099.4.1

King's College Chapel, Cambridge

Roof Covering Renewal Project

Specification of Works, Materials and Workmanship

Revision 4.01

CAROE ARCHITECTURE

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FOR CONSENTS

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A01 Quality Standards / Control

STANDARDS OF PRODUCTS AND EXECUTIONS

110 INCOMPLETE DOCUMENTATION

- General: Where and to the extent that products or work are not fully documented, they are to be:
  - Of a kind and standard appropriate to the nature and character of that part of the Works where they will be used.
  - Suitable for the purposes stated or reasonably to be inferred from the project documents.

    Contract documents: Omissions or errors in description and/ or quantity shall not vitiate the Contract nor release the Contractor from any obligations or liabilities under the Contract.
    Specifications and schedules require contractor to undertake surveys, take-off, scoping of areas of repair and ageing same, with any re-measurement costs, with the CA.
    The contractor is required to respond with costs and programme estimate in response to an instructed Change Control Form (CCF).

120 WORKMANSHIP SKILLS

- Operatives: Appropriately skilled and experienced for the type and quality of work.
- Registration: With Construction Skills Certification Scheme and Lead Contractors Association
- Evidence: Operatives must produce evidence of skills/ qualifications when requested.

130 QUALITY OF PRODUCTS

- Generally: New. (Proposals for recycled products may be considered, including re-casting of lead from existing roofs).
- Supply of each product: From the same source or manufacturer.
- Whole quantity of each product required to complete the Works: Consistent kind, size, quality and overall appearance.
- Tolerances: Where critical, measure a sufficient quantity to determine compliance.
- Deterioration: Prevent. Order in suitable quantities to a programme and use in appropriate sequence.

135 QUALITY OF EXECUTION

- Generally: Fix, apply, install or lay products securely, accurately, plumb, neatly and in alignment.
- Colour batching: Do not use different colour batches where they can be seen together.
- Dimensions: Check on-site dimensions.
- Finished work: Not defective, e.g. not damaged, disfigured, dirty, faulty, or out of tolerance.
- Location and fixing of products: Adjust joints open to view so they are even and regular.

140 EVIDENCE OF COMPLIANCE

- Proprietary products: Retain on site evidence that the proprietary product specified has been supplied.
- Performance specification: Submit evidence of compliance, including test reports indicating:
  - Properties tested.
  - Pass/ fail criteria.
  - Test methods and procedures.
  - Test results.
  - Identity of testing agency.
  - Test dates and times.
  - Identities of witnesses.
  - Analysis of results.

150 INSPECTIONS

- Products and executions: Inspection or any other action must not be taken as approval unless confirmed in writing (on a numbered submittal form if in relation to a sample or trial) referring to:
  - Date of inspection.
  - Part of the work inspected.
  - Respects or characteristics which are approved.
  - Extent and purpose of the approval.
  - Any associated conditions.

160 RELATED WORK

- Details: Provide all trades with necessary details of related types of work. Before starting each new type or section of work ensure previous related work is:
  - Appropriately complete.
  - In accordance with the project documents.
  - To a suitable standard.
  - In a suitable condition to receive the new work.
- Preparatory work: Ensure all necessary preparatory work has been carried out.

170 MANUFACTURER'S RECOMMENDATIONS/ INSTRUCTIONS

- General: Comply with manufacturer's printed recommendations and instructions current on the date of the Invitation to tender.
- Exceptions: Submit details of changes to recommendations or instructions.
- Execution: Use ancillary products and accessories supplied or recommended by main product manufacturer.
- Products: Comply with limitations, recommendations and requirements of relevant valid certificates.
- Substitutes: whether due to contractor's procurement or due to change in manufacturer's product range (or due to un-availability): it is the contractor's responsibility to demonstrate to the CA that substitutions are equivalent to specified materials or assemblies as further noted below.

180 WATER FOR THE WORKS

- Mains supply: Clean and uncontaminated.
- Other: Do not use until:
  - Evidence of suitability is provided.
  - Tested to BS EN 1008 if instructed.

SAMPLES/ APPROVALS

210 SAMPLES

- Products or executions: Comply with all other specification requirements and in respect of the stated or implied characteristics either:
  - To an express approval (in writing on a numbered submittal form)
  - To match a sample expressly approved as a standard for the purpose.

220 APPROVAL OF PRODUCTS

- Submissions, samples, inspections and tests: Undertake or arrange to suit the Works programme. NOTE: some samples of materials must be supplied within 2 weeks of contract being let.
- Approval: Relates to a sample of the product and not to the product as used in the Works. Do not confirm orders or use the product until approval of the sample has been obtained in writing.
- Complying sample: Retain in good, clean condition on site. Sample must be numbered and tagged securely and listed against submittal form. Remove when no longer required.

230 APPROVAL OF EXECUTION

- Submissions, samples, inspections and tests: Undertake or arrange to suit the Works programme.
- Approval: Relates to the stated characteristics of the sample. (If approval of the finished work as a whole is required this is specified separately). Do not conceal, or proceed with affected work until compliance with requirements is confirmed.
- Must be formally submitted with a numbered submittal form
- Complying sample: Retain in good, clean condition on site. Sample must be numbered and tagged securely and listed against submittal form. Remove when no longer required.

ACCURACY/ SETTING OUT GENERALLY

320 SETTING OUT

- General: Submit details of methods and equipment to be used in setting out the Works.
- Levels and dimensions: Check and record the results on a copy of drawings. Notify discrepancies and obtain instructions before proceeding.
- Inform: When complete and before commencing construction.
- NOTE: Specifications and schedules require contractor to undertake coordinated setting out, documenting approach and agreeing resulting setting out with CA (ie in relation to leadwork, boarding, solar panels). .

330 APPEARANCE AND FIT

- Tolerances and dimensions: If likely to be critical to execution or difficult to achieve, as early as possible either:
  - Submit proposals; or
  - Arrange for inspection of appearance of relevant aspects of partially finished work.
- General tolerances (maximum): To BS 5606, tables 1 and 2.

340 CRITICAL DIMENSIONS

- Critical dimensions: Set out and construct the Works to ensure compliance with the tolerances stated.

360 RECORD DRAWINGS

- Site setting out drawing: Record details of all grid lines, setting-out stations, benchmarks and profiles. Retain on site throughout the Contract and hand over on completion.
- For avoidance of doubt: contractor (and relevant sub-contractors) must have capability of drawing in AutoCAD and to exchange .dwg files with CA for setting out and to fix record drawings.

SUPERVISION/ INSPECTION/ DEFECTIVE WORK

510 SUPERVISION

- General: In addition to the constant management and supervision of the Works provided by the Contractor's person in charge, all significant types of work must be under the close control of competent trade supervisors to ensure maintenance of satisfactory quality and progress.
- Evidence: Submit, including details of the person proposed, their relevant skills training and knowledge; practical experience; qualifications; membership or registration with professional bodies; employment history, work related assessments and management structure.
- Replacement: Minimum notice before changing person in charge or site agent: 4 weeks.

520 COORDINATION OF ENGINEERING SERVICES

- Suitability: Site organisation staff must include one or more persons with appropriate knowledge and experience of mechanical and electrical engineering services to ensure compatibility between engineering and the Works generally.

- Evidence: Submit when requested CVs or other documentary evidence relating to the staff concerned.

540 DEFECTS IN EXISTING WORK

- Undocumented defects: When discovered, immediately give notice. Do not proceed with affected related work until response has been received.
- NOTE: Specifications and schedules require contractor to undertake surveys of existing materials (stonework, plasterwork, brickwork, timber boarding and structure), documenting scope of defects and proposing remedial scope (with re-measurement and confirmation of costs) agreeing resulting setting out with CA
- Documented remedial work: Do not execute work which may:
  - Hinder access to defective products or work; or
  - Be rendered abortive by remedial work.

550 ACCESS FOR INSPECTION

- Removal: Before off-hiring, removing scaffolding or other facilities for access, give notice of not less than 2weeks.

560 TESTS AND INSPECTIONS

- Timing: Agree and record dates and times of tests and inspections to enable all affected parties to be represented. Not less than 2 weeks notice is required.
- Dates for inspections, including opening up, covering up, condition surveys to be identified in the formal contract programme and confirmed within 2 weeks.
- Confirmation: one week prior to each such test or inspection. If sample or test is not ready, agree a new date and time.
- Records: Submit a copy of test certificates and retain copies on site.
- All submittals for tests, inspections, samples to be on numbered submittal forms.

610 PROPOSALS FOR RECTIFICATION OF DEFECTIVE PRODUCTS/ EXECUTIONS

- Proposals: Immediately when any work or product is known, or appears, to be not in accordance with the Contract, submit proposals for opening up, inspection, testing, making good, adjustment of the Contract Sum, or removal and re-execution.
- Acceptability: Such proposals may be unacceptable and contrary instructions may be issued.

620 MEASURES TO ESTABLISH ACCEPTABILITY

- General: Wherever inspection or testing shows that the work, materials or goods are not in accordance with the contract and measures (e.g. testing, opening up, experimental making good) are taken to help in establishing whether or not the work is acceptable, such measures:
  - Will be at the expense of the Contractor.
  - Will not be considered as grounds for revision of the completion date.
- Substitutes: whether due to contractor's procurement or due to change in manufacturer's product range (or due to un-availability): it is the contractor's responsibility to demonstrate to the CA that substitutions are equivalent to specified materials or assemblies as further noted below.

630 QUALITY CONTROL

- Procedures: Establish and maintain to ensure that the Works, including the work of subcontractors, comply with specified requirements.
- Records: Maintain full records, keep copies on site for inspection, and submit copies on request.
- Content of records:
  - Identification of the element, item, batch or lot including location in the Works.
  - Nature and dates of inspections, tests and approvals.
  - Nature and extent of nonconforming work found.
  - Details of corrective action.

WORK AT OR AFTER COMPLETION

710 WORK BEFORE COMPLETION

- General: Make good all damage consequent upon the Works.
  Temporary markings, coverings and protective wrappings: Remove unless otherwise instructed.
- Cleaning: Clean the Works thoroughly inside and out, including all accessible ducts and voids. Remove all splashes, deposits, efflorescence, rubbish and surplus materials.
- Cleaning materials and methods: As recommended by manufacturers of products being cleaned, and must not damage or disfigure other materials or construction.
- COSHH dated data sheets: Obtain for all materials used for cleaning and ensure they are used only as recommended by their manufacturers.
- Minor faults: Touch up in newly painted work, carefully matching colour and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions.
- Moving parts of new work: Adjust, ease and lubricate as necessary to ensure easy and efficient operation, including doors, windows, drawers, ironmongery, appliances, valves and controls.
- O&Ms, CDP data, warranties, historical records, conservator reports and similar MUST be provided in a full draft 2 weeks prior to Practical Completion. The Contract will preclude the CA issuing PC without these data which must be to the CA's reasonable satisfaction. Final records must be provided within 4 weeks after PC.

720 SECURITY AT COMPLETION

- General: Leave the Works secure with, where appropriate, all accesses closed and locked.
- Keys: Account for and adequately label all keys and hand over together with an itemized schedule, retaining duplicate schedule signed as a receipt.

A02 Architects Rules of Engagement / Worksheet Requirements

210 ARCHITECT'S 'RULES OF ENGAGEMENT

- Any construction work to a building, especially one that is part occupied and in use by the public, is a complicated task, which will only be achieved with careful planning, good site logistics and consideration from all parties involved. When there is a building of heritage value there is yet a further key consideration: how to ensure that the building itself, which is a cultural asset, is safeguarded and protected. All these matters are addressed in the contract documentation, particularly elsewhere in the Preliminaries – however the purpose of these rules of engagement is to underline some of the most important matters to address.
- All site operatives should be made aware that this building is listed and that this protects the building by law and that all approved work should be carried out with the greatest of care and respect for the fabric of the building.
  Show respect for the building – ask first!

