J20-077

PDP Green Consulting Ltd

Falmouth Town Council

Heritage Restoration of Falmouth's Ponsharden Cemeteries

Specification For Monument Repairs and Re-Setting

15-02-2021 Revision A

Consolidation of 80 monuments, repairs to boundary walls, repairs to Mortuary Chapel and Ohel, consolidation of boundary bank to road, and landscaping.

Contents

C20
Demolition

General requirements

150 Features to be retained

1. General: Keep in place and protect the following: Trees noted on drawings; protect in accordance with BS 5837. All monuments: protect from damage. All boundary structures: protect from damage. All remains of buildings: protect from damage.

Services affected by deconstruction/ demolition - Not Used

Deconstruction/ demolition work

330 Dust control

1. Lead dust: Submit method statement for control, containment and clean-up regimes.

340 Health hazards

1. Precautions: Protect site operatives and general public from hazards associated with vibration, dangerous fumes and dust arising during the course of the Works.

360 Structures to be retained

1. Extent: Refer to Clause 150. Any unrecorded monuments or structures uncovered during the works are to be protected from damage, left as found and and reported to the CA.
2. Parts which are to be kept in place: Protect.
3. Interface between retained structures and deconstruction/ demolition: Cut away and strip out with care to minimize making good.

370 Partly demolished structures

1. General: Leave in a stable condition, with adequate temporary support at each stage to prevent risk of uncontrolled collapse. Make secure outside working hours.
2. Temporary works: Prevent overloading due to debris.
3. Access: Prevent access by unauthorized persons.

390 Asbestos-containing materials – known occurrences

1. General: Materials containing asbestos are known to be present in: None known.
2. Removal:

391 Asbestos-containing materials – unknown occurrences

1. Discovery: Give notice immediately of suspected asbestos-containing materials when discovered during deconstruction/ demolition work. Avoid disturbing such materials.
2. Removal: Submit statutory risk assessments and details of proposed methods for safe removal.

410 Unforeseen hazards

1. Discovery: Give notice immediately when hazards such as unrecorded voids, tanks, chemicals, are discovered during deconstruction/ demolition.
2. Removal: Submit details of proposed methods for filling, removal, etc.

Materials arising

511 Employer's property

1. Components and materials to remain the property of the Employer: Any unrecorded monuments, any salvaged materials not required for the completion of the works.
2. Protection: Maintain until these items are removed by the Employer or reused in the Works, or until the end of the Contract.
3. Special requirements: Report any unrecorded monuments, protect and leave as found until instructions are issued

Ω End of Section

C40
Cleaning masonry/ concrete

General/ preparation

110 Scope of work

1. Monuments: Cleaning is to be carried out by volunteer labour. The conservator is to allow for all necessary access for volunteers and equipment. The conservator is to allow for programming volunteer cleaning to prevent delays to the progress of the monument conservation works.

120 Related repair and remedial works

1. Work to be carried out before cleaning work: Most cleaning work will be required to be carried out before monument conservation work is commenced. Consult with volunteers in advance.

142 Removal of fittings

1. Timing: Before commencement of cleaning work.
2. Disturbance to surfaces: Minimize.
3. Items for disposal: Iron cramps, but only after patterns have been taken if required by conservators.
4. Items to be kept for reuse: All decorative ironwork, any items fixed to monuments that are to be retained.

160 Protection

1. Surfaces not designated for cleaning: Prevent damage, including marking and staining.
2. Openings: Prevent ingress of water, cleaning agents and detritus.
   2.1. Vents and grilles: Seek instructions before sealing up.
3. Temporary mechanical fastenings
   3.1. In masonry: Locate in joints.
   3.2. In other surfaces: Seek instructions.
4. Additional protection:

175 Control and disposal of wash water and detritus

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

180 Cold weather

1. Cleaning procedures using water: Do not use when air temperature is at or below 5°C. Protect damp surfaces from frost.

190 Cleaning generally

1. Operatives: Volunteer labour. Volunteers to be trained by conservators and/or archaeologists.
2. Control of cleaning: Confine cleaning processes and materials to designated areas. Prevent wind drift.
3. Detritus: Remove regularly. Dispose of safely.

4. Monitoring: Frequently check results of cleaning compared to approved trial samples. If results established by trials are not achieved, seek instructions.
5. Modifications to cleaning methods and materials: Seek instructions.

215 Record of cleaning works

1. Written report: To be prepared by volunteers. Record cleaning methods and procedures used for each type of surface and deposit.
    1.1. Content: Relevant attributes of cleaning methods used including:
        1.1.1. Equipment and settings.
        1.1.2. Dwell times.
        1.1.3. Number of applications.
        1.1.4. Ambient temperatures.
2. Additional documentation: Photographs of each monument before and after treatment
3. Submission: At completion of cleaning works. Retain in client project archives for future reference.

230 Trial samples

1. Trial sample reference:
    1.1. Surface: One sandstone monument, one limestone monument, one slate monument
    1.2. Location/ Size: To be agreed
    1.3. Type of soiling: Atmospheric soiling. Biological growths.
    1.4. Cleaning methods: Water spray (cleaning by hand)
2. Records: Volunteers to maintain written records for each trial area, including cleaning methods and conditions, to enable replication of results elsewhere.

Products/ equipment

333 Water spray (cleaning by hand)

1. Equipment
    1.1. Spray/ Nozzle types: Hand held spray bottle.
    1.2. Brush types: Soft natural bristle brushes, denture brush or toothbrush.

Application

412 Removal of loosely adhered deposits

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

463 Water spray cleaning (cleaning by hand)

1. Surfaces: Minimize water run-off. Prevent damage. Avoid over wetting.
2. Application:: Spray surface with clean water and gently clean by moving brush in a circular motion using light pressure. Spray again to rinse away dirt and organic material. Do not over clean.

Ω End of Section

C41
Repairing/ renovating/ conserving masonry

Generally/ preparation

110 Scope of work

1. Schedule: Conservation of table tombs, pedestal tombs and monuments, conservation of headstones
2. Records of masonry to be repaired: Before starting work, use measurements and photographs as appropriate to record bonding patterns, joint widths, special features, etc.
3. Identification of masonry units to be removed, replaced or repaired: Mark clearly, but not indelibly, on face of masonry units or parts of units to be cut out and replaced. Transcribe markings to drawings/ photographs.

120 Site inspection

1. Purpose: To confirm type and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.
2. Parties involved: Project manager, contract administrator, contractor's representative, contractor's site manager, specialist conservator, structural engineer.
3. Timing: To be agreed at dates convenient to contractor's and conservator's programme of work on site
4. Instructions issued during inspection: To be confirmed by Contract Administrator

130 Removal of plant growths from masonry

1. Plants, root systems and associated soil/ debris: Carefully remove from joints, voids and facework.
2. Removal of roots: Where growths cannot be removed completely without disturbing masonry seek instructions.
3. Unwanted plants close to masonry: Where removal of root system is not possible or desirable, cut through stem as close to the ground as possible. Remove bark from stump and apply herbicide paste. Leave stump to wither.

140 Record of work

1. General: Record work carried out to masonry clearly and accurately using written descriptions, sketches, drawings and photographs, as necessary.
2. Specific records: Record repairs to table tombs, monuments, and headstones. Before and after photographs of repairs to each monument and headstone with a schedule of repairs actually carried out to each one. Update to the pdp Green Consulting drawings of the monuments/table tombs C04, C11, C13, C34/35, C39, C43 and C78, with before, progress and completion photographs.
3. Documentation: Submit on completion of the work.
    3.1. Number of sets: Two paper copies of the documentation, one editable copy of drawings(dwg) and written documents (docx), and one digital copy of all documentation (pdf).

Workmanship generally

150 Power tools

1. Usage for removal of mortar: Not permitted

155 Putlog scaffolding

1. Usage: Not permitted

160 Protection of masonry units and masonry

1. 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.
2. Masonry: Prevent damage, particularly to arrises, projecting features and delicate, friable surfaces. Prevent mortar/ grout splashes and other staining and marking on facework. Protect using suitable nonstaining slats, boards, tarpaulins, etc. Remove protection on completion of the work.

165 Structural stability

1. 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

1. Retained masonry in the vicinity of repair works: Disturb as little as possible.
2. Existing retained masonry: Do not cut or adjust to accommodate new or reused units.
3. 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

1. Skill and experience of site operatives: Appropriate for types of work on which they are employed.
    1.1. Documentary evidence: Submit on request.

