



## **INVERNESS CITY HERITAGE TRUST**

### **GUIDANCE ON STANDARDS OF WORK**

Building Repair Grants are given to assist in both the preparation of a repair scheme (comprehensive grants) and execution of that scheme on site. This work should respect the cautious, studied approach set out in the various international conservation charters. In particular, the cultural significance of the building should not be compromised and the work should retain as much historic and original fabric as possible by minimising interventions. Approved repairs to the existing fabric should use the traditional materials, craft skills and construction techniques found in the original building.

Applicants should note that Listed Building Consent and Planning permission must be obtained for these works prior to work starting on site and copies of the consent conditions should be forwarded to the Trust as soon as they are available. It should be understood that any proposals which require Listed Building Consent will not automatically become eligible for repair grants.

In order to attract grant assistance from Inverness City Heritage Trust the applicant's professional adviser should develop repair proposals to the highest standards of conservation practice using the following advisory standards of repair. It is equally important that the subsequent works on site are also administered to high standards.

Inverness City Heritage Trust should be consulted on detailed points where repair techniques or use of materials may affect the appearance or integrity of the historic fabric.

The following advisory standards of repair should be adopted:

#### **1. ROOF AND RAINWATER DISPOSAL**

##### **Structure**

1. Ensure the roof structure is sound or, where there are signs of movement or damage, arrange for an engineer to provide design advice for the long term stabilisation of the structure.
2. The proposed remedial works should be discussed with Historic Scotland and adopt a minimum intervention approach.

##### **Slating**

1. Understand the original roof build-up and design the repair, including the use of underfelt where appropriate, to suit the site circumstances.

2. Where different types of slate have been used across building phases or ranges as part of the natural evolution, these characteristics are to be respected.
3. Clear sarking of old nails and lift the lowest sarking boards to inspect the rafter ends and the wall plate.
4. Inspect timbers for rot, insect attack and structural weakness. Repair damaged timbers using new preservative treated timbers run to the original profile and treat rot or insect attack locally as required. Timbers should be spliced in-line rather than cheek bolted.
5. Where possible, separate timber repairs from damp stonework with a DPC and allow for free ventilation where practicable.
6. Re-slate using sound original slates recovered from the site together with matching slates brought in as required to make up the required number. Samples of slate to make up broken or unsuitable slates should be agreed before purchase.
7. Slates to be laid to exactly match the laying pattern using slates of the same shape as the originals.
8. Re-used slates should not be re-dressed as a matter of course.
9. Slates should be fixed with non-ferrous nails.
10. Replacement lead flashings, secret gutters, ridges and other weatherings to be lead as described below.
11. Mortar fillets at skews may be reinforced with expanded non-ferrous metal reinforcing lath and formed on top of code 4 soakers.
12. Chimneys not in use should be cleared of all debris and then terminated with inset wire gratings. Vents should be provided at the top and bottom of the flue to allow free air circulation.
13. Check the provision of ventilation to roof voids. If additional ventilation is required, the proposed method should be located discreetly, formed in traditional materials and details and submitted to Historic Scotland and/or the Local planning authority for approval.

### **Leadwork**

1. Weathering to lead flats roofs to be in new milled or cast lead as follows:
  - a. cupola astragal cover flashings to be code 5;
  - b. flashings, watergates, dormer cheeks etc to be lead code 6;
  - c. valleys to be minimum code 5;
  - d. short gutters or small areas of flat roofs without foot traffic may be minimum lead code 5;
  - e. all other flat roofs or gutters on geotextile underlay to be code 7;
  - f. ridges to be code 7 and fixed with clips of minimum code 7 lead, copper or terne-coated stainless steel.
2. Lead to be laid to follow the recommendations of the Lead Sheet Association. Complex and details unique to the building should be

drawn at a large scale sufficient to illustrate how these areas are to be constructed.

3. Flashings are to be inserted into chases sufficiently deep to allow the chase to be pointed. Existing raggles should be used wherever possible. Lead should be isolated from lime mortar by a protective coating
4. The use of sacrificial flashings where slating discharges into valleys and parapet gutters is encouraged.

