that are twice as deep as their width or greater and therefore need to be repointed.

Re-pointing existing lime mortar is to be kept to the absolute minimum structurally necessary; re-pointing for cosmetic reasons is not permitted.

Re-bedding and pointing of replacement or loose bricks to ensure structural stability and fire integrity of the wall. All pointing must be min 25mm deep to ensure fire integrity is maintained.

120 SITE INSPECTION

- Purpose: To confirm type and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.
- Parties involved: Conservation officer, contractors representative, specialist subcontractor, Architect.
- Timing: At least 2 working days prior to programmed start of cleaning.
- Instructions issued during inspection: Confirm in writing with revised drawings/schedules prior to commencing work.

120.1 REVIEWING SCOPE OF THE WORK:

- Inspect each relevant area of masonry with the CA to confirm the type and extent of the work.
- Mark clearly on face any masonry units or parts of units that are to be cut out and replaced.
- Identify each masonry unit that is to be removed, replaced or repaired with a code number cross-referenced to drawings/photographs.
- Adequately record the characteristics of existing masonry in areas affected by repair works. Use measurements and photographs as appropriate to record bonding patterns, joint widths, special features, etc.

125 REMOVAL OF FITTINGS/ FIXTURES

- Items to be removed, and reinstated on completion of repair work: Pipework and brackets.
- Identification: Attach labels or otherwise mark items using durable, non-permanent means, to identify location and describe refixing instructions, where applicable.
- Treatment following removal: Refurbish and repair as necessary.
- Storage: Protect against damage, and store until required.
Storage location: On site – tbc.



- Reinstatement: Refit in original locations using original installation methods.

- Items unsuitable or not required for reuse: tbc on site.
- Masonry fabric and surfaces: Do not damage during removal and replacement of fittings/ fixtures.

140 RECORD OF WORK

- General: Record work carried out to masonry clearly and accurately using written descriptions, sketches, drawings and photographs, as necessary.
- Specific records: Elevations to show location and type of work carried out.
- Documentation: Submit on completion of the work.
- Number of sets: 1 electronic.

WORKMANSHIP GENERALLY

151 POWER TOOLS FOR REMOVAL OF MORTAR is not permitted.

155 PUTLOG SCAFFOLDING will not be permitted. Submit details of any scaffolding which is required to be fixed into existing fabric for stability. Fixings should only be made into mortar joints if possible.

160 PROTECTION OF MASONRY UNITS AND MASONRY

- Masonry units: Prevent overstressing during transit, storage, handling and fixing. Store on level bearers clear of the ground, separated with resilient spacers. Protect from adverse weather and keep dry. Prevent soiling, chipping and contamination. Lift units at designed lifting points, where provided.
- Masonry: Prevent damage, particularly to arises, projecting features and delicate, friable surfaces. Prevent mortar/ grout splashes and other staining and marking on facework. Protect using suitable non-staining slats, boards, tarpaulins, etc. Remove protection on completion of the work.

165 STRUCTURAL STABILITY

- General: Maintain stability of masonry. Report defects, including signs of movement, that are exposed or become apparent during the removal of masonry units.

170 DISTURBANCE TO RETAINED MASONRY

- Retained masonry in the vicinity of repair works: Disturb as little as possible.
- Existing retained masonry: Do not cut or adjust to accommodate new or reused units.
- Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

180 WORKMANSHIP

- Skill and experience of site operatives: Appropriate for types of work on which they are employed.



- Documentary evidence: Submit on request.

180.1 : Use operatives who are skilled and experienced with the materials and procedures required for the types of repairs specified. Provide evidence of their training and previous experience to the CA on request.

SAND SAMPLE(S): Before placing order, submit for approval representative samples of:
Sands for bedding and pointing.
Sands for grouting.
Sands for mortar repair.

190 CONTROL SAMPLES

- General: Complete an area of each of the following types of work, and arrange for inspection before proceeding with the remainder: Water and steam cleaning to glazed brickwork.

MATERIALS/PRODUCTION/ACCESSORIES

220 RECORDING PROFILES:

- Take measurements from the existing masonry units identified by the CA to allow replacements to be matched accurately.
- Where inserts are required to record profiles in situ and there are no suitable joints, seek instructions.
- Prepare accurate drawings and templates as necessary, clearly and indelibly marked to identify use and location.