185 Adverse weather

1. General: Do not use frozen materials or lay masonry units on frozen surfaces.
2. Air temperature: Do not bed masonry units or repoint:
    2.1. In cement gauged mortars when ambient air temperature is at or below 3°C and falling or unless it is at least 1°C and rising, unless mortar has a minimum temperature of 4°C when laid and the masonry is adequately protected.
    2.2. In hydraulic lime:sand mortars when ambient air temperature is at or below 5°C and falling or unless it is at least 3°C and rising.
    2.3. In nonhydraulic lime:sand mortars in cold weather, unless approval is given.
3. Temperature of the work: Maintain above freezing until mortar has fully set.
4. Rain, snow and dew: Protect masonry by covering during precipitation, and at all times when work is not proceeding.
5. Hot conditions and drying winds: Prevent masonry from drying out rapidly.
6. New mortar damaged by frost: Rake out and replace.

190 Control samples

1. General: Complete an area of each of the following types of work, and arrange for inspection before proceeding with the remainder: Rebuilding in accordance with Clauses 320, 321 and 322 .
2. Headstones: Complete one fragmented slate headstone repair and one fragmented sandstone/limestone headstone repair and obtain approval of appearance before proceeding further.

Materials/ production/ accessories

215 Material samples

1. Representative samples of designated materials: Submit before placing orders.
    1.1. Designated materials: Secondhand stone imported to make up shortfall, secondhand brick imported to make up shortfall, sands for all mortars.
2. Retention of samples: Unless instructed otherwise, retain samples on-site for reference. Protect from damage and contamination.

220 Recording profiles

1. Profiles: Take measurements from existing masonry units, as instructed, to allow accurate matching of replacements.
2. Recording in situ: If there are no suitable joints to allow use of inserts, seek instructions.
3. Drawings and templates: Prepare as necessary. Templates must be clearly and indelibly marked to identify use and location.

240 Stone (ashlar slate backing slabs)

1. Standard: Burlington SR27543
2. Supplier: Burlington Stone
3. Type: Kirkby Honed Slate for backing slabs for repair of broken headstones
4. Quality: Monument quality. Free from vents, cracks, fissures, discolouration, or other defects that may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.
5. Finish: Honed
6. Additional requirements: Refer to Section F21 for additional requirements.

250 Stone orientation

1. Orientation of natural bed
    1.1. In plain walling: Horizontal.
    1.2. In projecting stones and copings: Vertical and perpendicular to wall face.
    1.3. In arches: Perpendicular to line of thrust.

265 Salvaged and second hand bricks

1. Source: Existing bricks salvaged from monuments and from collapsed walls of mortuary chapel. Note; Archaeologists acting as Employer's Agents are to supervise volunteers for the clearing of the rubble within and around the mortuary chapel, and its sorting/stacking for re-use.
2. Condition
    2.1. Free from matter such as mortar, plaster, paint, bituminous materials and organic growths.
    2.2. Sound, clean and reasonably free from cracks and chipped arrises.

281 Fixings

1. Description: Cramps and fixings for the repair and reassembly of monuments
2. Type: Submit proposals.
3. Material: Marine grade 316 austenitic stainless steel
4. Size, strength and number: As necessary to resist loads likely to occur during the life of the building, and to prevent lateral displacement or pulling apart of the construction.

Dismantling/ rebuilding

310 Dismantling masonry for reuse

1. Masonry units to be reused: Remove carefully and in one piece.
    1.1. Treatment: Clean off old mortar, organic growths and dirt, and leave units in a suitable condition for rebuilding.
    1.2. Identification: Mark each unit clearly and indelibly on a concealed face, indicating its original position in the construction. Transcribe makings to drawings/ photographs.

320 Rebuilding (Monuments)

1. Description: Ashlar stonework and panels to monuments including C04, C11, C13, C34/35, C39, C43 and C78
2. Replacement materials: All materials to be salvaged and reused from existing monuments
3. Mortar: As section Z21.
    3.1. Standard: BS EN 998-2
    3.2. Mix: Suggested Mix: 1:3 St Astier NHL 3.5 hydraulic lime/sand
    3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of sharp, well graded clear sand to 1 part soft silver sand and 1 part Portland stone dust or to match monument. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.
4. Fixings: Cramps and dowels, as clause 281
5. Grout: Grout for joints and cracks, as clause 390
6. Rebuilding: To match previous face and joint lines, joint widths and bonding. Adequately bonded to retained work/ backing masonry, as appropriate.
7. Joint surfaces: Dampen, as necessary, to control suction.
8. Laying masonry units: On a full bed of mortar; perpend joints filled.
9. Exposed faces: Remove mortar and grout splashes immediately.
10. Joints: Flush
11. Other requirements: Include for taking mortar samples from monuments and analysis at a recognised specialist such as Rose of Jericho to determine original mix, binder and sands used. Issue reports to CA. Suggested materials and mixes may be reviewed once results of analysis received.

323 Repair (Fragmented and split/delaminating slate headstones)

1. Description: Repairs to slate headstones. Refer also to Schedule of Works and Proforma Condition and Repair Schedules for the Jewish and Congregationalist Cemeteries.
2. Replacement materials: Monumental quality slate backing slabs as C41/240 and F21.
3. Mortar: As section Z21.
    3.1. Standard: BS EN 998-2
    3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
    3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.
4. Fixings: Cramps and dowels, as clause 405
5. Grout: Grout for joints and cracks, as clause 390
6. Repair: Assemble fragments onto backing slab, tightly butted, correctly aligned and flat. Pin to backing slab with stainless steel pins and epoxy resin as clause 405. Grout joints as clause 390

and finish with mortar pointing. Repair split/delamination/weathering with mortar repair as clause 520. Repair flaked headstone by glueing flake back into place with epoxy resin.

7. Joint surfaces: Dampen, as necessary, to control suction.
8. Exposed faces: Remove mortar and grout splashes immediately.
9. Joints: Flush
10. Other requirements: Fragments to be dried out before work commences. Edges of fractures to be stabilised with injection resin. Point lost sections, voids and fragmentary edges with mortar and finish flush. On completion arrange for cleaning by volunteers before erection. Suggested mortar, sands and mixes may be reviewed once results of site trials received.

324 Repair (Broken panels to table tombs)

1. Description: Repairs to panels and cappings of table and pedestal tombs. Refer also to Schedule of Works and Proforma Condition and Repair Schedules for the Jewish and Congregationalist Cemeteries.
2. Replacement materials: None, existing panels to be reused.
3. Mortar: As section Z21.
   3.1. Standard: BS EN 998-2
   3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
   3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.
4. Fixings: Cramps and dowels, as clause 640
5. Grout: Grout for joints and cracks, as clause 390
6. Repair: Assemble sections to match original alignment, tightly butted, and flat. Pin or cramp (cramps only to be used where they will be concealed in the final work) together with stainless steel pins or cramps and epoxy resin as clause 640. Grout joints as clause 390 and finish with mortar pointing. Repair delamination/weathering with mortar repair as clause 520.
7. Joint surfaces: Dampen, as necessary, to control suction.
8. Exposed faces: Remove mortar and grout splashes immediately.
9. Joints: Flush
10. Other requirements: Accurately record before dismantling. Volunteers to clean panels before repairs commence. Sections to be dried out before reassembly. Edges of fractures to be stabilised with injection resin if necessary. Point lost sections, voids and fragmentary edges with mortar and finish flush. Suggested mortar, sands and mixes may be reviewed once results of site trials received.

325 Repair (Broken sandstone/limestone headstones in large fragments)

1. Description: Repairs to broken sandstone/limestone headstones where the fragments are large. Refer also to Schedule of Works and Proforma Condition and Repair Schedules for the Jewish and Congregationalist Cemeteries.
2. Replacement materials: None, existing fragments to be reused.
3. Mortar: As section Z21.
   3.1. Standard: BS EN 998-2
   3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
   3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.
4. Fixings: Cramps and dowels, as clause 640

5. Grout: Grout for joints and cracks, as clause 390
6. Repair: Assemble sections to match original alignment, tightly butted, and flat. Pin or cramp (cramps only to be used where they will be concealed in the final work) together with stainless steel pins and epoxy resin as clause 640. Grout joints as clause 390 and finish with mortar pointing. Repair delamination/weathering with mortar repair as clause 520.
7. Joint surfaces: Dampen, as necessary, to control suction.
8. Exposed faces: Remove mortar and grout splashes immediately.
9. Joints: Flush
10. Other requirements: Volunteers to clean fragments before repairs commence. Sections to be dried out before reassembly. Edges of fractures to be stabilised with injection resin if necessary. Point lost sections, voids and fragmentary edges with mortar and finish flush. Suggested mortar, sands and mixes may be reviewed once results of site trials received. Repaired sandstone/limestone headstones to be laid on a limecrete base at a slight fall rather than be stood back up.