### **Fired Clay Roof Tiles**

1. Understand the original roof construction and repair the timber substructure - including replacement felt as appropriate.
2. Tiled roofs are normally laid on battens and counter battens over roofing felt.
3. Fired clay roof tiles have a limited life as the tile begins to delaminate, shatter and break down with exposure and age. Consequently, older roofs may require a higher proportion of new tiles.
4. Replace broken or unsound tiles with new tiles of the same colour, profile, size and glaze (if relevant).

### **Asphalt**

1. Where an asphalt roof covering is damaged and leaking this should be lifted and replaced with new asphalt laid in coats strictly in accordance with the instructions of the Mastic Asphalt Council. Sand dusted surface is preferred.
2. If an insulated roof is installed, solar reflective paving and gravel may be required (though this element of work is not eligible for grant). Lead overflashings to be detailed in accordance with the Lead Sheet Association's publication, "The Lead Sheet Manual".

### **Metal Roofs**

1. Repairs to copper roofs should replace copper trays by closely matching the original but with details, gauge of copper and underfelt as recommended by the Copper Sheet Association.
2. Corrugated iron used as a roofing material or wall cladding should be replaced with new galvanised corrugated iron to the original profile and using fixings to match the original.

### **Stone Slab Roofing**

1. Record existing stone slab slating noting course heights, lap and peg fixing.
2. Carefully remove existing slabs using best practice and lay aside for re-use. Do not lever out pegs by lifting tails of slabs. Pegs should be removed without splitting slabs or enlarging peg holes. This may require a higher than usual level of skill and workmanship.

3. Re-grade slabs and make up differences in new stone slabs which match the source, colour and texture of the original.
4. Re-fix using newly made seasoned timber pegs.

### **Rainwater Goods**

1. Check that the existing rainwater goods are adequate to control and discharge water safely. If not, the professional adviser should submit proposals for additional installations. Note that alterations may require Listed Building Consent.
2. Where cast iron rainwater goods are sound, rod clear, rub down and re-paint.
3. Where broken damaged, missing or in uPVC, replace to match original profile and detail in cast iron.
4. Ensure maintenance access exists at ground level.
5. Ground drainage to be checked and made fully operational to ensure water is being conducted properly away from the building. Digging within archaeologically sensitive areas such as graveyards, may require an archaeologist.
6. All cast-iron rainwater elements to be primed and painted in accordance with manufacturer's written instructions using a high performance paint specification. Paint new cast iron goods before site assembly and make good joints, chips and fixings immediately after fixing. The final colour should be agreed in advance with Inverness City Heritage Trust and or the Conservation Architect at The Highland Council.

### **Skylights/Ventilators**

1. Original cast iron skylights are usually sound and should be repaired and reused rather than replaced. These are to be painted as outlined for rainwater goods above.
2. Where replacement rooflights are required, replace with new rooflights to the same detail and materials.

### **Safe Access**

1. The opportunity should be taken to ensure there is adequate safe access for maintenance and repair.
2. Where required, provide attic walkways to allow safe inspection and maintenance of these spaces.
3. Locate access ladders and roof hatches discreetly.

### **Lightning Conductors**

1. Lightning conductor systems can result in a considerable visual intrusion on historic structure; refer to English Heritage design guide "*Lightning Protection of Churches*" for guidance on discreet design.

2. Fixings should be secured in joints rather than stones and conductor lines are to be discreetly located behind or beside other building elements such as downpipes or buttresses.
- Early lightning conductors may be retained and integrated into the new system.

## 2. MASONRY

### Scaffolding and Structural Condition

1. Ensure that scaffolding is designed, as far as practicable, to avoid any fixing into stonework. Consider the use of window openings, window jamb cramps, raking support or fixing into mortar joints that are sufficiently wide to prevent damage to adjacent stone courses. Should fixings into stone be necessary, however, a strategy for the insertion and removal of fixings should be devised before scaffolding is erected.
2. Where significant structural movement, settlement cracking or other evidence of a compromised structure is identified, an engineer experienced in the repair of historic structures may be required.