Brick Repair and Replacement.

Individual facing bricks to be replaced where there is significant cracking or missing material such that the masonry is no longer performing within the wall. Refer to NBS CI C41

Brick Replacement

260 BRICKS:

- Type: New to match existing – submit samples for approval prior to commencing works. Bricks to match existing as closely as possible in terms of strength, shape, dimensions, texture and colour. Bricks tested to BS EN 771-1:2011
Northcot offer a brick matching service. Obtain samples from here in the first instance. Other suppliers will be considered subject to review of specification and samples.

<http://www.northcotbrick.co.uk/#contact>

NORTHCOT SALES OFFICE

t: 01386 700551

sales@northcotbrick.co.uk



265 SALVAGED/SECOND HAND BRICKS to be free from deleterious matter such as mortar, plaster, paint, bituminous materials and organic growths. Bricks to be sound, clean and reasonably free from cracks and chipped arises. Bricks to be frost resistant and tested for salt content. **Provenance must be confirmed prior to acceptance.**

365 REPLACEMENT OF BRICKS

- Bricks: Reclaimed brick as clause 265.
- Mortar: As section Z21.
- Mix: As clause 320

385 LAYING REPLACEMENT MASONRY:

- Keep exposed faces of new material to face lines agreed with the CA.
- Accurately align faces, angles and features. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
- Dampen joint surfaces to control suction as necessary. Lay on a full bed of mortar and ensure that all joints are filled. Ensure that no mortar/grout encroaches upon exposed face.

385A BEDDING MORTAR

Mortar/pointing samples must be taken of each different type and analysed prior to agreeing the exact mix with the CA and CO.

Allow for 6 no. level 2 samples by Ty Mawr for pricing purposes. These may not all be necessary. <https://www.lime.org.uk/news/mortar-analysis.html>

~~Use the following for pricing purposes only.~~

Mix: As pointing. ~~For pricing purposes only use: 1:2 Quicklime:Sand (can be obtained pre-bagged from <https://edenhotlimemortar.co.uk/products.php>)~~

~~_____ Sand source/ type: For pricing purposes only use: clean, well graded sharp Nostafeld sand~~

Updated pointing and bedding mixes as follows:

New Warehouse (red brick):

Mix A- 3No Coarse Mersey sand, 1No NHL 3.5 Hydrated Lime. (Fine brush finish)

New Warehouse (blue brick):

Mix B- 3No Washed Mersey sand, 1No NHL 3.5 Hydrated Lime, 15ml Natural Black Pigment.



Pigment to be: <https://www.womersleys.co.uk/shop/paints/pigments/pigments-black>

Lime to be: <https://www.womersleys.co.uk/shop/hydraulic-lime/old-white-ionic-hydraulic-lime-nhl35> or similar approved.

New Warehouse – Filling holes within bricks:

Mix C- 3No Washed Mersey sand, 1No NHL 3.5 Hydrated Lime, variants of Natural Red Pigment to colour tone to each individual brick repair
(<https://www.womersleys.co.uk/shop/paints/pigments>)

1830s (Red Brick):

Mix D1 – 1no Nosterfield sand

2no Leighton Buzzard sand

20% black grit

1no NHL 2

Pigment to be:

https://www.womersleys.co.uk/shop/construction_pointing_Mortar/clinker-coal-ash
or similar approved.

Joints that cannot be fully filled with bedding mortar: Grout thoroughly around replacement masonry units.

Grouting: Keep grout back from exposed face to allow for the depth of pointing, using an approved temporary sealing material. Prevent grout staining exposed face.

Reinstatement of feature brickwork

Ensure replacement bricks match profile of those damaged or missing – seek instructions from CA.

Mortar Repairs

610 MORTAR REPAIR OF CRACKS

- Mortar: As section Z21.
- Mix: See clause 385A Mix C above.
- Sand source/ type: See clause 385A Mix C above.
- Preparation: Clean out holes to remove debris, dust and dirt.

Point cracks, leaving a hole at the base through which to inject grout. These 'proving' holes are to be placed at max 500mm centres.