326 Repair (Broken sandstone/limestone headstones in small fragments)

1. Description: Repairs to broken sandstone/limestone headstones where the fragments are small. Refer also to Schedule of Works and Proforma Condition and Repair Schedules for the Jewish and Congregationalist Cemeteries.
2. Replacement materials: None, existing fragments to be reused.
3. Mortar: As section Z21.
    3.1. Standard: BS EN 998-2
    3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
    3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.
4. Fixings: Cramps and dowels, as clause 640
5. Grout: Grout for joints and cracks, as clause 390
6. Repair: Assemble fragments to match original alignment, tightly butted, and flat onto previously prepared limecrete bed. Bed and point fragments in lime mortar. Grout joints as clause 390 and finish with mortar pointing. Repair delamination/weathering with mortar repair as clause 520.
7. Joint surfaces: Dampen, as necessary, to control suction.
8. Exposed faces: Remove mortar and grout splashes immediately.
9. Joints: Flush
10. Other requirements: Volunteers to clean fragments before repairs commence. Sections to be dried out before reassembly. Edges of fractures to be stabilised with injection resin if necessary. Point lost sections, voids and fragmentary edges, and edges abutting edge curb of bed with mortar and finish flush. Suggested mortar, sands and mixes may be reviewed once results of site trials received. Repaired sandstone/limestone headstones to be laid on a limecrete base at a slight fall rather than be stood back up.

327 Repair (Upright sandstone/limestone headstones with broken corners, delamination/weathering, or corroding fixings)

1. Description: Repairs to upright sandstone or limestone headstones. Refer also to Schedule of Works and Proforma Condition and Repair Schedules for the Jewish and Congregationalist Cemeteries.
2. Replacement materials: None.
3. Mortar: As section Z21.
    3.1. Standard: BS EN 998-2

3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand

3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.

4. Fixings: Cramps and dowels, as clause 640
5. Grout: Grout for joints and cracks, as clause 390
6. Repair: Assemble broken corners to match original alignment, tightly butted, and flat. Pin to main part of stone with stainless steel pins and epoxy resin as clause 640. Grout joints as clause 390 and finish with mortar pointing. Repair delamination/weathering with mortar repair as clause 520. Replace corroded fixings with stainless steel pins and epoxy resin as clause 640.
7. Joint surfaces: Dampen, as necessary, to control suction.
8. Exposed faces: Remove mortar and grout splashes immediately.
9. Joints: Flush
10. Other requirements: Headstones to be repaired in situ. Volunteers to clean fragments before repairs commence. Sections to be dried out before reassembly. Edges of fractures to be stabilised with injection resin if necessary. Point lost sections, voids and fragmentary edges, and edges abutting edge curb of bed with mortar and finish flush. Suggested mortar, sands and mixes may be reviewed once results of site trials received. Repaired sandstone/limestone headstones to be laid on a limecrete base at a slight fall rather than be stood back up.

Replacements and insertions

330 Preparation for replacement masonry

1. Defective material: Carefully remove to the extent agreed. Do not disturb, damage or mark adjacent retained masonry.
2. Existing metal fixings, frame members, etc.: Report when exposed.
3. Redundant metal fixings: Remove.
4. Recesses: Remove projections and loose material; leave joint surfaces in a suitable condition to receive replacement units. Protect from adverse weather if units are not to be placed immediately.

350 Stone inserts

1. Description: Piecing in new stone to repair corners of panels where stone has been spalled by corroding cramps
2. Stone: Limestone or sandstone to match material of original panel
3. Finish: Flush and to match existing.
4. Preparation and insertion: As clause 395.
5. Mortar: As section Z21.

5.1. Standard: BS EN 998-2

5.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand

5.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.

6. Fine sand to approval
7. Fixings: Replacement cramps, as clause 410
8. Joints: Very fine.
9. Other requirements: Use of clause 350 (mortar bonding) or 355 (resin bonding) to Contractor's choice subject to CA approval

355 Stone inserts

1. Description: Piecing in new stone to repair corners of panels where stone has been spalled by corroding cramps
2. Stone: Limestone or sandstone to match material of original panel
3. Finish: Flush and to match existing.
4. Preparation and insertion: As clause 395.
5. Adhesive: Suitable resin based adhesive to contractor's choice and CA approval
6. Fixings: Replacement cramps, as clause 410
7. Joints: Very fine with no adhesive visible.
8. Other requirements:

385 Laying replacement masonry units

1. Exposed faces of new material: Keep to agreed face lines.
2. Faces, angles and features: Align accurately. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
3. Joint surfaces: Dampen to control suction as necessary.
4. Laying units: On a full bed of mortar, all joints filled.
5. Exposed faces: Keep clear of mortar and grout.

390 Grouting joints and cracks (joints and cracks in repaired headstones and monument panels)

1. Grout mix: PLM-M natural lime injection mortar by CTS Sri.
2. Joints that cannot be fully filled with pointing mortar: Grout thoroughly into joints and cracks including joints between backing slate and headstone.
3. 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.

395 Installing stone inserts

1. Pockets to receive inserts
    1.1. Cut out accurately. Undercut sides of pocket where necessary to provide space for bonding material.
    1.2. Adjust depth so that insert stands proud of existing stone for finishing in situ.
    1.3. Clean out thoroughly.
2. Inserts: Cut to the smallest rectangular shape necessary to replace the defective area and provide a firm seating. Install accurately and securely.
    2.1. Exposed faces: Keep clear of bonding material.
3. Existing joint widths: Maintain. Do not bridge joints.

405 Bonded dowels (for mounting headstones to backing slabs)

1. Description: For repairs to headstones
2. Standard: To BS EN 1090-1
3. Dowels: Austenitic stainless steel threaded bar marine grade 316, 6mm diameter
4. Adhesive: Epoxy resin
5. Holes for dowels: Suitably sized and accurately aligned in back of headstone and in face of backing slab; clean and dry.
6. Other requirements: Do not use adhesive to bond fragments at joints unless instructed.

410 Corroded metal fixings

1. Removal: Cut out carefully, causing the least possible disturbance to surrounding masonry. Remove associated rust debris.
2. Replacement: Compatible fixings as clause 281.

415 Stone pinnings for rubble stonework

1. Material for pinnings: Small stones reclaimed from collapsed boundary walls
2. Placing: Tamp pinnings firmly into fresh mortar. Ensure mortar is thoroughly compacted into voids and that levelling and load distribution functions of pinnings are retained.

420 Temporary distance pieces for joints in ashlar stonework

1. Material: Lead or stainless steel.
2. Removal: When mortar/ grout is sufficiently strong to take loading without compression.

Tooling/ dressing stone in situ

450 Weathering ledges at joints

1. Locations: Where stones project or are recessed.
2. Requirement: Carefully weather the ledge, to approval.
3. Method: Suitably graded carborundum blocks or tooling as appropriate.

455 Descaling stone

1. Requirement: Carefully remove loose scaling and powdering from stones to the extent agreed.
2. Method: Suitable bristle brushes or carborundum blocks. Do not use wire brushes.

458 Redressing stone

1. Requirement: Carefully dress back stones to the extent agreed.
2. Method: Suitably graded carborundum blocks or tooling as appropriate.

Mortar repairs

510 Preparation for mortar repairs

1. Repair area: Scribe area of masonry to be removed using straight horizontal and vertical lines parallel to joints. Where repair area abuts joints, maintain existing joint widths and do not bridge joints.
2. Decayed masonry: Cut back carefully to a minimum depth of 20 mm to a sound background. Where the depth of removal exceeds 50 mm, seek instructions.
3. Precautions: Do not weaken masonry by removing excessive material. Do not damage adjacent masonry.
4. Top and vertical reveals of repair area: Undercut.

515 Reinforcement for mortar repairs

1. Material: Austenitic stainless steel, phosphor bronze or copper alloy wire, 3 mm diameter.
2. Armatures: Form to suit profiles of mortar repair and provide effective reinforcement.
3. Cover to reinforcement: Not less than 18 mm.
4. Installation: Drill holes into background to receive reinforcement, and bond firmly with a suitable epoxy resin.

520 Mortar repairs

1. Description: To headstones and monuments
2. Undercoats: As section Z21.
   2.1. Standard: BS EN 998-2
   2.2. Mix: 1:2.5 St Astier NHL3.5 hydraulic lime/sand
   2.3. Sand source/ type: As finishing coat without stone dust
   2.4. Building up: In layers where necessary, each layer not exceeding 12 mm.
3. Finishing coat: To match approved samples.
   3.1. Standard: BS EN 998-2
   3.2. Mix: 1:2.5 St Astier NHL3.5 hydraulic lime/sand
   3.3. Sand source/ type: Sharp well graded sand to approval. A suitable sand colour is to be chosen so that the repair mortar is a close match to the colour of the stone to be repaired.
   3.4. Finished thickness: 7 mm
   3.5. Finish: Scraped back, as clause 550 or floated, as clause 555, to approval
4. Reinforcement: Not required

540 Applying mortar

1. Surfaces to receive mortar: Clean, and free from dust and debris. Dampen to control suction.
2. Applying coats: Build up in layers to specified thickness. Apply mortar firmly, ensuring good adhesion with no voids. Form a mechanical key to undercoats by combing or scratching to produce evenly spaced lines.
3. Allow each layer to achieve an initial set before applying subsequent coats. Prevent each layer from drying out rapidly by covering immediately with plastics sheeting and/ or dampening intermittently with clean water.
4. Finishing mortar coat: Form accurately to required planes/ profiles, and finish flush with adjacent masonry.
5. Protection: Protect completed repairs from adverse weather until mortar has set.