  King's College Chapel, Cambridge is a Grade 1 listed building. This means it is of exceptional and national significance and that the building fabric and anything that is attached to the fabric is protected by law. It is a criminal offence to cause damage to a listed building. The construction work that is being undertaken has been approved by the relevant planning authorities – but only that work which is approved can be undertaken and it must be done in a way that avoids harm to the fabric that remains.
- The Contractor must undertake suitable measures to protect the building fabric to avoid damage. All protective measures must be planned in advance (by method statement) and agreed with the Site Manager, the Contract Administrator (CA) and the design team.
  Plan, protect, preserve.

  Damage can be caused not just by impact and scratching, but by exposure to the weather, excessive humidity, sudden temperature changes, runoffs and dust etc. There is a need to both protect the fabric within a work area and isolate the work area from other areas e.g. by fire-resistant dust-proof screens.

- Where alterations are being made to the existing building fabric, or new elements are being added or inserted into the existing building fabric: the contractor must be vigilant, notify the CA and the design team of his activities and findings and make allowance for recording.
  Be vigilant, notify, record.

  Recording of the building, of what is discovered inside the building and what is discovered under the building is an important part of the project. It will give greater insight into the history of the building. It is very important to be vigilant and to report any findings (even if they may not seem significant) to the CA. Recording will usually be undertaken by an archaeologist or building historian employed by the client but the Contractor will need to programme in this work and provide attendances.
- The Contractor must plan, develop, co-ordinate service routes, agree routes and all alterations to the existing fabric with the CA and the design team with a view to minimising loss of fabric and achieving a visually acceptable solution.
  Plan, coordinate, minimise impact.

  Remember that the lifetime of most service installations is short compared to the lifetime of the building itself. The insertion of new materials can cause serious harm to a heritage building – not just by looking unsightly, but also by damaging the historic fabric of the building. Existing openings, holes etc. should be re-used where possible. New openings, holes, should be kept to a minimum and must be agreed with the CA and authorised in writing, in advance of undertaking.
- The Contractor must agree the type and location of fixings with the CA and design team in advance of carrying out the work, whether this is a fixing for services, architectural and structural works or temporary works.
  Check before you fix!

  New fixings can cause serious harm to a heritage building, not just disfiguring the appearance, but can cause loss of detail, splits, surface deterioration, staining and corrosion etc. Fixings into masonry should generally be made into joints unless otherwise agreed by the CA. Decorative features should be avoided. Generally non-corrosive fixings should be used such as stainless steel or otherwise agreed with the CA and the design team.
- The Contractor must agree a method for lifting masonry and dismantling fabric in advance of the work and demonstrate by a sample area that the method is appropriate.
  Demonstrate before you lift!

  Some works may need to be undertaken by a specialist conservator and these will be agreed. There will often be a requirement for recording before any lifting or dismantling takes place as noted above. Where the Contractor does undertake the work, the objective is to avoid any damage to the fabric, including to neighbouring material. This is often possible with the appropriate tools, skilled operatives and enough care and attention. Slabs should be fully bedded with joints to match existing using lime mortars as specified.
- **Respect, Respect, Respect – show respect for the building, the occupiers and the public. The building will be here long after us. Take pride to in your work – you are creating history!**

220 CARE GENERALLY

- Utmost care has to be taken not to damage the building or any fittings.
- The Contractor is responsible for and is to make good free of charge to the Employer and to the satisfaction of the Architect any damage to the building, its contents or surroundings arising from the works.
- The Contractor is to properly protect the site, paths, railings, gates, etc., cart away all rubbish arising from the works and leave the site in a clean, neat and orderly condition on completion.

PROCEDURES

230 WORKSHEETS

- Reflecting the Grade 1 listed status of the building AND the requirement to undertake the works in a 'live' environment, the contractor will produce 'work sheets' for all key tasks which will be reviewed by the CA with the Employer prior to commencement. The work sheet will comprise a description of the works and the method(s) for undertaking the activity, setting out:
- A description of the task and materials to be used

- Information to be referred to (as appropriate to the task):
  - Protections & temporary works;
  - Any preparatory works by others;
  - Maintaining operation continuity for occupants;
  - Labour resources;
  - Any subcontractors (identifying their resources and supervisors);
  - Timescales;
  - Monitoring and supervision.
- The work sheet must be the basis for pre-start briefing of the workforce or tool-box talk
  - NOTE: the worksheet is distinct from RAMS assessments which the contractor must also conduct to safely carry out the works.
- The purpose of the worksheet is to record all the careful planning the site agent will naturally be expected to undertake. As a minimum the following worksheets will be prepared and will signed off prior to commencement of the item of work:
  - Site set up
  - Scaffolding erection / adaptation / dismantling
  - Opening up roofs and gutters
  - Inspection and handling of hoppers and RWGs and repairs thereto
  - Internal and external protections
  - Prior to implementing handover of finished areas of work.
  - Access to the works
  - Hand-over and clearance of site.

140 SCHEDULE OF CONDITIONS

- The Contractor will be required to carry out a fully detailed schedule of conditions of the existing building and surroundings affected, including external works, access roads and the Contractor's allocated working compound where appropriate in conjunction with the Architect prior to commencement of the works. The schedule is to be accomplished by a set of dated and annotated photographs and is to be signed by the Clerk of the Works (Mr Shane Alexander) and the Contractor.

PROGRAMME / OPERATION

150 SEQUENCING OF THE WORKS

- An outline programme is to be agreed. Generally the Contractor is to allow for sequencing the work so as to not interfere with the use of the building by visitors and the public.
- If the Contractor is ordered to cease work unexpectedly during any part of a normal working day, he is to keep a strict record of such stoppages listing the operatives on site at such times. All stoppages must be confirmed by the Employer.
- The employer will provide a list of known events and services during which works will case which must be deemed included in the contract.
- A further allowance for unexpected standing time to be included in the contract.
- The programme must include CDP programme and lead-times, allowing 2 weeks for response to submittals and for amendments thereto. The main contractor is fully responsible for the CDP performance of any sub-contractor and supplier and will verify their CDP programme input prior to letting any sub-contract.
- The contractor must update and re-issue the contract programme in the event of any delay, whether a relevant event or contractor-culpable delay, indicating any impact on the completion date and/or impact on the assumed sequence of the works.

160 PHOTOGRAPHIC RECORDING

- Keep a digital camera on site, minimum 5MP resolution.
- Record generally the progress of the works.
- Provide weekly photographs of progress.
- Monthly progress reports (circulated not less than 3 days before contract progress meetings) to include a selection of relevant progress photos
- Contractor to set up and maintain for the contract duration a time-lapse camera to record the works, for publicity purposes.

A90 Performance Specification

To be read with the Preliminaries/General conditions and all applicable work sections.

GENERALLY

4 STANDARDS AND REFERENCE DOCUMENTS: The British Standards, Codes of Practice and other reference documents referred to in, or relevant to, this Specification, except where specifically modified, shall have full effect as though printed herein.
The references to or lists of reference documents are not exhaustive and shall be supplemented by those listed under each related work section.
Note that where a British Standards, Codes of Practice or other reference document comprises a number of parts, the latest issue and amendments of each relevant part shall apply.
Listings of British Standards, Codes of Practice and other reference documents etc. must not be considered as conclusive.
The Main Contractor/sub-contractor/Supplier must comply with all relevant Standards etc. at time of Tender.

5 The contractor will be responsible for maintaining the stability of all existing structures and so, whilst not strictly an element of CDP, they will need to design any necessary temporary works, such as propping or scaffolding refer to ABA's Structural Specification and general notes drawing 999.

13 DEFINITIONS:
Any reference in this Specification to the Contractor or its derivatives shall be deemed to include the Contractor itself, it's domestic sub-contractors and it's and their suppliers,
Any reference to any party in the singular or masculine shall be deemed to include the plural and feminine and visa versa.

20 PERFORMANCE SPECIFICATION:
This Specification and the Drawings which form part of the Tender Documents describe the Works to be undertaken, states the required levels of performance and the technical standards to be met and to which the installations are to be designed, tested, manufactured and installed.

30 PRINCIPLES AND MINIMUM STANDARDS:
The design, materials, methods of fabrication, installation, testing and performance requirements in this Specification are intended to describe general arrangement, design principles, establish minimum performance requirements and set minimum standards.

60 PROPORTION AND PROFILES:
Ensure the construction and detailing of the Works achieves the appearance, proportions and profiles indicated on the Drawings.

61 JOINT ARRANGEMENT:
The Drawings indicate the CA's preferred design and joint layouts, however where the specialist design requires, joint locations may be modified, but only with CA's prior approval. Make every effort to maintain the layout as indicated.

70 DESIGNER's PREFERENCES:
In some cases a preference for a particular material, design, type or method of construction has been indicated on the Drawings or described in this Specification.
If the Contractor is not satisfied that such preferences will satisfy the requirements of this Specification, the Tender must include a statement(s) in this respect, giving reasons, any supporting evidence and alternative proposals.

If no statement nor alternative proposals are included, then such preferences will be deemed to have been accepted and hence forth, form part of the proposals.
Where the materials, methods or standards listed in this document exceed the requirements of the relevant British Standards and Codes of Practice these performance criteria shall take precedence.
In the event of conflicting requirements notify and seek instructions from the CA.
Inform the CA in all cases before ordering materials.

80 REPLACEMENT OR RECTIFICATION:
If the Works are operated and maintained by the Employer in accordance with the Contractor's Operating and Maintenance Manual, and the Works subsequently fail or defects present within the Rectification Period or period of any guarantee or warrantee, then return and rectify the defect or replace the defective components as appropriate, at own expense or otherwise reimburse the Employer for any costs incurred in the rectification of defective carried out by others.
The Contractor will not be required to make good at it's own cost any defect which is due to normal wear and tear by the users.

91 MATERIALS AND WORKMANSHIP:
Where and to the extent that any materials and workmanship are not fully specified they shall be:
Suitable for the intended purpose in the Works, stated in or reasonably to be inferred from the Contract Documents.
In accordance with good building practice including the relevant provisions of applicable current BSI, EN or ISO documents whether or not these are specified in respect of a particular item. All leadwork must be in accordance with BS 6915 and latest editions of 'Rolled lead sheet. The complete manual' published by the Lead Sheet Training Academy.
Handled, stored and incorporated into the work in accordance with the manufacturer's written recommendations.
Compatible with each other and with materials in adjacent constructions.
Inform the CA where any of the foregoing conflict with each other or any other specified requirements.

105 PROVIDE WRITTEN CONFIRMATION [to the CA with the Tender] that:
All technical terms and requirements of the Specification are fully understood.
Reference documents have been consulted for guidance and compliance has been verified.
The requirements are met by the proposed materials and installation.

