## GENERAL REQUIREMENTS

100 TO BE READ with Preliminaries, Schedule of Work, and Drawings which have been prepared specifically for this Contract.

110 SCOPE: This section of the Specification sets out the materials and trade workmanship requirements for the stonework repair work in the Contract.

120 SUBCONTRACTOR/S: The Contractor is required to provide details of any proposed sub-contractors or suppliers with this tender. The Contractor will be required to engage a dedicated team/s of skilled stonemasons and/or conservators for the repairs work described in this specification, supervised by a competent working foreman qualified and/or experienced in conservative repair techniques. The sample panels and trial areas must be carried out by the same team who carry out the main work. New operatives joining the team will be required to carry out a range of samples for approval.

130 CONTRACTOR'S PROPOSALS: Method statements, drawings, samples and other proposals are required at least three weeks in advance of the relevant work commencing. These dates should be indicated on the Contractor's programme.

140 PROGRAMME: The Contractor must allow in his programme for material delivery periods, subcontractors lead-in periods, opening-up and surveying, preparation and approval of shop drawings and samples; allow for restrictions on working season and for periods of protection during curing of lime mortars and shelter coats.

150 SCAFFOLD: Provide a mason's scaffold designed to carry the weight of stone required for the scheduled repairs; liaise between scaffolder and stone mason in order to ensure that scaffold lifts are provided at the correct levels, with access and hoist/s where required; ensure that loads of existing stones can be accommodated where they have to be lifted off and placed onto scaffold, particularly coping stones.

155 LIFTING: Provide suitable lifting equipment to carry the weight of stone required for the scheduled work and to meet health and safety requirements, considering the environment in which the stonework is to be erected. Submit proposals for approval in advance.

160 REPAIRS GENERALLY: In keeping with the building's historic character, the intention of the repairs in the Contract is to retain as much extant stonework as possible, staving off further decay by the use of mortar repairs, re-pointing, lime watering and shelter coating. Weathering mouldings and copings are to be reinstated where defective by piecing in stone in order to protect the face of walls and decorative features below. Individual decayed stones will be considered for replacement by CA dependant upon elevation and accessibility for future repair.

## MATERIALS GENERALLY

170 NATURAL STONE: Great Oolite Group limestone from the Bath–Cotswolds area (Bath Stones) for repair are listed below, and are to comply with the general clauses given below. Samples of the current production from each one of these quarries should be obtained and examined given the inherent three-dimensional variability of the worked limestone beds.

**a. Stanleys Quarry**
Stoke Ground Base Bed Bath Stone
Westington Hill CHIPPING CAMPDEN Gloucestershire
Tel: 01386 841236
Contact: Brendan, sales@cotswoldstone.com

**b. Cotswold Hill Stone & Masonry Ltd.**
Cotswold Hill Quarry (Bed 2 or Bed 1)
Stoke Ground Top Bed/ Base Bed Bath Stone
Ford Temple Guiting CHELTENHAM Gloucestershire
Tel: 01386 584384
Contact: Tim, enquiries@stonequarries.co.uk

**c. The Bath Stone Group**
Stoke Ground Top Bed/ Base Bed Bath Stone
Tel: 01225 723792
Email: elaine@bathstone.com or matthew@bathstone.com

**d. Lovell Stone Group**
Hartham Park Bath Stone
Tel: 01929 439255

**e. Hanson Bath and Portland Stone**
Monks Park, Box Ground
CORSHAM Wiltshire
Tel: 01179 869631
Email via http://bathandportlandstone.co.uk

**f. Ham & Doulting Stone**
Elm Park, Park Lane Bath Stone
Lanes End Gastard CORSHAM
Tel: 01458 223166

180 ORDER MATERIALS: They should match the existing adjoining stones in type, quarry, colour, texture, bed, as far as possible unless scheduled otherwise. Calculate the quantities of stone required and issue schedule to quarry following site inspection and instruction in conjunction with the CA; agree delivery dates and place a firm order for stone from the suppliers given in the Schedule of Work. The Contractor must inform the CA within one month of the start of the work on site if any stone supplies cannot be met. If advance registration has been made prior to tender, confirm that the supplies can be met. At the same time submit written guarantee from Supplier that all stone will be from the quarry and bed specified.