550 Scraped finish to mortar repairs

1. Procedure: Finish final coat of repair mortar proud of existing masonry face. When mortar is set, but not too hard, scrape back to required face line using fine saw blade or other suitable means, to achieve required finish.

555 Float finish to mortar repairs

1. Procedure: Use a wood float and/ or a felt faced float to give an even overall texture. Do not use steel floats.

Crack repairs/ ties/ reinforcement

610 Mortar repair of cracks

1. Description: To ashlar stonework of headstones and monuments
2. Mortar: As section Z21.
   2.1. Standard: BS EN 998-2
   2.2. Mix: Grout if required: PLM-M.
   Mortar mix: 1:2.5 St Astier NHL3.5 hydraulic lime/sand
   2.3. Sand source/ type: Sharp well graded sand to approval. A suitable sand colour is to be chosen so that the repair mortar is a close match to the colour of the stone to be repaired.

3. Preparation: Clean out cracks to remove debris, dust and dirt. Dampen recesses, as necessary, to control suction.
4. Applying mortar: Press well into cracks so that they are fully filled. Ensure that mortar does not encroach upon exposed faces. Finish mortar flush with masonry face.
5. Other requirements: Finish mortar to match colour and texture of adjacent stone

640 Pinning (excluding slate headstones)

1. Description: To fragmented/broken sandstone and limestone headstones and broken ashlar panels of monuments
2. Dowels/ Pins
   2.1. Standard: To BS EN 1090-1
   2.2. Type: Austenitic stainless steel threaded bar marine grade 316
   2.3. Diameter: 6 mm
   2.4. Additional requirements: Penetration into background not less than 50 mm
3. Resin: Low viscosity resin to approval
4. Holes: Drill carefully, sloping downwards into background. Remove drilling dust and debris and keep dry.
5. Filling holes
   5.1. Check that dowel lengths are correct before filling with resin.
   5.2. Use sufficient resin so that when the dowel is inserted the resin is dispersed to achieve an effective repair.
6. Exposed faces: Keep clean and free from resin stains. Use temporary plugging material and/ or isolating membranes as necessary.
7. Clearances: Keep ends of ties and resin back from face of masonry.
8. Making good after resin has cured: Either mortar, as clause 690 or stone plugs, as clause 692

690 Making good to injection and insertion holes

1. Preparation: Clean out holes thoroughly.
2. Repair mortar: To match existing masonry units/ joints in colour and texture. Fill holes and finish mortar neatly and flush with surrounding masonry.
3. Finished appearance: Obtain approval for first 5 holes before completing the remainder.

Grouting rubble filled cores - Not Used

Pointing/ repointing

810 Preparation for repointing

1. Existing mortar: Working from top of wall downwards, remove mortar carefully, without damaging adjacent masonry or widening joints, to a minimum depth of 25mm for brickwork. Fine joints up to 3mm wide are only to be cut out, prepared and repointed where the existing mortar joint has eroded to a depth of 2-3 times the joint width; otherwise if the joint is sound then the existing joint should be left.
   1.1. Loose or friable mortar: Seek instructions when mortar beyond specified recess depth is loose or friable and/ or if cavities are found.
2. Raked joints: Remove dust and debris.

821 Pointing (Brickwork)

1. Description: Brickwork

2. Preparation of joints: Rake out existing mortar. Carefully brush away loose mortar. Dampen joints, as necessary, to control suction
3. Mortar: As section Z21.
   3.1. Standard: BS EN 998-2
   3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
   3.3. Sand source/ type: Suggested Sand: Cornish Lime Company CLS90, well graded 5mm down
4. Joint profile/ finish: Flush, with brushed finish, as clause 860.
5. Other requirements: Suggested materials and mixes may be reviewed once results of original mortar analysis received. See C41/321

820 Pointing (Ashlar Stonework to Monuments)

1. Description: Ashlar stonework joints to monuments
2. Preparation of joints: Rake out existing mortar. Carefully brush away loose mortar. Dampen joints, as necessary, to control suction
3. Mortar: As section Z21.
   3.1. Standard: BS EN 998-2
   3.2. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
   3.3. Sand source/ type: Suggested Sand: Aggregate composed of 4 parts of soft silver sand to 1 part Portland stone or stone to match headstone dust. For joints over 3mm wide use with a maximum sieve sieze of 2.36mm. For fine masonry joints less than 3mm wide use with a maximum sieve size of 1.18mm.
4. Joint profile/ finish: Flush.
5. Other requirements: Suggested materials and mixes may be reviewed once results of original mortar analysis received. See C41/320

840 Pointing with tools/ Irons

1. General: Press mortar well into joints using pointing tools/ irons that fit into the joints, so that they are fully filled.
2. Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly.

860 Brushed finish to joints

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

Ω End of Section

C60 REPAIRING/RENOVATING/CONSERVING CAST AND WROUGHT IRON RAILINGS AND GATES

To be read with Preliminaries/General conditions.

GENERALLY/PREPARATION

110 SCOPE OF WORK:
Repairs to cast/wrought iron railings prior to decorating.
Repairs to cast/wrought iron gates prior to redecorating.
Installation of replacement matching components where original components are missing prior to decorating.

120 REVIEWING SCOPE OF THE WORK:
- Inspect each relevant area of railings and gates with the CA to confirm the type and extent of the work.
- Mark clearly any components units or parts of components that are to be cut out and replaced.
- Identify each component that is to be removed, replaced or repaired with a code number cross-referenced to drawings/photographs.
- Adequately record the characteristics of existing railings and gates in areas affected by repair works. Use measurements and photographs as appropriate to record assembly methods, joint details, special features, etc.

125 REDUNDANT FITTINGS/FIXINGS
- Remove the following items from the ironwork carefully, causing as little disturbance as possible.
Redundant fixing straps.

140 RECORD DRAWINGS:
- Maintain accurate records of work carried out to ironwork as follows:
Plan and elevation drawings.
- Hand over 2 copies of paper record drawings to the CA at Practical Completion and a copy of drawings on CD in DWG format.

WORKMANSHIP GENERALLY

151 POWER TOOLS FOR REMOVAL OF IRONWORK are permitted only where approved by the CA.

160 PROTECTION:
- Prevent overstressing of ironwork units during transit, handling, storage and fixing. Brace fragile elements to avoid distortion.
- Store ironwork units on level bearers clear of the ground separated with resilient spacers. Protect from adverse weather and keep dry. Prevent soiling, chipping and contamination by salts and other deleterious substances. Prevent distortion.
- Prevent damage to all ironwork, particularly arrises, projecting features and delicate, surface detail. Protect with suitable nonstaining resilient materials which must be removed at Practical Completion.

- Prevent mortar/grout splashes and other staining and marking of ironwork.

165 STRUCTURAL STABILITY: Ensure that the stability of the railings and gates is maintained throughout the work. Report to the CA any defects, including signs of movement, that are exposed or become apparent during the removal of components.

170 DISTURBANCE TO RETAINED IRONWORK
- Ensure that retained ironwork in the vicinity of repair works is disturbed as little as possible.
- Do not cut or adjust existing retained ironwork to accommodate new or reused components without approval.
- Prop or wedge retained loose ironwork or components that are vulnerable to movement during repair works, so that they are firmly and correctly positioned.

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

190 REFERENCE SAMPLE(S): Obtain approval of the following before proceeding with the remainders:
Welded repair to railing.

MATERIALS /PRODUCTION/ACCESSORIES

220 RECORDING PROFILES:
- Take measurements from existing ironwork to allow replacements to be matched accurately.
- Prepare accurate drawings and templates as necessary, clearly and indelibly marked to identify use and location.

240 CAST IRON
- Type: Grey cast iron, cast to exactly match the composition, dimensions and profiles of the existing components.
- Finish: From the mould.
- Supplier: To contractor's choice.
- Other requirements: No mild steel or other substitute materials will be permitted.

245 WROUGHT IRON
- Type: True wrought iron, produced from salvaged historic iron, re-forged and rolled into sections and tubes to exactly match the composition, dimensions and profiles of the existing components.
- Finish: From the rolling mill.
- Supplier: To contractor's choice.
- Other requirements: No mild steel or other substitute materials will be permitted.