115 ALTERNATIVES AND OPTIONS:
Ensure the Tender is strictly in accordance with this Specification and Drawings.
However, if the Contractor wishes to offer for consideration alternatives and options to the requirements of this Specification, then provide an accompanying letter fully detailing them and quote the price adjustment to the Tender sum.
Where no requirements are defined in this Specification, specify the basis of the Tender in the tender specification.
Where a product is defined in this Specification, and an alternative is proposed, specify it in the alternative tender.
Include drawings, specifications and samples where requested. Refer to sample schedule.
Possible alternative options might include:

116 SPECIFICATION SUBSTITUTION:
Where a substitution for a specified material, component or system is proposed as part of the alternative tender, give reasons for substitution, submit all evidence showing its equivalency, compare it with equivalent information for the specified material, highlighting the relevant characteristics showing where there is equivalent or improved performance(s).
Where required provide certified translations to English.
Ensure such information includes (where relevant and available):
Manufacturer's illustrative and technical literature,
Performance characteristics,

Performance test results and/or assessments,
Third party independent accreditation,
Environmental criteria or characteristics with values
Environmental Profiles,
Specification,
Drawings,
Method statements,
CDM Risk assessment and COSHH data sheet review.
Manufacturer: Quality Assurance, Environmental Management, Environmental and Social Policy statements.
Environmental assessment of manufacturer, materials, transport, embodied energy and CO_2.
Environmental profile of product, materials, transport, embodied energy,
Information of availability of spares and maintenance materials in the UK.
Equality Act
Building Regulations Requirements
Where no evidence is provided, substitution will not be considered.
If further specification substitutions are proposed during the Contract provide all such information with at least 1 months' notice of date of ordering materials, to allow evaluation by the CA, to meet the Programme.
Any substitutions carried out without such submission will be required to be replaced with the specified materials.
The CA reserves the right to reject an application for substitution.
The contractor must make substitution requests on a Change Control Form (CCF) to the CA

133 TENDER QUALITY ASSURANCE PROCEDURES: Submit the following particulars:
Examples of standard documentation from which the project quality plan will be prepared.
Provide an outline on the Quality Assurance and Quality Control procedures intended for use in the Works.

161 SAMPLES:
Refer to relevant parts of the Specification and sample schedule for summary. Ensure samples are in all respects, representative in standards of commodities, workmanship and performance, of those to be supplied and installed within the Works, in accordance with this Specification.

168 CONTROL SAMPLES:
Complete control samples in locations agreed with CA in advance, for approval prior to continuing with the remainder of respective works.
Complete each of the items with sealants, fixings, fastenings and all other associated items, except if this would prejudice the performance of the whole installation.

These control samples when finally approved will form part of the final installation, and will be used to control the quality of the remaining Works.

172 CDM REGULATIONS: refer to PCI and Preliminaries.

177 SAFETY: The finished surfaces of the installation in all accessible areas must not:
Have any irregularities capable of inflicting personal injury.
Release irritant or staining substances.

178 SITE SAFETY:
Comply in all aspects to the Health and Safety at Work Acts.
Provide COSHH assessments/data sheets for all materials used on site.
Method Statements are required for all aspects of work to be undertaken.

SURVEYS

210 INCLUDE ALL COSTS for necessary surveys and for the taking of site dimensions.
The contractor will be deemed to have the skills and equipment to undertake surveys,

including laser levels, LIDAR scanning and photogrammetry to complete the tasks identified in the documentation.

211 CARRY OUT SURVEY:
Prior to any manufacture or orders, carry out a measured site survey of the Works, check all critical dimensions and levels. Submit to the CA the drawn survey highlighting any areas of discrepancy. Report to CA any dimensional discrepancies which would prejudice compliance with this Specification or the proposals as drawn.

The contractor's attention is drawn to the specific surveys that have been called up in the drawings and specifications.

213 SITE & ENVIRONMENT SURVEY: Visit the site and carry out a survey of all relevant conditions:
to enable timely commencement of the Works,
to undertake the whole installation to meet the programme,
to ensure the Works take the conditions into account.

215 SUITABILITY OF EXISTING [BACKGROUNDS, BASES] AND CONDITIONS:
Before commencing the Works the Contractor must confirm that existing backgrounds/ bases/substrates and conditions will, after the specified preparation, be suitable to receive the specified applications/coverings.
In the event that backgrounds/bases/substrates and conditions are unacceptable to work on, inform the CA, in writing, with information on the location, extent and levels of unacceptability, with guidance on what is required to achieve suitable backgrounds/bases/substrates and conditions and offer any advice on methods of achieving same.
Make reference to relevant British Standards, Code of Practices and Manufacturer's recommendations on drying periods and thicknesses.
Do not under any circumstances start work on backgrounds/bases which are unacceptable. Applying or laying of coverings will be taken as further acceptance of the suitability of the backgrounds/bases/substrates and conditions within any given area.

216 SITE CONDITIONS:
Ensure ambient temperature is within the range recommended by the manufacturer/supplier and adequate ventilation is provided to area of installation.
Provide appropriate lighting levels with even distribution. Note: Use of halogen or incandescent lamps is prohibited.
Ensure that all the correct tools are to hand before work commences.

217 RELATIVE HUMIDITY: Ensure ambient humidity is within a range recommended by the manufacturer/supplier and adequate ventilation is provided to area(s) of installation.

CONTRACTOR'S DESIGNED PORTION (CDP) ITEMS

218 The following requirements apply although where specifications are issued by the Structural Engineer and/or M&E Engineer, the detailed requirements contained therein will take precedence. Any conflicts or contradictions must be resolved by reference to the CA in time to suit the programme.

CONTRACTOR'S RESPONSIBILITIES IN RELATION TO CONTRACTOR'S DESIGNED PORTION (CDP) ITEMS

220 TECHNICAL DESIGN RESPONSIBILITIES: Be responsible for the full specification and resolution of details, the fabrication and installation of the materials and products selected and proposed by the Contractor.

222 DESIGN & CO-ORDINATION:
Complete the detailed design of the installation and associated features shown on the general arrangement Drawings to meet the requirements of this Specification.

Co-ordinate detailed design with that for all related works.

226 CO-ORDINATE THE DESIGN with the Works of other trades and actual site conditions to ensure the correct selection of materials, choice of dimensions and of workmanship. Assume Drawings show minimum requirements unless stated otherwise.

227 DESIGN RESPONSIBILITY:
Prepare all necessary detail design and production drawings required in connection with the Works and submit these for comment by the CA prior to starting work on site.
Prepare all drawings to an appropriate scale and show dimensions, types of materials, finishes, type and locations of fixings, including the relationship of components to the structure and surrounding construction items.
Give due consideration to the working tolerances between the installation and adjacent structure and materials and show how these tolerances are accommodated, the type and extent of shimming.

230 APPROVED PRODUCTION INFORMATION DOCUMENTS:
Be responsible for carrying out the Works strictly in accordance with the finally approved detailed specification and drawings.
Do not commence fabrication nor place any orders until in possession of approved documents.

235 DRAWING PREPARATION SCHEDULE: Submit the following particulars to the CA within two weeks of appointment:
A schedule of detailed drawings to be prepared by the Contractor and dates for submission for comment.

240 DESIGN, PRODUCTION AND AS-BUILT INFORMATION:
The design and production information forms an integral part of the Works.
Be responsible for ensuring that these are provided in sufficient time to meet the programme.

241 DESIGN INFORMATION: Following appointment, prepare and provide design drawings developed from the Contract Design Intent Drawings.

242 SUBMIT DOCUMENTS to the CA for comment by the Design Team.
During the Contract submit to the CA the required number of copies of design and production information.
The CA will note comments on one copy, date and sign to show that it has been inspected, then return it, [this will be deemed to be a direction, notice or instruction under the Contract].
The period for comment at each stage of issue shall be ten 10 working days for twenty (20) drawings maximum.
Allow more time for comment if more than twenty (20) drawings are submitted at a time.
Make reasonable allowance for the time taken in completing design and production information, inspection by the CA and any subsequent amendment(s), resubmission(s) and re-inspection(s) when preparing the master programme.
Documents received by the CA after midday will be deemed to have been received at the start of the next working day.
The CA's and/or Consultants comments will be given on the basis of design principles only and this is reflected in the stamping of drawings for Review for Design Conformity.
Inspection and any comments made by the CA will not relieve the Contractor from full design responsibility.

244 COMMENTS ON DRAWINGS AND OTHER INFORMATION: All drawings being inspected will be stamped to indicate their status meaning one of the following:
A Status:
Agreement to design or production information shown, no comments.
Will be used on drawings on which there are no further comments.
B Status:
Agreement to design or production information shown subject to comments made.

Will be used on drawings on which there are comments but which are not fundamentally wrong.

C Status:

Design or production information to be resubmitted
Will be used only on drawings which are fundamentally wrong.
An explanation for failure will be given.

245 AMENDMENTS:
Ensure that any necessary amendments to the design and production information are made without delay.
Unless and until the CA confirms that resubmission is not required, submit copies of amended drawings etc. to CA, and ensure incorporation of necessary amendments all as before.

246 DISTRIBUTION OF FINAL VERSIONS: Complete final version of all design and production information and submit to the CA the number of copies required.

247 PRODUCTION INFORMATION: DETAILED WORKING/INSTALLATION DRAWINGS:
Following appointment, prepare and provide production drawings for approval by the CA: fully dimensioned, annotated, detailed working drawings for the fabrication, manufacture and construction, including but not limited to:
Proposed layout and fixing details including grounds, shimming etc. relevant to structural design and construction.
Proposed junctions, penetrations, sealants, joints between components, movement control provisions etc.
Any stiffening, thermal, fire and/or sound insulation etc.
All interfaces with structure, fabric other trades and services.

248 SHOP DRAWINGS:
Submit co-ordinated shop drawings for all areas of the fabrication of the Works for the approval of the CA.
Fully dimension shop drawings and show at a suitable scale, the Works in plan, section and elevation; include full size details noting all material, fastenings and finish thickness.
Indicate the method and location of all joints, anchorages, supports and restraints.

250 SPECIFICATION: Prepare a detailed specification:
Each CDP item must be clearly set down and itemised in the order set out in CPI (Co-ordinated Project Information) and its CAWS (Common Arrangement of Work Sections) (SMM7) for ease of reference and checking. Adopt the work section and clause order of this Specification, based on the NBS National Building Specification in a format to the satisfaction of the CA.
Include comprehensive descriptions of all materials and workmanship proposed,
Include all manufacturer's technical details, test/assessment, performances of all components proposed for substitution, where they differ from those specified, showing equivalency where appropriate.

260 VARIATIONS:
Do not alter the intent of the Contract Specification or Drawings from those at Tender stage except:
As a response to an instructed variation to the performance requirements from the CA,
Improvements in design/performance will be considered, but only with the CA's prior approval,
Changes will be considered due to non-availability of components, but only with the CA's prior approval, and not as a result of poor procurement management.
In each case ensure the variations are supported by:
a full breakdown of changes,
their effect on costs, if any.

270 STRUCTURAL CALCULATIONS:
Prepare and provide 2 copies of all supporting calculations, as required by the CA.

Submit for all areas of the Works including fastenings and fixings.
Use metric values only, for ease of checking by Consultant.

271 TECHNICAL CALCULATIONS: Submit calculations verifying conformance of the systems with the performance specified.

280 ASSIST IN OBTAINING APPROVALS:
Provide all information necessary, to the CA, for obtaining all necessary statutory approvals for the Works, including any commodities selected, proposed or offered as alternatives to those indicated or specified[.

282 EXCLUDED WORK:
When submitting the Tender, clearly describe any work necessary for the proper completion of the Contract which has not been included for in the Tender and which may require to be executed and paid for by [others].
Any such work not specifically stated and described shall be deemed to have been included for in the Tender.

285 ACCEPTANCE OR APPROVAL of Drawings and documents provided by the Contractor in respect of the Works proposed and/or designed by them or their sub-contractors will not relieve the Contractor of responsibility for any discrepancies, errors or omissions therein: for providing goods suitable in dimension, construction, finish and function for the location in which and purpose for which they are installed of for any other Contractual and legal obligations.

TENDER SUBMISSION REQUIREMENTS RELATING TO CDP ITEMS

286 GUARANTEE:
In the Tender state the terms of the guarantees for the Works offered.

287 MANUFACTURER/INSTALLER GUARANTEES/WARRANTIES
Provide a list of any other materials or components with specific guarantee periods.