### Masonry Repair

1. Carefully remove any vegetation while avoiding damage to the masonry.
2. From the scaffolding, brush down loose stone (with bristle brushes, not wire) and tap the existing surface to ensure the face of the stone is sound. Where the stone face is eroded or crumbly and this does not pose a threat to the weathering function (eg cills), the structural integrity or the architectural interpretation of the building, it is advisable to leave in place for attention at some time in the future.
3. Where soft, cracked or crumbly stones are identified as a threat to the structure or weathering, or significantly detracting from the architectural composition and integrity of the building, they may be carefully cut out and indented with a matching stone that respects the existing stone joint pattern. Where it is necessary to replace missing, broken, cracked or eroded stones with new stone, ensure that the new stone is a suitable replacement for the original in terms of colour, texture, porosity, crushing strength and weathering properties. Advice on suitable new stone to match existing can be obtained from the British Geological Survey.
4. Remove any redundant fixings, surface-mounted cables, television aerials and extraneous ferramenta - including redundant drainage branch pipework. If cables are still required, efforts should be made to run them internally within attic spaces or behind plaster strapping. Aerials should be positioned within roof voids though this services-related work will not be grant-eligible.

5. Exposed surfaces of new stone should be hand dressed to match the original face or tooling. Avoid the use of power tools on any exposed surface of stone. Cut replacement stone on the correct geological bed for the circumstances of its use in different elements of the building. Lay on a full mortar bed, grout behind and point fully to ensure loads are taken by the new stone. Indented face stone should have a minimum bed depth of 150 mm. New stone should not be distressed or toned down to match original.
6. Avoid the use of restoration mortars on face work or margins. Mortar made from lime, sand and graded matching stone, may be acceptable for small “pocket” repairs in otherwise sound stone and where lying water and subsequent frost damage may be considered a risk.

### **Joints in Ashlar Masonry**

1. Where ashlar masonry is quite tight with few open joints, avoid re-pointing this masonry.
2. Re-point open ashlar joints by raking out loose or crumbly mortar by hand with a hacksaw blade or similar and hose joint clean. Angle grinders and power drills must not be used.
3. Wet joints and re-point the narrow joints using putty lime mortar and fine light coloured sand.
4. Take care to protect the arrises to avoid staining on the ashlar.
5. Brush off any loose mortar. Ensure stones are not stained by water used to sponge off any mortar residue.
6. Protect pointing while it is curing in accordance with best practice.

### **Removal of Cementitious Pointing**

1. As it can be damaging to the adjacent stone arrises to remove well-adhered cement mortar, it is often better to avoid removing sound cementitious pointing.
2. Where cracked and open, carefully remove cementitious mortar by the use of fine masonry chisels, avoiding power tools.
3. When free space has been created, mortar may be freed from the stone by working back into this space. Pointing should be raked out to a minimum depth of 35 mm and the joint hosed clean.

### **Joints in Rubble Masonry**

1. Where mortar joints in rubble masonry are loose or crumbly, carefully rake out to a minimum of 35 mm using tools narrower than the joint to avoid damaging the stone.
2. Thoroughly hose out the joint and re-point with the mortar mix informed by analysis (see below). Pointing to be well packed into the joint and finished to match the original style of the masonry, including appropriate numbers of pinning stones to maintain the mortar/stone ratio of the wall indicated in the original build.

3. Stones used for pinning repair in rubble masonry should have the same colour, surface treatment and edge dressing as the surrounding masonry. For example, rubble stones should not have sharp and square saw cut edges.

### **Brick**

1. All brickwork repairs to accurately follow the original build, using brick of accurately matching colour, size, hardness and porosity.
2. Following brickwork repair, rake out loose or crumbly mortar and re-point using a pointing tool and application technique similar to that used originally with a mortar type to suit the age of the building and the strength of the brick.