Once mortar set, plug proving holes with cotton wool and flush crack with water via injection holes. Introduce lime based grout through holes via syringe. Mix to be agreed subject to analysis on site.

611 MORTAR REPAIR OF small scale filling of fixing holes.

- Mortar: As section Z21.
- Mix: See clause 385A Mix C above.
- Sand source/ type: See clause 385A Mix C above.
- Preparation: Clean out holes to remove debris, dust and dirt. Undercut any holes to provide a key. Dampen recesses, as necessary, to control suction. Apply colour matched mortar.

620 RESIN INJECTION REPAIR OF CRACKS

- Resin injection system manufacturer: To be approved.
- Product reference: To approval.
- Preparation: Clean out cracks to remove debris, dust and dirt. Secure loose masonry units.
- Exposed faces: Keep clean and free from stains.
- Resin application: Use methods recommended by system manufacturer to fully bond masonry.
- Completion: After resin has cured, remove temporary crack plugging material and protective coatings.
- Pointing to cracks and injection holes: To manufacturer recommendations.

690 MAKING GOOD TO INJECTION AND INSERTION HOLES

- Preparation: Clean out holes thoroughly.
 - Repair mortar: To match existing masonry units/ joints in colour and texture.
- Fill holes and finish mortar neatly and flush with surrounding masonry.
- Finished appearance: Obtain approval for first few holes before completing the remainder.

Pointing.

810 PREPARATION FOR REPOINTING:

- Work from the top of the wall downwards.
- Joints should be carefully raked out manually and without damaging adjacent masonry, arises or widening joints. Form a neat recess of depth not less than 18-25mm, when mortar beyond this depth is loose and friable and/or cavities are found seek instructions.
- Remove dust and loose debris. Dampen joints to control suction as necessary.

820 POINTING BRICKWORK



3 no. mortar/pointing samples must be taken of each different type and analysed prior to agreeing the exact mix with the CA and CO. ~~Use the following for pricing purposes only.~~

See clause 385A mixes above.

- Preparation of joints: As clause 810
- Mortar: As section Z21.
- Mortar: As section Z21.
- ~~For pricing purposes only:~~ Mix: 1:2 Quicklime:Sand (can be obtained pre-bagged from <https://edenhotlinemortar.co.uk/products.php>)
- ~~Sand source/ type: For pricing purposes only:~~ clean, well graded sharp Nostafeld sand
- Joints profile/ finish: To match existing.
- Other requirements: N/A.

840 POINTING WITH TOOLS/IRONS:

- Press mortar well into joints using pointing irons that fit into the joints, so that they are fully filled.
- Ensure that no mortar encroaches upon the face of the masonry. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly as specified.

860 BRUSHED FINISH TO JOINTS

Timing: After initial mortar set has taken place remove laitance and excess fines by brushing, to give a coarse texture. Do not compact mortar.

900 Protection and cleaning

- Protect works from direct sun and rain, well ventilated and moist min 10 deg C for min 4 weeks until face cured.
- Turn back scaffold boards adjacent to brick faces at night and during heavy rain.
- Remove any staining immediately.
- Do not carry out works below 5deg and falling. Recommence at 3deg and rising.
- Keep daily max/min temperature records on site during October-April (and beyond should frost be forecast).

901 Completion

- Give at least one weeks notice of completion to allow inspection prior to scaffold removal.
- Remove all tools, plant and equipment and used materials and debris.

C51 Repairing/ Renovating/ Conserving timber



To be read with Preliminaries/ General conditions

GENERAL INSPECTION

Purpose: To confirm nature and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.

Parties involved: Contract administrator

Timing: At least 5 days before starting each section of work.

Instructions issued during inspection: Confirm in writing, with drawings and schedules as required, before commencing work.

Design of Repairs

-Cut back of damaged timber should be the minimal required to insert new piece in gap.

-Nailing of components will not be permitted if the nails will be on exposed surfaces at completion – with the exception of beading. Punch nail heads below the surface and fill to match colour of timber where a paint finish is not specified.

If decayed timber needs to be removed to form a splice or patch repair, take off just enough timber to allow an effective repair. Always fit the new material to the profile of the old.

-All fixings must not be visible upon completion of joinery and shall be non-corrosive. Nails to BS1220, screws to BS1210.