288 GUARANTEES:
Allow in the Tender, for providing a guarantee for the performance of all the materials and components as a complete installed assembly or application.
Comply with requirements as defined in the guarantee issued by the Manufacturer and/or Installer.

289 WARRANTY:
Enter into a Design Warranty Agreement with the Employer in respect of the detail design.
Ensure they are project specific Warranties for material from the supplier and workmanship listed in the Specification, clearly stating the name of the Project and signed by a Board Director of the issuing company.
Warranties must be drawn in the name as directed by the CA.
The form and wording of the Warranties are to be approved by the CA and Employer.
All parties to understand that the Contract will not permit the CA to issue Practical Completion unless Warranties are completed and executed.

PERFORMANCE REQUIREMENTS IN RELATION TO CDP ITEMS

290 STATUTORY INSTRUMENTS, REGULATIONS, STANDARDS AND GOOD PRACTICE:
Confirm that the Tender proposal conforms with all relevant documents:
British Standards Institution's Standards, Codes of Practice, Published Documents etc.,
Any applicable European or International Standards, Health and Safety [Regulations, Acts and Approved Code of Practice, guidance documents].
Consents/pending applications
Approved Documents/Technical Standards/Technical Guidance Documents
Fire Prevention Officer Requirements
Environmental Health Officer Requirements

Environment Agency Agent requirements
Requirements of any other Authorities,
Any other applicable Legislation,
Recognized good practice.

MECHANICAL RESISTANCE AND STABILITY IN RELATION TO CDP ITEMS

304 GENERAL & DETAILED REQUIREMENTS:
The following requirements apply although where specifications are issued by the Structural Engineer and/or M&E Engineer, the detailed requirements contained therein will take precedence. Any conflicts or contradictions must be resolved by reference to the CA in time to suit the programme.

305 ALLOWANCE FOR SITE AND CONTEXT:
When assessing wind pressures, make due allowance for pressure variations over the whole site, taking full account of the height above sea level, ground roughness factors, prevailing wind and any shelter.

306 CALCULATING LOADS: When calculating loads, assume:
that dead loads, including loads due to fixtures and fittings, act concurrently with the maximum wind load,
that live loads do not act concurrently with the maximum wind load.

307 DEAD LOADS:
Ensure the installation transmits all dead loads likely, safely, to the building's structure, via the points of support provided for the purpose.
Ensure the installation is capable of accommodating the following dead loads without any reduction in performance:
The installation’s own dead load shall be accommodated locally, and without causing deflections or movements which affect PV panels.
The dead loads derived from permanent fixtures, or services, attached to either the internal or external surfaces.

308 LIVE LOADS:
Ensure the installation transmits all live loads likely to the building's structure, via the points of support provided for the purpose.

309 THERMAL-INDUCED LOADS:
Ensure all materials and components used in the installation are capable of accommodating internal loads generated by differential temperatures.
Ensure calculations accommodate appropriate performances to establish maximum stresses developed in all brittle materials, especially glass and all composite materials and components as a result of temperature gradients within the materials or components.
Ensure these calculations prove that the strength of the materials and components is adequate to prevent failure due to thermally-induced stresses or replace the materials and components that cannot.

311 EXTERNAL/INTERNAL WIND LOADING:
Design the Works and fixings to meet or exceed the requirements of [BS 6399:Part 2 in respect of:
Wind pressure and buffeting,
Wind and snow load;
Verify the site conditions and be satisfy of the validity of any data provided.
Provide with the Tender, details of the minimum performance that the various elements will achieve in respect of this clause.
Assess the wind behaviour, in particular, around the proposed installation due to their relationship to adjacent building and structure.
Include a report with the Tender submission showing how the design takes into account the findings.

315 LOADING:
Design the installations and fixings to equal or exceed the requirements of:
BS 6399:Part 3, Roof loadings produced by the usage, maintenance operations; including distributed, concentrated, impact and inertia loads,
BS 8200, installation: People and ladder loadings produced by the usage, maintenance operations; including distributed, concentrated, impact and inertia loads,
other relevant Standards and Code of Practice, for the individual elements, as defined in the relevant work section
Using weights of materials etc. to BS 648. Provide with the Tender details of the minimum performance that the various elements will achieve in respect of this clause.

315B ROOF LOADING:
Superimposed roof loading for the [Works] shall be taken as:
[0.75] kN/m2 for general use unless the BS or CP requires higher loadings.
For other use reference shall be made to BS 6399:Part 3.
Take account of and submit calculations with reference to [BRE Digest 332 and BS 6399:Part 3] regarding:
Snow loading in respect of parapet heights where applicable.
Geographical location and building configuration.
Any further vortex effects from parapets or other architectural features on the walls and/or roofs] shall be calculated in accordance with the Code(s) of Practice(s)[.

320 STRUCTURAL CALCULATIONS:
Ensure the Tender proposals include structural calculations in connection with the design of the installations, together with the details of the fixings and assemblies proposed for the approval of the CA in accordance with:

Stainless steel:
BS 499: Part 2, (permissible stress design), or
BS 5950: (all relevant parts), (limit state design),
Steel Construction Institute publications:
Publication 119 Design of stainless steel fixings and ancillary components.
Publication 123 The structural design of stainless steel,
The Structural Engineer's Specification where appropriate,
For other materials:
Other appropriate and approved BS or CP,
See relevant work section(s) for other materials: e.g.
Use metric units only for ease of commentary by Consultants including Structural Engineer.

321 SAFETY FACTORS: Design the Works with a safety factor in calculations, Refer to JM Structural Consultant’s requirements.

322 MAXIMUM ALLOWABLE DEFLECTION:
Ensure the deflection, in components, installations, framing, fixings and fastenings, in the direction normal to the plane of its span, when carrying full design load, do not exceed deflections permitted by the relevant Code of Practice and as defined by JM Structural Consultants.

329 STABILITY: Ensure the method of fixing and stability of the complete waterproofing construction and upstands etc. against the effect of wind and any other incidental loads.

330 THERMAL MOVEMENT:
Design assemblies and all components for thermal movement resulting for a surface temperature differential of:
[90 C deg. (-15 deg. C to 20 deg. C and 20 deg. C to 75 deg. C): subject to sun.
60 C deg. (-15 deg. C to 20 deg. C and 20 deg. C to 45 deg. C): not subject to sun.]
The installation and all components shall withstand noiselessly all thermal movement resulting from specified temperature differential without buckling, distortion, creaking, failure of joint seals and finishes, undue stress to fixing assemblies or other harmful effects.
Dimensions shown on the Drawings are based on a design temperature of [20] deg. C.

Ensure fabrication, assembly and erection take into account the ambient temperature of the time of the respective operations.

331 SERVICE TEMPERATURE RANGES:
Ensure the installation is capable of accommodating the following annual service temperature ranges for materials, used in normal circumstances:
External surface temperatures:
Cladding/glazing, walling and roofing:

Heavyweight, light colour:	-20°C to +50°C
Heavyweight, dark colour:	-20°C to +65°C
Lightweight (insulated), light colour:	-25°C to +60°C
Lightweight (insulated), dark colour:	-25°C to +80°C

Glass:

Clear:	-25°C to +40°C
Coloured or solar-control:	-25°C to +90°C

Internal temperatures:

Building empty or out of use:	-10°C to +36°C
Building in normal use:	-5°C to +30°C

332 ACCOMMODATION OF THERMAL MOVEMENT: Ensure the installation is capable of accommodating changes in dimension and shape of its components resulting from changes in service temperatures and from differential service temperatures between the inside and outside of the building without any reduction in performance.

333 ACCOMMODATION OF MOVEMENT GENERALLY: Ensure the installation is capable of accommodating the following movements without any reduction in the specified performance due to:
deflection under design loads,
effects of repeated wind loading,
changes in dimension and shape of components arising from building movements, including settlement, creep, twisting, rotation and racking,
movement of any joint whether designed to permit movement or not,
noise vibrations generated by the [installation].

334 ACCOMMODATION OF MOISTURE MOVEMENT: Ensure the installation is capable of accommodating the following movements without any reduction in performance due to:
changes in the moisture content of its components, resulting from variations in the moisture content of the air, either inside or outside the building, expansion of absorbed or retained moisture due to freezing.

335 STRUCTURAL MOVEMENTS, DEFLECTION:
Design the installation, systems and fixings to accommodate:
differential structural movements due to dead and live loads,

339A ATTEND MEETINGS ON COORDINATING ACCURACY AND TOLERANCE:

Attend a meeting(s) with the CA and applicable sub-contractors to co-ordinate designs with repair works, incl. setting out of new lead roof coverings.
Identify areas where dimensions are likely to be critical for satisfactory performance or fit.
Choose and agree manufacturing and assembly methods and details that avoid problems of fit and minimize the number of tolerance constraints.
When this is not possible select reasonable and achievable tolerance targets based upon normal methods and current practice, which are acceptable to following trades.
Discuss the tolerance requirements to ensure understanding of the design intentions, development of building details and a positive commitment to achieving fit between all parties.

340 DESIGNS FOR ASSEMBLY:
Verify available methods, materials and techniques for special requirements of fit and assembly.

Make provision in designs to accommodate inconsistencies of the existing building; e.g. deflection in the roof slopes.
Discuss with the CA and sub-contractors the tolerance requirements to ensure understanding of the design intentions, development of building details and a positive commitment to achieving fit.
Ensure fixings for components make adequate allowance for adjustment in position.
Ensure the chosen methods of assembly and installation details do not create conflicting issues with the existing fabric.

341 SURVEYING INSTALLED COMPONENTS & CORRECTIVE ACTION:
Check the accuracy of previously established setting out requirements.
Distribute survey information,
Confirm acceptance or otherwise by subsequent trades,
If required the method and sequence of corrective action.
Repeat until acceptance by all parties.

342 SUITABILITY OF BACKGROUNDS/ BASES/ SUBSTRATES: Commencement of installation will be taken as joint acceptance by the Main Contractor and sub-contractor(s) of the suitability of the tolerances of backgrounds/ bases/ substrates within any given area.

344 APPEARANCE AND FIT:
Arrange the setting out, erection, juxtaposition of components and application of finishes (working within the practical limits of the design and Specification) to ensure that there is satisfactory fit at junctions, that there are no practically or visually unacceptable changes in plane, line or level and that the finished work has a true and regular appearance.
Whenever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve, obtain CA's approval of proposals of the appearance of the relevant aspects of the partially finished work as early as possible.
Without prejudice to the above, and unless specified otherwise, tolerances will (where applicable) be not greater than those given in BS 5606.

389 COMPLETION
Roof areas: Clean
Outlets: Clear.
Flashings: Dressed into place.
Work necessary to provide a watertight finish: Complete.
Storage of materials on finished surface: Not permitted.
Completed coatings: Protect against damage from traffic and adjacent or high level working.
All O&M and record information deposited (see above)

390 RESISTANCE TO WATER PENETRATION:
Design, manufacture and install the Works to prevent water from penetrating into the installation, the building or other parts of the external envelope.
Ensure all components are finished as required to provide an effective barrier to prevent rainwater entry.
Ensure water does not enter parts of the assembly itself, with adverse effects.
Ensure the abutments of the Works to the surrounding construction is water-tight.
Ensure the water-tightness of the Works is not impaired under all conditions of loading from structural, wind, thermal or other movements,
Ensure all external components are vented and drained to the building exterior.

396 TENDER SUBMISSION:
Advise in the Tender submission the effect of any water penetration or condensation formation upon the completed installation, including any electrical installations.
Clearly describe what methods are proposed to prevent future damage from the effect of any entrainment of moisture within or behind the installations, or any condensation run off from one material to another describing the proposed drainage methods, dispersal of water and evaporation of moisture.

C20
Demolition

To be read with preliminaries/ general conditions.

