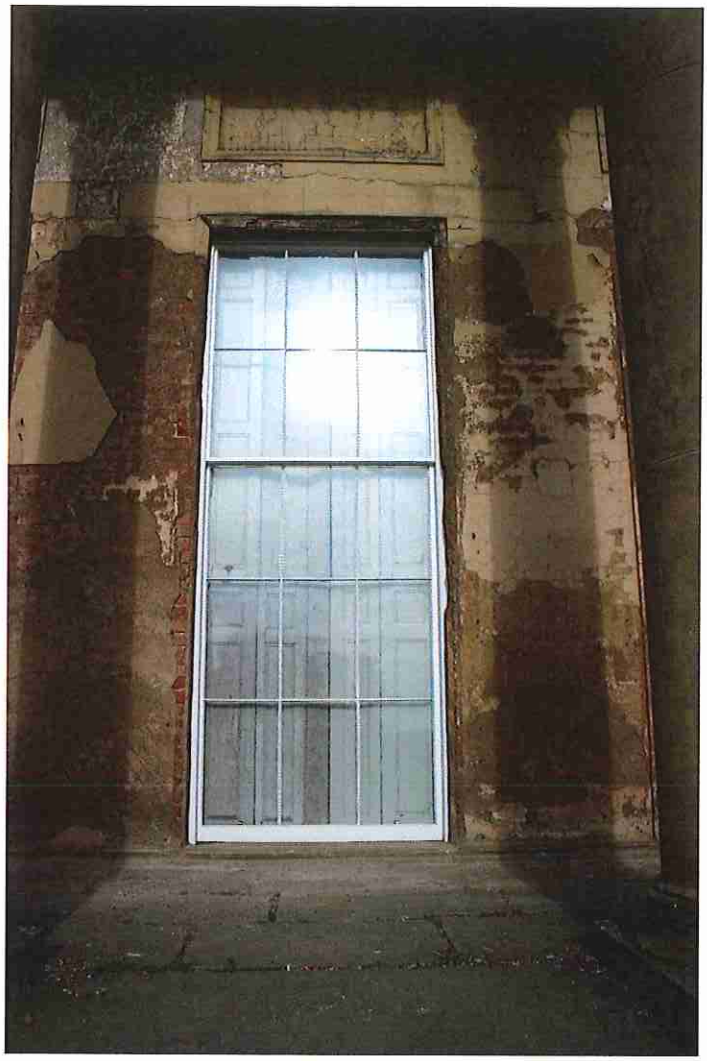
4306: HEATON HALL

Phase 4 Fabric Repairs

SPECIFICATION

DECEMBER 2016



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4306 Heaton Hall Phase 4 Fabric Repairs

14 December 2016

Table of Contents

Title	
C20	Demolition
C41	Repairing / renovating / conserving masonry
C51	Repairing / Renovating / Conserving timber
C52	Fungus / beetle eradication
D20	Excavating and filling
E10	Mixing / casting / curing in situ concrete
E20	Formwork for in situ concrete
E30	Reinforcement for in situ concrete
F21	Natural stone/ ashlar walling / dressings
H71	Lead sheet coverings / flashings
H75	Stainless steel strip / sheet coverings/ flashings
J41	Reinforced bitumen membrane roof coverings
L10	Windows / Rooflights / Screens / Louvres
L30	Stairs / ladders / walkways / handrails / balustrades
L40	General glazing
M20	Plastered / Rendered / Roughcast coatings
M60	Painting / clear finishing
Q10	Kerbs / edgings / channels / paving accessories
Q20	Granular sub-bases to roads / pavings
Q25	Slab / brick / sett / cobble pavings
R10	Rainwater pipework/ gutters
Z10	Purpose made joinery
Z11	Purpose made metalwork
Z20	Fixings/ adhesives
Z21	Mortars
Z22	Sealants

C20 Demolition

To be read with Preliminaries/ General conditions

GENERAL REQUIREMENTS

110 DESK STUDY/ SURVEY

- Scope: Before starting deconstruction/ demolition work, examine available information, and carry out a survey of:
  - the structure or structures to be deconstructed/ demolished,
  - the site on which the structure or structures stand, and
  - the surrounding area.
- Report and method statements: Submit, describing:
  - Form, condition and details of the structure or structures, the site, and the surrounding area.
    Extent: Wall to be part taken down and rebuilt using salvaged components as indicated on Drawing No. 4306/OE01, copings to be removed and reset from Orangery parapet and north Orangery garden walls, as indicated on drawing 4306/R02 .
  - Type, location and condition of features of historical, archaeological, geological or ecological importance.
  - 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.
  - Identity and location of services above and below ground, including those required for the Contractor's use, and arrangements for their disconnection and removal.
  - Form and location of flammable, toxic or hazardous materials, including lead-based paint, and proposed methods for their removal and disposal.
  - Form and location of materials identified for reuse or recycling, and proposed methods for removal and temporary storage.
  - Proposed programme of work, including sequence and methods of deconstruction/ demolition.
  - Details of specific pre-weakening required.
  - Arrangements for protection of personnel and the general public, including exclusion of unauthorized persons.
  - Arrangements for control of site transport and traffic.
  - Special requirements: Structural calculations in support of method statements .
- Format of report: Electronic submission supplemented by photographs .

120 EXTENT OF DECONSTRUCTION/ DEMOLITION

- General: Subject to retention requirements specified elsewhere, deconstruct/ demolish structures down to level of existing substrate / footing of Orangery garden wall where indicated on drawing No. 4306/OE01, copings only to be removed from Orangery parapet and north garden walls, and set aside for re-use, as 4306/R02.

130 GROUNDWORKS

- Old foundations, slabs and the like: Break out in locations and to the extents stated.
- Contaminated material: Remove, and carry out remediation required by the Enforcing Authority.

140 BENCH MARKS

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

150 FEATURES TO BE RETAINED
- General: Keep in place and protect the following: Remainder of the Orangery south garden wall not indicated for rebuilding, and parapet / north garden wall heads prior to re-setting the removed copings.

SERVICES AFFECTED BY DECONSTRUCTION/ DEMOLITION

210 SERVICES REGULATIONS
- Work carried out to or affecting new and/ or existing services: Carry out in accordance with the byelaws and/ or regulations of the relevant Statutory Authority.

220 LOCATION OF SERVICES
- Services affected by deconstruction/ demolition work: Locate and mark positions.
- Mains services marking: Arrange with the appropriate authorities for services to be located and marked.
  - Marking standard: In accordance with National Joint Utilities Group 'Guidelines on the positioning and colour coding of underground utilities' apparatus'.

232 SERVICES DISCONNECTION ARRANGED BY EMPLOYER AND CONTRACTOR
- Responsibility: The Employer will arrange with the appropriate authorities for disconnection of services and removal of fittings and equipment owned by those authorities prior to deconstruction/ demolition, as follows: None envisaged.
- Disconnection of remaining services: Arrange with the appropriate authorities. Remove fittings and equipment not owned by those authorities.
- Timing: Do not start deconstruction/ demolition until disconnections are completed.

250 LIVE FOUL AND SURFACE WATER DRAINS
- Drains and associated manholes, inspection chambers, gullies, vent pipes and fittings:
  - Protect; maintain normal flow during deconstruction/ demolition.
  - Make good any damage arising from deconstruction/ demolition work.
  - Leave clean and in working order at completion of deconstruction/ demolition work.
- Other requirements: None envisaged.

260 SERVICE BYPASS CONNECTIONS
- 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.
- Minimum notice to adjoining owners and all affected occupiers: 72 hours, if shutdown is necessary during changeover.

270 SERVICES TO BE RETAINED
- Damage to services: Give notice, and notify relevant service authorities and/ or owner/ occupier regarding damage arising from deconstruction/ demolition.
- Repairs to services: Complete as directed, and to the satisfaction of the service authority or owner.

DECONSTRUCTION/ DEMOLITION WORK

310 WORKMANSHIP
- Standard: Demolish structures in accordance with BS 6187.
- Operatives:
  - Appropriately skilled and experienced for the type of work.
  - Holding, or in training to obtain, relevant CITB Certificates of Competence.
- Site staff responsible for supervision and control of work: Experienced in the assessment of risks involved and methods of deconstruction/ demolition to be used.

320 GAS OR VAPOUR RISKS
- Precautions: Prevent fire and/ or explosion caused by gas and/ or vapour from tanks, pipes, etc.

330 DUST CONTROL
- General: Reduce airborne dust by periodically spraying deconstruction/ demolition works with an appropriate wetting agent. Keep public roadways and footpaths clear of mud and debris.
- Lead dust: Submit method statement for control, containment and clean-up regimes.

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

360 STRUCTURES TO BE RETAINED
- Extent: As 4306/OE01.
- Parts which are to be kept in place: Protect.
- Interface between retained structures and deconstruction/ demolition: Cut away and strip out with care to minimize making good.

391 ASBESTOS-CONTAINING MATERIALS – UNKNOWN OCCURRENCES
- Discovery: Give notice immediately of suspected asbestos-containing materials when discovered during deconstruction/ demolition work. Avoid disturbing such materials.
- Removal: Submit statutory risk assessments and details of proposed methods for safe removal.

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

MATERIALS ARISING

510 CONTRACTOR'S PROPERTY
- Components and materials arising from the deconstruction/ demolition work: Property of the Contractor except where otherwise provided.
- Action: Remove from site as work proceeds where not to be reused or recycled for site use.

511 EMPLOYER'S PROPERTY
- Components and materials to remain the property of the Employer: Components of orangery garden south boundary wall to be built back into the works .
- Protection: Maintain until these items are removed by the Employer or reused in the Works, or until the end of the Contract.
- Special requirements: Mark / label location in the finished works as necessary.

520 RECYCLED MATERIALS
- 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.
- Evidence of compliance: Submit full details and supporting documentation.
  - Verification: Allow adequate time in programme for verification of compliance.

C41 Repairing/ renovating/ conserving masonry

To be read with Preliminaries/ General conditions

GENERALLY/ PREPARATION

110 SCOPE OF WORK
- Local areas of masonry repairs and repointing of the existing Orangery south wall masonry, and repair and renewal of coping stones to the main Orangery roof parapet walls, as indicated on Drawing No. 4306/EE02 and R02 .

120 REVIEWING SCOPE OF THE WORK
- Inspection: Arrange before starting work. Confirm type and extent of work required.
- Marking: Mark clearly, but not indelibly, on face of masonry units or parts of units to be cut out and replaced.
- Identification of masonry units to be removed, replaced or repaired: Code number cross-referenced to drawings/ photographs.
- Records of masonry to be repaired: Before starting work, use measurements and photographs as appropriate to record bonding patterns, joint widths, special features, etc.

125 REDUNDANT FITTINGS/ FIXINGS
- Items to be removed: Any embedded iron, redundant fixings, wood dowels, vegetation and other deliterious material .
- Removal: Minimize disturbance to surfaces.

130 REMOVAL OF PLANT GROWTHS FROM MASONRY
- Plants, root systems and associated soil/ debris: Carefully remove from joints, voids and facework.
- Removal of roots: Use dampened temporary wood wedges or other approved method to assist removal. Where growths cannot be removed completely without disturbing masonry seek instructions.
- Plants to remain in the ground: Cut out a section of stem as close to the ground as possible. Peel bark back from stump and apply herbicide paste. Leave stump to wither.

140 RECORD DRAWINGS
- General: Maintain accurate records of work carried out to masonry as follows: Mark up elevation drawings at time of survey, and amend 'as built' .
- Submission: At completion.
  - Copies: 2 No. marked up copies to be handed to the CA at Practical Completion .

WORKMANSHIP GENERALLY

150 POWER TOOLS FOR REMOVAL OF MORTAR
- Usage: Not permitted .

155 PUTLOG SCAFFOLDING
- Usage: Not permitted .

160 PROTECTION

- Handling of masonry units: Prevent overstressing during transit, storage and fixing. Lift units at designed lifting points where provided.
- Storage of masonry units: On level bearers clear of the ground, separated with resilient spacers. Protect from adverse weather and keep dry. Prevent soiling, chipping and contamination by salts and other deleterious substances.
- Protection of masonry: Suitable nonstaining slats, boards, etc. Remove at completion.
  - Prevent damage, particularly to arrises, projecting features and delicate, friable surfaces.
  - Prevent mortar/ grout splashes and other staining and marking.

165 STRUCTURAL STABILITY

- 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

- Retained masonry in the vicinity of repair works: Disturb as little as possible.
- Existing retained masonry: Do not cut or adjust to accommodate new or reused units.
- Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

180 OPERATIVES

- General: Skilled and experienced with the materials and procedures required.
  - Evidence of training and previous experience: Provide on request.

185 ADVERSE WEATHER

- Frozen materials: Do not use. Do not lay masonry units on frozen surfaces.
- Air temperature: Do not bed masonry units or repoint:
  - In cement gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising (unless mortar has a temperature of not less than 4°C when laid and the masonry is thoroughly protected).
  - In hydraulic lime:sand mortars when at or below 5°C and falling or unless it is at least 3° C and rising.
  - In nonhydraulic lime:sand mortars in cold weather without approval.
- Temperature of the work: Maintain above freezing until mortar has fully set.
- Rain and snow: Protect masonry by covering during precipitation and at all times when work is not proceeding.
- Hot conditions and drying winds: Prevent masonry from drying out too rapidly.
- New mortar damaged by frost: Rake out and replace.

190 CONTROL SAMPLES

- General: Obtain approval of the following before proceeding with the remainder: Repointing : First stage approval after raking out of existing joints, an area approximately 1 metre square, followed by second stage approval after repointing.
  Repairs to stone: Approval of material sample MUST be given by CA prior to ordering, followed by approval of typical indent repair .
  Protection: Protect from adverse weather and damage.

195 SAND SAMPLES

- Approval: Before placing order, submit for approval representative samples of: Sands for bedding and pointing, including prepared mortar sample as clause 190 .

