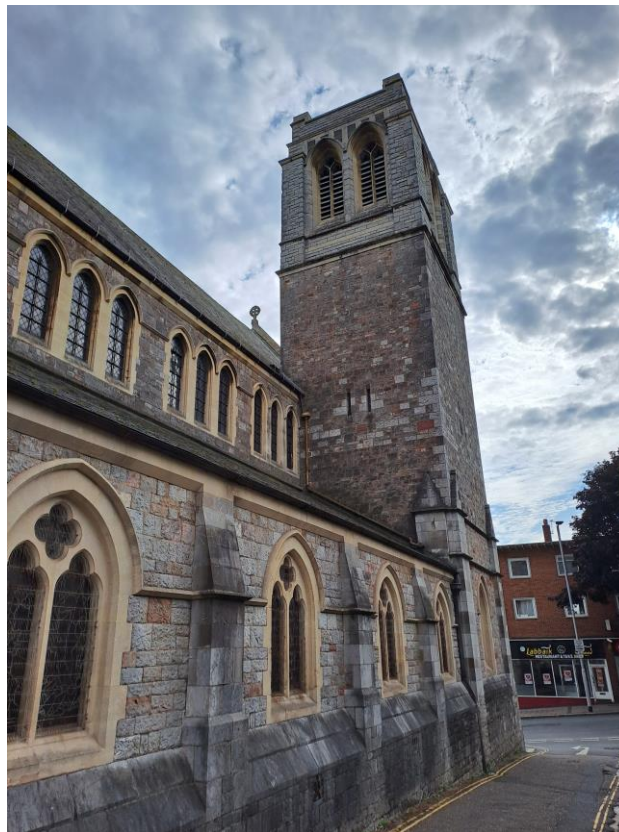


PHILIP HUGHES ASSOCIATES
HISTORIC BUILDINGS CONSERVATION CONSULTANTS
OLD MANOR STABLES, TOUT HILL, WINCANTON, SOMERSET BA9 9DL
Tel: 01963 824240 Email: info@pha-building-conservation.co.uk www.pha-building-conservation.co.uk

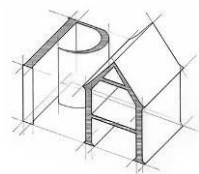
SPECIFICATION AND SCHEDULE OF WORK
for
TOWER STONEMWORK REPAIRS
at
SACRED HEART CHURCH
EXETER



November 2023

Partners

Philip Hughes MRICS CBS RICS Accredited in Building Conservation
Samir Khatri RIBA Architect Accredited in Building Conservation (AABC)
Sam Wheeler MRICS CBS RICS Accredited in Building Conservation
Regulated by RICS



CONTENTS

Section One – Preliminaries	1
Section Two – Special Considerations	9
Section Three – Materials and Workmanship	10
General requirements	10
Stonework conservation and pointing	13
Section Four – Schedule of Work	20

SECTION ONE - PRELIMINARIES

INTRODUCTION

Employer	The Employer will be Father Petroc Cobb, Sacred Heart Church, The Presbytery, 25 South St, Exeter EX1 1EB (Tel: 01392 642389 01392 642388)
Contract Administrator	The Contract Administrator will be Philip Hughes Associates, Old Manor Stables, Tout Hill, Wincanton, Somerset BA9 9DL (Tel: 01963 824240).
Principal Designer	The Principal Designer will be the Contract Administrator.
Scope of Work	<p>The works are to the external walls of the church tower at the Sacred Heart, Exeter and will comprise the following:</p> <ul style="list-style-type: none">a) Provide rope access for the works.b) Provision of temporary protections and site facilities for the duration of the works.c) Stonework conservation and repair to the tower.
The Site	<p>The tower is located at the north west corner of the Sacred Heart Church, Exeter, Devon.</p> <p>Contractor's access is to be via the internal access through the tower and externally from the main road. Internal areas are to be accessed via main west door from the main road and the eastern door to the presbytery link from the church garden.</p> <p>Internally access will be limited to working areas in the tower and access routes to these areas. The church, presbytery and main road/public footpaths will remain in use throughout the works.</p> <p>There is a small carpark to the north east of the church where the contractor can deliver materials but parking will not be available in this space. The parking space and lane to it are narrow severely restricting vehicular access. Contractors will need to find public parking locally.</p> <p>Externally the site area will be restricted to the areas immediately in the vicinity of the works and agreed storage and site facility areas.</p> <p>To the north and west of the church, under two sides of the tower, there are busy public highways and foot paths. The works to the tower will be over these paths and roads. It is envisaged that the Contractor will need to obtain a road closure licence for works in these areas. Public footpaths should be kept open where ever possible.</p>
The Contract	<p>The contract will be via exchange of letter.</p> <p>Interim payments will be made on a monthly basis.</p> <p>A 5% retention will be held on interim payments until Practical Completion and a 2.5% retention held for the defects liability period.</p> <p>A defects liability period of 12 months will apply to the works.</p> <p>In the event of a dispute the terms set out in the Agreement for Minor Works Building Contract 2016 (MW 2016) issued by the Joint Contracts Tribunal will be assumed to apply.</p>