250 FIXINGS AND ACCESSORIES
- For cast iron: Fixings are to exactly match the composition, dimensions and profiles of the existing components.
- For wrought iron: Fixings are to exactly match the composition, dimensions and profiles of the existing components.

- Screw fixings: Replacement screws are to have heads to match the original screws in shape and size, and are to be made of the same materials as the original fixings. Stainless steel may be used with the approval of the CA.
- Joints: Joints such as mortice and tenons joints or riveted joints are only to be dismantled if unavoidable. Parted mortice and tenon joints are to be reassembled with a screwed tenon. Parted riveted joints are to be reassembled with matching rivets finished to match the original detail.
- Joint surfaces: Decorate concealed surfaces before assembly of joints in accordance with clause M60/740.

255 WROUGHT IRON - FABRICATION
- Ornamental work: To be carefully forged, hand wrought and incised where and as required to comply with the drawings, or to match the existing ironwork.
- Framing and fitting: All work shall be substantially framed together and closely fitted. All jointings shall be neatly and strongly tenoned and riveted together, or forge welded.
- Heads of rivets and tenons: Countersunk to match existing.
- Spindles: Forged.
- Collars: Forge welded to spindles.
- Free ornament: forged from wrought iron and forge welded to ironwork in the forge. No cast parts to be included.

REPLACEMENTS AND INSERTIONS

260 DISMANTLING
- Support: Ensure adequate support of ironwork to maintain stability whilst components are being removed, during repair work, and during reassembly.
- Leaded caulked sockets: Chain drill caulking lead in stone sockets to remove majority of material, and chisel out remainder with a suitably sized bolster. Avoid damage to ironwork and masonry.
- Iron components: Only remove components which cannot be repaired in situ. Severely damaged components requiring new sections to be welded in place may be removed by electric saws with the approval of the CA.
- Joints: Carefully disassemble joints by releasing screw fixings where possible, or by drilling out rivets or seized screws following recording of joint details.

265 PREPARATION FOR REPAIR/REPLACEMENT IRONWORK
- Removal of paint and rust: Remove all traces of paint and rust from areas of ironwork to be repaired to leave a clean, dry surface.
- Cast iron: Grit blasting as clause M60/532.
- Wrought iron: Chemical paint stripping followed by steam cleaning to remove all traces of residual paint and chemical, flame cleaning to remove rust as clause M60/534.

270 WELDED REPAIRS: CAST IRON
- Material: New grey cast iron as clause 240.
- Finish: Welds ground flush to make an invisible repair.
- Preparation and insertion as clause 280.

275 WELDED REPAIRS: WROUGHT IRON
- Material: True wrought iron as clause 245.

- Finish: Welds ground flush to make an invisible repair.
- Preparation and insertion as clause 285.

280 INSTALLING CAST IRON INSERTS/PUDDLED REPAIRS

- Cut each insert and the retained ironwork to matching true faces to provide close mating of surfaces, and ensure that the finished component will exactly match the dimensions of the original.
- Inserts and retained ironwork are to be joined by full penetration welds. Vee joint connections if necessary to achieve full weld penetration.
- Preheat cast iron components before welding to ensure gradual temperature change and avoidance of cracking.
- Welding to be carried out using arc welding with cast iron filler rods.
- Puddled repairs to wasted/pitted sections that are structurally serviceable are to be carried out using arc welding with cast iron filler rods.

285 INSTALLING WROUGHT IRON INSERTS/PUDDLED REPAIRS

- Where work is to be carried out on ironwork which cannot be removed from site, arc or MIG welding will be acceptable.
- Removable ironwork such as gates are to be taken to the workshop and repaired using the traditional techniques of forge welding, tenoning, riveting and collaring where possible.
- Cut each insert and the retained ironwork to matching true faces to provide close mating of surfaces, and ensure that the finished component will exactly match the dimensions of the original.
- Inserts and retained ironwork are to be joined by full penetration welds. Vee joint connections to achieve full penetration if required.
- Welding to be carried out using arc or MIG welding using a non-corrodable ferrous alloy. Mild steel electrodes or wire will not be permitted.
- Puddled repairs to wasted/pitted sections that are structurally serviceable are to be carried out using gas welding with wrought iron filler rods. Arc or MIG welding using a non corrodable ferrous alloy may be used with the approval of the CA. Mild steel electrodes or wire will not be permitted.

290 REASSEMBLY

- Decorate concealed surfaces before reassembly as clause M60/740.
- Seal all joints and junctions with Densoseal 16A polybutene mastic to prevent water penetration. Work well in and finish flush with surface to avoid potential watertraps.
- Clean out wall and plinth sockets to remove all dust, and ensure that socket is dry before pouring lead. Support ironwork to true line and level, and ensure adequate stability during installation. Plug wall sockets with damp clay to retain molten lead. Fill sockets with molten lead and leave proud of surface. When cool, caulk lead down to tighten ironwork to the socket and leave slightly proud of surface to shed water away from ironwork. Clean away lead overspill.
- After assembly and fitting, check all gates to ensure smooth and accurate operation, and grease moving parts. Check that latches and locks operate properly, grease and leave in full working order.

295 SPARES

- Hand to CA two spare copies of each gate key.

F10
Brick/ block walling

Types of walling

315 Clay common brickwork

1. Description: Honeycomb core walls to rebuilt table tombs C11, C34/35, C43 and C78.
2. Bricks: To BS EN 771-1.
   - 2.1. Manufacturer: Contractor's choice, submit proposals
     - 2.1.1. Product reference: Contractor's choice, submit proposals
   - 2.2. Size: 215 x 102 x 65 mm.
   - 2.3. Mean compressive strength (minimum): Not required
   - 2.4. Durability designation: F2
   - 2.5. Density
     - 2.5.1. Gross dry: Not applicable
     - 2.5.2. Net dry: Not applicable
   - 2.6. Water absorption: Not applicable
   - 2.7. Configuration: Solid or frogged
   - 2.8. Recycled content: Not applicable
   - 2.9. Additional requirements: None
3. Mortar: As section Z21.
   - 3.1. Standard: To BS EN 998-2
   - 3.2. Mix: 1:2.5 St Astier NHL3.5 hydraulic lime/sand
   - 3.3. Additional requirements: Durability: Freeze/ thaw resistance:Suitable for exposed external use below dpc
4. Bond: Honeycomb

Testing - Not Used

Workmanship generally

430 Conditioning of clay bricks and blocks

1. Bricks and blocks delivered warm from manufacturing process: Do not use until cold.
2. Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

500 Laying generally

1. Mortar joints: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
2. Bond where not specified: Half lap stretcher.
3. Vertical joints in brick and concrete block facework: Even widths. Plumb at every fifth cross joint.

520 Accuracy

1. Courses: Level and true to line.
2. Faces, angles and features: Plumb.
3. Permissible deviations
   - 3.1. Position in plan of any point in
4. relation to the specified building

5. reference line and/ or point at
6. the same level ± 10 mm.
    6.1. Straightness in any 5 m length ± 5 mm.
    6.2. Verticality up to 3 m height ± 10 mm.
    6.3. Verticality up to 7 m height ± 14 mm.
    6.4. Overall thickness of walls ± 10 mm.
    6.5. Level of bed joints up to 5 m
7. (brick masonry) ± 11 mm.
    7.1. Level of bed joints up to 5 m
8. (block masonry) ± 13 mm.

535 Height of lifts in walling using cement gauged or hydraulic lime mortar

1. Quoins and advance work: Rack back.
2. Lift height (maximum): 1.2 m above any other part of work at any time.
3. Daily lift height (maximum): 1.5 m for any one leaf.

560 Coursing brickwork

1. Gauge: Four brick courses including bed joints to 300 mm.

580 Laying frogged bricks

1. Single frogged bricks: Frog uppermost.
2. Double frogged bricks: Larger frog uppermost.
3. Frog cavity: Fill with mortar.

635 Jointing

1. Profile: Consistent in appearance.

645 Accessible joints not exposed to view

1. Jointing: Struck flush as work proceeds.

665 Pointing

1. Description: Honeycomb brickwork core walls to table tombs
2. Joint preparation: Remove debris. Dampen surface.
3. Mortar: As section Z21.
    3.1. Standard: To BS EN 998-2
    3.2. Mix: 1:2.5 St Astier NHL3.5 hydraulic lime/sand
    3.3. Additional requirements: None
4. Profile: Flush

690 Adverse weather

1. General: Do not use frozen materials or lay on frozen surfaces.
2. Air temperature requirements: Do not lay bricks/ blocks:
    2.1. In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising, or as manufacturer's/ supplier's recommendations.
3. Temperature of walling during curing: Above freezing until hardened.
4. Newly erected walling: Protect at all times from:

4.1. Rain and snow.

4.2. Drying out too rapidly in hot conditions and in drying winds.

Additional requirements for facework

800 Toothed bond

1. New and existing facework in same plane: Bond together at every course to achieve continuity.

830 Cleanliness

1. Facework: Keep clean.
2. Mortar on facework: Allow to dry before removing with stiff bristled brush.
3. Removal of marks and stains: Rubbing not permitted.