TIMBER PROCUREMENT

Timber (including timber for wood-based products): Obtained from well-managed forests and/ or plantations in accordance with:

- The laws governing forest management in the producer country or countries.
- International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES). Documentation: Provide either:
 - Documentary evidence (that has been or can be independently verified) regarding the provenance of all timber supplied.
 - Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood-based products.

Certification scheme: Forest Stewardship Council (FSA).

- Other evidence: UK Timber procurement policy Category B evidence: Completed supply chain information.

TIMBER SUPPLIER CONTRACTOR TO CONFIRM PRIOR TO ORDERING

Materials

New wood:

All timber shall be of the species to match the existing and in all cases shall be of the best quality available, free from decay, holes, splits, shakes, and knots and in accordance with BS 1186 : Part 2 Class 1 and with a moisture content of 10% to 12%.

European Pine to match existing floorboards.



All timbers shall be from a renewable source which is properly managed to ensure a sustainable supply. Certification will be required.

– Repair timber should match the original as closely as possible in every way: species, grain orientation, moisture content, growth characteristics and section orientation (cross sectional cut position).

-Adhesives for timber joints shall be a waterproof resin-based adhesive.

-Where preservative treated timber is specified carry out as much cutting and machining as possible prior to treatment. Re-treat all timber surfaces which are subsequently processed.

Do not use timber members which are damaged, crushed or split beyond the limits permitted by their grading.

Ensure that notches and holes are not so positioned in relation to knots or other defects that the strength of members will be reduced.

- Preservative treatment: Organic solvent impregnation to NBS section Z12 and Wood Protection Association Commodity Specification C8.

CROSS-SECTION CHARACTERISTICS:

To match existing flooring.

SHAPING:

Straight members: Sawn or axed on sides other than any exposed heart face.

EXECUTION

Preparation and fabrication off site

-New timbers must match the moisture content of the existing sound timber as closely as possible – within 1%. Site moisture readings must be taken prior to proceeding and new timbers allowed to equilibrate on site for at least 10 days prior to installation to minimise risk of distortion and damage.

-All joinery components shall be kiln dried to achieve an average moisture content of 12-14% (external timbers), and 10-12% (internal timbers) at the time of fixing.

- All materials must be cut to the required sizes and acclimatised to end use conditions for a minimum of 4 weeks prior to being worked further.

-Fabricate joinery components to BS 942:2007. Form sections out of solid timber except where specified. Carefully machine timbers to accurate lengths and profiles free from twist or bowing.

After machining all surfaces are to be smooth and free from tearing, woolliness, chip bruising and other machining defects. Assemble with tight close-fitting joints with meeting surfaces to be perfectly flush to produce components free from distortion.

All joinery is to be manufactured to very strict tolerances to ensure the best possible finished product.

Max 1mm tolerance in 1m length of component.

Make allowance for future movement caused by temperature variations and variations in humidity.



PROTECTION OF TIMBER AND WOOD COMPONENTS BEFORE AND DURING INSTALLATION

Storage: Keep dry, under cover, clear of the ground and with good ventilation. Support sections/ components on regularly spaced, level bearers on a dry, firm base. Handling: Do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.

DIMENSIONS GENERALLY

Site dimensions: Take as necessary before starting fabrication.

- Discrepancies with drawings: Report without delay and obtain instructions before proceeding.

WARPING OF TIMBER

Bow, spring, twist and cup: Not greater than the limits set down in BS 4978 or BS EN 14081-1 for softwood, or BS 5756 for hardwood.

PROCESSING TREATED TIMBER

Cutting and machining: Carry out as much as possible before treatment.

Extensively processed timber: Retreat timber sawn lengthways, thickened, planed, ploughed, etc.

Surfaces exposed by minor cutting and/ or drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

MOISTURE CONTENT CHECKING

Procedure: When instructed, check moisture content of timber sections with an approved electrical moisture meter.

Test results: Keep records of all tests. If moisture content falls outside specified range, obtain instructions.

Z21 Mortars

310 Lime:sand mortar mixes

Proportions and additional requirements for mortar materials are specified elsewhere.

320 Sand for lime:sand masonry mortars

Sharp, well graded. Quality, sampling and testing: To BS EN 13139.