TENDERING INFORMATION

Tender Package	<p>The following documents are provided for tendering purposes:</p> <ul style="list-style-type: none">a) One copy of the drawings as listed (on drawing register).b) One copy of the specification.c) One copy of the form of tender. <p>Check all documents and paging of the same upon receipt and report any discrepancies. Do not amend documents without written authorisation.</p>
Before Tendering	<p>Inspect the site and ascertain all factors relating to its location, ground conditions and working space together with any other factors that may affect the tender.</p>
Access to Site	<p>Access for inspection of the interior is to be arranged with the Contract Administrator.</p>
Pricing	<p>The main contractor should set prices against the items in Section 4 - 'Schedule of Works'. Where items are subdivided prices are to be set against each division. The prices should then be carried to the summary which should be totalled and entered upon the form of tender provided. 'Extra Over Items' are to be included in the summary.</p>
Contract Sum	<p>This shall be a fixed, all-inclusive price based upon the contract documents and a careful inspection of the site, including an allowance for all work and risks. It should include for handing over the works clean, functional and complete, fit for immediate occupation and use as intended.</p>
Disbursements	<p>Tenders will be deemed to include all travelling time and disbursements arising out of the employment of work people including safety, health and welfare, and any insurances additional to those required by the contract conditions.</p>
Prime Cost Sum	<p>A sum (usually referred to as a PC sum and sometimes entered into a bill description as PC prices) provided for work or services to be executed by a nominated statutory authority; such sums or prices exclude contractor's profit.</p>
Provisional Sum	<p>A sum provided for the entire cost of anticipated work that cannot be properly drawn or described. Where work is undertaken against provisional sums on a time and materials basis, the Contract Administrator is to be notified in advance and timesheets are to be sent to the Contract Administrator on a weekly basis identifying the work undertaken and the time spent. Copies of invoices for materials are also to be provided.</p>
Domestic Subcontracts	<p>Tenderers must submit names of any proposed domestic sub-contractors with their tender.</p>
Evaluation of Tender	<p>The tender shall remain open for 3 months. The employer does not undertake to accept the lowest or any tender and will not pay any tendering costs.</p>
Discrepancies	<p>This specification is to be read in conjunction with the contractor's own inspection of the site and any discrepancy found shall be notified to the Contract Administrator and the discrepancy shall be rectified or explained before a tender is submitted.</p>

Sacred Heart Church, Exeter – Tower Stonework Repairs

Extras	The contractor shall include for everything necessary for the proper execution of the works and all items which may reasonably be inferred although not specifically shown on the drawings or mentioned in the specification and no extras will be allowed unless agreed in writing by the Contract Administrator.
Contingency	There is to be a 10% contingency.
Tenders	Tenders are to be sent to the Contract Administrator in sealed envelopes by 5pm on the day named in the letter of invitation.
Priced Copies	A priced copy of the Schedule of Work (Section 4) showing a detailed breakdown of the pricing (including all divisions) is to be submitted within 3 working days upon request of Contract Administrator.

GENERAL PRELIMINARIES

Management	Provide proper management of the works including close supervision of the contractor's own employees and sub-contractors.
Foreman	<p>The contractor is to retain on site at all times a suitably qualified foreman. The foreman is to be appointed sufficiently early on so as to be able to attend a pre-start on site meeting and is to be present on site throughout the time the scaffolding is being delivered and erected and also at the conclusion of the works when the same is being dismantled and cleared away. The foreman shall be responsible for all labour working on site including sub-contractors. He shall be responsible also for site security and for the protection of the building during the course of the works. He is to ensure that the working area is kept tidy at all times. He is to pay particular attention to the condition and safe maintenance of the scaffold and all arrangements to be made for public safety.</p> <p>The same foreman is to be retained on site throughout the contract. If for any reason he is not available due to sickness or holidays the Contract Administrator is to be advised directly.</p>
Programme	Prepare a programme for the work to be tabled at the pre-contract meeting, supply the Contract Administrator with a copy and keep a record of progress. Give the Contract Administrator due notice of all critical dates (e.g. when information is required, when work is due to be covered up). The programme is to include all provisional items described in terms of hours of work in the Schedule of Work.
Notification	<p>The contractor is to notify the Contract Administrator of any site visits required or decisions to be taken at least 5 working days in advance.</p> <p>The contractor is to notify and liaise with police, fire brigade, local and highway authorities and all others concerned with the works.</p>
Meetings	The contractor's site foreman is to attend weekly site meetings.
Contractor's Equipment and Facilities	<p>Provide the following which shall be deemed to include all incidental items required by the contractor:</p> <ul style="list-style-type: none">a) Plant, tools, vehicles, scaffolding and temporary equipment of every description.b) Hoarding, barriers, covers and everything necessary for safety and weather protection.c) Access into and around the site including hardstandings and storage areas.d) Temporary structures including welfare facilities. The contractor is to have use of the WC and wash facilities within the ground floor of the presbytery. The contractor can make use of the lower ground floor facilities for mess room. This area will be shared with various groups and timings of breaks on certain days may need to be varied. Sheds to the east of the church can be used for limited storage of materials. The contractor is to ensure these facilities are kept clean and tidy at all times.e) Water, power and lighting and means of distribution. Electrical and water supplies are available within the presbytery and are to be made available to the contractor, free of charge. Contractor to use both power and water responsibly.

	<p>f) Adequate telephone facilities. A mobile telephone would be acceptable provided there is sufficient reception.</p> <p>g) Adequate means of water disposal, to ensure that water from any source does not collect on the site.</p>
Temporary Facilities	<p>Inform the Contract Administrator of the intended siting of all temporary works, facilities (including skips) and services. All such works are to be subject to approval which must be obtained by the contractor in writing.</p> <p>Maintain, alter, adapt and move temporary works and services as necessary. Clear away when no longer required and make good any damage caused by the siting, use or removal of these services</p>
Existing Services	<p>The contractor shall ascertain the position of all existing services over the area of the site before starting work and shall take all necessary precautions to protect, isolate or maintain these during the progress of the works.</p>
Security	<p>Keep the site secure and prevent trespass, including trespass by work people or plant on or over adjacent property.</p>
Noise, Disturbance	<p>Noise, dust, smoke and disturbance are to be kept to an absolute minimum. Prevent all forms of pollution or nuisance. No radios to be permitted on site. The contractor shall organise his work so not to provide grounds for complaint under the Control of Pollution Act, 1974.</p>
Outside Working Area	<p>The contractor is to ensure that all areas outside the site, both inside and outside the building, affected by the works are kept clean and tidy and that there is no risk to public safety.</p>
Hot Work	<p>Hot Work is generally prohibited on site. Hot work is defined as 'All operations involving flame, hot air or Arc Welding and cutting equipment, brazing and soldering equipment, blow lamps, bitumen boilers and other equipment producing heat or having naked flames'. If any of these operations are essential for the execution of the specified work written approval must be obtained from the Contract Administrator relating to each operation.</p>
Fire Precautions	<p>The following precautions shall be taken to avoid the outbreak of fire:</p> <ul style="list-style-type: none">a) Discuss proposals with Employer to ensure fire hazards are known.b) Additional fire-fighting equipment shall be provided appropriate to specific identified risks.c) Flammable materials must not be stored on site. Do not take flammable liquids or gases (eg preservative treatments) into the building other than those needed for one day's work.d) Smoking is prohibited (see below).e) Do not permit any accumulation of flammable debris.f) Burning of rubbish is strictly prohibited. All rubbish must be promptly removed from site.