200 REPLACEMENT STONEWORK GENERALLY: Supply only stone that is free from vents, cracks, fissures, discoloration or other defects that might adversely affect strength, durability or appearance. Select stone of similar density and of comparable quality to that to be replaced to match existing in shade, texture, finish and range of colour variation. Supply stone that is thoroughly seasoned, sawn, dressed and moulded in accordance with templates and site dimensions taken by sub-contractor. Allow for final dressing on site to fit tightly into cut recesses as necessary.

210 STONE FOR CARVING: Select 'free' stone for carving that is consistent in grain and colour throughout and to match existing. Supply sufficient stone for carver to have ample scope for his work.

220 WORKING DRAWINGS: The Contractor must provide shop drawings of all new or replacement stone to a scale of at least 1:10, showing the proposed bonding and fixing of stonework. These drawings are to be supplied to the CA at least three weeks prior to the programme date for cutting of the new stone. Prepare and submit for comment method statement/s of the method by which large or awkward members have been designed to be handled and hoisted, at least three weeks before cutting.

230 SAMPLES OF STONE: Provide samples at least 150 x 150mm of each stone specified which are representative of the colour, texture and strength and from the batch quarry and bed to be used, in advance of ordering materials and allowing at least three weeks for approval by the CA. Retain samples on site during works. Provide mortar samples as described in Specification Z21r.

**COMPONENTS AND ACCESSORIES**

240 MORTARS: For mortar materials, mixes, preparation and pointing refer to Section Z21r Mortars and Pointing.

250 DAMP PROOF COURSES will only be used where an existing DPM is interrupted or specifically instructed by CA: use Highload Original Polymeric DPC by Ruberoid Building Products Ltd (tel. 0844 412 7228; www.hyload.co.uk )

260 LEAD SHEET FOR WEATHERINGS AND FLASHINGS: to BS 1178 and in accordance with Specification H71r Code and sizes to suit locations in accordance with LSA recommendations and/or as shown on Drawings.

270 BITUMEN SOLUTION: To BS 3416, Type 1, of brushing consistency.

280 METAL DOWELS AND FIXINGS: Stainless steel sheet, strip or plate or spiral to BS 1449 Pt 2; or bar to BS 970 Pt4: or Phosphor bronze to BS 1234. Size, shape and key as appropriate to situation and/or as shown on drawings; show dowels and fixings on mason's drawings and agree with CA in advance of manufacture.

290 RESIN ANCHOR FIXING: As specified on the Drawings or in the Schedule of Work and installed in accordance with manufacturer's recommendations.

300 EPOXY RESIN for gluing fine details and fragments: Paraloid B72 supplied by Brenntag NV, Mechelsesteenweg 34bus12, B-2018 Antwerp, Belgium.
(contact: Dirk De Brauwer, tel: 00 32 2384966, email: dirk.debrauwer@brenntag.be) or equal and approved.

310 POLYESTER RESIN for setting pins: Araldite thixotropic catalysed epoxy resin for injection manufactured by Huntsman Advanced Materials Ltd (contact Nicole Quintana tel. +41 61 966 1588; www.huntsman.com ) or equal and approved.

320 MASONRY ADHESIVES: Not to be used on any stone without prior consent of CA in writing.
a. For indent repairs and pinning fractures in ashlars and dressings use thrixotropic catalysed polyester resin, used in conjunction with mechanical fixings all as specified.
b. For larger well bedded pieces, set only in mortar. Masonry adhesive should only be used in conjunction with mechanical fixings.
c. For pinning fine details use stainless steel wire set within an epoxy resin. Do not use polyester resin.