Ω End of Section

F21
Natural stone/ ashlar walling/ dressings

Types of walling/ dressings

110 Ashlar slate backing slabs

1. Description: Backing slates for repair of headstones
2. Stone: To BS EN 771-6.
   2.1. Name (traditional): Kirkby Honed
   2.2. Petrological family: Slate
   2.3. Colour: Blue grey
   2.4. Origin: Kirkby Moor Quarry, Kirkby-In-Furness, Cumbria
   2.5. Finish: Honed. Sample Number SR 27543
   2.6. Supplier: Burlington Stone, Cavendish House, Kirkby In Furness, Cumbria, LA17 7UN
   2.7. Unit dimension tolerances: Length + 1 mm, width (bed) +1 mm, height + 1 mm
   2.8. Quality: Monumental Quality, free from vents, cracks, fissures, discolouration, or other defects deleterious to strength, durability or appearance. Before delivery to site, season thoroughly, dress and work in accordance with shop drawings prepared by supplier.
3. Other requirements: Slabs to be 25mm thick, slightly narrower and shorter than the headstone to be repaired. Contractor to be responsible for providing required finished dimensions to supplier. Tops to be splayed to shed water.

General production

240 Stone samples

1. Submit: Labelled samples of dressed stone or arrange for samples which represent the range of variation in appearance to be inspected.
   1.1. Timing: Before placing orders.

250 Cutting and dressing of stone

1. Timing: After seasoning but before delivery to site.
2. Accuracy
   2.1. Exposed and joint surfaces: Square, true planes free from hollow or rough areas.
   2.2. Dimensions: Maintain specified joint widths.
3. Orientation for natural bed of stones: Appropriate to properties of stones and repair of headstones.

260 Identification of stone units

1. Marking: Clearly and indelibly on concealed faces to indicate the natural bed and headstone for which the slab is intended.

270 Inspection of stone units

1. Give notice: Before despatch to site, at appropriate stages of production.

280 Sand samples

1. Submit: Representative samples for approval of colour and grading.
   1.1. Timing: Before placing orders.

Laying and jointing - Not Used

Ω End of Section

M15
Lime based beds for support of laid down monuments

Types of screed

115 Limecrete beds

1. Description: Levelling screeds/beds for laying down repaired monuments
2. Substrate: Gravel bed
3. Thickness
   - 3.1. Nominal: 50mm
   - 3.2. Minimum: 50mm
4. Mix
   - 4.1. Proportions (lime:aggregate): 1:2.5 NHL 5 hydraulic lime/MoT Type 1 aggregate 50mm down with 0.25 soft silver sand and 0.25 Portland stone dust (1:3 total proportions lime:sand/aggregate
5. Finish: Wood floated and keyed
   - 5.1. To receive: Headstone laid on the ground or ledger tomb cap
6. Other requirements: Top surface laid at a fall of 1.5º to shed water. Bed laid within 50 x 150 or 50 x 200mm precast concrete square edged kerb. Cure for at least 7 days. Bed laid on min 50mm thick bed of 10mm gravel/pea gravel, laid on one layer Terram or similar weed control membrane

Generally/ preparation - Not Used

Batching/ mixing

305 Aggregates

1. Sand: To BS EN 13139.
   - 1.1. Grading limits: In accordance with BS 8204-1, Table B.1.
2. Coarse aggregates for fine concrete levelling screeds
   - 2.1. Standard: To BS EN 12620.
   - 2.2. Designation: 4/10.
3. Lightweight aggregates: In accordance with BS 8204-1, Annex A.

330 Mixing

1. Water content: Minimum necessary to achieve full compaction, low enough to prevent excessive water being brought to surface during compaction.
2. Mixing: Mix materials thoroughly to uniform consistency. Mixes other than no-fines must be mixed in a suitable forced action mechanical mixer. Do not use a free fall drum type mixer.
3. Consistency: Use while sufficiently plastic for full compaction.

340 Adverse weather

1. Screeds surface temperature: Maintain above 5°C for a minimum of four days after laying.
2. Hot weather: Prevent premature setting or drying out.

Laying

350 Screeding to falls

1. Minimum screed cover: Maintain at the lowest point.

2. Falls: Gradual and consistent.
    2.1. Gradient (minimum): 1.5º

375 Compaction of beds

1. General: Compact thoroughly over entire area.

Finishing/curing

510 Finishing generally

1. Timing: Carry out all finishing operations at optimum times in relation to setting and hardening of screed material.
2. Prohibited treatments to screed surfaces
    2.1. Wetting to assist surface working.
    2.2. Sprinkling cement.

520 Wood floated finish

1. Finish: Slightly coarse, even texture with no ridges or steps.

650 Curing

1. General: Prevent premature drying. Immediately after laying, protect surface from wind, draughts and strong sunlight. As soon as screed has set sufficiently, closely cover with damp hessian.
2. Curing period (minimum): Keep polyethylene sheeting in position for: seven days.
3. Drying after curing: Allow screeds to dry gradually. Do not subject screeds to artificial drying conditions that will cause cracking or other shrinkage related problems.

Ω End of Section

M20
Plastered/ rendered/ roughcast coatings

Types of coating

310 Lime:sand

1. Description: New and repaired render cappings to graves
2. Substrate: Rubble stone and brick base
   2.1. Preparation: Rebed loose rubble stone and brickwork in NHL 3.5 lime mortar to form rough profile for finished shape
3. Lime manufacturer: St Astier
   3.1. Product reference/ Type: Hydraulic Lime NHL 3.5
4. Undercoats
   4.1. Mix: Suggested Mix: 1:2.5 St Astier NHL 3.5 hydraulic lime/sand
      4.1.1. Sand: Suggested Sand: Cornish Lime Company CLS90, well graded 5mm down
   4.2. Thickness (excluding dubbing out and keys): Maximum 10mm each coat, with first coat thicker than the second coat.
5. Final coat
   5.1. Mix: Suggested Mix: 1:3 St Astier NHL 3.5 hydraulic lime/sand. Ensure complete drying of undercoats before application of final coat. Re-wet base to refusal.
      5.1.1. Sand: Suggested Sand: Cornish Lime Company CLS90, well graded 5mm down
   5.2. Thickness: Maximum 8mm
   5.3. Finish: Wood float
6. Accessories: None
7. Other requirements: Include for taking render samples from existing cappings and analysis at a recognised specialist such as Rose of Jericho to determine original mix, binder and sands used. Issue reports to CA. Suggested materials and mixes may be reviewed once results of analysis received.

General

418 Control samples

1. Complete sample areas, being part of the finished work, in locations as follows: New capping to C03 Stephens

421 Scaffolding

1. General: Prevent putlog holes and other breaks in coatings.

424 Special protection of historic plasterwork

1. General: Prevent damage and disturbance to retained plasterwork.
2. Protection methods: Submit proposals.

Materials and marking of mortar

478 Hydraulic lime

1. Standard: To BS EN 459-1.
   1.1. Type: Natural hydraulic lime (NHL).

495 Mixing

1. Render mortars (site prepared)
   1.1. Batching: By volume. Use clean and accurate gauge boxes or buckets.
   1.2. Mix proportions: Based on damp sand. Adjust for dry sand.
   1.3. Lime:sand: Mix thoroughly. Allow to stand, without drying out, for at least 16 hours before using.
2. Mixes: Of uniform consistence and free from lumps. Do not retemper or reconstitute mixes.
3. Contamination: Prevent intermixing with other materials.

497 Cold weather

1. General: Do not use frozen materials or apply coatings on frozen or frost bound substrates.
2. External work: Avoid when air temperature is at or below 5°C and falling or below 3°C and rising. Maintain temperature of work above freezing until coatings have fully hardened.
3. Internal work: Take precautions to enable internal coating work to proceed without detriment when air temperature is below 3°C.

Preparing substrates

510 Suitability of substrates

1. Soundness: Free from loose areas and significant cracks and gaps.
2. Cutting, chasing, making good, fixing of conduits and services outlets and the like: Completed.
3. Tolerances: Permitting specified flatness/ regularity of finished coatings.
4. Cleanliness: Free from dirt, dust, efflorescence and mould, and other contaminants incompatible with coatings.