Smoking	There is to be no smoking within or in the immediate vicinity of the building. Anyone caught smoking in restricted areas may be excluded from the works for the duration of the contract at the Contract Administrator's discretion and at no expense to the Employer.
Inspection	Whenever work ceases for a meal break or at the end of the day, the general foreman is to make a thorough inspection of areas where work has been in progress during the same day to make quite sure that there are no signs of incipient fire.
Temporary Electrical Wiring	All temporary electric wiring is to comply with the regulations of the Institution of Electrical Engineers. Circuits are to be physically disconnected from the mains at the end of the day even when mains switch is turned off at night.
Preservative Treatment	Special care should be taken where preservative treatments have been used as these are commonly based on flammable solvents the vapour from which has a very low flash point. Such vapour may remain in unventilated spaces for a considerable time after treatment.
Advertising	The contractor's and scaffolders signboard will be subject to approval. All other advertising is to be approved by CA.
Press Enquiries	The contractor is to refer all press enquiries to the Employer.
Confidentiality	No financial matters are to be disclosed to third parties. All matters relating to the contract are confidential.
Handover	At handover: a) Make good all damage consequent upon the work. b) Remove all temporary marking, coverings and protective wrapping unless otherwise instructed. c) Clean the works thoroughly, removing all splashes, deposits, efflorescence, rubbish and surplus materials consequent upon the execution of the work. d) Cleaning materials and methods to be as recommended by manufacturer of product being cleaned. In the absence of such recommendations cleaning materials and methods to be approved by the Contract Administrator. e) Security at completion - liaise with the employer and leave the works secure.
Defective Work	As soon as possible after any part of the work is known or suspected to be defective, submit proposals to the Contract Administrator for further testing, opening up, inspection, making good or removal and re-execution and obtain instruction. Wherever inspection or testing shows that the work is not in accordance with the contract and measures (e.g., testing, opening up, experimental making good) are taken to establish the acceptability of the work, such measures: a) will be at the expense of the contractor. b) will not be considered as grounds for an extension of time.
Making Good Defects	Make arrangements with the Contract Administrator and give reasonable notice of the precise dates for access to the various parts of the works for purposes of making good defects. Inform Contract Administrator when remedial works to the various parts of the works are completed.

HEALTH AND SAFETY/CDM REGULATIONS

CDM	<p>Construction (Design and Management) Regulations 2015 will apply to this project.</p> <p>The contractor will develop a Construction Phase Health and Safety Plan (HSP) as referred to in regulation 2 of the CDM Regulation. The contractor will implement effective management, monitoring and supervision of this plan and coordinate the activities of all contractors on site, ensuring their compliance with Health and Safety requirements.</p> <p>The Contract Administrator will liaise with the Principal Contractor to ensure that the HSP complies with the regulations.</p>
Outline H&S Plan	<p>An outline Construction Phase Health and Safety Plan must be submitted to the Contract Administrator and is to include the following:</p> <ul style="list-style-type: none">a) Method statements related to the construction hazards identified in the pre-tender health and safety plan and/or statement on how the hazards will be addressed and other significant hazards identified by the contractor.b) Details of the management structure and responsibilities.c) Arrangements for issuing health and safety directions.d) Procedures for informing other sub-contractors and employees of health and safety hazards.e) Selection procedures for ensuring competency of other sub-contractors, the self-employed and designers.f) Procedures for communications between the project team, other sub-contractors and site operatives.g) Arrangements for co-operation and co-ordination between contractors.h) Procedures for carrying out risk assessment and for managing and controlling riski) Emergency procedures including those for fire prevention and escape.j) Arrangements for ensuring that all accidents, illness and dangerous occurrences are recorded.k) Arrangements for welfare facilities.l) Procedures for ensuring that all persons on site have received relevant health and safety information and any training.m) Arrangements for consulting with and taking the views of the people on site.n) Arrangements for preparing site rules and drawing them to the attention of those affected and ensuring their compliance.o) Monitoring procedures to ensure compliance with site rules, selection and management procedures, health and safety standards and statutory requirements.p) Review procedures to obtain feedback.

H&S File The Health and Safety File is an information source and guide for the Employer and end users providing an understanding of the building and its systems and enabling it to be operated and maintained safely. Provide the CA with 3 copies of the information required below.

- a) Details of construction methods and materials which may present significant residual hazards with respect to cleaning, maintenance or demolition.
- b) As built drawings recording details of construction on paper prints.
- c) Copies of manufacturers current literature for all products for which the particular proprietary brand has been chosen, including COSHH dated data sheets and manufacturers recommendations for cleaning and maintenance.
- d) Copies of all guarantees, warranties and maintenance agreements offered by subcontractors and manufacturers.
- e) Copies of all test certificates and reports required in the specification.

The H&S file must be fully compiled, passed to and approved by the CA prior to practical completion being certified.