330 BIOCIDE: Use only after specific instructions from CA.
Acticide 50X supplied by ACTI-Chem Specialists (tel. 01606 818 800; www.thor.com ).

340 WEEDKILLER: Use only after specific instructions from CA.
a. Ammonium Sulphamate crystals.
b. Glyphosate based weed-killer: 'Murphy Tumbleweed' , or equivalent.

350 FUNGICIDE: Use only after specific instructions from CA; Murasol 20 as manufactured by Cementone Beaver Ltd Tingewick Buckinghamshire MK18 1AN.

**HANDLING AND STORAGE**

390 HANDLING: Provide adequate lifting plant to unload and handle stones safely into position without damage. Protect arisses to prevent damage. Transport stone with minimum handling and transhipment. Stack carefully in vehicle with packing materials to prevent damage.

400 STORE STONE in neat and orderly stacks on battens. Protect from damage, staining and inclement weather. Programme deliveries to suit progress of works and avoid storing stone on site for long periods.

Do not store wrapped in polythene for prolonged periods.

410 ADHESIVES AND SEALANTS: Ensure that operatives observe manufacturer's recommendations and statutory requirements for storage and safe use of adhesives. Do not use adhesives in unsuitable environmental conditions or beyond the manufacturers recommended time period.

**WORKMANSHIP GENERALLY**

420 COMPLY with BS 5390: Section 5 - Work on Site and BS 6270, Code of Practice for the Cleaning and Maintenance and Surface Repair of Buildings, unless specifically specified or instructed otherwise.

430 STANDARDS: All work is to be of a consistently high standard and to match the standard agreed on the sample panel. Different standards may be required in certain instances, usually to match existing work and the contractor should allow for this where necessary. Repair work to be carried out to schedule and to a standard/s agreed with CA.

440 FOREMAN: The contractor shall provide adequate supervision, including employing a thoroughly competent foreman mason exclusively for this contract, who is experienced in the repair of historic buildings.

450 OPERATIVES: Cutting, dressing, laying and jointing of stone to be carried out by skilled masons. Provide evidence of previous experience and details of work previously carried out.
Work is to be carried out by a consistent team of masons and/or conservators in accordance with clause 120.

460 PUTLOG SCAFFOLDING will not be permitted.

470 TOOLS: All dressing, shaping, finishing, carving and tooling of the stone is to be done by hand using traditional hand-held chisels and tools by skilled masons. Cutting-out for repairs is to be done likewise, carefully by hand. Small diameter hand-held diamond drills may be used on hard mortar or for pins and fixings. Disk Cutters shall NOT be used at any time.

**PREPARATION OF NATURAL STONE**

480 PRODUCTION: Stone to be cut and dressed after seasoning but before delivery to site, including shaping, finishing, and all sinkings for fixing and lifting devices, so that exposed surfaces and joints are square, true planes free from hollow or rough edges and with minimal deviation from the specified dimensions. Ensure that specified joint widths are maintained and that the natural bed is horizontal in plain walling, vertical and at right angles to the wall face in projecting stones and at right angles to the line of thrust in arches. Face bedding will be rejected. Finish the stone to match the approval sample in profile, jointing and surface tooling.

490 IDENTIFICATION: Mark each stone on an unexposed face clearly to indicate its natural bed and position in the finished work, referenced to the drawings.

500 INSPECT STONE: All blocks/ dressings must be carefully inspected and checked by the sub-contractor for match with the approved sample(s) and compliance with the sawing schedule and specification before despatch to site.
Further inspections should be made for stone defects and cutting accuracy during and after moulding and dressing. The foreman must carry out his own checks when receiving delivery of stones to site. Inform the CA at appropriate stages so that he/she may inspect the stones.