### **Concrete**

1. Commission an independent investigative specialist report on the condition of the concrete and repair the structure accordingly. The report should include such techniques as use of a cover-meter to establish the depth of cover to the reinforcement and include core samples at strategic locations to enable analysis of the depth of carbonation, chloride content and quality of concrete.
2. Remedial works may include treatment with corrosion inhibitors and repair of spalling by breaking out poor concrete, cleaning or replacing reinforcement and repairing concrete to match the original finish. Consider treating repair locally with corrosion inhibitor to prevent localised sacrificial corrosion.

### **Harl/ Render**

1. Harl is to be applied in accordance with traditional harling (or throwing) techniques. Samples of the original harl should be analysed to clearly identify the various constituents eg shell, aggregate, lime proportions etc. The new harl should have a wide range of aggregate grading and replicate any local mix or application traditions. Render coats may be thrown or trowel applied.
2. Quality and appearance of work to be determined by accepting a suitable sample panel.
3. Harling/rendering to be applied using a lime mortar mix in 2 or 3 coats.
4. Site operations should ensure that flashings, rainwater goods and external joinery are fitted at the appropriate time in order to ensure a good finish to the harl/render.
5. Where a lined out “ashlar” appearance is to be made, this is to be undertaken to a pre-determined pattern of joints. The ruling tool is to be appropriately shaped in order to provide lines of the correct depth, consistency and cross-section.

### **Lime Mortars for Building, Pointing and Harling**

1. Lime mortars have significantly different working properties to cement mortars. Advice on procedures and suitable mixes can be obtained from the Scottish Lime Centre Trust.
2. All works to be undertaken by fully trained masons with experience of historic building work.
3. Lime mortar mix for indenting or pointing should match the original mortar and be informed by careful analysis of original build mortar samples. It should be prepared in advance to achieve maturity and may require a hydraulic content to achieve a predictable set and avoid lime leaching. Pozzolanic materials may be added to putty lime mortars to aid setting.
4. Where evidence of the original mix does not exist, lime and sand for the mix is to be carefully selected to ensure the mix has a suitable self colour, even if it is to be limewashed.
5. Ensure lime mortar work is undertaken in appropriate weather conditions and protect lime mortar from sun and rain until cured in accordance with best practice.
6. Earth mortar exists in some early buildings. Care should be taken to identify, analyse and carefully reproduce where repair is required.

### **Removal of Algae from Masonry**

1. Where water has caused moss and algal growth on masonry, the area is to be scraped clean with wooden spatulas and treated with an appropriate biocide then cleaned down to remove all organic debris and soil prior to re-pointing. It should be recognised that the use of a biocide is unlikely to have a long-lasting effect, may damage the masonry and consequently should not form part of a regular maintenance regime. The source of moisture encouraging such growth is to be addressed in order to prevent re-growth.

### **Removal of Paint from Masonry (not eligible for grant)**

1. Analyse paint type to establish least damaging paint removal method.
2. Paint removal should be tested and approved for use on that particular stone type before approval to proceed is given.
3. Chemicals used on stone are to be neutralised immediately after use as recommended in the manufacturer's written instructions

### **Removal of Invasive Vegetation from Masonry and Immediate Vicinity**

1. The main vegetation trunks are to be cut and roots treated with suitable systemic weed killer in accordance with the manufacturer's instructions. Larger growths of vegetation may be cut into smaller areas (creating a grid) prior to treatment. This will identify areas where growth persists and allow subsequent treatment to be more selective.

More than one treatment may be necessary applied over a period of time.

2. The vegetation adhering to the masonry is to be left until dead, and then carefully removed by gently teasing the mat away from the building taking care to sever roots that penetrate the masonry. Larger vegetation should be removed by hand weeding ensuring that all roots are removed to avoid leaving potential paths for water ingress as they decay. Any loose pointing should be made good in a lime based mix – see guidance note above
3. Stones that are found to be loose are to be held in place by wooden wedges until consolidation work is undertaken.

### **Limewash**

1. Historic limewash can have several constituents ranging from natural pigments, tallow and other organic additives. As with other mortars, an analysis and sample panels should be carried out before the specification is finalised.
2. Limewash should be applied to a pre-wetted surface. Multiple coats will be required as it should be applied in sufficiently thin coats (the consistency of skimmed milk) to allow carbonation.
3. Limewash should be screened from rapid drying in accordance with best practice. Where the limewash is exposed to drying winds or temperature, repeated wetting of the screens will be necessary.
4. Layers of limewash should not be applied if the appropriate attendance to control rapid drying is not possible.
5. Regular maintenance coats will be required over subsequent years.