Presentation of H&S File The H&S file is to be contained in a series of A4 size, plastic covered, loose leaf, four-ring binders with hard covers, each indexed, divided and appropriately cover titled. The main set(s) of as-built drawings may form annex(es) to the file.

SECTION TWO - SPECIAL CONSIDERATIONS

The Building	<p>The church of the Sacred Heart was built on the site of the former town house of the Abbots of Tavistock, which became the Bear Tavern after the Dissolution. Believed to be the earliest surviving work of Leonard Stokes, a leading figure in the Gothic Revival, and designed in conjunction with CE Ware, a local engineer, the church was built in 1883/4. The tower was completed in 1926. The church is noted as a good and well detailed example of Gothic Revival architecture with a rich collection of late 19th century fittings.</p> <p>The presbytery, 25 South Street, attached to the south west of the church dates from the late 18th or early 19th century the building is believed to have been converted to a presbytery when the church was built. The ground floor was extended to the east to form a link with the church in 2020.</p> <p>Both the church and the presbytery are listed separately as being of special historical and architectural interest. Both are listed grade II.</p>
Ancient Fabric	<p>The building and site contain features of special interest and importance and great care must be taken to avoid unnecessary disruption of the fabric. If in doubt about cutting or removing anything, contact the Contract Administrator.</p>
Fit New to Old	<p>To ensure the survival of the maximum amount of ancient fabric all new work must be fitted to the old - not the old adapted to accommodate the new.</p>
Irregularities and Distortions	<p>In an old building a certain amount of distortion and irregularity is to be expected and is one way in which a building reflects its age. Unless instructed otherwise by the contract administrator no attempt is to be made to even up or correct such irregularities.</p>
Surface Treatments	<p>No surface treatment is to be undertaken unless included in the schedule of works and all such treatments shall be exactly as specified. No additives are to be used in any mix unless specified.</p>
Specification	<p>It is the contractor's responsibility to ensure that the relevant provisions of the specification and particularly of this section are fully understood by his operatives including those of sub-contractors. A copy of the specification and drawings shall be retained on site for reference.</p>
Treasure Trove	<p>Items of interest or value found during the course of the work must be reported to the Contract Administrator. These are to remain the property of the Employer.</p>
Damage	<p>Damage to ancient fabric cannot simply be rectified by replacement because ancient features are no longer ancient if they are renewed. Take special care therefore to avoid all damage. Report any damage to the Contract Administrator immediately.</p>
Recording	<p>Any features of historic interest exposed during the works will need to be recorded by measurement, drawing and photographs. Should such features be encountered then the contractor is to notify the Contract Administrator without delay.</p>
British Standards	<p>Note that British Standards and Codes of Practice are designed as minimum standards for new work and are not always relevant to work on historic buildings.</p>

SECTION THREE - SPECIFICATION OF MATERIALS AND WORKMANSHIP

GENERAL REQUIREMENTS

This section is to be read in conjunction with all other sections. If any part of this document is detached for use by other parties, ensure a copy of this section is also provided.

Definition of the term "Approved"	The term "approved" shall be understood to mean that the use of a particular material, unit, component or method will be subject to the written approval of the Contract Administrator. Unless otherwise specified in the written approval, approval is limited to the visual appearance of the work, materials or components involved and shall not relieve the contractor from compliance with the specification.
As Directed	As defined for 'approval'.
"Carefully Remove"	The term used for components which are to be retained as stated or where adjacent work is to be retained. Handle such components with care and protect from damage. In pricing such work it will be assumed that the contractor considers that he is able to unfix and handle without damage.
Dimensions/ Sizes	Unless otherwise indicated, any dimensions stated in descriptions are in the sequence of length, width and height.
Descriptions	<p>The descriptions in this specification/schedule of works are to be taken in a comprehensive sense and the rates are to include for everything and all associated work necessary for the execution of the work described in an efficient manner, including:</p> <ul style="list-style-type: none">a) Materials and components as specified and all labour in fitting and fixing in position including cutting and wastage.b) Use of plant, tools and temporary works of every description.c) All matters of general application as set forth in sections 1 and 2 and this section.
British Standards	Where materials, articles and/or workmanship are specified to be in accordance with a BS and/or BSCP this is deemed to mean the latest issue of the British Standard Specification or British Standard Code of Practice together with any amendments.
Setting Out	Check the levels and dimensions of the site against those shown on the drawings, and record the results on a copy of the drawings. Notify the Contract Administrator in writing of any discrepancies and obtain instructions before proceeding.
Before Commencing	<p>Liaise with all parties concerned and arrange liaison between trades. Do not start or continue any part of the work until:</p> <ul style="list-style-type: none">a) Environmental conditions are suitable for the type of work involved.b) Supervisors are satisfied that operatives understand what is required.c) Related preceding work is fully completed and, if necessary, tested and approved.
Weather	Specified requirements for weather precautions and protection refer to rain, frost, snow, sleet, gales, excessive sunshine, drying winds, flooding or any other state of the weather which could cause damage or otherwise interfere with the execution of the works.