MATERIAL/ PRODUCTION/ ACCESSORIES

215 SAMPLES

- Inspection: Make arrangements for the to inspection of samples of the following materials: Dressed stone as C41/240 .
- Samples: Representative of the range of variation in appearance for each type of material to be matched.
- Appearance: Obtain approval before placing orders with suppliers or proceeding with production.
- Approved samples : Keep both on site and at supplying quarry / quarries . for reference purposes. Protect from damage.

220 RECORDING PROFILES

- Profiles: Take measurements from existing masonry units, as instructed, to allow replacements to be matched accurately.
- Recording in situ: If there are no suitable joints for inserts, seek instructions.
- Drawings and templates: Prepare as necessary, clearly and indelibly marked to identify use and location.

230 INSPECTION OF DRAWINGS/ TEMPLATES

- Give notice: Before commencing production of the following replacement masonry units: St ring course, hood mould, replacement sections to pinnacles etc .
  - Period of notice (minimum): Two weeks .

240A STONE GENERAL WALLING MASONRY

- Type: Buff Sandstone to match existing walling stone, and as supplied for previous phase of works. Sowerby Bridge or similar. Contractor to submit samples for CA approval .
- Requirements: Free from vents, cracks, fissures, discolouration, or other defects which may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.
- Finish: Tooled to match existing .
- Supplier: Contractor's choice to CA approval .

240B STONE TO COPINGS, STRING COURSES, WINDOW SURROUNDS AND OTHER DRESSED FEATURES

- Type: Buff Sandstone to match existing walling stone, and as supplied for previous phase of works. Sowerby Bridge or similar. Contractor to submit samples for CA approval .
- Requirements: Free from vents, cracks, fissures, discolouration, or other defects which may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.
- Finish: Tooled to match existing .
- Supplier: Contractor's choice to CA approval .

245A REPLACEMENT STONE UNITS

- Minimum bed depths and agreed face lines in relation to existing work: Maintain. Make suitable allowances for any final finishing carried out in situ.
- Sizes and profiles: To match existing masonry; existing joint widths maintained.
- Sinkings for fixings and joggles: Accurately aligned and positioned in relation to existing masonry. Provide sinkings for lifting devices.
- Marking: Each block/ dressing clearly marked on a concealed face to indicate the natural bed and position in the finished work.
  Stones are to be cut so that they are laid on bed and at right angles to the line of thrust in arches. Face bedded units are not permitted without prior consent of the CA.

250 ORIENTATION OF STONE

- Natural bed:
  - In plain walling: Horizontal
  - In projecting stones and copyings: Vertical and at right angles to wall face.
  - In arches: At right angles to line of thrust.

255 ASHLAR BLOCKS/ DRESSINGS

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

281A FIXINGS FOR REPLACEMENT STONEWORK

- Procurement: Selected by the specialist contractor/ supplier. Submit details of proposed fixings, and agree with structural engineer if considered necessary.
- Material: All dowels and cramps and other fixing types as necessary to be austenitic stainless steel.
- Type, size, strength and number: As necessary to resist all loads likely to occur during the life of the building, and to prevent any lateral displacement or pulling apart of the construction.

DISMANTLING/ REBUILDING

310A DISMANTLING MASONRY FOR REUSE COPINGS TO ORANGERY PARAPET WALLS

- Masonry units to be reused: Remove carefully and in one piece.
- Identification: Where masonry is to be removed temporarily, identify each unit clearly and indelibly on concealed faces indicating their original positions in the walling can be readily identified.
- Old mortar, dirt and organic growths: Clean off and leave masonry in a suitable condition for rebuilding.

320A REBUILDING COPINGS TO ORANGERY PARAPET WALLS

- Replacement materials: Existing coping stones rebbeded on Orangery parapet wall heads, and lower 'garden' wall to the north of the Orangery where roof finishes are renewed. See drawing 4306/R02 for details .
- Mortar: As section Z21.
  - Mix: 1:3 NHL 3.5 hydraulic lime : sand .
  - Sand source/ type: Well graded crushed stone to approved sample, 4 parts course to 5 parts fine .
- Fixings: Cramps and dowels as clause 281A .
- Rebuilding: To match previous face and joint lines, joint widths and bonding and adequately bonded to retained work and backing masonry, etc.
- Joint surfaces: Dampen to control suction as necessary.
- Laying: On a full bed of mortar, and all joints filled.
- Exposed faces: Keep clear of mortar and grout.
- Joints: Conservation flush joints .
- Other requirements: Locate on dowels resin fixed to the wall head, as described on drawing 4306/R02 .

REPLACEMENTS AND INSERTIONS

330 PREPARATION FOR REPLACEMENT MASONRY

- Defective material: Carefully remove to the extent agreed. Do not disturb, damage or mark adjacent retained masonry.
- Existing metal fixings, frame members, etc: Report when exposed.
- Redundant metal fixings: Remove completely.
- Recesses: Thoroughly clean to remove loose material and leave joint surfaces in a suitable condition to receive replacement units. Protect from adverse weather.

340A REPLACEMENT OF STONE PLAIN ASHLAR, FULL BLOCK

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Bedding depths: To match exsting, assume min. 150mm .
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: Stainless sreel dowels / cramps as necessary, as clause 281 .
- Joints: As clause 320 .
- Other requirements: Carefully cut out ashlar blocks, in one piece if possible, and insert new stone on 1:3 lime sand mortar bedding (and backing if applicable). Keep mortar back from face 25mm, or twice the height of the joint, for later repointing .

340B REPLACEMENT OF STONE CARVED WORK, FULL BLOCK

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Bedding depths: To match exsting, assume 100 - 150mm .
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: Stainless sreel dowels / cramps as necessary, as clause 281 .
- Joints: As clause 320 .
- Other requirements: Carefully remove all mouldings / copings etc, in one piece if possible, and insert new stone on 1:3 lime sand mortar bedding (and backing if applicable). Keep mortar back from face 25mm, or twice the height of the joint, for later repointing .

340C REPLACEMENT OF STONE PLAIN ASHLAR, PART BLOCK

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Bedding depths: To match exsting, assume 100 - 150mm .
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: Stainless sreel dowels / cramps as necessary, as clause 281 .
- Joints: As clause 320 .
- Other requirements: Carefully cut back existing block to an agreed line full depth, and hand dress the remaining section to a sharp arris. Insert new stone on 1:3 lime sand mortar bedding (and backing if applicable). Keep mortar back from face 25mm, or twice the height of the joint, for later repointing .

350A STONE INSERTS PLAIN ASHLAR, FULL FACE REPLACEMENT

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Finish: Flush and to match existing.
- Preparation and insertion: As clause 395.
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: As clause 320, if considered necessary .
- Joints: Very fine.
- Other requirements: Only to be used where blocks are min 200mm thick. No resin / adhesives are to be used as a bonding material for inserts, although such use is permitted for securing to dowels. A positive 3 - 5mm mortar pointed joint should be formed between the insert and surrounding masonry, and similarly mortar should be used as a bedding and backing material .

350B STONE INSERTS PLAIN ASHLAR, PART FACE REPLACEMENT

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Finish: Flush and to match existing.
- Preparation and insertion: As clause 395.
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: As clause 320, if considered necessary .
- Joints: Very fine.
- Other requirements: Only to be used where blocks are min 200mm thick. No resin / adhesives are to be used as a bonding material for inserts, although such use is permitted for securing to dowels. A positive 3 - 5mm mortar pointed joint should be formed between the insert and surrounding masonry, and similarly mortar should be used as a bedding and backing material .

350C STONE INSERTS CARVED WORK, PART FACE OR PART BLOCK REPLACEMENT

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Finish: Flush and to match existing.
- Preparation and insertion: As clause 395.
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: As clause 320, if considered necessary .
- Joints: Very fine.
- Other requirements: Part block or indent replacement of projecting, weathering, or other detailed work such as copings and window and door surrounds etc. Only to be used in indent form where blocks are min 200mm thick. No resin / adhesives are to be used as a bonding material for inserts, although such use is permitted for securing to dowels. A positive 3 - 5mm mortar pointed joint should be formed between the insert and surrounding masonry, and similarly mortar should be used as a bedding and backing material, NOTE: Any inserts corresponding to the full height of projecting weathering courses are to extend the full depth of the stone into the wall, (ie part block replacements), to ensure their stability in the finished work .

350D STONE INSERTS CARVED WORK, FULL FACE REPLACEMENT

- Stone: Buff Sandstone to match existing as clause 240A / 240B.
- Finish: Flush and to match existing.
- Preparation and insertion: As clause 395.
- Mortar: As section Z21.
  - Mix: As clause 320 .
  - Sand source/ type: As clause 320 .
- Fixings: As clause 320, if considered necessary .
- Joints: Very fine.
- Other requirements: Full face indent replacement of projecting, weathering, or other detailed work such as copings and window and door surrounds etc. Only to be used in indent form where blocks are min 200mm thick. No resin / adhesives are to be used as a bonding material for inserts, although such use is permitted for securing to dowels. A positive 3 - 5mm mortar pointed joint should be formed between the insert and surrounding masonry, and similarly mortar should be used as a bedding and backing material .

385 LAYING REPLACEMENT MASONRY

- Exposed faces of new material: Keep to approved face lines.
- Faces, angles and features: Accurately align. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
- Joint surfaces: Dampen to control suction as necessary.
- Laying: On a full bed of mortar, all joints filled.
- Exposed faces: Keep clear of mortar and grout.

395A STONE INSERTS

- Pockets to receive inserts:
  - Cut out accurately. Undercut sides of pocket where necessary to provide space for bonding material.
  - Adjust depth so that insert stands proud of existing stone for finishing in situ. Clean out thoroughly.
- Inserts: Cut to the smallest rectangular shape necessary to replace the defective area and provide a firm seating. Install accurately and securely.
  - Exposed faces: Keep clear of mortar. NOTE: No resin / adhesives should be used as bonding materials, all inserts should be bedded backed and pointed in mortar, as clause 320, 350, and Section Z21.
- Existing joint widths: Maintain. Do not bridge joints.
- Replacement cramps: From new shoulders as required.

405 BONDED DOWELS FOR STONE INSERTS

- Dowels: 6mm diameter austenitic stainless steel .
  - Secured into clean, dry holes with adhesive. Do not use adhesive to bond stones at joints unless agreed otherwise.
  - Adhesive: Epoxy resin to contractor's choice .
  - Additional requirements: NOTE: No resin / adhesives should be used to bond stone inserts to existing retained material. All inserts should be bedded backed and pointed in mortar, as clause 320, 350, and Section Z21. .
- Holes:
- Drilled in the background and the rear of the replacement/ insert to receive dowels and adhesive.
  - Aligned to allow accurate positioning of the replacement/ insert.

410 CORRODED FIXINGS

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

420 TEMPORARY DISTANCE PIECES FOR JOINTS IN ASHLAR STONEWORK

- Material: Lead or stainless steel distance pieces.
- Purpose: To provide well distributed support and ensure correct joint width.
- Removal: When mortar/ grout is sufficiently strong.

TOOLING/ DRESSING STONE IN SITU

450 WEATHERING LEDGES AT JOINTS

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

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

458 REDRESSING STONE
- Requirement: Carefully dress back stones to the extent agreed.
- Method: Suitably graded carborundum blocks or tooling as appropriate.

POINTING/ REPOINTING

810 PREPARATION FOR REPOINTING
- Removing mortar:
  - Work from the top of the wall downwards.
  - Remove carefully and without damaging adjacent masonry, arrises or widening joints.
- Recess for repointing: Form a neat recess of depth not less than 25mm minimum or twice the thickness of the joint When mortar beyond this depth is loose and friable and/ or cavities are found seek instructions.
- Dust and loose debris. Remove. Dampen joints to control suction as necessary.

820 POINTING STONEWORK GENERALLY
- Preparation of joints: Rake out (if soft) or chop back (if hard) to a clean depth of 25mm minimum or twice the width of the joint. The old mortar is to be left with a square face, and the arisses lighly dressed to exclude water traps. The use of power tools is forbidden, all work is to be carried out by hand .
- Mortar: As section Z21.
  - Mix: 1:3 Hydraulic Lime (NHL 3.5) : Sand .
  - Sand source/ type: Well graded crushed stone to approved sample, 4 parts course to 5 parts fine .
- Joints: Conservation flush joints: The cleaned joint is to be flushed out with clean water and ironed in with a pointing iron, bringing the mortar out of the joint slightly. After the initial set has taken place the mortar face is to be knocked off, then hit back with a stiff bristle brush to compact the mortar within the joint thoroughly, while also exposing the aggregate .
- Other requirements: Any loose or flaking masonry is to be dressed back lightly by hand .

C51 Repairing/ Renovating/ Conserving timber

To be read with Preliminaries/ General conditions

GENERAL

110 INSPECTION

- Purpose: To confirm nature and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.
- Parties involved: Contractor's representative, Architect, Foreman carpenter / joiner, Timber treatment specialist (Robinson's Preservations Ltd., or Contractor's choice to CA approval).
- Timing: On completion of the access scaffolding works to facilitate a detailed survey of the central block windows, and at least two working days before the window repair works are due to commence.
- Instructions issued during inspection: Architect / Joinery specialist to produce schedules of work based on the inspection detailing the agreed scope of works, to be remeasured against LEP Window Schedules 4227A/WS01 - WS02. Timber Treatment specialist to produce a costed timber repair schedule based on the findings of any areas where rot is suspected, for confirmation on architect's instruction prior to commencement of the works.

130 OPENING UP

- Purpose: To reveal previously concealed areas of structure or fabric not recorded during initial surveys.
- Extent: Isolated areas to be agreed during inspections (clause 110), for opening up by the contractor to enable the Timber treatment specialist to complete his recommendations.
- Timing: Give notice before starting opening up.
  - Period of notice: At least 48 hours.
- Retained building structure/ fabric: Do not damage or destabilize.

150 TIMBER PROCUREMENT

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

160 TIMBER SUPPLIER

- Supplier: Contractor's choice, submit proposals.