510 CUT STONE: After seasoning, but before delivery to site cut stones to required sizes and profiles with lines of all mouldings, curves, angles, etc. worked to true and proper forms out of solid, ensuring that joints do not occur at mitred corners, and that stones are 100mm minimum depth measured from finished face of wall. Work the exposed and joint faces of each stone to a surface compatible with the adjacent existing

stonework. Finish off stone to match existing adjacent surfaces in plane, profile, jointing and surface tooling. Minimize the amount of cutting on site by preparing stones in advance in the mason's yard.

**LAYING AND JOINTING**

520 ASHLAR WALLING: Dampen stones and lay on a full bed of mortar with all joints filled. Use temporary lead or stainless steel distance pieces to ensure consistent joint width of 5mm maximum; remove when mortar is sufficiently strong.
Fit and grout solid all dowels and cramps as the work proceeds.
Keep courses level and in line, and accurately plumb all wall faces, angles and features. Set out carefully to ensure satisfactory junctions and joints with adjoining or built-in elements and components.
New stonework is to follow the jointing pattern of the surrounding stonework.
Bed cramps and dowels in mortar, as specified elsewhere - tamp to expel air.
Form openings using rigid templates accurately fabricated to the required size.
Finish joints flush as the work proceeds, avoiding feathered edges.
Keep stonework clean during construction and until practical completion. Ensure that no mortar encroaches on the face when laying. Turn back scaffolding boards at night and during heavy rain. Rubbing to remove marks or stains will not be permitted.

530 DAMP PROOF COURSES: Stonework to start not less than 150mm below finished level of external paving or soil except where shown otherwise.
Damp proof course to be installed not less than 150mm above finished level of external paving or soil. Fully bed DPC in mortar full depth of wall, with lapped joints. Finish flush with external face and neatly point.

**PROTECTION**

540 INCLEMENT WEATHER: Do not use frozen materials and do not lay on frozen surfaces.
Do not carry out any stonework repairs when air temperature is at or below 3 deg C on a falling thermometer, or 1°c on a rising thermometer. Non-hydraulic or un-guaged lime mortars are not to be used between 1 November and 1 March without agreement of CA.
Maintain temperature of the work above freezing until the mortar has achieved structural strength, by the use of suitable protection to section Z21r. Adequately protect newly laid stonework and mortar repairs against rain and snow by covering during and at completion of each days work. Rake out and replace any mortar damaged by frost; rebuild any stone work damaged by frost. Maintain protection to completed work until mortar has achieved adequate set in accordance with Specification Z21r.

550 WARM WEATHER: Ensure stonework and lime mortars do not dry out too rapidly during periods of warm or windy weather by protecting using damp hessian covered in polythene. Monitor conditions until mortar has gone off, lightly spraying to maintain in moist conditions as required. Maintain protection to completed work until mortar has achieved adequate set in accordance with Specification Z21r.

560 PROTECTION: Prevent damage to existing and repaired stonework, particularly arrises and projecting features, with wooden slats, boards etc., as well as padding and Hessian, securely fixed. Remove protection on Practical Completion. Prevent staining and other disfigurement of stonework during repairs and by following trades.

570 CLEAN: Keep a vacuum cleaner on sit at all times to keep works clean of dust and debris daily. Rub down and leave stonework clean to approval at the completion of each area of work and before scaffolding is taken down. Do not wash down with excessive water at anytime during the contract. Ensure scaffold is cleaned down thoroughly before dismantling to prevent dust lines across stonework. Clean all plain glazing in vicinity of works with distilled water and cotton wool swabs at completion; engage specialist for cleaning down stained glass.

**WORKMANSHIP FOR REPAIRS**

580 SCHEDULE OF WORK: Agree a schedule of work with CA following inspection form the scaffold. Confirm all provisional repairs shown on drawings or schedules before proceeding.

590 REPAIR METHODS described below are typical of repairs anticipated and correspond to items in the Schedule of Works or on drawings. Further repair methods specific to the contract may be itemised in the Schedule or instructed following inspection.