Delivery Procedure	<p>Arrange and programme deliveries to the site so that materials:</p> <ul style="list-style-type: none"> a) Are dispatched suitably protected, if liable to damage. b) Arrive in a sequence suited to incorporation into the works. c) Arrive in quantities that minimise site storage but do not delay the works.
Good Practice	<p>Where and to the extent that materials, products and workmanship are not fully specified they are to be:</p> <ul style="list-style-type: none"> a) Suitable for the purposes of the works stated in or reasonably to be inferred from the contract documents. b) In accordance with good building practice, including the relevant provisions of the current BSI documents.
Manufacturer's Recommendations	<p>Handle, store, prepare and use or fix each product in accordance with manufacturer's printed or written recommendations/instructions. Inform the Contract Administrator if these conflict with any other specified requirements.</p> <p>The recommendations/instructions are those which are current 10 days before the date of tender. If they change between tender and construction inform the Contract Administrator and obtain instructions before ordering materials or starting work.</p>
Liaison with Manufacturer	<p>The contractor shall supply the manufacturers with all relevant details and afford them every facility for inspecting the work during progress of the works in order to ascertain that their products are being used correctly, and allow them to take samples of their materials from the site if so desired.</p>
Proprietary Brands	<p>Should the contractor wish to obtain the materials from firms or sources other than those specified, prior approval in writing for every item must be obtained from the Contract Administrator.</p>
Materials Delays	<p>The employer reserves the right to place orders in advance of the signing of the contract for materials, the supply of which is likely to delay the progress of the works, and the contractor shall confirm such orders after signing the contract.</p>
Samples	<p>Where approval of products or materials is specified submit samples or other evidence of suitability. Do not confirm orders or use materials until approval has been obtained. Retain approved samples on site for comparison with products and materials used in the works. Remove when no longer required.</p>
Craftsmanship	<p>Undertake work by or under the direct supervision of operatives with suitable training, experience and competence. Craftsmen shall undertake work requiring special skill. Do not permit apprentices to work unsupervised.</p>
Workmanship	<p>Undertake all work with skill and care in order to produce work fit for its intended purpose and of good quality. Generally make every attempt to undertake the work as follows:</p> <ul style="list-style-type: none"> a) Cutting away and alteration work generally: undertake with the minimum amount of disturbance to those parts of the building intended to be left undisturbed. b) Work involving existing work and components: undertake to the same standard and appearance as that originally achieved, unless otherwise specified. c) New work: undertake new work associated with the alterations as specified in the appropriate work sections.

Appearance and Fit	Wherever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve obtain approval of proposals or of the appearance of the relevant aspects of the partially finished work as early as possible.
Fixings/ Fastenings/ Adhesives/ Mortars	<p>All fixings, fastenings, adhesives and mortars to be subject to approval by the Contract Administrator. Generally use fixing and jointing methods and types and spacings of fastenings which are suitable having regard to:</p> <ul style="list-style-type: none">a) Nature of and compatibility with product/material being fixed and fixed to.b) Recommendations of manufacturers of fastenings, and manufacturers of product/material being fixed and fixed to.c) Materials and loads to be supported.d) Conditions expected in use.e) Appearance, this being subject to approval.f) Durability, compatibility with other components and corrosion resistance.
Cleanliness	Keep the works and the equipment used for its construction clean. Accumulate debris in suitable pre-determined areas and promptly remove from site. Keep all gutters, downpipes and drains clear and flush out on completion.
Protection Generally	Protect the works, during construction and as portions reach completion, against any form of damage or deterioration. Such protection shall include coverings, guard rails, temporary heating or other appropriate methods. Any heating required for protection to be approved in advance and in writing by the Contract Administrator.
Unwanted Materials	Remove debris and materials not required for re-use on site. Do not permit such materials to accumulate to become a health or fire risk.

STONEMWORK CONSERVATION & POINTING

MATERIALS

Pure Lime	The lime is to be in lime putty form. The putty is to be obtained by slaking a pure (non-hydraulic) lump lime with water. (The lump lime is not to be ground or crushed prior to slaking.) The lime putty is to be strained through a screen to remove all lumps over 0.5mm diameter. The slaked lime (lime putty) is to be stored in an airtight container for a minimum period of 12 months prior to use.
Hydraulic Lime	<p><i>Eminently Hydraulic Lime</i></p> <p>St Astier eminently hydraulic lime (100% pure) in dry hydrate form, available from:</p> <ul style="list-style-type: none">- The Lime Centre, Long Barn, Morestead, Winchester, Hants SO21 1LZ Tel: 01962 713636.- Limebase Products Ltd., Walronds Park, Isle Brewers, Taunton, Somerset TA3 6QP Tel: 01460 281921.- Cornish Lime Company, Brims Park, Old Callywith Road, Bodmin, Cornwall PL31 2DZ. Tel: 01208 79779.- Ward & Co., Ryeford Industrial Estate, Ryeford Road (North), Stroud, Glos. GL10 2LA. Tel: 01453 791725 <p>Hydraulic lime shall be stored in a suitable dry heated store and is to be used within 4 weeks of production. Once bags are opened or punctured exposure to the air will weaken the hydraulic set. Opened bags must be re-sealed at the end of each day and used within 2 days.</p>
Cement	No cement is to be used.
Pozzolanic Additives	A pozzolanic material is one which helps to make a lime mortar set. The pozzolanic additive is to be trass obtained from Nimbus Conservation Ltd, Eastgate, Christchurch Street East, Frome BA11 1QD (Tel: 01373 474646)
Charcoal	Charcoal to be used as an additive to lime mortars for pointing work is to be crushed so that no piece is greater than 3mm (1/8") diameter.
Aggregate for Mortars	<p>a) The aggregates for mortars shall be non-staining, clean, sharp and of the correct colour so that new mortar, when dried out, will match the original colour and texture of the existing mortar.</p> <p>b) The aggregate to be well washed, dried and stored in dry conditions.</p> <p>c) Samples of selected aggregates to be provided for approval - see schedule of work.</p>
Water	Water for the works is to be clean and pure and free from salts.
Metal Fixings	<p>a) Micro pins to be fabricated of soft copper wire 1.2mm diameter and 0.6mm diameter.</p> <p>b) Dowels, and other metal fixings associated with masonry to be fabricated from austenitic stainless steel grade 316.</p>
Resin	a) Resin securing dowels and fixings into masonry shall be a high strength pourable epoxy resin (e.g. Sikadur 42 available from Resapol, Unit 6, Hanover West Industrial Estate, Park Royal, London NW10 7NS Tel: 01942 609001.

- b) Resin securing micro pins shall be a flexible epoxy resin (i.e. not fully polymerised) to permit slight movement of fixing (e.g. Sika 31). Details of the resin proposed to be included in the Method Statement.