PRODUCTS

310 STRUCTURAL SOFTWOOD (GRADED DIRECT TO STRENGTH CLASS) C24
- Grading standard: To BS 4978, BS EN 519, BS EN 14081-1 or other national equivalent and so marked.
- Strength class to BS EN 338: To Structural Engineer's recommendations.
- Treatment: Organic solvent to British Wood Preserving and Damp Proofing Association Commodity Specification C8, or fire retardand impreganation FR3, Type B (humidity resistant), as appropriate.
- Moisture content (maximum) at time of installation: 20%.
- Other requirements: Refer to Structural Engineer.

340 STRUCTURAL HARDWOOD (STRENGTH CLASS NOT SPECIFIED) FOR STRUCTURAL USE GENERALLY
- Species and origin: Oak.
- Grading standard: To BS 5756 and so marked.
  - Grade: To be determined.
- Surface finish: Planed all round.
- Treatment: As Clause 310.
- Moisture content (maximum) at time of installation: As supplied.
- Other requirements: Refer to Structural Engineer.

480 SCREWS FOR GENERAL USE
- Standard: As section Z20.
- Material: Stainless Steel.
- Tensile strength (minimum): General purpose.
- Finish as delivered: As supplied.

530 NON FERROUS DOWELS FOR SASH BOX LINING REPAIRS
- Material: Hardwood to Structural Engineer's approval.
- Manufacturer: Supplier to be approved by Structural Engineer.
  - Product reference: 20mm diameter hardwood dowels.

540 RESIN GROUT/ ADHESIVE FOR SURFACE REPAIRS GENERALLY
- Type: Note: This method is to be used for insitu repairs to sash box linings ONLY AS A LAST RESORT, where no alternatve repair technique / method is considered viable. Gap fiiling epoxy resin.
- Manufacturer: Contractor's choice, to CA approval.
  - Product reference: To CA approval.

EXECUTION

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

605 REPAIRS TO TIMBER WINDOWS

The following criteria should be adopted in any works to refurbish the windows at the Hall:

Timber sash windows to the South elevation of the Orangery, and casement to the north and east elevations and into the service yard are to be refurbished in situ, incorporating repair techniques which will minimise the loss of original fabric, and using like for like materials. Replacement will only be considered where a window is deemed to be beyond economic repair, and any new windows will be faithful reproductions of the originals in terms of section sizes, and pattern.

Generally the windows are traditional timber vertically sliding sash windows to the Orangery south front, and casement windows to the other 'service' elevations, all of which are externally putty glazed with 'crown' glass.

EXTENT OF WORKS TO EXISTING ORANGERY TIMBER WINDOWS

The scope of works envisaged in the tender documentation has been compiled from limited inspections externally from the ground. Access to all areas is difficult and for that reason timber to casements and sash boxes will need to be carefully inspected for wet and dry rot and wood-boring insects to firm up the scope of work once scaffold access is afforded. Any defective areas found are to be cut out and replaced using splice repair techniques included as part of this specification.

Timber for Repairs

Timber for window repairs will be generally to BS EN 942, and will be carefully selected to match the existing as closely as possible, whilst being free of knots, fissures, shakes, heartwood, etc. The new timber will be worked to the line of the existing timber to match size and profile. Replacement timber should meet the following criteria:-

- 100% heartwood. Pitch Pine / Baltic Redwood with Oak cills.
- Close grained (8 – 10 grains per centimetre).
- Radially cut, with the radial cut inserted parallel to the widest dimension of the repair object.
- Air seasoned, NOT kiln dried, for at least two years, and in the workshop for as long as possible prior to use.

As a guide the likely wood species for general repairs is Pitch Pine with Oak cills, but this will be confirmed on site. Douglas Fir may be an alternative to Pitch Pine, dependent on availability.

Glass

Existing damaged glass is to be removed and carted away, for which the putty may have to be softened. This can be achieved by the following methods:-

- Application of organic solvent paint stripper.
- Using a soldering iron.
- Applying household bleach.
- Applying a mixture of 1:3 potassium carbonate and quick lime.

Putty

Reglazing of the timber sash casements will be undertaken in linseed oil putty. Where metal fixing sprigs or pins are required these should be fixed with a small gap between the sprig and the glass to avoid fracturing the thin delicate glass.

Guidelines for Repairs

The following principles will apply in the execution of the repairs:-

- Where decayed timber is to be removed to form a splice repair, the minimum amount of existing timber should be removed to allow an effective repair to be formed.

- Always work new material to the line of the existing and avoid unnecessary trimming of the original timber. Repairs should follow any existing deformations in the line of the window.
- Avoid mixing timber species between new and existing in a repair as the joint between the two is likely to fail from different rates of expansion and contraction during dry and damp conditions.
- When carrying out a repair, try to ensure that the structural integrity of the window is maintained and that the window continues to work as it was designed to do.
- Where possible, spliced repairs should be designed to ensure that moisture is directed towards the outer face of the timber and that moisture does not lay on the repair joint. The length of the splice is governed by the section of timber and the nature of the component being repaired and it should be designed to ensure an effective bond between the new and existing sections of timber.
- Wherever possible, splice repairs should be formed which include mechanical fixings (eg timber pegs/dowels or non-ferrous screws/pins) as well as glue. Screw or pin fixings should ideally be made from the inner face of the window.
- Well-seasoned timber should be used in forming a repair with the line and density of the grain (number of growth rings) of the new timber matching the existing as closely as possible. As with all joinery work, timber with shakes, fissures, warping, heartwood, sapwood or numerous/large knots should be avoided for use in repair.
- Avoid previous design faults when carrying out repairs. Consider modifying a method of construction (or a previous repair) where it is liable to lead to further decay.
- If possible, repair to window frames should be formed in-situ especially where the frame is built-in and cannot be removed without damaging either the window or surrounding wall. In general, casements/sashes can be easily removed without damage to be repaired on site or in a joinery workshop. Sash casements are generally to be removed for repair, the box frames / linings repaired in situ.
- Where windows are to be dismantled as part of the repair process, always mark and record the constituent parts before dismantling, especially where a significant number of windows are to be repaired. Similarly, always number glass panes before removal.

All repairs will enable fully free working components, or repaired frames will be screwed shut where required, and will be executed in accordance with LEP Drawing Nos. 4306/WR03, and repair schedules 4306/WS01 - WS04, and 'The Society for the Protection of Ancient Buildings Technical Pamphlet 13 – Repair of Wood Windows'.

Sash weights, cords, etc. are to be checked, and any necessary replacement undertaken as part of the works. The bottom casements of the south Orangery are likely to require new cords and weights if they are to be made operational, due to the additional weight of glass to be fitted in the lower 6 no. panes as part of the proposed refurbishment works.

Preparation for Decoration

Under no circumstances should windows be immersed in caustic soda or other acid bath treatments. Following stripping, frames are to be rubbed down with wet abrasive paper and primed ready for decorating. Concealed surfaces are to be primed and undercoated prior to re-fixing in openings. The existing paint layers are likely to include lead based paints, so the appropriate safety procedures will be adopted. Refer to Section M60.

Mastic Sealing to Surrounding Masonry

All windows are to be repointed to the surrounding masonry in accordance with the following sketch, by raking out existing mortar and mastic, sealing the gap with newspaper, onto which a lime mortar backing provides a base for burnt sand and boiled linseed oil mastic, worked to a neat chamfer.

Repair Techniques to be Employed

Refer to drawing No. 4306/WR03 for details of repair techniques, and repair schedules 4306/WS01 - WS04 for location of repairs.

610 TEMPORARY SUPPORTS/ PROPPING

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

620 PROTECTION OF TIMBER AND WOOD COMPONENTS BEFORE AND DURING INSTALLATION

- 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.
- Handling: Do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.

660 CROSS SECTION DIMENSIONS OF STRUCTURAL SOFTWOOD AND HARDWOOD

- General: Dimensions given on drawings and in schedules of work are finished sizes.
- Maximum permitted deviations from finished sizes:
  - Sawn surfaces:
    Thickness and widths < 100 mm: -1, +3 mm.
    Thickness and widths > 100 mm: -2, +4 mm.
  - Further processed surfaces:
    Thickness and widths < 100 mm: -1, +1 mm.
    Thickness and widths > 100 mm: -1.5, +1.5 mm.

670 CROSS SECTION DIMENSIONS OF NONSTRUCTURAL SOFTWOOD AND HARDWOOD

- General: Dimensions given on drawings and in schedules of work are finished sizes.
- Maximum permitted deviations from finished sizes:
  - Sawn surfaces:
    Thickness and widths < 100 mm: -1, +3 mm.
    Thickness and widths > 100 mm: -2, +4 mm.
  - Further processed surfaces: -0, +1.

680 WARPING OF TIMBER

- Bow, spring, twist and cup: Not greater than the limits set down in BS 4978, BS EN 519 or BS EN 14081-1 for softwood, or BS 5756 for hardwood.

710 REUSE OF TIMBER SECTIONS/ WOOD COMPONENTS

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

730 PARTIAL REMOVAL OF EXISTING DECORATIVE/ PROTECTIVE FINISH TO SASH BOXES

- Extent: Remove minimum necessary to expose damaged or decayed wood. Feather the edge of remaining coating around repair site.
- Method: To be determined with specialist conservator.

750 CLEANING DIRTY OR STAINED WOOD

- Generally: Scrub with neutral pH soap and clean, warm water.
- Old varnish: Remove using mixture of turpentine (not turpentine substitute) and acetone in proportions determined by experiment, followed by washing down.

COMPLETION

910 MECHANICALLY FASTENED JOINTS

- General: Inspect accessible bolted, coach screwed and timber pegged joints and tighten fasteners if necessary.
  - Timing: On Completion and at end of Defects Liability Period or Rectification Period.

C52 Fungus/ beetle eradication

To be read with Preliminaries/ General conditions.

110 SURVEY AND REPORT

The tender should include the Provisional Sum identified in the Contract Bills for rot eradication works. Once the external access scaffold has been completed, a survey to establish the scope of works should be undertaken, supplimented by a quotation and method statement for undertaking the works. Opening up of the parapet gutter bases and roof structure in key localised areas in the vicinity of noted saturation and damp in the external walls should be undertaken to facilitate the survey, allowing as far as possible an accurate informed assessment of the scope of works. This costed report should be prepared by Robinson's Preservation Limited, or similar Timber Treatment Specialist to CA approval, and should record the following:

The source and extent of any dampness.
The nature and extent of infestation and decay.
Any site conditions and restrictions likely to affect the execution of the works.

The report will be supplemented by the specilaist sub-contractor with a description and provisional quantities for proposed eradication treatment and the nature and extent of removal of/or replacement of building fabric which will be required. It will also detail their requirements for contractor's attendance, and any scaffold modifications etc. required for the successful completion of the works.

Copies of the report are to be circulated to all parties, and the extent of works to be agreed with the CA and Structural Engineer, with the costs reported therein reconciled against the Provisional Sum for the works.

Work consequent upon treatment, but not included in the tender, is to be clearly identified as such. Costs are to be inserted in the Schedule of Works.

Insofar as it affects the insurance backed guarantee (See clause 390) the removal and replacement of all rot affected structural timber is to be carried out by Robinsons Timber Preservation, or other approved specilaist. The extent of removals and replacement are to be agreed with the Architect and Structural Engineer prior to the commencement of the work.

120 ASSOCIATED WORK

- Work shown to be necessary by survey: Carry out as part of main contract works. Any temporary support is to be provided by the Main Contractor (who shall also include for any alterations to suit the progress of the work) to the SE's approval prior to it's installation. It is not to be removed until work in the specific area is completed. Agree with Robinsons Preservation, or other approved specilaist, the programme, nature, and extent of such timber removal and incorporate into the contract programme. .

140 OPENING UP/ CUTTING OUT/ REMOVAL OF BUILDING FABRIC

- Extent: Submit proposals.
- Retained building fabric: Maintain stability and do not damage.

210 DRY ROT
- Fruiting bodies: Do not disturb. Spray with fungicide.
  - Removal: Remove carefully. Clean down surfaces.
- Infected materials: Remove immediately and dispose of safely at a tip approved by a waste regulation authority. Prevent contamination of other parts of the building.

220 WET ROT
- Rotten timber: Cut out until sound timber is reached.

230A BEETLE INFESTATION Remove timber agreed with CA as being structurally unsound. Probe timber, drilling if necessary, to determine the extent of the damage. Scrape and trim back all friable parts of otherwise sound timber. Remove infected material immediately from the building and dispose of safely at a tip aproved by a Waste Regulation authority.
-

250 CLEANING Thoroughly clean down all surfaces in affected areas. Remove all loose material, dust and debris and burn or remove from site without delay.

310A TIMBER PRESERVATIVES/ MASONRY FUNGICIDES GENERALLY
- Comply with the Health and Safety Executive Guide, 'Remedial Timber Treatment in Buildings: A guide to good practice and the safe use of wood preservatives', current at the time of tendering.
- Preservatives to be approved and registered by the Health and Safety Executive (HSE) and listed in the 'Pesticides (Reference Book 500)' and the 'Pesticides Register' current at the time of tendering.
- Apply in strict accordance with statutory conditions of approval given on product labels.

315 TREATMENT METHODS GENERALLY
- Select treatment method(s) from those specified, ensuring suitability for the type, scale and location of the fungal/insect attack.
- Where treatment involves drilling timber, agree the number, sizes and locations of holes with the CA.

318 TIMBER PRESERVATIVE TREATMENT FOR DRY ROT
- Preservative type: Pro-Bor 10 or product to the approval of the CA.
- Treatment method: To suit type, scale and location of fungal/ beetle attack.

338A MASONRY FUNGICIDE TREATMENT AGAINST DRY ROT
- Fungicide type: Probor DB Fungicidal Wall Solution, or similar product to the approval of the CA.
- Treatment method: Drill and irrigate walls, or pressure spray soak wall surfaces with solution, to specialists recommendations dependent on location.

355 DRILLING TIMBER FOR INJECTION OF PRESERVATIVES
- Sizes and location of holes: Submit proposals.
- Sealing holes after treatment: To allow retreatment. Submit proposals for CA approval.
- Approval of appearance: Obtain approval of first few holes before completing remainder.