### **DPC**

1. Installation of new chemical DPCs are not considered grant eligible and should not feature in a grant eligible scheme. The effects of chemicals within the wall core are not known and the DPC is likely to concentrate moisture evaporation (and accelerate decay) in the lower levels of the wall.
2. Appropriate DPCs may be considered for situations such as under copes etc. lead-cored sanded bitumen DPC's may be preferable to avoid slip planes.

## **3. WINDOWS AND DOORS**

### **Leaded Glazing and Zinc Camed Glazing**

1. Before beginning a repair to leaded or zinc camed windows, a report should be commissioned from a glass specialist to schedule the works required to bring the window construction into a good state of repair. This report should be sufficiently detailed to give an outline of the works proposed with the associated costs and give a brief outline of the

importance of the glazing and identify any unique attributes that may require more in-depth investigation.

### **Leaded Glass Protection**

1. Remove any inappropriate window protection and make new window protection in woven or welded non-ferrous or stainless steel wire mesh with a pitch and strength designed to meet the risk and made by a skilled wireworker to accurate templates.
2. Protection should follow the glass line and not cover stone tracery. It should be fixed using non-ferrous fixings into joints in the masonry ino, back from the outside stone face but suitably spaced away from the glass to give maximum protection.
3. To increase protection in vulnerable areas, consider toughened glass or, where weight is an issue, clear polycarbonate. Clear sheet material should be fitted behind mesh but not against the leaded glass and be installed with adequate ventilation at top and bottom. Clear sheet used without mesh gives unsightly reflections.

### **Joinery**

1. Windows should be overhauled and repaired wherever possible by carefully splicing in new matching timber to accurately follow the original profile using traditional techniques and glue.
2. Where new replacement windows are required they should be single glazed and manufactured from matching timber accurately following the original design and profiles.
3. Reuse original ironmongery where possible. Where necessary select historically appropriate new ironmongery that meets the modern requirements of security and exit, yet is of an appropriate style and quality. Use only slot headed screws.

### **Original Glass**

1. Original historic glass (crown, cylinder, plate, patterned or coloured glass or glass with seeds, reams or other notable impurities) should be saved for re-use.
2. Modern cylinder, Vauxhall, crown, float glass or horticultural glass may be used for replacements depending on the original glass type to be found on the building. These may vary on a single building or elevation.
3. Match glass type to original examples on site or to date of building construction. Any patterns established as a result of evolution of the building should be respected.

### **Secondary Glazing (not generally eligible for grant)**

1. Secondary glazing may be fitted on the inside but this should follow the glazing divisions of the window and not foul or damage any shutters or the opening of the window.
2. Secondary glazing is not grant eligible unless an historic installation.

### **Abutment Pointing**

The joint between joinery and masonry is to be pointed with either of the following:

1. A traditional site mixed mastic comprising burnt mastic sand and boiled linseed oil placed against a suitable backing stop.

or

2. Lime mortar pointing placed against a suitable backing stop. Where a building is harled/rendered the use of lime mortar to fill this joint will allow the harl/render to be brought up to the joinery. This should be placed after joinery fascias have been decorated to ensure good protection of the fascia.
3. For late twentieth century metal windows polysulphide mastic may be used. Proprietary glazing putty is available for glazing twentieth century metal windows.

### **Painting of external joinery**

1. Paint external joinery, using traditional methods and using good quality oil-based paint including preparation as recommended in the paint manufacturer's written instructions.
2. Ensure paint is not spread onto adjacent masonry.
3. Window colour to be as original from scrapes, or off-white. Avoid brilliant white for pre-1920 buildings.
4. Consider the use of traditional lead paints on grade "A" listed buildings.