WORKMANSHIP

General Clauses

- Samples Samples of all the main types of work will be required for approval.
- Inspection a) Include for inspection by the Contract Administrator of all main stages of work prior to covering over (e.g. allow for inspection of all raking out prior to repointing).
- b) Include for cutting out and making good 10 no. newly pointed joints selected at random.
- Additives Absolutely no additives are to be used in mortars unless specifically mentioned in this specification.
- Protection of mortars Protect mortars as follows:
- a) All mortars shall be properly covered up and protected from frost, sun and wind.
- b) Pointing in lime mortar shall be protected against rain until set.
- c) It is important that lime-based mortars and renders are only allowed to lose their moisture slowly and rapid drying out must be prevented. Include for tending mortars as specified in rates for work.
- d) From November to March inclusive, protection of mortars is to be maintained using insulation blankets.
- Protection and Cleaning a) Cover delicate finished work with adequate protection suitably fixed and remove on completion.
- b) Prevent staining during the works.
- c) Remove dust and clean down stonework prior to removal of scaffolding and as scaffolding is dismantled.

Pointing Work

Mortar for Pointing The mortar is to be match the original as closely as possible.

Mortar Mix A

2 putty line : 4 aggregate :1 pozzolanic additive

Mortar Mix B

1 hydraulic lime NHL2 : 3 aggregate

Mortar Mix C

1 hydraulic lime NHL3.5 : 3 aggregate

Aggregates are to be selected to match the existing mortar in colour and texture and adjusted to suit the size of the joints.

- Mixing Lime Putty Mortar
- a) The lime and aggregate are to be mixed together to form coarse stuff and set aside in airtight containers prior to use.
 - b) Measured constituents by volume in clean gauge boxes.
 - c) No more water than is absolutely necessary to work the materials is to be incorporated. The addition of water to lime mixes is not normally necessary or desirable as the lime becomes plastic when worked. (Note: wall surfaces being worked on must be thoroughly dampened and thus reduce suction and water required in the mix).
 - d) Where pozzolanic additive is specified it is to be added immediately before use.
 - e) A pan mixer is preferred for lime putty mortars.
 - f) Mortar for pointing very fine joints is to be passed through an 80 mesh sieve.
- Mixing Hydraulic Lime Mortar
- a) Measure constituents by volume in clean gauge boxes.
 - b) Sufficient water should be added for workability.
 - c) The mortar must be very well mixed to avoid balling. A conventional cement mixer or a paddle mixer may be used.
 - d) Mortar must be applied within 2 hours of mixing.
- Mortar Samples
- Mortar samples with a range of colours and textures are to be prepared in 50x50x25mm cubes in a timber box. See schedule of work.
- Pointing Trials
- Include for the preparation of four trial panels approx. 1m². Mortar mixes to be agreed in advance and the panels to be inspected and a mortar mix and pointing technique approved by the Contract Administrator before the work proceeds. The selected panel is to be kept intact and undisturbed until the work is complete and has been approved.
- Descaling
- Descal stonework as follows:
- a) Remove all loose flakes of stone with a gloved hand.
 - b) Brush surface with churn brush to remove dust.
 - c) Take care to avoid damage to surrounding surfaces intended to be left undisturbed.
 - d) Agree trial area with Contract Administrator prior to proceeding with the works generally.
- Raking Out
- a) Great care is to be exercised in ensuring that the arrises of the stones are not further damaged during raking out of joints or cutting out existing cement pointing.
 - b) Sound lime pointing is to be retained.
 - c) Joints are to be raked out using hand tools to depth minimum 30mm. The use of angle grinders is forbidden.
 - d) Thin joints (less than 6mm) shall be raked out to minimum depth of three times their width, using saw blades if necessary. A range of raking out tools are to be available on site to accommodate the variations in joint width. No joint is to be raked out using a tool more than $\frac{3}{4}$ width of the joint.
 - e) Where pointing is described in the schedule as ‘deep packed’ joints are to be cleaned out or raked out to a minimum depth of 100mm.

f) Small compressed air tools may be necessary to remove cement rich mortar. If removal of cement rich mortar damages stone inform the Contract Administrator immediately and stop work on the area concerned.

g) The masonry is to be washed down to remove dust and thoroughly dampened before repointing to reduce suction.

h) Where there is any danger of stonework becoming loosened during the raking out and repointing exercise, raking out is to be limited to small areas (say 1m²) which are to be repointed immediately before progressing to an adjacent area.

Damping Down Areas to be pointed shall be thoroughly dampened down the day before and immediately before mortar is applied.

- Pointing with Hydraulic Lime or Pozzolanic Mortars
- a) Pointing shall be well packed in but finished full, flush with the surface of the masonry.
 - b) The pointing should not be re-worked until the initial set has occurred. To expose the aggregate the surface should be scrapped back with a small pointing tool when it is placed.
 - c) The mortar should be kept constantly damp until the hydraulic set is complete (approx. 7 days). Avoid re-wetting the surface of mortar as this may result in lime bloom. Water should be retained from the initial wetting down of the masonry and within the mortar and be protected from drying out. If the mortar is found to be drying periodically re-wet the hessian or blanket protections.
 - d) When the hydraulic set is complete the mortar should be protected as a putty lime mortar to assist carbonation of the lime (controlled cyclic wetting and drying).

Conservation Work

Micro Pinning Laminating or fracturing stonework is to be pinned using the micro pinning technique as follows:

- a) Provide temporary support to fragments during drilling and fixing of pins (Note: some stone fragments may have been dowelled previously).
- b) Undertake grouting in advance of pinning to avoid loss of fixative.
- c) Pin and hole diameter are dependent on the size of fragment to be pinned and the length of pin required. (The limiting factor has been found to be the length of small diameter drill bits. MSS Jobber drills are available in long lengths from Avery Knight & Bowler, Bath.)