390A GUARANTEE

- Type: Insuranced protection. Administered by an independent insurance protection company.
  - Guarantee period from completion of installation (minimum): 20 years
- Documentation: Provide certificates/ guarantees at completion of installation. Robinson's Preservation, or the appointed specialist, is to provide an insurance backed guarantee administered by an independent insurance protection company, as a condition of handover.
- The guarantee for a period of not less than 20 years from Practical Completion as a condition of handover. The certificate is to bound into the Building Owner's Manual.

D20 Excavating and filling

To be read with Preliminaries/General conditions

GENERALLY/THE SITE

110 SITE INVESTIGATION
- Report: Dig trial holes in location of new ramps and report findings to C/A.

CLEARANCE/EXCAVATING

168 SITE CLEARANCE
- Timing: Before topsoil stripping, if any.
- General: Clear site of rubbish, debris and vegetation. Do not compact topsoil.
- Treatment: Apply a suitable non-residual herbicide to areas to receive planting.

220 STRIPPING TOPSOIL
- General: Before beginning general excavation or filling, strip topsoil from areas where there will be regrading, buildings, pavings/ roads and other areas shown on drawings.
- Depth:
  - Remove to an average depth of 150 mm.
  - Give notice where the depth of topsoil is difficult to determine.
- Handling: Handle topsoil for reuse or sale in accordance with clause 225.
- Around trees: Do not remove topsoil from below the spread of trees to be retained.
- Site storage: Keep separate from excavated sub-soil.

221 TREATING TOPSOIL
- Treatment: Apply a suitable translocated nonresidual herbicide.
- Timing: Not less than two weeks before excavating topsoil.

225 HANDLING TOPSOIL
- Standard: To BS 3882.
- Aggressive weeds:
  - Species: Included in the Weeds Act, section 2 or the appropriate Wildlife and Countryside Act for the relevant jurisdiction.
  - Give notice: Obtain instructions before moving topsoil.
- Contamination: Do not mix topsoil with:
  - Subsoil, stone, hardcore, rubbish or material from demolition work.
  - Other soil or material containing aggressive weeds, sharps, plastics and non soil forming materials and notifiable animal or plant diseases.
  - Oil, fuel, cement or other substances harmful to plant growth.
  - Other classifications of topsoil.
- Multiple handling: Keep to a minimum. Use topsoil immediately after stripping.

240 ADJACENT EXCAVATIONS
- Requirement: Where an excavation encroaches below a line drawn at an angle from the nearest formation level of another higher excavation, the lower excavation, all work within it and backfilling thereto must be completed before the higher excavation is made.
- Angle of line below horizontal: 45°.
- Backfill material: Hardcore filling as clause 712.

244 EXCAVATIONS ADJACENT TO EXISTING FOUNDATIONS

- Prior to commencing excavation:
  - Excavate trial pits adjacent to existing foundations to determine extent and formation levels.
  - Allow for inspection of trial pits.
  - Allow time for amendment of details if required.
    Time period: 5 working days.
- Backfill material to new excavation: As clause 710.

250 PERMISSIBLE DEVIATIONS FROM FORMATION LEVELS

- Beneath mass concrete foundations: ±25 mm.
- Beneath ground bearing slabs and r.c. foundations: ±15 mm.
- Embankments and cuttings: ±50 mm.
- Ground abutting external walls: ±50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

270 FOUNDATIONS GENERALLY

- Give notice if:
  - A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings.
  - The formation contains soft or hard spots or highly variable material.

290 FOUNDATIONS IN MADE UP GROUND

- Depth: Excavate down to a natural formation of undisturbed subsoil.
- Discrepancy: Give notice if this is greater or lesser than depth given.

310 UNSTABLE GROUND

- Generally: Ensure that the excavation remains stable at all times.
- Give notice: Without delay if any newly excavated faces are too unstable to allow earthwork support to be inserted.
- Take action: If instability is likely to affect adjacent structures or roadways, take appropriate emergency action.

330 UNRECORDED FEATURES

- Give notice: If unrecorded foundations, beds, voids, basements, filling, tanks, pipes, cables, drains, manholes, watercourses, ditches, etc. not shown on the drawings are encountered.

360 EXCESS EXCAVATION

- Excavation taken wider than required:
  - Backfill: With hardcore as clause 710.
- Excavation taken deeper than required:
  - Backfill: With well graded granular material or lean mix concrete.

DISPOSAL OF MATERIALS

410 EXCAVATED TOPSOIL STORAGE

- Storage: Stockpile in temporary storage heaps to the direction of the Park staff.

415 EXCAVATED TOPSOIL REMOVAL

- General: Remove from site.

450 WATER

- Generally: Keep all excavations free from water until:
  - Formations are covered.
  - Below ground constructions are completed.
  - Basement structures and retaining walls are able to resist leakage, water pressure and flotation.
- Drainage: Form surfaces of excavations and fill to provide adequate falls.
- Removal of water: Provide temporary drains, sumps and pumping as necessary. Do not pollute watercourses with silt laden water.

454 GROUND WATER LEVEL, SPRINGS OR RUNNING WATER

- Give notice: If it is considered that the excavations are below the water table.
- Springs/ Running water: Give notice immediately if encountered.

FILLING

500 PROPOSED FILL MATERIALS

- Details: Submit full details of proposed fill materials to demonstrate compliance with specification, including:
  - Type and source of imported fill.
  - Proposals for processing and reuse of material excavated on site.
  - Test reports as required elsewhere.
- Timing: At least 21 days before starting filling.

510 HAZARDOUS, AGGRESSIVE OR UNSTABLE MATERIALS

- General: Do not use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling, including material that is:
  - Frozen or containing ice.
  - Organic.
  - Contaminated or noxious.
  - Susceptible to spontaneous combustion.
  - Likely to erode or decay and cause voids.
  - With excessive moisture content, slurry, mud or from marshes or bogs.
  - Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55.
  - Unacceptable, class U2 as defined in the Highways Agency 'Specification for highway works', clause 601.

530 PLACING FILL

- Surfaces of excavations and areas to be filled: Free from loose soil, topsoil, organic material, rubbish and standing water.
- Freezing conditions: Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.
- Adjacent structures, membranes and buried services:
  - Do not overload, destabilise or damage.
  - Submit proposals for temporary support necessary to ensure stability during filling.
  - Allow 14 days (minimum) before backfilling against in situ concrete structures.
- Layers: Place so that only one type of material occurs in each layer.
- Earthmoving equipment: Vary route to avoid rutting.

610 COMPACTED FILLING FOR LANDSCAPE AREAS

- Fill: Material capable of compaction by light earthmoving plant.
- Filling: Layers not more than 200 mm thick. Lightly compact each layer to produce a stable soil structure.

617 HIGHWAYS AGENCY TYPE 1 UNBOUND MIXTURE

- Fill: To Highways Agency 'Specification for highway works', clauses 801 and 803:
  - Crushed rock (other than argillaceous rock).
  - Crushed concrete.
  - Recycled aggregates.
  - Crushed non-expansive slag to clause 801.2.
  - Well-burned non-plastic colliery shale.
- Amendments to requirements in Highways Agency 'Specification for highway works': None.
- Filling: To Highways Agency 'Specification for highway works', clause 802.

700 BACKFILLING AROUND FOUNDATIONS

- Under oversite concrete and pavings: Hardcore.
- Under grassed or soil areas: Material excavated from the trench, laid and compacted in 300 mm maximum layers.

710 HARDCORE FILLING

- Fill: Granular material, free from excessive dust, well graded, all pieces less than 75 mm in any direction:
  - Test requirements:
    Minimum 10% fines value tested in a soaked condition to BS 812-111 Not required.
    Impact value SZ tested to BS EN 1097-2 Not required.
- In any one layer only one of the following:
  - Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
  - Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
  - Crushed non-expansive slag.
  - Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
  - Well-burned non-plastic colliery shale.
  - Natural gravel.
  - Natural sand.
- Filling: Spread and level in 150 mm maximum layers. Thoroughly compact each layer.

E10 Mixing/casting/curing in situ concrete

To be read with Preliminaries/General conditions.

CONCRETE MIXES

101 SPECIFICATION
- Concrete generally: To BS 8500-2.
- Exchange of information: Provide concrete producer with information required by BS 8500-1, clauses 4 and 5.

110A BASIC DESIGNATED CONCRETE FOUNDATIONS TO NEW RETAINING WALLS
- Designation: GEN1.
- Coarse recycled aggregates: As permitted by BS 8500-1.
- Consistence class: Contractor's choice to CA approval.
- Additional requirements: Submit proposals.

125 SUBSTITUTION OF STANDARDIZED PRESCRIBED CONCRETE FOR DESIGNATED CONCRETE
- General: Conform to BS 8500-2, clause 9.
- Substitution: In accordance with BS 8500-1, table A.13.
  - Proposals: Submit for each substitution, stating reasons.
- Site mixing: Not permitted.

MATERIALS, BATCHING AND MIXING

215 READY-MIXED CONCRETE
- Production plant: Currently certified by a body accredited by UKAS to BS EN ISO/IEC 17065 for product conformity certification of ready-mixed concrete.
- Source of ready-mixed concrete: Obtain from one source if possible. Otherwise, submit proposals.
  - Name and address of depot: Submit before any concrete is delivered.
  - Delivery notes: Retain for inspection.
- Declarations of nonconformity from concrete producer: Notify immediately.

225 CHANGES TO SPECIFICATION
- Changes to specification of fresh concrete (outside concrete producer's responsibility): Sub mit proposals .

415 ADMIXTURES
- Calcium chloride and admixtures containing calcium chloride: Do not use.

PROJECT TESTING/ CERTIFICATION

505 PROJECT TESTING OF CONCRETE - GENERAL
- Testing: To BS 8500-1, Annex B.
  - Nonconformity: Obtain instructions immediately.
- Recording: Maintain complete correlated records including:
  - Concrete designation.
  - Sampling, site tests, and identification numbers of specimens tested in the laboratory.
  - Location of the parts of the structure represented by each sample.
  - Location in the structure of the batch from which each sample is taken.

508 REGULAR PROJECT TESTING OF CONCRETE

- Tests: Compressive strength and consistency.
- Sampling:
  - Point: At point of discharge from delivery truck.
  - Rate: One sample from each batch for consistence.
- Other requirements: Cubes for early age strength testing to be stored under same conditions as concrete in members.

530 TESTS RESULTS

- Submission of reports: Within one day of completion of each test.
  - Number of copies: One.
- Reports on site: A complete set, available for inspection.

PLACING/ COMPACTION/ CURING AND PROTECTION

630 PREMATURE WATER LOSS

- Requirement: Prevent water loss from concrete laid on absorbent substrates.
  - Underlay: Select from:
    Polyethylene sheet: 250 micrometres thick.
    Building paper: To BS 1521, grade B1F.
  - Installation: Lap edges 150 mm.

650 SURFACES TO RECEIVE CONCRETE

- Cleanliness of surfaces immediately before placing concrete: Clean with no debris, tying wire clippings, fastenings or free water.

680 PLACING

- Records: Maintain for time, date and location of all pours.
- Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
- Temperature limitations for concrete: 30°C (maximum) and 5°C (minimum), unless otherwise specified. Do not place against frozen or frost covered surfaces.
- Continuity of pours: Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
- Discharging concrete: Prevent uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
- Thickness of layers: To suit methods of compaction and achieve efficient amalgamation during compaction.
- Poker vibrators: Do not use to make concrete flow horizontally into position, except where necessary to achieve full compaction under void formers and cast-in accessories and at vertical joints.

690 COMPACTING

- General: Fully compact concrete to full depth to remove entrapped air. Continue until air bubbles cease to appear on the top surface.
  - Areas for particular attention: Around reinforcement, under void formers, cast-in accessories, into corners of formwork and at joints.
- Consecutive batches of concrete: Amalgamate without damaging adjacent partly hardened concrete.
- Methods of compaction: To suit consistence class and use of concrete.

810 CURING GENERALLY

- Evaporation from surfaces of concrete: Prevent, including from perimeters and abutments, throughout curing period.
  - Surfaces covered by formwork: Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.
  - Top surfaces: Cover immediately after placing and compacting. If covering is removed for finishing operations, replace it immediately afterwards.
- Surface temperature: Maintain above 5°C throughout the specified curing period or four days, whichever is longer.
- Records: Maintain details of location and timing of casting of individual batches, removal of formwork and removal of coverings. Keep records on site, available for inspection.

811 COVERINGS FOR CURING

- Sheet coverings: Suitable impervious material.
- Curing compounds: Selection criteria:
  - Curing efficiency: Not less than 75% or for surfaces exposed to abrasion 90%.
  - Colouring: Fugitive dye.
  - Application to concrete exposed in the finished work: Readily removable without disfiguring the surface.
  - Application to concrete to receive bonded construction/ finish: No impediment to subsequent bonding.
- Interim covering to top surfaces of concrete: Until surfaces are in a suitable state to receive coverings in direct contact, cover with impervious sheeting held clear of the surface and sealed against draughts at perimeters and junctions.

818 CURING PERIODS GENERALLY

- Minimum periods: When not otherwise indicated, to BS EN 13670, Annex F.8.5.

840 PROTECTION

- Prevent damage to concrete, including:
  - Surfaces generally: From rain, indentation and other physical damage.
  - Surfaces to exposed visual concrete: From dirt, staining, rust marks and other disfiguration.
  - Immature concrete: From thermal shock, physical shock, overloading, movement and vibration
  - In cold weather: From entrapment and freezing expansion of water in pockets, etc.

E20 Formwork for in situ concrete

To be read with Preliminaries/ General conditions.

GENERALLY/ PREPARATION

110 LOADINGS
- Requirement: Design and construct formwork to withstand the worst combination of the following:
  - Total weight of formwork, reinforcement and concrete.
  - Construction loads including dynamic effects of placing, compacting and construction traffic.
  - Wind and snow loads.

170 WORK BELOW GROUND FOUNDATIONS
- Casting vertical faces against faces of excavation: Permitted provided face of excavation is stable.
  - Requirements: Submit proposals for maintaining stability of excavated faces and preventing contamination of concrete by loose soil.