## **4. ROT WORKS**

### **Rot works**

1. Locate the reason for moisture getting into the fabric and successfully prevent this happening. Remove rot and, where time permits, allow fabric to dry out
2. Seek expert advice on methods of treatment adopting green principles wherever possible.
3. Carefully patch in new pre-treated timbers to match original and make good internal finishes to match original (but see item 7.4).

## **5. IRONWORK**

The identification of mild steel, cast and wrought iron should be ascertained at an early stage to guide subsequent works.

### **Cast iron**

1. Each project should be assessed and the most appropriate repair technique(s) employed given the application, materials and historic importance.
2. Cast iron may be welded by specialists using high nickel electrodes, or brazed using aluminium bronze. Plate repairs or pinning by drilling and tapping adjoining components may also be appropriate. Cold metal stitching may also be feasible.
3. Re-casting missing components using traditional techniques might also be considered. Design and quality should match existing.

### **Wrought Iron**

1. Wrought iron should be removed for repair by proven experts in this field.
2. Use of suitable quality recycled wrought iron is preferable to steel.

### **Decorative and other Metal work Repair**

1. Weathervanes, roof ventilation louvers, solum ventilators, railings, gates or other historic architectural ferramenta may be considered for repair as part of the eligible works.
2. Flame cleaning, needle gunning or blast cleaning may be appropriate. Chemical cleaning should be avoided, particularly for cast iron due to the porosity of the material.
3. Weathervanes may be gilded.

### **Metalwork Protection**

1. Generally new steel (not cast or wrought iron) should be galvanised following manufacture.
2. Suitable long life paint treatments for ironwork, such as zinc rich primers, and micaceous iron oxide build coats should be considered for use and applied in accordance with manufacturers written instructions. Hard shell epoxy paints should not be used on cast iron; dry film thicknesses should strike a balance between protection and loss of detail.

## **6. OTHER**

### **Unforeseen Works**

1. It is accepted that unforeseen work may sometimes be necessary. Any such work should be clearly identified, costed and agreed with Historic Scotland before being included in the works.

### **Sustainability Issues**

1. Those involved in specification are requested to satisfy themselves that the products specified or used in the works will not endanger the health of the consumers or others, will not cause significant damage to the environment during manufacture, use, or disposal, will not consume a disproportionate amount of energy during manufacture, use, or disposal, will not cause unnecessary waste because of over-packaging or because of an unusually short shelf life, or will not contain materials derived from threatened species or threatened environments.
2. All timber for the works to be supplied with written confirmation that it is sustainably produced. Large section hardwood timbers to come with the appropriate chain of custody. Historic Scotland may wish to have sight of such confirmation.
3. Specifiers are encouraged to ensure that protected wildlife (eg bats) is not adversely affected by the repair work.

### **BIBLIOGRAPHY AND FURTHER INFORMATION**

Historic Scotland, "The Repair of Historic Buildings in Scotland"

Historic Scotland, Technical Advice Notes (TANS)

1. TAN 1, Preparation and use of Lime Mortars Revised 2003]
2. TAN 2, Conservation of Plasterwork
3. TAN 4, Thatch and Thatching Techniques
4. TAN 6, Earth Structures and Construction in Scotland
5. TAN 13, The Archaeology of Scottish Thatch
6. TAN 15, External Lime Coatings on Traditional Buildings
7. TAN 20, Corrosion in Masonry Clad Early Twentieth Century Buildings
8. TAN 24, The Environmental Control of Dry Rot
9. TAN 26, Care and Conservation of 17<sup>th</sup> Century Plasterwork in Scotland

Historic Scotland, Guide for Practitioners

1. The Conservation of Timber Sash and Case Windows

Historic Scotland/English Heritage

1. Timber Decay in Buildings – The Conservation Approach to Treatment

English Heritage, 23 Savile Row, London W1X 1AB

1. Lightning Protection for Churches

Other useful Contacts

1. Scottish Lime Centre Trust, Charleston, Fife: for advice on lime mortar mixes



2. British Geological Survey, Edinburgh: for advice on selection of building stone
3. Historic Scotland's Building Conservation Register: for access to a list of consultant's, contractors and suppliers.
4. Historic Scotland's reference library of ironwork pattern books.