5 Desk study/ survey

1. Scope: Before commencing roof strip out works, examine available information, and carry out a survey of the areas impacted by removals.
2. Report and method statements: Submit, describing:
   - 2.1. Use of existing sarking deck on the main roof as a working platform for removals, include appraisal of revealed conditions and identification and reporting of uncovered defects.
   - 2.2. Type, location and condition of features of historical, archaeological, geological or ecological importance.
   - 2.3. Type, location and condition of adjoining or surrounding premises that might be adversely affected by removal of the structure or structures or by noise, vibration and/ or dust generated during deconstruction/ demolition.
   - 2.4. Identity and location of services above and below ground, including those required for the Contractor's use, and arrangements for their disconnection and removal.
   - 2.5. Form and location of flammable, toxic or hazardous materials, including lead dust from underside corrosion, and proposed methods for their removal and disposal.
   - 2.6. Form and location of materials identified for reuse or recycling, including lead to be re-cast, and proposed methods for removal and temporary storage.
   - 2.7. Arrangements for protection of personnel and the general public, including exclusion of unauthorized persons.
   - 2.8. Arrangements for control of site transport and traffic.
3. Format of report: A4 report issued electronically.

15 Bench marks

1. Unrecorded bench marks and other survey information: Give notice when found. Do not remove marks or destroy the fabric on which they are found.

30 Services disconnection arranged by contractor

1. General: Arrange with the appropriate authorities for disconnection of services and removal of fittings and equipment owned by those authorities prior to starting deconstruction/ demolition.

35 Live foul and surface water drains

1. Drains and associated manholes, inspection chambers, gullies, vent pipes and fittings
   - 1.1. Protect and ensure normal flow throughout.
   - 1.2. Make good any damage arising.
   - 1.3. Leave clean and in working order at completion.

40 Service bypass connections

1. General: Provide as necessary to maintain continuity of services to occupied areas of the site on which the deconstruction/ demolition is taking place and to adjoining sites/ properties.
2. Minimum notice to adjoining owners and all affected occupiers: 72 hours, if shutdown is necessary during changeover.

50 Workmanship

1. Operatives

1.1. Appropriately skilled and experienced for the type of work.

1.2. Holding, or in training to obtain, relevant CITB Certificates of Competence.

2. Site staff responsible for supervision and control of work: Experienced in the assessment of risks involved and methods of removals to be used.

55 Site hazards

1. Precautions: Prevent fire and/ or explosion caused by gas and/ or vapour from tanks, pipes, etc.
2. Dust: Reduce airborne dust by regular vacuuming. Keep public roadways and footpaths clear of mud and debris.

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

3. Site operatives and general public: Protect from health hazards associated with vibration, dangerous fumes and dust arising during the course of the Works.

65 Fabric to be retained

1. Protect where vulnerable to works or removals.

75 Asbestos-containing materials – known occurrences

1. General: Materials containing asbestos are known to be present in: Refer to Pre-Construction Information.

76 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.

78 Unforeseen hazards

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

85 Site condition at completion

1. Debris: Clear away and leave the site in a tidy condition.
2. Other requirements: Make good any defects or damage incurred to the approval of the Architect.

86 Site surface at completion

1. Levels: Grade the site to follow the levels of adjacent areas.
2. Surface: Level and re-seed any areas of disturbed ground on completion of the works. Make good any damage to paving or property.

90 Contractor's property

1. Components and materials arising from the deconstruction/ demolition work: Property of the Contractor except where otherwise provided. For the avoidance of doubt: all lead recovered from the roof remains the property of the employer.
2. Action: Remove from site as work proceeds where not to be reused or recycled for site use.

91 Employer's property

1. Components and materials to remain the property of the Employer: ALL leadwork and lead plaques from the existing lead roofs.
2. Protection: Maintain until these items are removed by the Employer or reused in the Works, or until the end of the Contract.

3. Existing lead (excl. plaques): It is the expectation that the existing lead will be taken off for recasting and reused subject to metallurgical testing to be commissioned by the contractor. Maintain chain of custody throughout.

95 Recycled materials

1. Materials arising from deconstruction/ demolition work: Can be recycled or reused elsewhere in the project, subject to compliance with the appropriate specification and in accordance with any site waste management plan.
2. Evidence of compliance: Submit full details and supporting documentation.
   2.1. Verification: Allow adequate time in programme for verification of compliance.

Ω End of Section

C41
Repairing/ conserving masonry

Generally/ preparation

110 Scope of work

1. Schedule: Refer to drawings. Contractor is required to schedule and agree scope for construction.
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: Contractor and Architect.
3. Timing: On completion of scaffold and temporary roof installation.
4. Instructions issued during inspection: Confirm in writing, with drawings and schedules as required, before commencing work.

125 Removal of fittings/ fixtures

1. Items to be removed, and reinstated on completion of repair work: Lightning conductor tapes where obstructing access to masonry. Methodology to be submitted and approved by Max Fordham LLP prior to commencement.

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. Documentation: Submit on completion of the work.

Workmanship generally

150 Power tools

1. Usage for removal of mortar: Not permitted without CA express approval and trial in advance.

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 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.
    2.2. 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 adverse weather.: 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: See Z21. Include: Raking out and repointing (4lm); deep grout and repoint (full depth 1lm); grout, point and cap delaminating/scaling face (2 x 1m2) .

Material/ production/ accessories

215 Material samples

1. Representative samples of designated materials: Submit before placing orders.
    1.1. Designated materials: Like-for-like stone for indent/replacement. Lincolnshire limestones to match existing such as Clipsham, Ketton, Ancaster...subject to location and approval.
    1.2. Mortars: Up to 10no mortar biscuits to be provided before on site trials. See Z21; Mixes to be agreed with CA in advance.
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.

230 Inspection of drawings, templates, casts, etc.

1. Timing: Before starting production of masonry units associated with the following items: TBC. Subject to inspections from scaffold.
2. Period of notice (minimum): 7 days.

240 Stone

1. Supplier: TBC dependent on location of defect.
2. Type: TBC
3. 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.
4. Finish: All signs of machining to be removed. Allow for hand-finished boating or French drag to agreed sample.

245 Replacement stone units

1. Sizes and profiles: To match existing masonry. Maintain existing joint widths.
2. Sinkings for fixings, joggles and lifting devices: Accurately aligned and positioned in relation to existing masonry.
3. Marking: Mark each block/ dressing clearly and indelibly on a concealed face to indicate the natural bed and position in the finished work.

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.

255 Ashlar blocks/ Dressings

1. Cutting and dressing stone: To true and regular surfaces, free from hollow or rough areas.

281 Fixings

1. Description: Requirement TBC following masonry survey from scaffold.
2. Type: Submit proposals.
3. Material: Grade 316 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

1. Replacement materials: To match existing.
2. Mortar: As section Z21.
3. Fixings: Cramps and dowels, as clause 281
4. Rebuilding: To match previous face and joint lines, joint widths and bonding. Adequately bonded to retained work/ backing masonry, as appropriate.
5. Joint surfaces: Dampen, as necessary, to control suction.
6. Laying masonry units: On a full bed of mortar; perpend joints filled.
7. Exposed faces: Remove mortar and grout splashes immediately.
8. Joints: To match existing

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.

340 Replacement of stone

1. Stone: As clause 240.
2. Bedding depths: To match existing.
3. Mortar: As section Z21 and subject to samples.
4. Fixings: Dowels and cramps, as clause 281
5. Joints: Very fine.

350 Stone inserts

1. Description:
2. Stone: As clause 240.
3. Finish: Flush and to match existing, subject to sample - allowing for hand finish.
4. Preparation and insertion: As clause 395.
5. Mortar: As section Z21.
6. Joints: Very fine.

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

1. Grout mix: See Z21.

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

1. Standard: To BS EN 1090-1
2. Dowels: Grade 316 stainless steel.
3. Adhesive: Epoxy resin
4. Holes for dowels: Suitably sized and accurately aligned in masonry background and in rear of replacement/ insert stone; clean and dry.
5. Other requirements: Do not use adhesive to bond stones at joints unless instructed.

410 Corroded 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.

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: Grade 316 stainless steel, phosphor bronze or copper allow wire.
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. MORTAR REPAIRS TO BE UNDERTAKEN BY ICON QUALIFIED CONSERVATOR.

520 Mortar repairs

1. Undercoats: As section Z21. Use Keim or Saint 1 specialist mortars subject to trial.
   1.1. Building up: In layers where necessary, each layer not exceeding 12 mm.
2. Finishing coat: To match approved samples.
3. Reinforcement: As 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. Mortar: As section Z21.
2. Preparation: Clean out cracks to remove debris, dust and dirt. Dampen recesses, as necessary, to control suction.
3. 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.

620 Resin injection repair of cracks

1. Preparation: Clean out cracks to remove debris, dust and dirt. Secure loose masonry units.
2. Exposed faces: Keep clean and free from stains.
3. Resin application: Use methods recommended by system manufacturer to fully bond masonry.
4. Completion: After resin has cured, remove temporary crack plugging material and protective coatings.

630 Ties

1. Holes: Drill carefully and accurately, in locations shown on drawings, to suit types and lengths of tie. Remove drilling dust and debris.
2. Adjacent masonry: Do not damage during drilling. Keep cavities behind facings free from debris.
3. Tie installation
    3.1. Expansion type anchor fixings: Set to the correct torque.
    3.2. Bonded ties: Grouted.
    3.3. Ends of ties: Keep back from face of masonry to allow for making good.
4. Exposed masonry faces: Clean and free from grout/ mortar stains.
5. Making good: Stone plugs to ashlars, as clause 692

640 Pinning

1. Dowels/ Pins
    1.1. Type: Grade 316 stainless steel.
2. Resin: Low viscosity resin to approval
3. Holes: Drill carefully, sloping downwards into background. Remove drilling dust and debris and keep dry.
4. Filling holes
    4.1. Check that dowel lengths are correct before filling with resin.
    4.2. Use sufficient resin so that when the dowel is inserted the resin is dispersed to achieve an effective repair.
5. Exposed faces: Keep clean and free from resin stains. Use temporary plugging material and/ or isolating membranes as necessary.
6. Clearances: Keep ends of ties and resin back from face of masonry.
7. Making good after resin has cured: Stone plugs to match existing. Either mortar as clause, as clause 690 or stone plugs as clause, as clause 692

690 Making good to insertion holes in mortar joints

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 3 holes before completing the remainder.

692 Making good to tie and dowel insertion holes in masonry units using core drilled plugs

1. Plugs: Cut plug from masonry face before drilling hole for each tie/ dowel. Where resulting plug is unusable, prepare plug from matching material.
    1.1. Plug diameter: Smallest practicable.
2. Holes: Clean.
3. Method of securing plug: A spot of epoxy resin and nonhydraulic lime:sand mortar
4. Joints: Fine and flush.
5. Finished appearance: Obtain approval for first 3 holes before completing remainder.

Grouting rubble filled cores

710 Preparation for grouting

1. Open joints in masonry: Seal with an approved temporary material to prevent leaking of grout. Leave weep holes every two or three courses to assist in flushing out dust and debris, and to prove effectiveness of grouting. Locate temporary seal back from facework to allow for specified repointing. Seek instructions if repointing precedes grouting.

712 Flushingout

1. Timing: Before grouting.
2. Requirement: Flush out using clean water delivered under moderate pressure through open joints.

720 Hand grouting

1. Description: Insertion holes are not to be drilled unless with prior agreement and instruction from the CA.
2. Grout mix: Subject to site trials.
3. Method: Direct grout into open joints using clay cups formed against masonry surface. Pour grout to refusal; allow to set; break off excess mortar and brush down masonry face.