600 SAMPLE OF REPAIR METHODS: Provide samples of each repair method itemised in the Schedule of Work in a location agreed with CA and seek approval before proceeding with the work. Retain and protect samples on site until Practical Completion for reference and ensure standard of work matches samples. Samples to be carried out by the same mason/conservator who is to carry out the work.

**CRAMPS**

610 REPLACEMENT OF CORRODING CRAMPS: Carefully remove corroding/ferrous cramps where exposed and embedded cramps where stone is spalling away. Re-cut stone to receive new cramps and mortar or indent stone repair.
Replace with appropriate keyed cramps in stainless steel to agreed design. Bed cramps and dowels in mortar to Section Z21r. Form indent repair to match surrounding work.

615 In the event that a corroding/ferrous cramp cannot be fully removed and a cramp remnant remained embedded in stone, apply a galvanising treatment/ corrosion inhibitor (such as Galvafroid Zinc Rich Cold Galvanising Coating or similar) in situ to any retained embedded metalwork, all to manufacturer's specification and in consultation with CA.

620 Only if specifically instructed:
IN SITU TREATMENT OF EMBEDDED IRONWORK: HIGH BUILD EPOXY
Reveal cramp by neatly cutting out a section of stone to be indented subsequently.
Clean off all rust by chipping, wire brushing, air abrasive etc.
Apply 1no coat of high build epoxy zinc phosphate coating immediately.
Leave to cure before priming and decorating to Specification M60.

630 Only if specifically instructed:
IN SITU TREATMENT OF EMBEDDED IRONWORK: RUST CONVERTER
Prepare and apply proprietary rust converter to accessible parts of the cramp immediately e.g. 'Fertan' or similar approved in accordance with manufacturer's recommendations

**RESETTING STONE**

640 RESETTING STONE: Rake out mortar joints ground stone; lever stone loose using timber shims etc. to protect the arises and carved detail; clear backing and bedding mortar. Reset stone to new line as agreed with CA in lime mortar as specified in Section Z10r using slate shims if necessary. Install new cramps as instructed.

**REPLACING STONE**

650 REPLACING ASHLAR: Cut out defective stone completely or to a minimum depth of 150mm, using hand tools and diamond drills to minimise vibration; take care to avoid damage to arises and surfaces of adjacent stonework; protect surfaces below from debris and clear-up dust immediately. Provide support to surrounding stonework as necessary. Fix new stone as specified in clause 520, worked and finished to conform with existing detail, bedded with lime mortar as specified in accordance to Section Z21r. Grout all voids and point up with lime mortar finished in accordance with agreed sample panel and to slightly reveal arises keeping the work clean to prevent staining. Protect as specified in clauses 540- 560 incl.

660 REPLACING MOULDED SECTIONS: Cut out existing stone as described in Clause 650. Carve stone to match original profile and finish. Agree profile with CA and take template of existing. Allow for a minimum

100mm depth of block to be built into the wall. Set in place of defective stone with lime mortar as described in Clause 650.

670 REPLACING CARVED DETAIL: Agreed extent of replacement with CA. Provide drawings for approval. Allow minimum 100mm depth of block to be built into wall. Cut out existing stones described in Clause 650. Carve stone to match existing style, detail and finish. The Carver is not necessarily required to mechanically copy existing work, but to carve in the same style, and spirit as the existing. Carry out carving sample for approval of CA. Set in place of defective stone with lime mortar as described in Clause 650.

680 REPLACING STONE SLAB PAVINGS: Replace existing broken flagstone where scheduled or instructed, matching the existing in pattern, thickness, dimensions and finish. Match stone type unless specifically instructed otherwise. Bed on continuous sand or mortar bed as shown on drawings and point as specified in section Z21r. Do not brush mortar over face of stones
Lay with falls away from building and into gullies. Follows the level/s of the existing paving without leaving edges proud adjacent stones.