Pin and hole diameter is to be kept to an absolute minimum to reduce stresses on the stone. If a choice of pin size is available a larger number of smaller diameter pins is to be selected.

<u>Pin Size</u>	<u>Hole Diam</u>	<u>Max. depth of hole</u>	<u>Thickness of fragment</u>	<u>Pin spacing (centre to centre)</u>
2x0.6mm	3mm	140mm	up to 45mm	90mm
3x0.6mm	3mm	140mm	up to 45mm	100mm
2x1.2mm	4mm	140mm	up to 45mm	140mm
2x1.2mm	4mm	225mm	up to 75mm	140mm

3x1.2mm	5mm	180mm	up to 60mm	170mm
3x1.2mm	6mm	225mm	up to 75mm	TBA
3x1.2mm	6mm	290mm	up to 100mm	TBA

Note: The majority of pinning is to be undertaken using hole diameters of 3 and 4mm.

- d) The length of the pin into sound stonework to be at least twice the length of pin in the fragment.
- e) The diameter of pins to be adjusted as appropriate by twisting a number of strands of copper wire together.
- f) The spacing of pins is to be selected based on the size of fragment to be pinned and the size of pin to be used.
- g) Dedust holes for pins to ensure that a fixing is achieved.
- h) Apply latex (or similar non-staining material) to the surface of the stone as protection from excess resin and remove on completion of pinning.
- i) Dip prepared pins in epoxy resin to form a protective layer around the pin prior to inserting into the hole. This protection is intended to resist corrosion of the copper.
- j) Set pins in 'flexible' epoxy resin. Hypodermic syringes or guns with tubing attached may be necessary to get the resin into the full depth of the holes. Form clay cups around the hole end to ensure that adequate resin enters each hole. (2.1mm external diameter Portex clear pvc tubing available from Laboratory Analysis, Exeter. Tel: 01392 841082.)
- k) Ends of pins are to be set below the surface of the stone (where the size of fragment permits the pins should be recessed by minimum 3mm) and are to be filled over with a lime mortar repair material (as specified).

- Drilling Drilling is to be with rotary, non percussive, variable speed drills, including hand drills.
- Dowelling Substantial pieces of stone, which have fractured, are to be dowelled using 6mm diameter stainless steel threaded rod. Dowelling to be undertaken generally as for micro pinning.
- Grout Put lime putty through 300 micron sieve, put pozzolanic additive through 300 micron sieve, add 4 parts lime putty to 1 part pozzolanic additive to 3 parts water.
- Flushing Solution Add 1 part of ethyl alcohol to 4 parts of water.
- Grouting
Fine Cracks Fine cracks in shattered stonework are to be grouted as follows:
 - a) Provide temporary support to fragments during drilling and grouting.
 - b) Grout injection holes to be drilled carefully using a small manual drill 2-3mm diameter.
 - c) Loose material to be blown out.
 - d) Solution of water and alcohol introduced (injected) into fractures as a wetting aid.
 - e) Flush fractures with water immediately before grouting to avoid rapid water loss from the grout.

- f) Prevent escape of grout using mortar fillets/clay plugs, but allow weep holes to check grout penetration and allow escape of air.
- g) Grout from the base upwards with pozzolanic lime grout as specified. Keep grout agitated to avoid materials settling out.
- h) Plug holes as grouting proceeds.
- i) Remove clay/mortar fillets as grouting proceeds and point up fractures and grout holes on completion.

Lime Adhesive Mortar Adhesive mortar for use with pins is to be prepared by mixing lime, fine stonedust and casein. 1 part of lime putty to be added to 2 parts stone dust and 1 part of low fat cottage cheese. The cheese must be strained to remove water prior to mixing.

Adhesive mortar for re-attaching fragments is to be a fine pozzolanic mortar. Lime and aggregates for the mortar to be passed through an 80 mesh sieve.

Loose Fragments Loose fragments are to be removed, cleaned and rebedded in a thin lime adhesive mortar.

Cement Removal Take extreme care to avoid damage to existing stonework during removal of cement mortars. Previous cement repairs and pointing are to be removed taking extreme care to avoid damage to existing stonework. If necessary drill the cement at close centres to weaken it sufficiently to enable it to be removed. A range of tools including hand, mechanical and compressed air tools are to be available.

Mortar for Repairing Stonework Mortar used for building up areas of shallow decay shall be a hydraulic lime mortar with graded crushed stone particles mixed to produce a mortar of the same colour and texture as the stone to be repaired and to be marginally less dense and slightly more porous. The precise blend to be determined by trials and are to be based on mortars for pointing above.

Prepare stone repair mortar samples - see schedule of work, section 5.

The lime and aggregate are to be mixed together in the proportions 2 parts of lime to 5 parts of the chosen aggregate.

Mortar Repairs Mortar repairs have a number of different functions including:

- Filling fine cracks (e.g. between parts of shattered stones).
- Protective filling (e.g. weathering surfaces, supporting fragile stone or edges of stones).
- Filling cavities (e.g. sulphate blisters).
- Capping (i.e. protection of vulnerable and weakened surfaces).
- Reprofilling (i.e. rebuilding decayed or lost areas of stone to redefine the form of the stonework).

In general undertake mortar repairs as follows:

a) Scrape back any areas of softened stone to a sound surface taking care to retain the original stone surface if it survives.

b) Where instructed by the Project Manager (normally where depth of repair exceeds 50mm) introduce 8 gauge soft copper wire or stainless steel Spiro-tie reinforcement as an armature, set in pre-drilled holes in sound stones using epoxy adhesive.

c) Thoroughly dampen with water to reduce suction.