740 Application of grouting

1. Grouting: Continuous operation.
2. Monitoring: Monitor grouting carefully and continuously at each delivery point (flow and delivery pressure), and at adjacent/ opposite wall faces, to ensure that there is an effective distribution of grout with no leaking, staining, or disruption to the masonry.
3. Temporary seals: Remove on completion of grouting and leave joints in a suitable condition for repointing.

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.
    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.

820 Pointing

1. Preparation of joints: As clause 810. Dampen joints, as necessary, to control suction
2. Mortar: As section Z21.

3. Joint profile/ finish: To match existing and approved sample. Recessed back from weathered arrises where necessary to retain original joint widths. Brushed finish, as clause 860.

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. Note: very fine joints in the stonework generally.
2. Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly as clause 820.
3. Other requirements: Grout deep voids, as clause 720.

850 Pointing with injection mortar

1. General: Inject mortar into joints so that they are fully filled with no voids.
2. Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly as clause 820.

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

C51
Repairing/ conserving timber

General

110 Inspection

1. Purpose: To confirm nature and extent of repair/conservation work to existing sarking boards and roof structures.
2. Parties involved: Architect, Structural Engineer and Contractor.
3. Instructions issued during inspection: To be confirmed in writing by CA.
4. Contractor is required to complete scheduling of repairs, documenting same and presenting to CA for agreement.

130 Opening up

1. Purpose: To reveal previously concealed areas of structure or fabric not recorded during initial surveys.
2. Extent: To be agreed. Generally roof structures where removals reveal further defect.
3. Timing: Give notice before starting opening up.
4. Retained building structure/ fabric: Do not damage or destabilize.

150 Timber procurement

1. Timber (including timber for wood-based products): Obtained from well-managed forests and/ or plantations in accordance with:
   1.1. The laws governing forest management in the producer country or countries.
   1.2. International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
2. Documentation: Provide either in accordance with the chain of custody certification scheme requirements:
   2.1. documentary evidence (that has been or can be independently verified) regarding the provenance of all timber supplied; or
   2.2. evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood-based products.

Structural repairs/ alterations

210 Structural repairs to timber roof structures

1. To Structural Engineer's Specification.

Products

320 Softwood for repairs to existing sarking boards

1. Species: To match existing timber to which the repair is being made. Selection subject to approved samples.
2. Grading standard: To the appropriate BS EN 14081-1 compliant standard.
   2.1. Grade: To Structural Engineer's specification.
3. Treatment
   3.1. Preservative treatment: Protim double vacuum. Following treatment, any areas of treated timber revealed by cross-cuts, holes, notches shall be brushed with a suitable end grain preservative.

4. Moisture content (maximum) at time of installation: 12-16% although as above care must be taken to match that of the existing timber. Allow for acclimatisation of replacement boards by storing in close proximity to required works before fixing. Give notice if existing timber is above the 16% moisture content threshold.
5. Other requirements:
    5.1. Finishing: Replacement boards to be stained on the soffit and side edges to match in with existing boards as seen from below. Finish subject to approved samples.
    5.2. Generally: Re-fix all retained sarking boards with stainless steel screws.

470 Nails

1. Standard: As section Z20.
2. Material: Stainless steel
    2.1. Strength (minimum): To Structural Engineer's Specifications

480 Screws

1. Standard: As section Z20.
2. Material: Stainless steel.
3. Tensile strength (minimum): To Structural Engineer's Specifications.

490 Coach screws

1. Standard: To DIN 571.
2. Material: Stainless steel.
3. Tensile strength (minimum): To Structural Engineer's Specifications.

540 Resin grout/ adhesive

1. Description: To Structural Engineer's Specification.

Execution

600 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.

610 Temporary supports/ propping

1. General: Provide adequate temporary support at each stage of repair work to prevent damage, overstressing or uncontrolled collapse of any part of the structure.
2. Bearings for temporary supports/ propping: Suitable to carry loads throughout repair operations.

620 Protection of timber and wood components before and during installation

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

630 Material samples

1. Representative samples of designated materials: Submit before placing orders.
    1.1. Designated materials: Timber boards for sarking board replacement, including stained finish to soffit and side edges.

650 Dimensions generally

1. Site dimensions: Take as necessary before starting fabrication.
    1.1. Discrepancies with drawings: Report without delay and obtain instructions before proceeding.

665 Cross section dimensions of non-structural softwood

1. Dimensions: Dimensions in this specification and shown on drawings are finished sizes.
2. Maximum permitted deviations from finished sizes: As stated in BS EN 1313-1, clause 6 for sawn sections.

690 Processing treated timber

1. Cutting and machining: Carry out as much as possible before treatment.
2. Extensively processed timber: Retreat timber sawn lengthways, thicknessed, planed, ploughed, etc.
3. Surfaces exposed by minor cutting and/ or drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

710 Reuse of timber sections/ wood components

1. Sections/ components scheduled to be removed but not reused in existing locations: Agree extent of retention for reuse elsewhere in the works.
    1.1. Treatment following removal:
    1.2. Storage: Protect against damage, and store until required.
        1.2.1. Storage location:
2. Reuse: Adapt sections/ components, as necessary, and install in agreed locations.

720 Temporary removal and reinstatement of fittings/ fixtures

1. Items to be removed, and reinstated on completion of repair work
    1.1. Identification: Attach labels or otherwise mark items using durable, non-permanent means, to identify location and refixing instructions, where applicable.
    1.2. Treatment following removal:
    1.3. Storage: Protect against damage, and store until required.
        1.3.1. Storage location:
    1.4. Reinstatement: Refit in original locations using original installation methods.
2. Items unsuitable or not required for reuse: Obtain instructions regarding disposal.

860 Moisture content checking

1. Procedure: Check moisture content of timber sections with an approved electrical moisture meter.
2. Test results: Keep records of all tests. If moisture content falls outside specified range obtain instructions.

870 Moisture content testing

1. Procedure: Test timber sections with an electrical moisture meter with deep probes. (A meter that has been carefully calibrated against oven drying tests or otherwise guaranteed by an independent testing authority.)
2. Test sample: Test 5% but not less than 10 lengths of each cross-section in the centre of the length.
3. Test results: 90% of values obtained to be within the specified range. Provide records of all tests.

Completion - Not Used

Ω End of Section

G20
Carpentry/ timber framing/ first fixing

Clauses

2 Timber procurement

1. Timber (including timber for wood based products): Obtained from well managed forests/ plantations in accordance with:
   1.1. The laws governing forest management in the producer country or countries.
   1.2. International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
2. Documentation: Provide either in accordance with chain of custody certification scheme requirements:
   2.1. Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied, or
   2.2. Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.
3. Chain of Custody Certification scheme:

3 Strength grading of timber

1. Grader: A company currently registered under a third party quality assurance scheme operated by a certification body approved by the UK Timber Grading Committee.

4 Grading and marking of softwood

1. Timber of a target/ finished thickness less than 100 mm and not specified for wet exposure: Graded at an average moisture content not exceeding 20% with no reading being in excess of 24% and clearly marked as 'DRY' or 'KD' (kiln dried).
2. Timber graded undried (green) and specified for installation at higher moisture contents: Clearly marked as 'WET' or 'GRN'.
3. Structural timber members cut from large graded sections: Regraded to approval and marked accordingly.

5 Graded timber for replacement gutter structures

1. Species: Accoya Grade A
2. Grading standard: To the appropriate BS EN 14081-1-compliant standard.
   2.1. Grade: Min Grade A1
3. Strength class to BS EN 338: C22
4. Surface finish: Sawn generally but planed to falls of gutter firring pieces.
5. Treatment: Treat any areas of timber revealed by cross-cuts, holes, notches shall be brushed with a suitable end grain preservative.

6 Graded timber for side Chapel and South Porch roof structures

1. Species: Accoya Grade A
2. Grading standard: To the appropriate BS EN 14081-1-compliant standard.
   2.1. Grade: Min Grade A1
3. Strength class to BS EN 338: C22
4. Surface finish: Sawn.
5. Treatment: Treat any areas of timber revealed by cross-cuts, holes, notches shall be brushed with a suitable end grain preservative.

8 Fascia boarding (to parapet gutters)

1. Grading standard: To the appropriate BS EN 14081-1-compliant standard.
2. Species and origin: Slow-grown Whitewood, Baltic, planed, free from wane, pitch pockets, decay and insect attack.
3. Moisture content at time of installation: 16% or less.
4. Thickness: 25mm
5. Jointing: Penny gaps with staggered joints.

30 Selection and use of timber

1. Timber members damaged, crushed or split beyond the limits permitted by their grading: Do not use.

32 Notches, holes and joints in timber

1. Notches and holes: Do not use without approval. Where confirmed by prior approval by CA, position in relation to knots or other defects such that the strength of members will not be reduced.
2. Scarf joints, finger joints and splice plates: Do not use without approval.

35 Processing treated timber

1. Cutting and machining: Carry out as much as possible before treatment.
2. Extensively processed timber: Retreat timber sawn lengthways, thicknessed, planed, ploughed, etc.
3. Surfaces exposed by minor cutting/ drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

36 Protection

1. Generally: Keep timber dry and do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.
2. Timber and components: : Store under cover, clear of the ground and with good ventilation. Support on regularly spaced, level bearers on a dry, firm base. Open pile to ensure free movement of air through the stack.

40 Moisture content

1. Moisture content of wood and wood based products at time of installation: Not more than:
    1.1. Covered in generally unheated spaces: 18%. Give notice if higher than 15%.
    1.2. Covered in generally heated spaces: 18%. Give notice if higher than 15%.
    1.3. Internal in continuously heated spaces: 18%. Give notice if higher than 15%.

41 Jointing timber

1. Joint type: To Engineer's specification.

42 Bolt/ Screw assemblies

1. Designation: Grade 316 stainless steel.
2. Size: To Structural Engineer's specifications.
3. Nuts and washers: Material grade and finish to suit bolts
4. Washer dimensions: Diameter/ side length of washers in contact with timber faces to be minimum 3 times bolt diameter, with a thickness not less than 0.3 times bolt diameter.

43 Bolted joints

1. Bolt spacings (minimum): To BS EN 1995-1-1, section 8.5.
2. Holes for bolts: Located accurately and drilled to diameters as close as practical to the nominal bolt diameter and not more than 2 mm larger.
3. Washers: Placed under bolt heads and nuts that would otherwise bear directly on timber. Use spring washers in locations which will be hidden or inaccessible.
4. Bolt tightening: So that washers just bite the surface of the timber. Ensure that at least one complete thread protrudes from the nut.
    4.1. Checking: At agreed regular intervals. Tighten as necessary.

Ω End of Section

H71 Rev 4.01
Lead sheet coverings/flashings

To be read with preliminaries/ general conditions.

2 ROOFING - VENTILATION ACCESSORIES

1. Nicholson Specialist Trade Supplies. PO Box 10943, London N12 9SJ, Tel: 0845 0095 980 FAX; 0845 6588 980, e mail: info@nicholsonsts.com
   Refer to Drawings for Types Required:
   Main Roof: EA 150
   Side Chapel Roofs: EA 100 and EA 150
   Installation: obtain goods at the correct angle to suite the particular use and detail, secure with stainless steel screws in accordance with the makers standard details

3 Hollow core roll lead roof coverings (Main Roof)

1. Covering system: Sand cast lead roof covering with hollow core rolls and rounded ridge.
2. Substrate: The existing timber boarded roof deck is to be over-boarded with new diagonally fixed penny jointed boarding - See K20.
   2.1. Preparation: Remove or drive home fixings following removal of existing lead. Re-fix existing sarking boards to secure. Overboard as above.
3. Sheet underlay: Plain building paper to BS 1521 Class A laid continuously across the slope with min 250mm weather lap.
4. Lead
   4.1. Type: Sand cast.
   4.2. Thickness: Code 8 min (or higher code as required by setting out).
5. Joints in direction of fall: Hollow cored roll without splash lap. Copper Clips within roll centres of clips at 450mm max which should be decreased to 300mm
   centres for severe exposures.
   5.1. Spacing: As drawings, subject to setting out. Regular and not more than 750mm.
6. Cross joints: Min 100mm vertical weathering height. Allow 250mm laps measured from nail centres with 2No lead burned clips with 6mm minimum expansion gaps.
   6.1. Spacing: As drawings, subject to setting out. Regular and never to exceed 2500mm.
7. Intermediate fixings: Not required.
8. Abutments: Min 100mm upstands.
9. Accessories: Apply chalk slurry/chalk rich paint coat to underside of lead (except at laps and rolls) and allow to dry before laying.