CONSTRUCTION

310 ACCURACY
- General requirement for formwork: Accurately and robustly constructed to produce finished concrete in the required positions and to the required dimensions.
- Formed surfaces: Free from twist and bow (other than any required cambers).
- Intersections, lines and angles: Square, plumb and true.

STRIKING

510 STRIKING FORMWORK
- Timing: Prevent any disturbance, damage or overloading of the permanent structure.

FORMED FINISHES

610 BASIC FINISH
- Location: Faces below ground level.
- Finish: Faces fully compacted and cover to reinforcement provided.

E30 Reinforcement for in situ concrete

To be read with Preliminaries/ General conditions.

110 QUALITY ASSURANCE OF REINFORCEMENT
- Standards:
  - Reinforcement: To BS 4449, BS 4482, BS 4483 or BS 6744.
  - Cutting and bending: To BS 8666.
- Source of reinforcement: Companies holding valid certificates of approval for product conformity issued by the UK Certification Authority for Reinforcing Steels (CARES).

140 PLAIN BAR REINFORCEMENT
- Standard: To BS 4482.
  - Strength grade: 250.

150 RIBBED BAR REINFORCEMENT
- Standard: To BS 4449.
  - Strength grade: Generally B500B, but B500C where detailed .

310 CUTTING AND BENDING REINFORCMENT
- General: To schedules and to BS 8666.
- Bending on site, including minor adjustments: Not permitted.

320 PROTECTION OF REINFORCEMENT
- Dropping from height, mechanical damage and shock loading: Prevent.
- Cleanliness of reinforcement at time of pouring concrete: Free from corrosive pitting, loose mill scale, loose rust and contaminants which may adversely affect the reinforcement, concrete, or bond between the two.

451 FIXING REINFORCEMENT
- Standard: To BS 7973-1 and -2.
- Installation: In addition to any spacers and chairs shown on drawings or schedules, provide adequate support, tie securely and maintain the specified cover.
- Tying:
  - Wire type: 16 gauge black annealed. Use stainless steel wire for stainless steel reinforcement.
  - Ends of tying wire: Prevent intrusion into the concrete cover. Remove loose ends.
- Compatibility of metals: Prevent contact between ordinary carbon steel and stainless or galvanized reinforcement.

480 NOMINAL COVER TO REINFORCEMENT
- Top face: 50 mm.
- Formed faces: 50 mm.

F21 Natural stone/ ashlar walling/ dressings

To be read with Preliminaries/ General conditions.

TYPES OF WALLING/ DRESSINGS

110A ASHLAR SANDSTONE RETAINING WALLS TO NEW RAMPS AND STEPS: SOUTH ORANGERY.

- Stone: To BS EN 771-6.
  - Name (traditional): Buff sandstone, 'Sowerby Bridge' or similar to approved sample, as used on previous Phase of works to repair / renew components of the south elevation of the Hall.
  - Petrological family: Sandstone.
  - Colour: Buff.
  - Origin: Quarry: Contractor to confirm for C/A approval.
  - Finish: Sawn.
  - Supplier: As used on previous Phases of works for stone repair / replacement to the elevations of the Hall, Contractor to confirm and supply samples for C/A approval.
  - Unit dimension tolerances: Length + 1 mm, width (bed) +1 mm, height + 1 mm.
  - Compressive strength:
    Mean value (minimum): Contractor to supply information from Quarry for C/A approval.
    Characteristic value (minimum): Not applicable.
    Category: I.
  - Open porosity: To be confrmed by supplier.
  - Additional requirements: None.
  - Quality: Free from vents, cracks, fissures, discolouration, or other defects deleterious to strength, durability or appearance. Before delivery to site, season thoroughly, dress and work in accordance with shop drawings prepared by supplier.
- Mortar: As section Z21.
  - Standard: Site made hydraulic Line mortar to BS EN 998-2.
  - Mix: 1:3 NHL3.5 : sand.
  - Sand: To BS EN 13139; crushed stone with grading to approval (typically 1.5 parts Nosterfield and 1.5 parts Leighton Buzzard, as used on previous Phases of works for patch repointing and masonry repairs).
  - Additional requirements: Submit samples of sand for approval.
- Bond: To be agreed on site / determined by supplier's drawings.
- Joints: Flush.
  - Width: 5 mm.
  - Pointing: Flush 'conservation' joint.
- Other requirements: Stainless steel dowels to each course and into mass concrete footing as 'Section C - C' Drawing No. 4306/OE01, and mortices to be cut into coping stones where necessary for securing handrail support legs to ramps. Coping stones to be nominal 290x240mm wide sections, twice chamfered, with base course 290mm wide with tapering height to follow the surface of the ramp..

110B ASHLAR REPLACEMENT COPING STONES TO ORANGERY PARAPET WALLS.

- Stone: To BS EN 771-6.
  - Name (traditional): Buff sandstone, 'Sowerby Bridge' or similar to approved sample, as used on previous Phase of works to repair / renew components of the south elevation of the Hall.
  - Petrological family: Sandstone.
  - Colour: Buff.
  - Origin: Quarry: Contractor to confirm for C/A approval.
  - Finish: Sawn.
  - Supplier: As used on previous Phases of works for stone repair / replacement to the elevations of the Hall, Contractor to confirm and supply samples for C/A approval.
  - Unit dimension tolerances: Length + 1 mm, width (bed) +1 mm, height + 1 mm.
  - Compressive strength:
    Mean value (minimum): Contractor to supply information from Quarry for C/A approval.
    Characteristic value (minimum): Not applicable.
    Category: I.
  - Open porosity: To be confrmed by supplier.
  - Additional requirements: None.
  - Quality: Free from vents, cracks, fissures, discolouration, or other defects deleterious to strength, durability or appearance. Before delivery to site, season thoroughly, dress and work in accordance with shop drawings prepared by supplier.
- Mortar: As section Z21.
  - Standard: Site made hydraulic Line mortar to BS EN 998-2.
  - Mix: 1:3 NHL3.5 : sand.
  - Sand: To BS EN 13139; crushed stone with grading to approval (typically 1.5 parts Nosterfield and 1.5 parts Leighton Buzzard, as used on previous Phases of works for patch repointing and masonry repairs).
  - Additional requirements: Submit samples of sand for approval.
- Bond: To be agreed on site / determined by supplier's drawings.
- Joints: Flush.
  - Width: 5 mm.
  - Pointing: Flush 'conservation' joint.
- Other requirements: Form pockets in underside of copings and fill with lime mortar to bed over stainless steel dowels resin fixed to the wall head through lead DPCs. Seal round lead dpcs with bitument prior to fixing copings, as noted on drawing 4306/R02.

GENERAL/ PRODUCTION

250 CUTTING AND DRESSING OF STONE

- Timing: After seasoning but before delivery to site.
- Accuracy:
  - Exposed and joint surfaces: Square, true planes free from hollow or rough areas.
  - Dimensions: Maintain specified joint widths.
- Orientation for natural bed of stones: Appropriate to properties of stones and positions in walling/ dressings.

260 IDENTIFICATION OF STONE UNITS

- Marking: Clearly and indelibly on concealed faces to indicate the natural bed and position in the finished work.

LAYING AND JOINTING

300 REFERENCE PANELS
- General: Complete areas of specified walling types and obtain approval of appearance before proceeding.
- Walling type:
  - Location: West Loggia to south Orangery .
  - Size: Retaining wall to west side of ramp .
  - Features: Coping stones as Section C - C, drawing No. 4306/OE01 .

315 ADVERSE WEATHER
- General: Do not use frozen materials or lay on frozen surfaces.
- Air temperature: Do not lay stones:
  - In cement gauged mortars: At or below 3°C and falling or below 1°C and rising.
  - In hydraulic lime:sand mortars: At or below 5°C and falling or below 3°C and rising.
- Temperature of walling during curing: Above freezing until mortar hardened.
- Newly erected walling: Protect at all times from:
  - Rain and snow.
  - Drying out too rapidly in hot conditions and in drying winds.

325 LAYING GENERALLY
- Stone selection: Do not use units with damaged faces or arrises.
- Accuracy:
  - Courses: Level and true to line.
  - Faces, angles and features: Plumb.
  - Setting out: Achieve satisfactory junctions and joints with adjoining or built-in elements and components.
- Absorbent stones: Dampen in warm weather to reduce suction. Do not soak.
- Mortar joints:
  - Laying: Full bed of mortar with all joints and voids filled.
  - Temporary distance pieces: Lead or stainless steel. Remove when mortar is sufficiently strong.
  - Appearance: Neat and consistent.
- Cleanliness: Keep facework clean. Rubbing and other abrasive or chemical cleaning methods to remove marks and stains not permitted.

330 WALLING BELOW GROUND LEVEL
- Extent of facework below finished level of adjoining ground or external works (minimum): 150 mm.

340 PUTLOG SCAFFOLDING
- Use: Not permitted.

370 JOGGLE JOINTS
- General: Fill with bedding mortar. Tamp to expel air.

390 POINTING
- Joint preparation: Rake out to depth of 7-10 mm as work proceeds. Remove debris. Dampen surface.
- Mortar application: Neat and consistent.

H71 Lead sheet coverings/ flashings

To be read with Preliminaries/ General conditions.

TYPES OF LEADWORK

250 WEATHERING TO PROJECTING STONE CORNICE AROUND ORANGERY

- Substrate: Stone.
- Underlay: Not required.
- Type of lead: Rolled to BS EN 12588.
  - Thickness: 2.50 or 2.65 mm (Code 6).
- Joints: Welted.
  - Spacing: 1000mm.
- Edge details: Welted drip at front (free) edge, to extens 25mm below front edge of moulding. Rear edge run into bed joint on top of moulding, secured with lead wedges at 300mm c/cs, and back pointed in BLM mastic.
- Fixing: Head fixed as above, with 1 no. clip in the welt at joints between sheets as described on drawing No. 4106/R02.
- Accessories: Clips in the welt, continuous stainless steel clip to form welted drip at free edge.

420 COVER FLASHINGS TO ABUTMENTS OF BITUMINOUS FELT ROOFS WITH UPSTANDING WALLS

- Lead:
  - Thickness: 2.00 or 2.24 mm (Code 5).
- Dimensions:
  - Lengths: Not more than 1500 mm.
  - End to end joints: Laps of not less than 100 mm.
  - Cover: Overlap to upstand of not less than 75 mm.
- Fixing: Lead wedges into bed joints at 300mm c/cs and back pointed in BLM mastic. Pinned to existing timber window cills where unseen / let into routed out grooves in cills, fixed and back pointed as described previously. Allow for lead weding including gussets where flashings wirked into recessed openings.

498A LEAD DAMP PROOF COURSE UNDER REMOVED AND REBEDDED COPINGS MAIN ORANGERY ROOF

- Lead:
  - Thickness: 2.00 or 2.24 mm (Code 5).
  - Finish: Fully coated on both sides with high-build, bitumen based paint on the surfaces which are to be embedded.
- Length: Not more than 1500 mm.
- Cover of flashing: Not less than 100 mm.
- Joints: Lap joints on parapet wall head, not less than 100 mm.
- Laying: On a thin even bed of wet mortar.
  - Next layer of overlying construction: Bed on mortar without delay and finish joint neatly.
- Other requirements: Drill through DPC into wall head to facilitate fixings of stainless steel dowls to secure repaired and rebedded coping stones. seal round penetrations in lead with bitumen prior to fixing and rebedding copings.

GENERAL REQUIREMENTS/ PREPARATORY WORK

510 WORKMANSHIP GENERALLY

- Standard: To BS 6915 and latest edition of 'Rolled lead sheet. The complete manual' published by the Lead Sheet Association.
- Fabrication and fixing: To provide a secure, free draining and completely weathertight installation.
- Operatives: Trained in the application of lead coverings/ flashings. Submit records of experience on request.
- Preforming: Measure, mark, cut and form lead prior to assembly wherever possible.
- Marking out: With pencil, chalk or crayon. Do not use scribers or other sharp instruments without approval.
- Bossing and forming: Straight and regular bends, leaving sheets free from ripples, kinks, buckling and cracks.
- Solder: Use only where specified.
- Sharp metal edges: Fold under or remove as work proceeds.
- Finished work: Fully supported, adequately fixed to resist wind uplift but also able to accommodate thermal movement without distortion or stress.
  - Protection: Prevent staining, discolouration and damage by subsequent works.

516 LEADWELDING

- In situ welding: Is permitted, subject to completion of a 'hot work permit' form and compliance with its requirements.

520 LEAD SHEET

- Production method:
  - Rolled, to BS EN 12588, or
  - Machine cast and BBA certified, or
  - Sand cast, from lead free from bitumen, solder, other impurities, inclusions, laminations, cracks, air, pinholes and blowholes; to code thicknesses but with a tolerance (by weight) of ±10%.
- Identification: Labelled to show thickness/ code, weight and type.

610 SUITABILITY OF SUBSTRATES

- Condition: Dry and free of dust, debris, grease and other deleterious matter.

FIXING LEAD

705 HEAD FIXING LEAD SHEET

- Top edge: Secured with two rows of fixings, 25 mm and 50 mm from top edge of sheet, at 75 mm centres in each row, evenly spaced and staggered.
- Sheets less than 500 mm deep: May be secured with one row of fixings, 25 mm from top edge of sheet and evenly spaced at 50 mm centres.

710 FIXINGS

- Nails to timber substrates: Copper clout nails to BS 1202-2, or stainless steel (austenitic) clout nails to BS 1202-1.
  - Shank type: Annular ringed, helical threaded or serrated.
  - Shank diameter: Not less than 2.65 mm for light duty or 3.35 mm for heavy duty.
  - Length: Not less than 20 mm or equal to substrate thickness.
- Screws to concrete or masonry substrates: Brass or stainless steel to BS 1210, tables 3 or 4.
  - Diameter: Not less than 3.35 mm.
  - Length: Not less than 19 mm.
  - Washers and plastic plugs: Compatible with screws and lead.
- Screws to composite metal decks: Self tapping as recommended by the deck and lead manufacturer/ supplier for clips.