**DRESSING/CUTTING**

690 DRESSING OFF: The intention is to eliminate water traps and/or to remove loose surface stone encouraging the newly exposed areas to harden. Remove loose stone carefully with phosphor bronze soft wire brushes and seek further instructions. If instructed by the CA carefully remove further material with a chisel, avoiding damage to the sound surface underneath, and/or rub down to hard stone with a carborundum forming feathered edges to avoid ledges and water-traps.

700 FORM CHASE FOR LEAD: Form regular chase 25mm deep with hand tools to take the turn up of lead. Where existing hard mortar has to be removed carefully drill along centre line of chase with small diamond drill at close centres, stop short at ends and use hand chisels to avoid damaging arrises and edges of surrounding stones. Chisel of along length of chase to required depth. Protect surfaces below from debris and clear-up dust immediately.
Size of chases:
a. 10mm high for traditional wedged lead detail, up to maximum 15mm for thicker codes.
b. 20mm high for screw-fixing detail where indicated on drawings.

**INDENT REPAIRS**

710 INDENTED REPAIR:
1. Agree extent of indent repairs to CA in advance and mark up on site for approval.
2. Carefully cut out defective area of stone to minimum depth of 100mm, to vertical and horizontal joints, square to the face and with sharp arises follow line of existing joints. Use light hand tools or, with prior approval, small disc cutters (100mm diameter) to minimise vibration.
3. Measure up after cutting out and cut new stone sawn square to provide joint width no greater than 2mm, worked and finished to conform to existing detail.
4. Fix stone into position with minimum 5mm diameter stainless steel threaded pins secured in annulus of polyester or epoxy resin. Protect surrounding surfaces and avoid getting resin on adjacent stone faces.
5. Point up with lime mortar finished flush with the face. Mortar colour to match as closely as possible and differentiated from repointing if joints.
6. Protect repair in accordance with clauses 540- 560 incl.

720 REPAIR TO MOULDED SECTION: Where a moulded section is defective the full section is to be cut out and the new stone pinned to the end of the remaining stone. Retain original jointing pattern. Take profiles of existing mouldings where best condition and reinstate to original un-weathered section unless instructed otherwise.

730 REPLACING OLD INDENTED REPAIRS: Where old indent is defective/causing damage to surrounding stone, carefully rake out joints and carefully cut out defective indent and defective stone as Clause 710. Cut and fix new stone as Clause 710. Allow for cutting out cementitious mortar repairs in accordance with Section Z21r, and piecing-in new indent repair.

**LIME MORTAR REPAIRS**

740 SAMPLES OF LIME MORTAR: Prepare 'biscuit' samples of mortar on a piece of stone or tile, to match the various conditions of weathering judged on the appearance dry and wet. Seek instructions from the CA. Retain samples on site for future reference during Contract.

745 BIOCIDE TREATMENT:
Mix Acticide 50X with water at rate of 1- 5% active solution; try weaker solution first and increase if not successful. Apply by hand or back held spray and allow to dwell for 24 hours; when moss growth has died back brush off with stiff bristle or non- ferrous brush. Use on sky facing surfaces and ledges or off sets not on generally areas of ashlar.

750 LIME MORTAR REPAIRS:

1. Cut out the decayed areas including defective existing repairs, undercutting the edges to provide key.
2. Wash and sterilise the cavity with water and formalin.
3. Saturate the cavity with lime rich water from the top of the coarse stuff curing bin to prevent dewatering of the repair mortar.
4. Place the repair mortar, compacting in layers not exceeding 10mm in thickness in any one application and having no featheredges. Allow each layer to dry out before rewetting and placing the next.
5. For cavities exceeding 12mm depth and extending over 50mm square surface area, drill holes to take stainless steel reinforcement mesh, pins or armatures and set in epoxy mortar; allowing minimum 25mm cover for reinforcement.
6. Finish repair to the required profile using a wood or felt-covered float, or with a damp sponge or coarse cloth. Follow joints or tooling in the original work, forming false joints for later pointing where appropriate to match existing work.
7. Protect repairs in accordance with clauses 540- 560 incl.
8. Keep moist and 'push-back' shrinkage during curing process, inspecting daily.