4 Eaves flashing to parapet gutter drops (Main roof)

1. Lead
   1.1. Type: Sand cast
   1.2. Thickness: Code 8 min.
2. Dimensions
   2.1. Lengths: Not more than 1500 mm.
   2.2. End to end joints: Welted joints. Laps not less than 100 mm.
   2.3. Lap to roof covering: Min 100mm vertical weathering. Allow 250mm lap.
   2.4. Cover to abutment: Not less than 100 vertical lap below bottom nail fixing of vertical cladding.
3. Fixing

3.1. Top edge: As clause 79.
3.2. Bottom edge: Clips.
3.3. Material: Lead
3.4. Spacing: Regular, subject to setting out. Max 300mm.

5 Vertical cladding to deep sided gutters (Main roof)

1. Covering system: Vertical cladding with welted seams.
2. Substrate: Timber fascia as K20.
3. Lead
   3.1. Type: Sand cast.
   3.2. Thickness: Code 8.
4. Joints in direction of fall: Welted seams
   4.1. Spacing: Regular, not more than 700mm. Setting out to be agreed with CA.
5. Fixing::
   5.1. Top edge: To clause 79
   5.2. Bottom edge: Clips.
   5.3. Material: Lead.
   5.4. Spacing: Regular, subject to setting out. Max 300mm (2no per vertical cladding sheet).
6. Intermediate fixings: Not required.
7. Accessories: Apply chalk slurry coat or chalk rich paint (except at laps) to underside of lead and allow to dry before fixing.

6 Solid core roll lead roof coverings (side Chapel roofs)

1. Covering system: Sand cast lead roof covering with solid core rolls.
2. Sarking or roof boarding: Penny jointed softwood sarking boards on new softwood structure - See K20.
3. Sheet underlay: Plain building paper to BS 1521 Class A laid continuously.
4. Lead
   4.1. Type: Sand cast.
   4.2. Thickness: Code 8 (or higher code as required by setting out).
5. Joints in direction of fall: Wood cored roll without splash lap and with bossed end caps - welded end caps are not permissible.
   5.1. Spacing: As drawings.
6. Cross joints: Drip with continuous ventilation. See drawing.
   6.1. Spacing: As drawings.
7. Intermediate fixings: Not required.
8. Abutments:
   8.1. Upstands: Min 100mm. Dress over existing stringcourse. This is to include the north abutment
   8.2. Top abutment: Turn lead up to achieve min 100mm upstand at the abutment. Dress over existing stringcourse and spot weld over fixings.
9. Accessories: Apply chalk slurry coat to underside of lead and allow to dry before laying
10. Ventilation:: Nicholsons Airtrak continuous eaves ventilator, sized to suit heights at the intermediate step and upstand to the gutter.

10 Gutter linings (Main Roof)

1. Substrate: Timber boarding on new sub-structure. See K20/G20.

2. Sheet underlay: Building paper to BS 1521, Class A1
3. Lead
   3.1. Type: Sand cast
   3.2. Thickness: Code 9 assumed, to suit setting out.
4. Cross joints: Min 70mm drips without splash lap.
   4.1. Spacing: Subject to setting out. Max 3,500mm.
5. Outlets: Sumps which throat downwards to outlets discharging into hoppers on the outside of the wall.
6. Abutment upstands:: Not less than 100mm high.
7. Falls: Subject to setting out. No less that 1:60 continuous fall towards outlet.
8. Accessories: Apply chalk slurry coat or chalk rich paint (except at laps) to underside of lead and allow to dry before laying.

11 Gutter linings (Side Chapel Roofs)

1. Substrate: Timber boarding on new sub-structure. See K20/G20.
2. Sheet underlay: Building paper to BS 1521, Class A1
3. Lead
   3.1. Type: Sand cast
   3.2. Thickness: Code 8
4. Cross joints: Min 60mm drips without splash lap.
   4.1. Spacing: As drawing (subject to setting out). Max 3,500mm.
5. Outlets: Sumps which throat downwards to outlets discharging into hoppers on the outside of the wall.
6. Abutment upstands:: Not less than 100mm high.
7. Falls:: Subject to setting out. No less that 1:80 continuous fall towards outlet.
8. Accessories: Apply chalk slurry coat or chalk rich paint to underside of lead and allow to dry before laying.

25 Ridge/ hip rolls to lead roofs

1. Roof covering: Rounded ridge with hollow rolls taken over; 1/3 sheet length taken over. Gussets of the same thickness lead to be installed in the at the ridge before forming the roll.
2. Capping: As above
   2.1. Laps in length: Min 100mm vertical weathering height to be maintained. Allow 250mm laps measured from nail centres of sheets beneath. 2No lead burned clips per tail edge with 6mm minimum expansion gaps.

35 Cover flashings Generally

1. Lead
   1.1. Type: Sand cast.
   1.2. Thickness: Code 6
2. Dimensions
   2.1. Lengths: Not more than 1500 mm.
   2.2. End to end joints: Laps of not less than 100 mm.
   2.3. Cover: Overlap to upstand not less than 75 mm.
3. Fixing
   3.1. Top edge: Lead wedges into bed joint.
   3.2. Bottom edge: Clips.

3.3. Material: Lead

3.4. Spacing: Regular, subject to setting out. Max 500mm.

3.5. Note: Flashings on side Chapel roofs to be dressed over stringcourse masonry.

3.6. Pointing into wall chase: Refer to drawn detail and subject to sample: mastic sealant and priming, capped with mortar.

36 Replacement of missing flashing section above West Porch

1. Lead
   1.1. Type: Sand cast
   1.2. Thickness: Code 7
2. Dimensions
   2.1. Lengths: Not more than 1500 mm.
   2.2. End to end joints: Welted to match existing.
   2.3. Cover: To match extant sheets on either side.
3. Fixing
   3.1. Top edge: Lead wedges into bed joint.
   3.2. Bottom edge: Clips.
   3.3. Material: Lead
   3.4. Spacing: Regular, subject to setting out. Max 300mm.
   3.5. Patination oil:: Apply one coat to exposed surfaces, underside of leading edges, clips as soon as practical, apply a smear coating to lead, evenly in one direction and in dry conditions.

60 Materials and workmanship generally

1. Lead production method: Hand cast: BBA-certified
2. Identification: Colour marked for thickness/ code, weight and type.
3. Workmanship standard: To BS 6915 and latest editions of 'Rolled lead sheet. The complete manual' published by the Lead Sheet Training Academy
4. Fabrication and fixing: To provide a secure, free draining and weathertight installation.
5. Marking out: Do not use scribers or other sharp instruments to mark out lead without approval.
6. Bossing and forming:: Straight and regular bends, leaving sheets free from ripples, kings, buckling and cracks.
7. Solder: Use only where specified.
8. Finished leadwork: Fully supported, adequately fixed to resist wind uplift but also able to accommodate thermal movement without distortion or stress.
9. Patination oil: Do not use unless specifically directed.

62 Lead-welding

1. In situ lead-welding: Not permitted within 7m of structure unless where expressly directed and agreed in advance, and undertaken under the management of a Hot Works Permit.

75 Timber for use with leadwork

1. Quality: Planed, free from wane, pitch pockets, decay and insect attack (ambrosia beetle excepted).
2. Moisture content: Not more than 16% at time of fixing and covering.
3. Preservative treatment: Organic solvent as section Z12 and Wood Protection Association Commodity Specification C8.

76 Laying sheet underlay

1. Handling: Prevent tears and punctures.
2. Laying: Fixed continuously across the roof slope with min 200mm vertical weather lap onto dry substrate.
   2.1. Fixing edges: With copper or stainless steel staples or clout nails.
   2.2. Do not lay over roof edges.
   2.3. Turn up at abutments.
3. Wood core rolls (side chapel roofs only): Fixed over underlay.
4. Protection: Keep dry and cover with lead at the earliest opportunity.

77 Preparation of existing timber substrates

1. Remedial work: Prepare old and new substrates as specified in K20.
2. Defective boards: Give notice.
3. Moisture content: Not more than 18% at time of covering. Give notice if greater than 16%.

78 Preparation of Lead - Application of chalk emulsion/slurry coat

1. Following preparation and bossing of the lead bay and before final fixing into place, the underside surface should be treated with the passivation coating.
2. The surfaces should be thoroughly cleaned and wire brushed to remove any mill scales, oxidation layers or previously formed corrosion products.
3. The coating should be brush applied to give a continuous thick coating of between 150 and 200 micrometers.
4. This may require more than one coat, depending upon the environmental conditions at the time of laying. If the lead is to be laid over substrates that may emit organic acids during their life (oak, sweet chestnut, various hardwoods or man-made boards containing adhesives – plywood, particle board and others) then an increased coating thickness is recommended.
5. The chalk enriched coatings may induce a small amount of capillarity of rainwater into the roof under severe exposure conditions. It is recommended that the coating be applied to some three quarters way around the inside of the roll (with or without splash laps) leaving a 30mm uncoated allowance on the edge.
6. For laps, an uncoated allowance should also be left at the bottom edge as follows::

   60° slope 70mm allowance
   30° slope 160mm allowance
   10° slope 220mm allowance
7. Drips and other details should be treated in a similar manner.
8. Coat wood battens to further enhance the passivation and protection treatment to the lead.
9. The coatings should be fully dried before the panel is finally installed on the roof.
10. Heating of the lead in cold weather, prior to application, will reduce the drying time.
11. Post Installation: : Following installation of the lead bays or weatherings all spillages on the top surfaces should be removed using warm water.
12. **This product should not be used in combination with patination oil**. A mixture of these two may result in surface staining and streaking of the topside lead.
13. Cleaning: : Brushes and other surfaces may be cleaned in water.
14. Manufactured by:: Rowan Technologies Ltd, 216 Church Road, Urmston, Manchester. Tel: 0161-748-3644, email: mail@rowantechnologies.co.uk

79 Fixing lead sheet

1. Top edge: Secured with two rows of fixings, 25 and 50 mm from edge, evenly spaced and staggered.

2. Fixings
   2.1. Nails to timber substrates: Copper clout nails to BS1202-2 , or stainless steel (austenitic) clout nails to BS 1202-1.
      2.1.1. Shank type: Annular ringed, helical threaded or serrated.
      2.1.2. Length: Not less than 20 mm or equal to substrate thickness.
   2.2. Screws to concrete or masonry substrates: Brass or stainless steel.
      2.2.1. Diameter: Not less than 3.35 mm.
      2.2.2. Length: Not less than 19 mm.
      2.2.3. Washers and plastics plugs: Compatible with screws.

80 Clips

1. Material
   1.1. Lead clips: Cut from sheets of the same thickness/ code as sheet being secured.
   1.2. Copper clips: Cut from 0.70 mm thick sheet to BS EN 1172, temper R220 (soft) or R240 (half hard) depending on position. Not to be used where exposed to view.
2. Dimensions
   2.1. Width: 50 mm.
   2.2. Length: To suit detail.
3. Fixing clips: Secure each to substrate with either two screw or three nail fixings not more than 50 mm from edge of lead sheet. Use additional fixings where lead downstands exceed 75 mm.