715 CLIPS

- Manufacturer: Submit proposals.
- Material:
  - Lead clips: Cut from sheets of same thickness/ code as sheet being secured.
  - Copper clips:
    Thickness: 0.70 mm.
    Temper: BS EN 1172, designation R220 in welts, seams and rolls, R240 elsewhere; dipped in solder if exposed to view.
  - Stainless steel clips:
    Thickness: 0.46 mm.
    Grade: BS EN 10088, 1.4301(304) terne coated if exposed to view.
- Dimensions:
  - Width: 50 mm where not continuous.
  - Length: To suit detail.
- 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.
- Fixing lead sheet: Welt clips around edges and turn over 25 mm.

760 CONTINUOUS CLIPS

- Material:
  - Lead continuous clips:
    Thickness: N/A.
  - Copper continuous clips:
    Thickness: N/A.
    Temper: BS EN 1172, designation R220 in welts, seams and rolls, R240 elsewhere.
  - Stainless steel continuous clips:
    Thickness: 0.46 mm.
    Grade: BS EN 10088, 1.4301(304).
- Dimensions:
  - Width: To suit detail.
- Fixing clips: Secure at 150mm c/cs with s/s plugs and screws into cornice masonry.
- Fixing lead sheet: Welt edge around continuous clip and dress down.

770 WEDGE FIXING INTO JOINTS/ CHASES

- Joint/ chase: Rake out to a depth of not less than 25 mm.
- Lead: Dress into joint/ chase.
  - 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.
- Sealant: Submit proposals.
  - Application: As section Z22.

JOINTING LEAD

810 FORMING DETAILS
- Method: Bossing or leadwelding except where bossing is specifically required.
- Leadwelded seams: Neatly and consistently formed.
  - Seams: Do not undercut or reduce sheet thickness.
  - Filler strips: Of the same composition as the sheets being joined.
  - Butt joints: Formed to a thickness one third more than the sheets being joined.
  - Lap joints: Formed with 25 mm laps and two loadings to the edge of the overlap.
- Bossing: Carried out without thinning, cutting or otherwise splitting the lead sheet.
  - Details where bossing must be used: Not applicable .

880 WELTED JOINTS
- Joint allowance: 50 mm overlap and 25 mm underlap.
- Copper or stainless steel clips: Fix to substrate at not more than 450 mm centres.
- Overlap: Welt around underlap and clips and lightly dress down.

970 PATINATION OIL
- Manufacturer: Submit proposals.
  - Product reference: Submit proposals.
- Location: Cornice weathering.
- Application: As soon as practical, apply a smear coating to lead, evenly in one direction and in dry conditions.

H75 Stainless steel strip/ sheet coverings/ flashings

To be read with Preliminaries/ General conditions.

TYPES OF STAINLESS STEEL WORK

420 COVER FLASHINGS TO MAIN SECTION OF ORANGERY ROOF

- Stainless steel:
  - Grade: 1.4404 (316L (Low Carbon).
  - Finish: Terned.
  - Thickness: 0.60 mm.
- Dimensions:
  - Lengths: Not more than 1800mm.
  - End to end joints: Single lock welts.
  - Cover to roofing upstand: Not less than 75 mm.
- Fixing: Lead wedges into bed joints, back pointed in BLM mastic. Min. 100mm laps between sheets. Top edge with vertical fold in bed joint, and bottom (free) edge stiffened with return fold welt.

GENERAL REQUIREMENTS/ PREPARATORY WORK

510 WORKMANSHIP GENERALLY

- Fabrication and fixing: To provide a secure, free draining and weathertight installation.
- Operatives: Trained in the application of stainless steel coverings/ flashings. Submit records of experience on request.
- Preforming: Measure, mark, cut and form stainless steel prior to assembly wherever possible.
- Marking out: Use scribers discreetly for marking out stainless steel. Do not use other sharp instruments.
- Folding: With mechanical or manual presses to give straight, regular and tight bends, leaving panels free from ripples, kinks, buckling and cracks. Use hand tools only for folding details not able to be pressed.
- Avoiding sharp edges: Fold under or remove as work proceeds.
- Sealants: Do not use in joints to attain waterproofing.
- Solder: Use only where specified.
- Finished stainless steel work: Fully supported, adequately fixed to resist wind uplift and able to accommodate thermal movement without distortion or stress.
  - Protection: Prevent staining, discolouration and damage by subsequent works.

520 STAINLESS STEEL STRIP/ SHEET

- Standard: To BS EN 10088-2 and BS EN ISO 9445-1 or -2.
  - Identification: Stamped or labelled with grade, finish and thickness as specified.
- Manufacturer: Submit proposals.
  - Product reference: FME terned stainless steel.

545 SOLDERING/ WELDING

- In situ soldering/ welding: Permitted, subject to completion of a 'hot work permit' form and compliance with its requirements.

610 SUITABILITY OF SUBSTRATES

- Condition: Dry and free of dust, debris, grease and other deleterious matter.

FIXING

710 FIXINGS FOR CLIPS
- Nails to timber substrates: Stainless steel austenitic.
  - Shank type: Annular ringed or helical threaded.
  - Shank diameter: Not less than 2.65 mm.
  - Head: Flat.
  - Length: Not less than 25 mm or equal to substrate thickness.
- Screws to concrete/ masonry substrates: Stainless steel (austenitic) to BS 1210, table 4.
  - Diameter: Not less than 3.45 mm.
  - Length: Not less than 25 mm.
  - Washers and plastic plugs: Compatible with screws.
- Screws to composite metal decks: Self-tapping, as recommended by the deck and stainless steel manufacturer.

750 CLIPS FOR FLASHINGS/ CROSS JOINTS
- Material: Stainless steel of same grade and thickness as that being secured.
- Dimensions:
  - Width: Not less than 50 mm.
  - Length: To suit detail.
- Fixing: Secure each clip to substrate with two fixings not more than 50 mm from edge of strip/ sheet being fixed.

770 WEDGE FIXING INTO JOINTS/ CHASES
- Joint/ Chase: Rake out to a depth of not less than 25 mm.
- Stainless steel covering/ flashing: Fold 25 mm into joint/ chase with a waterstop welted end.
- Fixing: With at least two stainless steel wedges to each piece of stainless steel sheet.
  - Spacing: Wedges at not more than 450 mm centres, and at every change of direction.
- Sealant: Submit proposals.
  - Application: As section Z22.

JOINTING

815 FREE EDGE DETAILS
- Visible feature edges: Finished with 15 mm welts (return fold).

820 SOLDERING DETAILS
- Solder: As recommended by the stainless steel manufacturer and appropriate to the metal finish. Not less than 30% tin content.
- Flux: Acidic, as recommended by the stainless steel manufacturer. Thoroughly remove residues.
- Unstressed joints: Use unreinforced soldering where there is no risk of movement stresses.
  - Seams: Form neatly and consistently with not less than 10 mm overlap of clean stainless steel.
- Stressed joints: Use reinforced soldering where there is a risk of movement stresses.
  - Seams: Form neatly and consistently with not less than 30 mm overlap of clean stainless steel. Reinforce seams with 3 mm diameter copper rivets at close centres.
  - Protection to rivets: Cover exposed rivet heads with solder. Isolate rivets from substrate with underlay to prevent localised friction.

825 WELDING DETAILS
- Seams: Form neatly and consistently.
  - Height of joint before folding: Not less than 30 mm.
  - Overlap: 10 mm.

J41 Reinforced bitumen membrane roof coverings

To be read with Preliminaries/ General conditions.

TYPES OF COVERING

110A BUILT-UP REINFORCED BITUMEN MEMBRANE WARM DECK ROOF COVERING TO MAIN ORANGERY ROOF

- Substrate: Existing assumed sand cement screed on concrete slab.
  - Preparation: Remove existing chippings, mastic asphalt finishes, tapered cork insulation and vapour control layer down to existing screed and cart away. Make good screed as necessary and U4 wood float finish, and prepare by removing any rough edges / surface defects to recieve new finishes.
- Vapour control layer: Prime with Bauder Quick Dry Primer and lay Bauder VB-4EXPAL 3.5mm aluminium lined elastomeric bitumen vapour barrier, partially bonded by torching, in accordance with manufacturer's recommendations and as noted on Drawing No. 4306/R02.
- Insulation: Bauder PIR Tapered un-faced rigid urethane insulation bedded to the vapout barrier in Bauder cold applied polyurethane insulation adhesive, all to manufacturer's recommendations and thicknesses as indicated on drawing No. 4106/R02, including 30mm flat board to perimeter channels where indicated.
- Overlay to insulation: Not required.
- Waterproof covering:
  - System manufacturer: Bauder Total Roof System - Warm Roof Construction.
  - First layer: Bauder TEC KSA DUO 3mm 200g/m2 glass grille reinforced self adhesive elastomeric bitumen underlayfully bonded to the insulation by removing the peel off release film, in accordance with manufacturer's recommendations.
    Attachment: Fully bonded as above, with 100mm side and head laps sealed by torching and rolling as manufacturer's recommendations.
  - Intermediate layer: Not required.
    Attachment: N/A.
  - Top layer/ Capsheet: Bauder K5K 5mm 250g/m2 polyester reinforced elastomeric bitumen capping sheet, charcoal grey finish, fully bonded to the underlay by torching in accordance with manufacturer's recommendations, 100mm head laps and 80mm side laps torched and rolled.
    Colour: Charcoal Grey.
    Attachment: Torch-on bonding .
  - Flashings and detail work: Refer to notes on drawing No. 4306/R02.
- Surface protection: Not required.
- Accessories: Edge trims and flashings by others as described drawing no. 4306/R02 .

110B BUILT-UP REINFORCED BITUMEN MEMBRANE WARM DECK ROOF COVERING TO LOWER AREA OF ORANGERY ROOF

- Substrate: Existing wood wool slab deck on underlying timber strucure, packed to provide falls in the deck.
  - Preparation: Remove existing chippings at roof perimeter, 50mm paving slab ballast and 50mm rigid insulation board, together with any vegetation growing from the roof rooted in the retrospectively added finishes over the mastic asphalt finishes and cart away. Make good asphalt as necessary ready to recieve new finishes .
- Vapour control layer: Prime asphalt with Bauder Quick Dry Primer and lay Bauder VB-4EXPAL 3.5mm aluminium lined elastomeric bitumen vapour barrier, partially bonded by torching, in accordance with manufacturer's recommendations and as noted on Drawing No. 4306/R02.
- Insulation: Bauder PIR un-faced rigid urethane insulation bedded to the vapout barrier in Bauder cold applied polyurethane insulation adhesive, all to manufacturer's recommendations and thickness generally 120mm, but with 50mm to perimeter channel, and no insulation immediately against Orangery north wall, as indicated on drawing No. 4106/R02.
- Overlay to insulation: Not required.
- Waterproof covering:
  - System manufacturer: Bauder Total Roof System - Warm Roof Construction.
  - First layer: Bauder TEC KSA DUO 3mm 200g/m2 glass grille reinforced self adhesive elastomeric bitumen underlayfully bonded to the insulation by removing the peel off release film, in accordance with manufacturer's recommendations.
    Attachment: Fully bonded as above, with 100mm side and head laps sealed by torching and rolling as manufacturer's recommendations.
  - Intermediate layer: Not required.
    Attachment: N/A.
  - Top layer/ Capsheet: Bauder K5K 5mm 250g/m2 polyester reinforced elastomeric bitumen capping sheet, charcoal grey finish, fully bonded to the underlay by torching in accordance with manufacturer's recommendations, 100mm head laps and 80mm side laps torched and rolled.
    Colour: Charcoal Grey.
    Attachment: Torch-on bonding .
  - Flashings and detail work: Refer to notes on drawing No. 4306/R02.
- Surface protection: Not required.
- Accessories: Edge trims and flashings by others as described drawing no. 4306/R02 .

PRODUCTS

322 PRIMER

- Type: As recommended by bitumen membrane manufacturer.
- Manufacturer: Bauder.
  - Product reference: Quick Dry Primer.

327 BONDING COMPOUND

- Type: As recommended by bitumen membrane manufacturer.
- Manufacturer: As for bitumen membrane.
  - Product reference: Submit proposals.
- Restriction: For heat sensitive insulation materials, use cold bonding compound.

330 TIMBER TRIMS, ETC

- Quality: Planed. Free from wane, pitch pockets, decay and insect attack (except ambrosia beetle damage).
- Moisture content at time of covering (maximum): 22%.
- Preservative treatment: As recommended by bitumen membrane manufacturer.

335 ANGLE FILLETS
- Material: As supplied by the system manufacturer.
  - Size (minimum): 50 x 50 mm, triangular in section.
- Restriction: Fillets under torch-on bitumen membranes to be non-combustible.

345 PERIMETER TRIMS
- Type: Aluminium to BS EN 12020-1, grade EN-AW 6063T4 or EN-AW 6063T6.
- Manufacturer: As for bitumen membrane.
  - Product reference: Submit proposals to C/A for approval.
- Colour: Light grey.
- Size: To approved sample.
  - Lengths (maximum): 3 m.

355 NAILS FOR FIXING REINFORCED BITUMEN MEMBRANES
- Type: Copper, extra large head clout to BS 1202-2.

370 COVER STRIPS TO JOINTS IN RIGID BOARD SUBSTRATES
- Bitumen membrane: To BS 8747, class S2P3.
- Width: 150 mm.

375 MINOR MOVEMENT JOINTS IN SUBSTRATES
- Manufacturer: Submit proposals.
  - Product reference: Submit proposals.
- Size: Submit proposals.
- Insert colour: Grey.

395 VAPOUR CONTROL LAYER
- Type: Metal cored flexible reinforced bitumen membrane.
- Manufacturer: Bauder.
  - Product reference: Bauder VB4-EXPAL.
- Thickness: 3.5mm.
- Vapour resistance: As manufacturer's product data sheets.