760 IN SITU REPAIRS TO SKY FACING SURFACES: Brush down surface to be repaired and remove debris.

1. Remove all loose or friable material.
2. Key surface as necessary by tooling.
3. Treat with biocide and allow to dry.
4. Wash and sterilise the cavity with water and formalin. Saturate the cavity with lime rich water from the top of the coarse stuff bin to prevent dewatering of the repair mortar.
5. Place the mortar repair building-up in layers and using stainless steel armature in accordance with Clause 750.
6. Form a smooth continuous weathering surface to conform to original profile unless otherwise instructed to improve the fall.
7. Finish as Clause 750.
8. Clean down thoroughly.
9. Protect and tend repairs in accordance with clauses 540- 560 incl.

**PINNING & GLUEING**

770 PINNING FRACTURES TO LARGE BLOCKS:

1. Provide lifting equipment and scaffold platform as required to remove stones for repair.
2. Agree with CA and mark-up for approval locations for pins.
3. Drill test hole using small diameter bit to test strength of fractured stone.
4. Using a 12mm diameter diamond-lipped using non-percussion drill bit drill with great care at an angle downwards into the stone at 150mm from the fracture to cross it at a depth of 150mm. Depth of hole to be approximately 500mm. Drill holes at approximately 300mm centres, or as agreed with CA.

5. Clean dust from hole using suction and flushing out with a volatile solvent compatible with the resin adhesive.
6. Cut 10mm diameter stainless steel or phosphor bronze threaded rod to fit the hole so as to keep it 25mm back from the stone face.
7. If necessary apply 2no coats of latex paint or modelling clay to the adjacent stone faces to prevent the resin from leaking out of interconnected fissures.
8. Inject low viscosity polyester or epoxy resin into the hole with a hypodermic syringe or gun allowing for the rod to be reinserted and ensuring no air is entrapped. Take care not to spill resin onto face of stone.
9. Any resin left on the face of the stone should be removed immediately with the appropriate solvent.
10. Point hole recess with lime mortar to match stone, once resin has cured in accordance with Section Z21r.

780 PINNING FRACTURES TO SMALL DETAILS:

1. Select locations for pins with CA and mark up for approval.
2. Using an 8mm diameter diamond-lipped bit drill with great care using non-percussion drill at an angle downward into the stone. Size, depth and centres of holes to suit conditions and agreed with CA in advance.
3. Drill test hole using small diameter bit to test strength of fractured stone.
4. Clean dust from hole using suction and flushing out with a volatile solvent compatible with resin adhesive.
5. Cut 6mm diameter stainless steel or phosphor bronze threaded rod to fit the hole so as to keep it 6mm back from the stone face.
6. If necessary apply 2no coats of latex paint or modelling clay to the adjacent stone faces to prevent the resin from leaking out of interconnected fissures.
7. Inject low viscosity polyester or epoxy resin into the hole for two-thirds of its depth with a hypodermic syringe and ensuring no air is entrapped. Take care not to spill resin onto face of stone. Any resin left on the face of the stone should be removed with the appropriate solvent.
8. Point hole recess with lime mortar to match stone, once resin has cured in accordance with Section Z21r.

790 PINNING FINE DETAILS: Following procedure in Clause 780 but using a 5mm diameter drill bit and 3mm diameter rod. Size, depth and centres of holes to suit conditions and agreed with CA in advance.

800 PINNING OLD DETAILS: Cut out cement pointing or repair, ensuring as much cement is removed from face of crack as possible. Drill stone, pin and fill crack as clauses 770, 780 or 790, as appropriate.