- d) The specified mix is to be applied in coats, built up to the correct profile where required (e.g. reprofiling).
- e) Mortar must not be over-trowelled which brings laitence on the surface and increases the risk of crazing.
- f) After the initial set, the final texturing is to be applied to the mortar by a suitable wooden tool to achieve a rough surface.
- g) Generally (except for mortar capping) mortar repairs are to be left 3mm below the true surface of the stone so that the patch appears to be an area of slightly eroded stone at a casual glance.
- h) Stones to be repaired individually. Joints between 2 stones being repaired with mortar are to be pointed up not less than seven days after the mortar repairs completed.
- i) The mortar is to be protected as for pointing.
- j) All mortar repairs are to be shown on the record drawings.

Shelter Coat A thin shelter coat is to be applied to the surface of the conserved stonework and is to be well worked in to fill pores and water traps in the stone but the high areas are to be left uncovered. The shelter coat is to be a lime/fine stone dust/casein (max.5%) mix. The stone dusts selected for shelter coat to match the colours of the existing. (Note that the colour of the sheltercoat will need to be varied from stone to stone and area to area.) Stone dust containing iron shall not be used. Prepare samples - see schedule of work.

Iron Cramps All iron cramps encountered during the course of the work are to be cut out and replaced with non-ferrous cramps, taking care to avoid causing further damage to surrounding stonework.

SECTION FOUR - SCHEDULE OF WORK

A. All works are to comply with the provisions of the materials and workmanship sections and general requirements of the specification. The specification is not a standard document and its requirements must be understood by all engaged on the works.

B. The scope of works defined within this schedule and shown on the drawings has been determined from a visual inspection and some opening up works. The extent of work will be reviewed by the Contract Administrator (CA) following required opening up.

C. If in doubt about any of the works being undertaken or its effect on the building or surroundings stop and ask. Telephone the CA or leave the item of work until the next site visit (normally at least weekly).

D. Access to the working areas is restricted by adjoining buildings, public highways and limited surrounding spaces. Careful consideration of working and access methods and techniques is required and may restrict the size of delivery vehicles.

1. Access and Protections

- 1.1 Provide rope access to the scheduled works on the tower. Include to form rope anchor points and protections to the tower fabric (and to the ropes) where the ropes are in contact with the parapet stonework, etc.
- 1.2 Works on or adjacent to public highways and footpaths:
 - a) Obtain all necessary road closure licences for the duration of the works to the road to the north of the church/tower and the footpath to the west.
 - b) Provide temporary barriers and protections to public highways around the church/tower while scaffolding and other works in these areas are undertaken. Include to pack away protections when not in use.
- 1.3 Provide protections at ground level in-case of any falling debris. Include temporary fencing and provide personnel on the ground to direct traffic, pedestrians, etc.
- 1.4 Protect the works from frost or inclement weather and provide all necessary waterproof sheets, protections to mortars etc., required to protect the works and make good any damage due to lack of such protection.
- 1.5 Remove rubbish and debris from site regularly and keep the site and works clean and tidy.
- 1.6 Allow to undertake additional protection works, instructed by CA as follows:
 - a) Include a provisional sum equivalent to 1 no. carpenter and 1 no. labourer for 8 hours each to undertake further protection works.
 - b) Allow a PC sum of £150 plus contractor's profit for materials.
- 1.7 Monitor, maintain and adjust protections as the works progress. On completion of the works dismantle all protections and cart away.

2. Tower Stone Repair Works

Note: *it is anticipated that all of the following scheduled works will be undertaken via rope access.*

- 2.1 Defrass and remove loose or friable stone to the full height of all 4no. elevations of the tower.
- 2.2 Undertake a visual and photographic inspection of the tower stonework to the full height of all 4no. elevations. Prepare report and attend CA meeting to discuss and review findings.

- 2.3 Prepare samples as follows:
- a) Prepare mortar samples for new repointing mortars and allow to thoroughly dry out for CA inspection and approval. Assume 6 no. samples.
 - b) Prepare mortar samples of mortar repair mortars and allow to thoroughly dry out for CA inspection and approval. Assume 8no. samples.
- 2.4 Rake out, deep pack and repoint mortar joints in the following areas:
- a) Tower parapet copings, to all 4no. elevations – patch repoint 25% of mortar joints in small patches in hydraulic lime mortar type C.
 - b) Tower parapet, external faces to all 4no. elevations – repoint 100% of mortar joints patches in lime mortar type B.
 - c) Tower parapet, string course, all 4no. elevations – repoint 100% of mortar joints in lime mortar type B.
 - d) Tower belfry level stonework, all 4no. elevations - repoint 100% of mortar joints in lime mortar type B.
- 2.5 Allow to pin 5no. fractured stones on the tower belfry level with 6mm dia. stainless steel dowels set in resin and mortar repair the face of the repair as specified. Include for each stone to have 3no. pins.
- 2.6 Micro-pin fractured stones to the external stonework of the tower. Flush out, grout and micro-pin 10no. fractures to the hood mould stonework as specified. Allow 4no. pins to each of the 10no. fractures.
- 2.7 Form mortar repairs to eroded stone or damaged stone as specified. Repair sizes will vary but for pricing assume.
- a) 15no. repairs each 50x75mm and 20mm deep.
 - b) 10no. repairs each 75x100mm and 20mm deep.
 - c) 10no. repairs each 150x250mm and 25mm deep.
 - d) 8no. repairs each 200x350mm and 25mm deep (with ceramic armatures).
 - e) 5no. repairs each 320x400mm and 30mm deep (with ceramic armatures).
- 2.8 Apply sheltercoat to eroded stone as specified. Clean back stone surface to sound and apply 2no. coats of thin sheltercoat thoroughly brushing back into the stone surface. Assume a total area of 4.5m² in small patches to be sheltercoated.
- 2.9 Undertake further conservation repair to the masonry of the tower, identified by CA as follows:
- a) Include a provisional sum equivalent to 2no. rope access conservators for 24 hours each to undertake further conservation repairs.
 - b) Include a PC sum of £250 plus contractor's profit for materials.