400 BUILT-UP REINFORCED BITUMEN WATERPROOF COVERING
- System manufacturer: Bauder.
  - Product reference: Total Roof System.
- First layer: Bauder TEC KSA DUO as Clause 110A / 110B.
  - Attachment: See Clause 110A / 110B.
- Intermediate layer: Not required.
  - Attachment: N/A.
- Top layer/ Capsheet: Bauder K5K, as Clause 110A / 110B.
  - Colour: Charcoal Grey Slate.
  - Attachment: As Clause 110A / 110B.
- Flashings and detail work: Refer to drawing No. 4106/R02.
- Guarantee: 20 years.

EXECUTION GENERALLY

515 ADVERSE WEATHER
- General: Do not lay coverings in high winds, wet damp conditions or in extremes of temperature unless effective temporary cover is provided over working area.
- Unfinished areas of roof: Keep dry. Protect edges of laid membrane from wind action.

520 INCOMPLETE WORK
- End of working day: Provide temporary seal to prevent water infiltration.
- On resumption of work: Cut away tail of membrane from completed area and remove from roof.

530 APPLYING PRIMERS
- Coverage per coat (minimum): As manufacturer's recommendations.
- Surface coverage: Even and full.
- Coats: Fully bond. Allow volatiles to dry off thoroughly between coats.

540 APPLYING BONDING COMPOUNDS
- Roof sited boilers: Permitted subject to permit.
- Temperature of compound: Suitable to achieve bond over whole surface. Do not overheat.
- Heat sensitive insulation materials: Use cold bituminous adhesive or overlays recommended by the insulation manufacturer.
- Application: Materials and method as bitumen membrane manufacturer's recommendations.

SUBSTRATES/ VAPOUR CONTROL LAYERS/ WARM DECK ROOF INSULATION

610 SUITABILITY OF SUBSTRATES
- Substrates generally: Secure, clean, dry, smooth, and free from frost, contaminants, voids and protrusions.
- Preliminary work: Complete including:
  - Grading to correct falls.
  - Formation of upstands, kerbs, box gutters, sumps, grooves, chases and expansion joints.
  - Fixing of battens, fillets and anchoring plugs/ strips.
- Moisture content and stability of substrate: Must not impair roof integrity.

625 REMOVING EXISTING COVERINGS
- Mechanical stripping: Not permitted.
- Exposed substrate: Do not damage.

640 FIXING TIMBER TRIMS
- Fasteners: As system supplier's details.
- Fixing centres (maximum): As system supplier's details.

670 LAYING VAPOUR CONTROL LAYER
- Attachment: Securely bond or nail to substrate.
- Side and end laps: As manufacturer's data sheets.
- Joints in second layer (where applicable): Stagger by half a sheet.
- Penetrations: Fully seal using bonding or taping methods recommended by manufacturer.
- Edges of insulation at roof edges, abutments, upstands, kerbs, penetrations and the like: Enclose, with vapour control layer:
  - Dressed up sufficiently, providing 50 mm (minimum) seal when overlapped by the roof covering; or
  - Turned back 150 mm (minimum) over the insulation and sealed down.

680 LAYING WARM DECK ROOF INSULATION

- Setting out:
  - Long edges: Fully support and run at right angles to structure.
  - End edges: Adequately support.
  - Joints: Butt together.
  - End joints: Stagger.
- Bedding: Full bed of bonding compound.
- Mechanical fixing: As manufacturer's recommendations.
- Protection to exposed edges of insulation: Reduced thickness treated timber batten, outer edge chamfered at changes in level.
- Completion: Boards must be in good condition, well fitting and stable.

WATERPROOF MEMBRANES/ ACCESSORIES

710 LAYING REINFORCED BITUMEN MEMBRANES GENERALLY

- Direction of laying: Unrolled up the slope.
  - Where practicable, install so that water drains over and not into laps.
- Side and end laps: As recommended by bitumen membrane manufacturer.
- Head and side laps: Offset.
  Intermediate and top layer/ capsheet: Fully bond.
- Successive layers: Apply without delay. Do not trap moisture.
- Strips of bitumen membranes for 'linear' details: Cut from length of roll.
- Completed coverings: Firmly attached, fully sealed, smooth, weatherproof and free draining.

730 PARTIAL BONDING OF REINFORCED BITUMEN MEMBRANE

- Venting first layer: Loose lay, align and cut to length. Do not carry up angle fillets and vertical surfaces or through details.
  - Long edges: Overlap minimum 50 mm.
  - Ends: Butt together.
- Intermediate layer: Fully bond to first layer and through to substrate.

735 POUR AND ROLL BONDING OF REINFORCED BITUMEN MEMBRANE

- Bonding compound:
  - Hot and fluid when bitumen membranes are laid.
  - Application: Spread evenly so that a small quantity is squeezed out at each edge.
- Bond: Full over whole surface, with no air pockets.
- Excess compound at laps:
  - First and intermediate layers. Spread out.
  - Top layer/ Capsheet: Remove.

740 TORCH-ON BONDING OF REINFORCED BITUMEN MEMBRANES

- Bond: Full over whole surface, with no air pockets.
- Excess compound at laps of top layer/ capsheet: Leave as continuous bead.

745 COLD APPLIED ADHESIVE BONDING OF REINFORCED BITUMEN MEMBRANES

- Bond: Full over whole surface, with no air pockets.

747 SELF-ADHESIVE BONDING OF REINFORCED BITUMEN MEMBRANES

- Bond: Full over whole surface, with no air pockets.

750 LAYING MINERAL FACED REINFORCED BITUMEN MEMBRANES

- Lap positions and detailing of ridges, eaves, verges, hips, abutments, etc: Submit proposals.
- Setting out: Neat, with carefully formed junctions.
- Lap bonding: Carry out only at prefinished margins or prepared 'black to black' edges.
- Excess bonding compound at laps: Remove whilst still warm.

775 SKIRTINGS AND UPSTANDS

- Angle fillets: Fix by bitumen bonding or nailing.
- Venting first layer of bitumen membrane: Stop at angle fillet. Fully bond in bitumen for 300 mm around perimeters. Overlap onto upstand with strips of BS 8747, class S1P1 bitumen membrane, fully bonded.
- Other layers of bitumen membrane: Carry in staggered formation up upstand, with each layer fully bonded. Where practicable, carry top layer over top of upstand.
- Upstands:
  - At ends of rolls: Form with bitumen membrane carried up without using separate strip.
  - Elsewhere: Form with matching strips of bitumen membrane, maintaining laps.
  - Additional fixing of bitumen membranes: As recommended by bitumen membrane manufacturer.

780 WELTED DRIPS

- Material: To BS 8747 Class S5P5, mineral surfaced.
  - Length: Form using maximum length strips.
  - Height at external gutter (minimum): 75 mm.
- Welt tail: Nail to face of drip batten. Fold neatly.
- Welt: Bond together, carry minimum 100 mm onto roof. Overlap with top bitumen membrane.

785 FIXING PERIMETER TRIMS

- First/ Intermediate layers bitumen membrane: Lay over roof edge upstand. Project free edge 25 mm from wall or fascia.
- Trim:
  - Setting out (minimum): 3 mm clear from wall or fascia.
  - Fasteners: Stainless steel countersunk wood screws to BS 1210, size and centres as recommended by system supplier.
  - Fixing: 30 mm from ends and at 300 mm (maximum) centres.
  - Jointing sleeves: Fix one side only.
  - Corner pieces: Purpose made.
- Completion:
  - Contact surfaces: Prime.
  - Joints: Cover with 150 mm long pads of bitumen membrane, bonded to trim.
- Completion of bitumen membrane:
  - Top layer/ Capsheet: Butt joint to rear edge of trim.
  - Cover strip: Fully bond to trim and top layer/ capsheet of bitumen membrane. Carry over roof edge upstand and lap 75 mm onto roof.
    Cover strip material: As top layer/ capsheet bitumen membrane.

COMPLETION

910 INSPECTION

- Interim and final roof inspections: Submit reports.

920 ELECTRONIC ROOF INTEGRITY TEST

- Testing authority: The roofing contractor.
- Timing of test: Prior to completion.
  - Condition of roof prior to testing: Complete to a stage where integrity can be tested.
  - Surface: Clean.
- Test results and warranty: Submit on completion of testing.

940 COMPLETION

- Roof areas: Clean.
- Outlets: Clear.
- Work necessary to provide a weathertight finish: Complete.
- Storage of materials on finished surface: Not permitted.
- Completed membrane: Do not damage. Protect from chemicals, traffic and adjacent or high level working.

L10 Windows/ Rooflights/ Screens/ Louvres

To be read with Preliminaries/ General conditions.

GENERAL

110 EVIDENCE OF PERFORMANCE
- Certification: Provide independently certified evidence that all incorporated components comply with specified performance requirements.

115 TIMBER PROCUREMENT
- Timber (including timber for wood based products): Obtained from well managed forests and/ or plantations in accordance with:
  - The laws governing forest management in the producer country or countries.
  - International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
- Documentation: Provide either:
  - Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied.
  - Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.

120 SITE DIMENSIONS
- Procedure: Before starting work on designated items take site dimensions, record on shop drawings and use to ensure accurate fabrication.
- Designated items: All structural openings for new windows and doors .

PRODUCTS

210A WOOD WINDOWS NEW BOX SASHES AND PATIO DOORS TO ORANGERY
- Manufacturer: Contractor's specialist Joinery Sub-Contractor.
  - Product reference: Traditional vertically sliding sash windows, and replacement patio doors.
- Species: Pitch pine / Douglas Fir, with oak cills, to match as closely as possible the species of the original window frames / casements.
- Finish as delivered: primed for site painting as M60.
- Glazing details: Site glazed as section L40.
  - Beading: N/A.
- Ironmongery/ Accessories: All cords and weights, sash lifts, and fastners to the meeting rails, to the sash windows and casements. Other specialist ironmongery to windows and doors to be manufactuered by specialist to match existing components. Patio doors to have concealed overhead closers, 1.5 pairs butt hinges per leaf, sash locks, shoot bolts top and bottom, and brass pull handles fitted internally.
- Fixing: Traditional fox wedges to reveals and treated timber packers screwed through to the masonry.
  Other Requirements: Isolate all timber from reveal masonry with DPC material.

EXECUTION

710 PROTECTION OF COMPONENTS
- General: Do not deliver to site components that cannot be installed immediately or placed in clean, dry floored and covered storage.
- Stored components: Stack vertical or near vertical on level bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

730 PRIMING/ SEALING
- Wood surfaces inaccessible after installation: Prime or seal as specified before fixing components.

760 REPLACEMENT WINDOW INSTALLATION
- Standard: To BS 8213-4.

765 WINDOW INSTALLATION GENERALLY
- Installation: Into prepared openings.
- Gap between frame edge and surrounding construction:
  - Minimum: 5mm.
  - Maximum: 10mm.
- Distortion: Install windows without twist or diagonal racking.

780 FIXING OF WOOD FRAMES
- Standard: As section Z20.
- Fasteners: Traditional fox wedges and treated timber packers screwed through DPC to masonry.
  - Spacing: When not predrilled or specified otherwise, position fasteners not more than 150 mm from ends of each jamb, adjacent to each hanging point of opening lights, and at maximum 450 mm centres.

810A SEALANT JOINTS
- Sealant: Traditional burnt sand and boiled linseed oil mastic on lime mortar backing, finished to a neat chamfer at the reveal, as Detail 1 and Detail 2, drawing No. 4227A/WR01
  - Application: As section Z22 to prepared joints. Finish triangular fillets to a flat or slightly convex profile.

820 IRONMONGERY
- Fixing: Assemble and fix carefully and accurately using fasteners with matching finish supplied by ironmongery manufacturer. Do not damage ironmongery and adjacent surfaces.
- Checking/ Adjusting/ Lubricating: Carry out at completion and ensure correct functioning.

L30 Stairs/ ladders/ walkways/ handrails/ balustrades

To be read with Preliminaries/ General conditions.

PRELIMINARY INFORMATION/ REQUIREMENTS

130 SITE DIMENSIONS
- Procedure: Before starting work on designated items take site dimensions, record on shop drawings and use to ensure accurate fabrication.
  - Designated items: Handrails to external ramps to east and west Orangery loggias.

COMPONENTS

570 PURPOSE MADE HANDRAILS TO ORANGERY LOGGIA RAMPS
- Component material, grade and finish as delivered:
  - Handrails: 60x15mm Bronze profiled handrail as Section C - C, drawing No. 4306/OE01.
  - Brackets: Stainless Steel carrier rebated into underside of rail connected to supporting legs.
- Workmanship:
  - Joinery: Not applicable.
  - Metalwork: To section Z11.
- Other requirements: Handrail supported on polyester powder coated stainless steel legs, detail as Section C - C, drawing No. 4306/OE01.
- Fixing: Legs secured into mortices cut in the coping stones to the ramp retaining walls, and traditionally lead caulked.
  - Centres: To be determened with handrail supplier. Proposals to be submitted to C/A for approval.

INSTALLATION

620 PRIMING/SEALING/PAINTING
- Surfaces inaccessible after assembly/installation: Before fixing components, apply full protective/decorative treatment/coating system.

630 CORROSION PROTECTION OF DISSIMILAR MATERIALS
- Components/ substrates/ fasteners of dissimilar materials: Isolate using washers/ sleeves or other suitable means to separate materials to avoid corrosion and/ or staining.

640 INSTALLATION GENERALLY
- Fasteners and methods of fixing: To section Z20.
- Structural members: Do not modify, cut, notch or make holes in structural members, except as indicated on drawings.
- Temporary support: Do not use stairs, walkways or balustrades as temporary support or strutting for other work.
- Applied features (finishes, inserts, nosings and the like): Substrates to be even, dry, sound and free from contaminants. Make good substrate surfaces and prepare/ prime as applied feature manufacturer's recommendations before application.

COMPLETION

910 INSPECTION
- Timing: Two weeks prior to date when Contractor expects work to be practically complete.
- Period of notice (minimum): 5 working days.

L40 General glazing

To be read with Preliminaries/ General conditions.