810 GLUING FRACTURED STONE:

1. Assess condition of each stone for gluing and agree method and type of adhesive with CA in advance. Surfaces to be of sufficient smoothness and evenness to suit gap filling and bonding characteristics of adhesive.
2. Surfaces to receive adhesive to be sound, unfrozen, free from dust, grease and any other contamination likely to affect bond. Where necessary, clean surfaces using methods and materials recommended by the adhesive manufacturer.
   Apply adhesives using recommended spreaders / applicators to ensure correct coverage. Bring surfaces together within the recommended time period and apply pressure evenly over full area of contact surfaces to enable full bonding.
   Remove surplus adhesive using methods and materials recommended by adhesive manufacturer and without damage to affected surfaces.

**CONSOLIDATION AND SHELTER COATING**

820 GENERALLY: These techniques should be carried-out by a conservator or conservation-trained mason. State with tender the name of the conservator to be used, giving names of the individuals concerned and their experience. Where necessary undertake a limited clean in accordance with Section A12r and as instructed by the CA. Review and agree scope of consolidation works with CA before proceeding. Record the works undertaken on drawings and by photography.

830 CHEMICAL CONSOLIDATION: Do not carry-out chemical consolidation unless specifically described in Schedule at Work and/or Drawings. Confirm with CA that Listed Building faculty or CFCE approval ahs been received for its use. Submit a detailed method statement for approval in advance of proceeding and follow manufacturer's instructions.

840 LIME WATERING: Carefully apply successive applications of limewater by hand held or back-pack spray, avoiding excessive wetting of the stone. Use water from slaking of lime putty. Spray onto surface of stone until it will take no more water and allow to dry-out slowly over night. Apply 20-40 applications in consultation with CA. Protect while drying in accordance with clauses 540- 560 incl.

850 MORTAR DENTISTRY REPAIRS:

1. Agree areas for repairs with CA in advance and mark on drawings.
2. Carefully brush-back loose and friable material and clean surfaces with air brushes.
3. Fill hollows and water traps on the surface of weathered stonework, following procedure in Clauses 750-760. Provide weathered horizontal surfaces to ledges. Do not attempt to reinstate missing features or decoration unless specifically instructed.
4. Protect and tend repairs until set in accordance with clauses 540- 560 incl.

860 LIME SHELTER COATING: At the completion of consolidation and lime mortar repairs, and in-consultation with CA, apply two coats of limewash by fine hair brush to cover stone and repairs. Limewash to be of a thick cream constituency made form matured non- hydraulic lime putty with added stone dust to give body where required. Colour limewash with natural pigments and provide samples to be agreed with CA. Apply further coat to weathering surfaces. Dilute washes where applied to fine detail. Break up large areas or pick out mouldings with different colours as instructed. Undertake trials for approval of the CA and conservation officer, before proceeding.

**COMPLETION**

900 CLEAN: Keep a vacuum cleaner on site at all times to keep works clean of dust and debris daily. Rub down and leave stonework clean to approval at the completion of each area of work and before scaffolding is taken down. Do not wash down with excessive water or acid solution at anytime during the contract. Ensure scaffold is cleaned down thoroughly before dismantling to prevent dust lines across stonework. Clean all plain glazing in vicinity of works with distilled water and cotton wool swabs at completion. Engage specialist for cleaning stained glass. Flush or rod through all drainage pipes and gullies.

910 SCAFFOLD: Allow at least two working weeks in the programme for CA to inspect works and for remedial work, prior to taking down scaffold. Dismantle scaffolding carefully avoiding any damage to completed works. Clear all poles connections, boards, sheeting, protection and temporary works from site.

920 RECORD the repairs and conservation work photographically and on marked-up drawings; submit two copies of a conservation record report to the CA at Practical Completion to include a description, photographs and drawings of condition before, scope of repairs and completed repairs. Include specification of materials used (e.g. lime, resins), details of quarries for stones and sands; recipes of mortar mixes; colour/s of lime washes.