527 Raking out for key

1. Joints in existing masonry: Rake out to a depth of 13 mm (minimum).
   1.1. Dust and debris: Remove from joints.

531 Roughening for key

1. Substrates: Roughen thoroughly and evenly.
   1.1. Depth of surface removal: Minimum necessary to provide an effective key.

551 Removal and renewal of existing plaster/ render

1. Location and extent: Agree, at least on a provisional basis, before work commences. Minimize extent of removal and renewal.

556 Removing defective existing render

1. Render for removal: Detached, hollow, soft, friable, badly cracked, affected by efflorescence or otherwise damaged.
2. Removing defective render: Cut out to follow existing cracks, do not divide into rectangular areas.
   2.1. Horizontal and vertical edges: Square cut or slightly undercut.
   2.2. Bottom edges to external render: Do not undercut.
   2.3. Render with imitation joints: Cut back to joint lines.
3. Cracks
   3.1. Fine hairline cracking/ crazing: Leave.
   3.2. Other cracks: Rake out to minimum width necessary for filling with mortar for render

4. Dust and loose material: Remove from exposed substrates and edges.

Backings/ beads/ joints - Not Used

Mouldings/ decorative plasterwork - Not Used

Internal plastering - Not Used

External rendering

810 Application generally

1. Application of coatings: Firmly and in one continuous operation between angles and joints. Achieve good adhesion.
2. Appearance of finished surfaces: Even and consistent. Free from rippling, hollows, ridges, cracks and crazing.
   2.1. Accuracy: Finish to a true plane, to correct line and level, with angles and corners to a right angle unless specified otherwise, and with walls and reveals plumb and square.
3. Drying: Prevent excessively rapid or localized drying out.

820 Dubbing out rendering

1. General: Correct substrate inaccuracies.
2. Thickness of any one coat (maximum): 16 mm.
   2.1. Total thickness (maximum): 20 mm, otherwise obtain instructions.
3. Mix: As undercoat.
4. Application: Achieve firm bond. Allow each coat to set sufficiently before the next is applied. Comb surface of each coat.

840 Undercoats generally

1. General: Rule to an even surface. Comb to provide a key for the next coat. Do not penetrate the coat.
2. Undercoats on metal lathing: Work well into interstices to obtain maximum key.

856 Final coat – plain floated finish

1. Finish: Even, open texture free from laitance.

880 Curing and drying

1. General: Prevent premature setting and uneven drying of each coat.
2. Curing coatings: Keep each coat damp by covering with polyethylene sheet and/ or spraying with water.
   2.1. Curing period (minimum): Minimum 7 days
   2.2. Final coat: Hang sheeting clear of the final coat.
3. Drying: Allow each coat to dry thoroughly, with drying shrinkage substantially complete before applying next coat.
4. Protection: Protect from frost and rain.

Ω End of Section

M60
Painting/clear finishing

Coating systems

130 Gloss paint

1. Description: for new unpainted ironwork.
2. Manufacturer: As clause 210.
   2.1. Product reference: Submit proposals.
3. Surfaces: Uncoated.
   3.1. Preparation: As clauses 400, 451, and 533.
4. Initial coats: Zinc Phosphate Metal Primer.
   4.1. Number of coats: One, 35 micron dry film thickness.
5. Undercoats: Micaceous Iron Oxide
   5.1. Number of coats: Two, 40 micron dry film thickness per coat.
6. Finishing coats: Oil based gloss.
   6.1. Number of coats: Two, 35 micron dry film thickness per coat.

131 Gloss paint

1. Description: for previously painted ironwork.
2. Manufacturer: As clause 210.
   2.1. Product reference: Submit proposals.
3. Surfaces: Previously coated.
   3.1. Preparation: As clauses 400, 440, 451, 532, and 534.
4. Initial coats: Zinc Phosphate Metal Primer.
   4.1. Number of coats: One, 35 micron dry film thickness on bare patches.
5. Undercoats: Micaceous Iron Oxide
   5.1. Number of coats: Two, 40 micron dry film thickness per coat to primed patches. One coat elsewhere.
6. Finishing coats: Oil based gloss.
   6.1. Number of coats: Two, 35 micron dry film thickness per coat.

Generally

210 Coating materials

1. Manufacturers: Obtain materials from any of the following:
2. Akzo Nobel, Dulux, Sadolin.
3. Selected manufacturers: Submit names before commencement of coating work.

215 Handling and storage

1. Coating materials: Deliver in sealed containers, labelled clearly with brand name, type of material and manufacturer's batch number.
2. Materials from more than one batch: Store separately. Allocate to distinct parts or areas of the work.

220 Compatibility

1. Coating materials selected by contractor
   1.1. Recommended by their manufacturers for the particular surface and conditions of exposure.
   1.2. Compatible with each other.
   1.3. Compatible with and not inhibiting performance of preservative/fire-retardant pretreatments.

280 Protection

1. 'Wet paint' signs and barriers: Provide where necessary to protect other operatives and general public, and to prevent damage to freshly applied coatings.

300 Control samples

1. Sample areas of finished work: Carry out, including preparation, as follows:
2. Types of coating Location
3. M60/ 130 and 131. …….
4. Approval of appearance: Obtain before commencement of general coating work.

Preparation

400 Preparation generally

1. Standard: In accordance with BS 6150.
2. Refer to any pre-existing CDM Health and Safety File.
3. Refer to CDM Construction Phase Plan where applicable.
4. Suspected existing hazardous materials: Prepare risk assessments and method statements covering operations, disposal of waste, containment and reoccupation, and obtain approval before commencing work. Lead based paints may be present.
5. Preparation materials: Types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared.
6. Substrates: Sufficiently dry in depth to suit coating.
7. Efflorescence salts: Remove.
8. Dirt, grease and oil: Remove. Give notice if contamination of surfaces/ substrates has occurred.
9. Surface irregularities: Remove.
10. Joints, cracks, holes and other depressions: Fill joints with Densoseal 16A polybutene based mastic. Work well in and finish flush with surface to avoid potential water traps. Fill cracks, holes and depressions with metal replacement filler based on steel particles with an epoxy resin binder. Prepare surface and apply in layers in accordance with manufacturer's recommendations. Work well in and finish off flush with surface. Abrade to a smooth finish and take particular care to fill potential water traps.
11. Dust, particles and residues from preparation: Remove and dispose of safely.
12. Water based stoppers and fillers
    12.1. Apply before priming unless recommended otherwise by manufacturer.
    12.2. If applied after priming: Patch prime.
13. Oil based stoppers and fillers: Apply after priming.

440 Previously coated surfaces generally

1. Preparation: In accordance with BS 6150, clause 11.5.
2. Contaminated or hazardous surfaces: Give notice of:
   2.1. Coatings suspected of containing lead.
   2.2. Substrates suspected of containing asbestos or other hazardous materials.

2.3. Significant rot, corrosion or other degradation of substrates.

3. Suspected existing hazardous materials: Prepare risk assessments and method statements covering operations, disposal of waste, containment and reoccupation, and obtain approval before commencing work.
4. Removing coatings: Do not damage substrate and adjacent surfaces or adversely affect subsequent coatings.
5. Loose, flaking or otherwise defective areas: Carefully remove to a firm edge.
6. Cracks, joints, holes and other depressions:: Fill joints with Densoseal 16A polybutene based mastic. Work well in and finish flush with surface to avoid potential water traps. Fill cracks, holes and depressions with metal replacement filler based on steel particles with an epoxy resin binder. Prepare surface and apply in layers in accordance with manufacturer's recommendations. Work well in and finish off flush with surface. Abrade to a smooth finish and take particular care to fill potential water traps.
7. Alkali affected coatings: Completely remove.
8. Retained coatings
   8.1. Thoroughly clean to remove dirt, grease and contaminants.
   8.2. Gloss-coated surfaces: Provide key.
9. Partly removed coatings
   9.1. Additional preparatory coats: Apply to restore original coating thicknesses.
   9.2. Junctions: Provide flush surface.
10. Completely stripped surfaces: Prepare as for uncoated surfaces.

451 Previously coated surfaces – blast cleaning

1. Operatives
   1.1. Trained/ experienced in blast cleaning.
   1.2. Submit evidence of training/ experience on request.
2. Dust and nuisance: Minimize.

532 Previously coated cast iron – blast cleaning

1. Oil and grease: Remove.
2. Blast cleaning
   2.1. Atmospheric conditions: Dry.
   2.2. Abrasive: Recyclable C17 grade chilled iron grit, free from fines, moisture and oil.
   2.3. Pressure:: Experiment on concealed sections of metalwork to achieve complete removal of paint, corrosion and scale without damaging or removing detail. Max pressure likely to be less than 5.5 bar.
   2.4. Surface profile:: 50-70 microns.
   2.5. Surface finish: To BS EN ISO 8501-1, preparation grade Sa2.5.
3. Primer: Apply as soon as possible and within four hours of blast cleaning.