   Clip fixings to concrete and masonry shall be stainless steel screws with washers into polyamide plugs to give 40mm penetration.
4. Fixing lead sheet: Welt clips around edges and turn over 25 mm, maintaining min 6mm expansion gap.

83 Fixing into joints/ chases

1. Joint/ chase: Recut chase to required depth. Clean out and allow to dry before installation.
2. Lead: Dress into joint/ chase.
   2.1. Fixing: Lead wedges at not more than 450 mm centres, at every change of direction and with at least two for each piece of lead.
3. Finishing of joint: Sealant to rear of joint; pointed with lime mortar to front 25mm min.
   3.1. Sealant: Submit proposals
   3.2. Pointing: As Z21.
4. For joints above 18mm wide: Dress lead to form water check at the rear of the joint. Secure with stainless steel screw and washer. Include masking tape layer on top of the lead tuck-in (not to be visible in finished joint).

91 Hollow-cored roll (Main Roof)

1. Undercloak: Turn up 100mm.
2. Copper clips: Nailed to sarking boards in line with the rolls at max 450mm centres. Turn over the top of the undercloak upstand. Do not restrict thermal movement.
3. Overcloak: Turn up 125mm, then welt the top edge over the undercloak upstand. Turn/dress the prepared and clipped upstand to form the hollow roll. Do not restrict thermal movement. To reduce accumulated lead thickness where laps are in-line, cut part of the overcloak away at the lap, as directed in LCA The Ultimate Guide to Best Practice, Detail 207.

92 Wood-cored roll joints without splash lap (Side Chapel Roofs)

1. Wood core

1.1. Size: 45 x 45 mm round tapering to a flat base 25 mm wide. Splay cut at the front of the roll.

1.2. Fixing to substrate: Brass or stainless steel countersunk screws at not more than 300 mm centres.

2. Undercloak: Dress half way around core.
3. Copper or stainless steel clips: Fix to core at not more than 450 mm centres. Do not restrict thermal movement of the undercloak.
4. Overcloak: Dress around core with edge welted around ends of clips, finishing 5 mm clear of main surface.

94 Drips with without splash laps (parapet gutters)

1. Underlap: Dress into rebate along top edge of drip.

1.1. Fixing: One row of nails at 50mm centres on centre line of rebate.

2. Overlap: Dress over drip to just short of lower level.

98 Welted joints

1. Joint allowance: 50 mm overlap, 25 mm underlap.
2. Copper clips: Fix to substrate at 450 mm centres.
3. Overlap: Welt around underlap and clips and lightly dress down.

99 Patination oil

1. Do not use unless specifically directed.

100 Fire Precautions

1. Fire precautions are to be strictly observed at all times.
2. Form and pre-fabricate items off the building and confine welding operations on scaffold and roofs to the minimum.
3. Welding and soldering operations, including the lead burning of clips onto sheets or flashings insitu will only be permitted with a Hot Work Certificate.
4. Wherever possible, slip a thin sheet of Supalux sheet or similar between timber and any lead to be welded.
5. End all welding and soldering on roofs 2 hours before the end of the working day. The Leadworker is then to check the condition of adjacent woodwork from the top and whenever possible from the far side. A further inspection is to be made by the trades foreman of every area where flame has been used before the site is vacated in the evening.
6. Site a 10-litre fire extinguisher (gas pressure) and dry bucket of sand alongside every position where flame is used.
7. Tungsten halogen lights are not to be used for temporary lighting due to the heat and risk of explosion if knocked accidentally.
8. Additional fire detection and alert methods to be provided. Joint Fire Code to be observed. Contractor's risk assessment to be prepared and agreed with CA, including method for disseminating, reviewing and monitoring risk management.

101 Safety Precautions

1. Lead and its corrosion products are hazardous to health and care must be taken not to ingest or inhale them.
2. Wear a disposal dust mask and gloves which should be thrown away after each use, overalls which should be washed after each use.
3. Always scrub your hands and wash your face thoroughly when work is finished and before handling or eating food.
4. Sweep up any loose offcuts and corrosion products and dispose of them safely.

5. See also Fire Precautions above.
6. For further safety information, see Working with lead in construction: a guide to healthcare LSA (1996).

Ω End of Section

K20
New timber board/sarking

To be read with preliminaries/ general conditions.

25 Timber sarking boards (roofs and parapet gutters)

1. Substrate: As drawing.
2. Boards: To be fixed with penny gaps not exceeding 5mm, and staggered joints. This is to include fascia boards forming eaves upstands to parapet gutters.
   - 2.1. Reaction to fire: Class A2-s3, d2 or better.
   - 2.2. Wood species: Slow grown Whitewood, Baltic to approved sample.
   - 2.3. Quality: Free from wane, pitch pockets, decay and insect attack.
   - 2.4. Surface finish: Planed.
   - 2.5. Edge profile: Square.
   - 2.6. Finished face width (exposed width after fixing): 150mm maximum.
   - 2.7. Finished thickness: 25mm.
   - 2.8. Moisture content at time of fixing: 12-16%.
3. Treatment: ONLY WHERE SPECIFICALLY REQUIRED: To be vacuum/pressure treated with Tanalith preservative to comply with the treatment code TE/BI for a 60 year service life.
4. Fixing: 65 mm x 3.35 mm stainless steel annular ringed shank nails.
5. Termination of sarking at roof edges and junctions: In accordance with drawings and specification for roof covering.
6. Other requirements:
   - 6.1. Main Chapel roof: To be fixed diagonally above existing boards. Recess boards at the bottom of the roof slope to provide flush finish with lead apron. Round off edges to protect lead sheet. Specially machined rounded cap-piece at ridge Ex 75x50 to agreed profile.
   - 6.2. Separate wood from masonry with DPC.

Workmanship

41 Treated timber

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

50 Fixing boards

1. Protection during and after installation: Keep boards dry, clean and undamaged.
2. Environmental conditions: Do not fix boards when ambient temperature is at or below 0°C, or above 30°C.
3. Moisture content of timber supports at time of fixing boards: Not more than 18%. Give notice if higher than 15%.
4. Fixing: Fix boards securely to each support to give flat, true surface free from undulations, lipping, splits and protruding fasteners.
5. Timber movement: Position boards and fixings to prevent cupping, springing, excessive opening of joints and other defects.
6. Heading joints: Tightly butted, central over supports and at least two boards widths apart on any one support.
7. Edges: Plane off proud edges.
8. Exposed nail heads: Neatly punch below surface.

Ω End of Section

Z20
Fixings and adhesives

Products

300 Fixings into existing historic fabric

1. All new fixing locations to be agreed with Architect in advance.

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: Non-compressible, 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.

390 Adhesives generally

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.

410 Powder actuated fixing systems

1. Types of fastener, accessories and consumables: As recommended by tool manufacturer.

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.

640 Fixing cramps

1. Cramp positions: Maximum 150 mm from each end of frame sections and at 600 mm maximum centres.
2. Fasteners: Fix cramps to frames with screws of same material as cramps.
3. Fixings in masonry work: Fully bed in mortar.

670 Pelleted countersunk screw fixing

1. Finished level of countersunk screw heads: Minimum 6 mm below timber surface.
2. Pellets: Cut from matching timber, match grain and glue in to full depth of hole.
3. Finished level of pellets: Flush with surface.

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.

690 Using powder actuated fixing systems

1. Powder actuated fixing tools: To BS 4078-2 and Kitemark certified.
2. Operatives: Trained and certified as competent by tool manufacturer.

700 Applying adhesives

1. Surfaces: Clean. Adjust regularity and texture to suit bonding and gap filling characteristics of adhesive.
    1.1. Support and clamping during setting: Provide as necessary. Do not mark surfaces of or distort components being fixed.
2. 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.
2. Samples: 5no mortar 'biscuit' samples to be agreed with the CA and provided in advance of commencement.

   Approved recipe to be used to complete pointing samples on site; up to 2lm in up to 3 locations. These are to be maintained during the works as a control.

320 Sand for lime:sand masonry mortars

1. Type: Sharp, well graded.
   1.1. Quality, sampling and testing: To BS EN 13139.
   1.2. For joint size 1-5mm:: Sand: 1-2mm to 0.075mm
   1.3. For bedding and joint size 5-10mm:: Sand: 3-5mm to 0.075mm
   1.4. Sand to be clean sharp pointing sand, entirely free from organic matter.
   1.5. Sand to be of an approved colour to match adjacent work.
   1.6. Sand for facework mortar to be from one source, different loads to be mixed if necessary to ensure consistency of colour and texture.
   1.7. AGGREGATE: Where used for ashlar stone pointing to be a range of crushed stone and sand to an approved sample.

330 Ready prepared lime putty

1. Type: Slaked directly from CL 90 quicklime to BS EN 459-1, using an excess of water.
   1.1. Maturation: In pits/ containers that allow excess water to drain away.
   1.2. Density of matured lime putty: 1.3-1.4 kg/litre.
2. Maturation period before use (minimum): 90 days

331 Natural Hydraulic Lime (NHL)

1. Type: NHL 2 to EN 459 and BS 459
2. Manufacturer: Saint Astier.
3. Supplier: The Lime Centre

332 Quicklime

1. Type: Calbux Granular 15, medium to high reactivity quicklime.
2. Manufacturer/Supplier: Tarmac Buxton Lime.

340 Pozzolanic additives for nonhydraulic lime:sand mortars

1. Manufacturer/ Supplier: Rose of Jericho, Horchester Farm, Holywell, nr Evershot, Dorchester, Dorset DT2 0LL
   1.1. Product reference: Argical M1000. This material is composed of calcine china clay (Metakoalin).
2. Mixing: To supplier's specification.

3. Working time:: Where mortars are to be gauged with Argical M1000, powder shall be prepared not more than two hours before use. Thoroughly mix the mortar once again before use, again without the addition of water unless the mortar appears crumbly, when a small quantity of water may be added to improve plasticity. Avoid excess water. No gauged mortar shall be knocked-up for re-use.

345 Admixtures for hydraulic lime:sand mortars

1. Do not use in mortar unless specified or approved. Do not use calcium chloride or any admixtures containing calcium chloride. Admixtures, if specified, to be to BS EN 934-3.

360 Making lime:sand mortars generally

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

370 Site prepared nonhydraulic lime:sand mortars

1. Mixing: Mix materials thoroughly by compressing, beating and chopping. Do not add water.
   1.1. Equipment: Roller pan mixer or submit proposals.

390 Knocking up nonhydraulic lime:sand mortars

1. Knocking up before and during use: Achieve and maintain a workable consistency by compressing, beating and chopping. Do not add water.
   1.1. Equipment: Roller pan mixer or submit proposals.

400 Making hydraulic lime:sand mortars

1. Mixing hydrated hydraulic lime:sand: Mix the lime thoroughly with the selected aggregates and with the minimum amount of water to make coarse stuff workable, the mixed material being able to take a polish from the back of a shovel. Mix on a dry clean platform before any water is added and then again after watering.
2. Working time: The coarse stuff must be used within 2 hours and must not be knocked up after stiffening has taken place.

410 Recipes for mortars, plasters and mortar repairs

1. The specifications require the contractor to prepare samples and alternative recipes for CA to review in relation to each application area. Contractor to allow for selection process and submittals, starting with patties and moving on to application into sample areas and trials.
2. Include provisional sum of £1,500 for laboratory testing of existing mortars and analysis for matching (Sandberg or similar).

Ω End of Section

Specification created using NBS Chorus