Grading/ Source: As specified elsewhere in relevant mortar mix items.

Provide a sample of each aggregate proposed and forward to the CA prior to commencement of works on site. For each sand sample, state the region and quarry of



origin and the grading and mineralogy of the aggregate. (NB not required for localised internal repairs pre-commencement of works).

Prepare sample biscuits of mortar of each type for approval. (NB not required for localised internal repairs pre-commencement of works).

331 Quicklime (calcium Oxide)

Supplier: Eden Hot Mix Lime (or contractor to submit proposals for approval).

Quicklime to BS EN 459-1 s

330 Ready prepared lime putty

Type: Slaked directly from CL 90 quicklime to BS 890, using an excess of water.

Maturation: In pits/ containers that allow excess water to drain away.

Density of matured lime putty: 1.3 - 1.4 kg/litre. Lime putty shall be kept in its original airtight container with a water film over .

until needed.

340 Pozzolan additives for nonhydraulic lime:sand mortars

Manufacturer/ Supplier: TBC pending site samples

Product reference: TBC pending site samples

Mixing: Mix thoroughly into mortar during knocking up.

350 Storage of lime:sand mortar materials

Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.

Ready prepared nonhydraulic lime putty: Prevent drying out and protect from frost.

Nonhydraulic lime:sand mortar: Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.

Bagged hydrated hydraulic lime: hydraulic lime shall be kept in its waterproof wrapper off the ground in dry conditions. Once opened, it must be kept in a dry store and used within a working day. Thereafter it should be discarded.

360 Making lime:sand mortars generally



Batching: By volume. Use clean and accurate gauge boxes or buckets.

Mixing: Mix materials thoroughly to uniform consistency, free from lumps.

Contamination: Prevent intermixing with other materials, including cement.

370 Site prepared nonhydraulic lime:sand mortars

Mixing: Mix materials thoroughly by compressing, beating and chopping. Do not add water. Mix sand and lime on a boarded platform without the addition of water, using a space to expel air and compress mix until lime uniformly distributed. Allow for bulking if sand is damp.

Equipment: Roller pan mixer or submit proposals.

Maturation period before use (maximum): 7 days.

380 Ready to use nonhydraulic lime:sand mortars

Manufacturer: Eden Hot Mix Lime (or contractor to submit proposals for approval).

Product reference: n/a

Materials: Internal repairs post opening up works: Nosterfield sand, quicklime as above. For other mortars -TBC following sampling.

Select from: Lime putty slaked directly from quicklime to BS EN 459-1 and mixed thoroughly with sand. Quicklime to BS EN 459-1 slaked directly with sand. Maturation period before use (maximum): 7 days.

390 Knocking up nonhydraulic lime:sand mortars

Knocking up before and during use: Achieve and maintain a workable consistency by compressing, beating and chopping. Do not add water.

Equipment: Roller pan mixer or submit proposals.

500 LIME MORTARS AND WINTER WORKING

- Hydraulic lime mixes require greater care in winter than in summer. To achieve a satisfactory set, 96 hours of constant temperatures above 8–10°C are required. For mortar depths greater than 15 mm this period is extended.
- Application should not be undertaken when temperatures are below 8°C or are rising from this temperature unless a means of creating constant warm air behind a sheeted protection is provided.



Protection:

- Ensure bulk materials and mixing water temperatures are above 8°C at the time of mixing.
- Provide three layers of protection whenever frost is likely. The following should be considered minimum recommendations.
 1. Hessian sacking: 12 oz bleached, starch-free hessian in contact with the working surface.
 2. Insulation: four layers of plastic bubble wrap laid or wrapped so that it may be removed when the temperature rises to 8°C to permit necessary air movement to the mortar.
 3. Polythene sheeting or tarpaulin to shed water clear of the protective underlayers.
- Adequate protection from frost including the provision of warm air heating remains the responsibility of the contractor.
- Protect during frosty weather for a minimum of five days, removing layers to allow
- air movement when temperature is above 8°C and reinstating as the temperature drops.
- Frost attack of hydraulic lime mortars will produce a powder with little or no strength. This should be removed for the depth of the damage and replaced with a fresh application which will most likely result in the taking down and rebuilding of the areas affected.