533 New cast and wrought iron – blast cleaning

1. Oil and grease: Remove.
2. Blast cleaning
   2.1. Atmospheric conditions: Dry.
   2.2. Abrasive: Recyclable C17 grade chilled iron grit, free from fines, moisture and oil.
   2.3. Pressure:: Experiment on concealed sections of metalwork to achieve complete removal of paint, corrosion and scale without damaging or removing detail. Max pressure likely to be less than 5.5 bar.

2.4. Surface profile:: 50-70 microns

2.5. Surface finish: To BS EN ISO 8501-1, preparation grade Sa2.5.

3. Primer: Apply as soon as possible and within four hours of blast cleaning.

534 Previously coated wrought iron – flame cleaning

1. Oil and grease: Remove.
2. Flame cleaning:: To be carried out by an experienced and highly skilled operator.
   2.1. Removal of corrosion:: Pass a high temperature oxyacetylene or oxypropane flame over the surface of the ironwork, detaching rust from base iron. Residual rust to be removed by chipping and brushing to a clean, corrosion free surface.
3. Primer: Apply primer whilst ironwork is still dry and warm, but not hot.
4. Residual paint:: Remove residual paint in flame cleaned areas of wrought iron with a proprietary chemical paint stripper followed by washing or steam cleaning to remove residual chemicals.

622 Organic growths

1. Dead and loose growths and infected coatings: Scrape off and remove from site.
2. Treatment biocide: Apply appropriate solution to growth areas and surrounding surfaces.
3. Residual effect biocide: Apply appropriate solution to inhibit re-establishment of growths.

Application

711 Coating generally

1. Application standard: In accordance with BS 6150, clause 9.
2. Conditions: Maintain suitable temperature, humidity and air quality during application and drying.
3. Surfaces: Clean and dry at time of application.
4. Thinning and intermixing of coatings: Not permitted unless recommended by manufacturer.
5. Overpainting: Do not paint over intumescent strips or silicone mastics.
6. Priming coats
   6.1. Thickness: To suit surface porosity.
   6.2. Application: As soon as possible on same day as preparation is completed.
7. Finish
   7.1. Even, smooth and of uniform colour.
   7.2. Free from brush marks, sags, runs and other defects.
   7.3. Cut in neatly.
8. Doors, opening windows and other moving parts: Ease before coating and between coats.

740 Concealed metal surfaces

1. General: Apply additional coatings to surfaces that will be concealed when component is fixed in place.
   1.1. Components: All components
   1.2. Additional coatings: Two undercoats

Ω End of Section

Z11
Purpose made metalwork

To be read with preliminaries/ general conditions.

310 Materials generally

1. Grades of metals, section dimensions and properties: To appropriate British Standards. When not specified, select grades and sections appropriate for the purpose.
2. Prefinished metal: May be used if methods of fabrication do not damage or alter appearance of finish, and finish is adequately protected.
3. Fasteners: To appropriate British Standards and, unless specified otherwise, of same metal as component being fastened, with matching coating or finish.

400 Stainless steel products

1. Chemical composition and physical properties: To BS EN 10088-1.
2. Sheet, strip and plate: To BS EN 10088-2.
3. Semi-finished products bars, rods and sections: To BS EN 10088-3.
4. Wire: To BS EN 1088-3.
5. Tubes
    5.1. Welded circular: To BS EN 10296-2.
    5.2. Seamless circular: To BS EN 10297-2.

Fabrication

515 Fabrication generally

1. Contact between dissimilar metals in components: Avoid.
2. Finished components: Rigid and free from distortion, cracks, burrs and sharp arrises.
    2.1. Moving parts: Free moving without binding.
3. Corner junctions of identical sections: Mitre.

520 Cold formed work

1. Profiles: Accurate, with straight arrises.

525 Adhesive bonding

1. Preparation of surfaces of metals to receive adhesives
    1.1. Degrease.
    1.2. Abrade mechanically or chemically etch.
    1.3. Prime: To suit adhesive.
2. Adhesive bond: Form under pressure.

Finishing

745 Preparation for application of coatings

1. General: Complete fabrication, and drill fixing holes before applying coatings.
2. Paint, grease, flux, rust, burrs and sharp arrises: Remove.

Completion

920 Completion

1. Protection: Remove.
2. Cleaning and maintenance: Carry out in accordance with procedures detailed in fabricators' guarantees.

Ω End of Section

Z20
Fixings and adhesives

Products

310 Fasteners generally

1. Materials: To have:
   1.1. Bimetallic corrosion resistance appropriate to items being fixed.
   1.2. Atmospheric corrosion resistance appropriate to fixing location.
2. Appearance: Submit samples on request.

320 Packings

1. Materials: Noncompressible, corrosion proof.
2. Area of packings: Sufficient to transfer loads.

340 Masonry fixings

1. Light duty: Plugs and screws.
2. Heavy duty: Expansion anchors or chemical anchors.

350 Plugs

1. Type: Proprietary types to suit substrate, loads to be supported and conditions expected in use.

360 Anchors

1. Types
   1.1. Expansion: For use in substrate strong enough to resist forces generated by expansion of anchor.
   1.2. Adhesive or chemical
      1.2.1. For use in substrate where expansion of anchor would fracture substrate.
      1.2.2. For use in irregular substrate where expansion anchors cannot transfer load on anchor.
   1.3. Cavity: For use where the anchor is retained by toggles of the plug locking onto the inside face of the cavity.

370 Wood screws

1. Type
   1.1. Wood screws (traditional pattern).
      1.1.1. Standard: To BS 1210.
   1.2. Wood screws.
      1.2.1. Pattern: Parallel, fully threaded shank or twin thread types.
2. Washers and screw cups: Where required are to be of same material as screw.

380 Miscellaneous screws

1. Type: To suit the fixing requirement of the components and substrate.
   1.1. Pattern: Self-tapping, metallic drive screws, or power driven screws.
2. Washers and screw cups: Where required to be of same material as screw.

390 Adhesives

1. Standards
   1.1. Hot-setting phenolic and aminoplastic: To BS 1203.
   1.2. Thermosetting wood adhesives: To BS EN 12765.
   1.3. Thermoplastic adhesives: To BS EN 204.

Execution

610 Fixing generally

1. Integrity of supported components: Select types, sizes, quantities and spacings of fixings, fasteners and packings to retain supported components without distortion or loss of support.
2. Components, substrates, fixings and fasteners of dissimilar metals: Isolate with washers/ sleeves to avoid bimetallic corrosion.
3. Appearance: Fixings to be in straight lines at regular centres.

620 Fixing through finishes

1. Penetration of fasteners and plugs into substrate: To achieve a secure fixing.

630 Fixing packings

1. Function: To take up tolerances and prevent distortion of materials and components.
2. Limits: Do not use packings beyond thicknesses recommended by fixings and fasteners manufacturer.
3. Locations: Not within zones to be filled with sealant.

680 Plugged countersunk screw fixing

1. Finished level of countersunk screw heads: Minimum 6 mm below timber surface.
2. Plugs: Glue in to full depth of hole.
3. Finished level of plugs: Projecting above surface.

700 Applying adhesives

1. Surfaces: Clean. Adjust regularity and texture to suit bonding and gap filling characteristics of adhesive.
2. Support and clamping during setting: Provide as necessary. Do not mark surfaces of or distort components being fixed.
3. Finished adhesive joints: Fully bonded. Free of surplus adhesive.

Ω End of Section

Z21
Mortars

Cement gauged mortars - Not Used

Lime:sand mortars

310 Lime:sand mortar mixes

1. Specification: Proportions and additional requirements for mortar materials are specified elsewhere.

320 Sand for lime:sand masonry mortars

1. Type: Sharp, well graded.
   1.1. Quality, sampling and testing: To BS EN 13139.
   1.2. Grading/ Source: As specified elsewhere in relevant mortar mix items.

350 Storage of lime:sand mortar materials

1. Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
2. Ready prepared nonhydraulic lime putty: Prevent drying out and protect from frost.
3. 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.
4. Bagged hydrated hydraulic lime: Store off the ground in dry conditions.

360 Making lime:sand mortars generally

1. Batching: By volume. Use clean and accurate gauge boxes or buckets.
2. Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
3. Contamination: Prevent intermixing with other materials, including cement.

400 Making hydraulic lime:sand mortars

1. Mixing hydrated hydraulic lime:sand: Follow the lime manufacturer's recommendations for each stage of the mix.
   1.1. Water quantity: Only sufficient to produce a workable mix.
2. Working time: Within limits recommended by the hydraulic lime manufacturer.

Ω End of Section

Specification created using NBS Chorus