GENERAL REQUIREMENTS

GENERAL REQUIREMENTS
The removal, repair and reinstatement of all glass shall be carried out by the selected specialist joinery contractor only. The work must not be subcontracted without the express permission of the Architect.

135 REMOVAL OF EXISTING CLEAR PLAIN GLASS

- All undamaged glass is to be carefully removed for reinstatement.
- Removal of all glass is to be the responsibility of the specialist joinery sub contractor.
- Establish a suitable method and sequence for the removal of all glazing before the work is commenced and agree it with the Architect (see C51/605).
- Carefully remove existing glazing and iron glazing bar tongues from the glazing bars and perimeter members of the sash casements, avoiding damage to the head and bottom rails, and stiles of the casement frames to leave clean smooth rebates free from obstructions and debris. Record patterns and sizes. Take templates.
- Report to CA any signs of deterioration of the casement surrounds revealed by removal of glazing, putty, compounds, etc.
- Do not reglaze affected surrounds until instructed.
- Provide temporary secure/dustproof/weatherproof protection to the approval of the Architect to fully protect the building at all times whilst the windows are being refurbished.

143 GLASS
Replacement glass shall be carefully chosen to match the original glass (most likely to be 'cylinder' glass) in colour and texture. Generally 3mm 'Lamberts Restauro Classic' cylinder blown glass is to be used in all new windows, and where damaged panes need replaced in refurbished casements, with the exception of the bottom 6 no. panes to the windows and patio doors in the south Orangery wall (Ref. OS01 - OS11 inclusive) which are to be glazed with 4mm toughened glass. All glass types to be agreed with the Architect before commencing the work. All new glass to have UV Protective Film fitted to the inside face as clause 146.

144 GLAZING COMPOUNDS
All new glass to be externally glazed to timber frames with cast iron 'tongues' to glazing bars and traditional timber sash casements with traditional Linseed putty, by Hodgson's Sealants Ltd., Putty Manufacturers, Belprin Road, Beverley, HU17 0LN. Tel: (01482) 868321

146 ULTRA VIOLET PROTECTION WINDOW FILM
Manufacturer: 3M Window Films
Product reference: Sun Control Window Film Prestige 70
Fixing: In accordance with the manufacturers instructions.
Other requirements: Allow for thoroughly cleaning all glass to receive film prior to it's installation and for trimming individual pieces to match the exact size of each pane of glass so that the lead cames are not covered where leaded glass is to be covered. ensure that all fixings and ironmongery function satisfactorily upon completion.

150 WORKMANSHIP GENERALLY

- Glazing generally: To BS 6262.
- Integrity: Glazing must be wind and watertight under all conditions with full allowance made for deflections and other movements.
- Dimensional tolerances: Panes/ sheets to be within ± 2 mm of specified dimensions.
- Materials:
  - Compatibility: Glass/ plastics, surround materials, sealers, primers and paints/ clear finishes to be used together to be compatible. Avoid contact between glazing panes/ units and alkaline materials such as cement and lime.
  - Protection: Keep materials dry until fixed. Protect insulating glass units and plastics glazing sheets from the sun and other heat sources.

152 PREPARATION

- Surrounds, rebates, grooves and beads: Clean and prepare before installing glazing.

TYPES OF GLAZING

210 PUTTY FRONTED SINGLE GLAZING TO EXISTING REPAIRED SASH CASEMENTS, NEW SASH CASEMENTS, PATIO DOORS AND FANLIGHTS

- Pane material: Nominal 3 mm clear cylinder glass generally, with UV protective film / privacy film (where appropriate) applied internally to all sash casements, 4mm clear toughened glass to lower 6 no panes of the South Orangery windows .
- Surround: To match existing .
  - Sealer: Paint primer .
- Type of putty: Linseed oil putty to BS 544 .
- Glass installation:
  - Glass: Located centrally in surround using setting and location blocks, and secured with glazing sprigs/ cleats/ clips at 300 mm centres.
  - Finished thickness of back bedding after inserting glazing (minimum): 1.5 mm.
  - Front putty: Finished to a smooth, neat triangular profile stopping 2 mm short of sight line. Surface lightly brushed to seal putty to glass and left smooth with no brush marks.
- Sealing putty: Seal as soon as sufficiently hard but not within 7 days of glazing. Within 28 days apply either:
  - The full final finish, suitably protected until completion and cleaned down and made good as necessary, or
  - Two coats of primer applied locally to the compound, to be followed nearer completion with the full specified finish.
- Opening lights: Keep in closed position until putty has set sufficiently to prevent displacement of glazing when opened.

610 WINDOW FILM

- Type: UV Protection .
- Manufacturer: 3M .
  - Product reference: Prestige 70 .
- Colour: Clear .
- Application: Carried out by a firm approved by the film manufacturer in accordance with manufacturer's recommendations.
  - Evidence of applicator's competence and experience: Submit on request.
  - Sample area: Complete as part of the finished work, in an approved location and obtain approval of appearance before proceeding.
  - Ambient air temperature at time of application: Above 5°C.
- Installed film: Fully adhered to the glass with no peeling, and free from bubbles, wrinkles, cracks or tears.
- Further contact with applied films: Avoid until bonding adhesive has cured.
- Cleaning and maintenance instructions: Submit copies.

M20 Plastered/ Rendered/ Roughcast coatings

To be read with Preliminaries/ General conditions.

TYPES OF COATING

310A LIME:SAND BUILT UP RENDER REPAIR COATINGS TO LOCALISED AREAS OF ELEVATIONS OF HEATON HALL AND ORANGERY

- Substrate: Existing brickwork to areas of walls where existing render has detached, or been removed due to loss of adhesion, as identified on drawing 4306/EE01 and EE02.
  - Preparation: Remove all dust, surface contaminents and loose and friable existing render and consolidate where necessary. Leave the wall damp but not wet.
- Lime manufacturer / supplier: Lime Green Products Ltd. / Womersleys Ltd., or Contractor's choice to C/A approval.
  - Product reference/ Type: Duro Natural Hydraulic lime, kiln dried sands and recycled aggregates (NHL 3.5 or equivalent strength), or Contractor to suggest alternative to C/A approval. Final coat to be Lime Green Eco-render, Natural hydraulic lime top coat, or Contractor to suggets alternative for C/A approval.
- Undercoats: As above.
  - Mix: Pre-mixed.
    Sand: As supplied. If render is site mixed used Nosterfield / Leighton Buzzrd or equivalent, 2.8mm down, to achieve a workable mortar.
  - Thickness (excluding dubbing out and keys): 9-12mm as necessary to flush through with surrounding work. Scratch the surface of each coat to give a good mechanical key for subsequent coats.
- Final coat:
  - Mix: Pre-mixed.
    Sand: To BS EN 13139, grading to approval.
  - Thickness: 4mm.
  - Finish: Wood float.
- Accessories: None envisaged.
- Other requirements: Dub out as necessary to flush through with surrounding retained finishes, and finish with BEECK Renosil Fine silicate based renovation coating, as M60/195C.

310B LIME:SAND REPAIR RENDER TOP COAT TO LOCALISED AREAS OF ERODED RENDER: HEATON HALL AND ORANGERY

- Substrate: Existing eroded render, including paint finishes, as identified on drawing 4306/EE01 and EE02.
  - Preparation: Remove all dust, surface contaminents and loose and friable existing render and consolidate where necessary. Leave the wall damp but not wet. Lightly scratch surfaces for adhesion / prime with BEECK Base V silicate primer to reduce the chance of a thin coat application over existing finishes delaminating.
- Lime manufacture / supplier: Lime Green Products Ltd. / Womersleys Ltd., or Contractor's choice to C/A approval.
  - Product reference/ Type: Lime Green Eco-render, Natural hydraulic lime top coat, or Contractor to suggets alternative for C/A approval.
- Final coat:
  - Mix: Pre-mixed.
    Sand: To BS EN 13139, grading to approval.
  - Thickness: 4mm.
  - Finish: Wood float.
- Accessories: None envisaged.
- Other requirements: Finish with BEECK Renosil Fine silicate based renovation coating, as M60/195C.

330A PROPRIETARY LIME:SAND EXTERNAL RENDER REPLACEMENT TO ORANGERY PARAPET WALLS

- Substrate: Existing brickwork and stonework, dependent on location.
  - Preparation: Remove all existing render and and remove any loose, flaking or unstable material from the substrateback to a sound, well adhering substrate.
- Manufacturer: Keim Mineral Paints.
- Undercoats:
  - Product reference/ Type: Keim Universal Render, hydrated limewith pozzolanic additives, sand and mineral fibre fillers.
    Fibre reinforcement: Proprietary glassfibre reinforcing mesh.
  - Thickness (excluding dubbing out and keys): 6mm.
- Final coat: Keim Universal Render, hydrated limewith pozzolanic additives, sand and mineral fibre fillers.
  - Product reference: As above.
  - Thickness: 4mm.
  - Finish: Hydro sponge float, as manufacturer's recommendations.
- Accessories: Stainless steel beads.
- Other requirements: Decorate with Keim Royalan Mineral Paint System as Section M60.
  For full specification of works refer to drawing No. 4306/R02.

330B PROPRIETARY LIME:SAND EXTERNAL RENDER PATCH REPAIR TO ORANGERY PARAPET WALLS

- Substrate: Existing brickwork and stonework, dependent on location.
  - Preparation: Identify areas of loose flaking and unstable render to rear of parapet walls, and remove all loose, flaking or unstable material from the substrate back to a sound, well adhering substrate, ensuring all edges are feathered in .
- Manufacturer: Keim Mineral Paints.
- Undercoats:
  - Product reference/ Type: Keim Universal Render, hydrated limewith pozzolanic additives, sand and mineral fibre fillers.
    Fibre reinforcement: None.
  - Thickness (excluding dubbing out and keys): Up to a maximum of 10mm.
- Final coat: Keim Universal Render, hydrated limewith pozzolanic additives, sand and mineral fibre fillers.
  - Product reference: As above.
  - Thickness: Up to 10mm maximum.
  - Finish: Hydro sponge float, as manufacturer's recommendations.
- Accessories: Stainless steel beads.
- Other requirements: Where necessary dub out in coats between 4 and 10mm thickness to flush through with adjacent render. Make good any cracks with Keim Spachtel, in accordance with manufacturer's recommendations, where necessary. Decorate all render to rear of parapets with Keim Royalan Mineral Paint System as Section M60. For full specification of works refer to drawing No. 4306/R02.

330C PROPRIETARY LIME:SAND EXTERNAL RENDER REPLACEMENT TO NORTH ORANGERY GADEN WALL

- Substrate: Existing brickwork.
  - Preparation: Remove all existing render and and remove any loose, flaking or unstable material from the surface of the brickwork back to a sound, well adhering substrate.
- Manufacturer: Keim Mineral Paints.
- Undercoats:
  - Product reference/ Type: Keim Universal Render, hydrated limewith pozzolanic additives, sand and mineral fibre fillers.
    Fibre reinforcement: Proprietary glassfibre reinforcing mesh.
  - Thickness (excluding dubbing out and keys): 6mm.
- Final coat: Keim Universal Render, hydrated limewith pozzolanic additives, sand and mineral fibre fillers.
  - Product reference: As above.
  - Thickness: 4mm.
  - Finish: Hydro sponge float, as manufacturer's recommendations.
- Accessories: None envisaged.
- Other requirements: Decorate with Keim Royalan Mineral Paint System as Section M60. For full specification of works refer to drawing No. 4306/R02.

350 ROMAN CEMENT REPAIR RENDER FOR MOULDINGS / CASTING REPAIR MOULDINGS TO WINDOW SURROUNDS: HEATON HALL AND ORANGERY

- Substrate: Existing eroded render for localised run in situ repairs, and existing brick background where existing defective mouldings removed to be replaced by Roman Cement cast in reverse moulds, as identified on drawing 4306/EE01 and EE02.
  - Preparation: Remove all dust, surface contaminents and loose and friable existing render and consolidate where necessary. Leave the wall damp but not wet. Lightly scratch surfaces for adhesion / prime as necessary.
- Lime manufacture / supplier: Lime Green Products Ltd. / Womersleys Ltd., or Contractor's choice to C/A approval.
  - Product reference/ Type: Roman Stucco, Roman Cement based binder, or Contractor to suggets alternative for C/A approval.
- Final coat:
  - Mix: Pre-mixed.
    Sand: To BS EN 13139, grading to approval.
  - Thickness: To be determined on site by thicknesses of existing detail.
  - Finish: Making good / running mouldings in situ: Horse mould formed from tin or zinc sheet, supported by timber profile and brace. Form the finishing profile (horse mould) from tin or zinc sheet supported by a timber profile and brace generally as described above. Apply the setting coat in one smooth operation
    leaving the work clean and true to line and level, with no ripples, ridges, plaster splashes or indentations. Finish junctions and angles free hand. Allow for purpose made profiling knife cut from tin or zinc sheet and run along a hand held rule or guide rail.
    Cast architraves from reverse mould: Agree sections of mouldings to be reproduced and casting methods with architect before commencing work. Ensure all paint is removed from the original moulding (model) to be reproduced. Type: Moulding types are to be produced to identically match existing. Material: Plaster of Paris (British Gypsum Class A casting plaster). Work is to be carried out by skilled and experienced craftsmen. Form reverse mould using methods and materials which allow the profile and detail of the original to be reproduced accurately and without damaging the original moulding. All to be agreed with the architect prior to commencement. Make sufficient moulds to complete the required number of casts and maintain a consistent appearance. Squeezes are to be taken of existing mouldings to obtain a match. Squeezes are to be over moulded to account for loss of original definition. Mouldings are to be reinforced with canvas and lath. Fixing: Concealed stainless steel screws, supplimented with grounds and noggings / lime plaster as necessary. Ensure that all noggings, bearers etc required to support the castings are accurately positioned and securely fixed. Fill all joints and holes and finish flush and smooth to correct profile. Fix securely, true to line and level. Bed direct fixed mouldings solid. Reinforce framing, fixing points and joints with wads .
- Accessories: None envisaged .
- Other requirements: Finish with BEECK Renosil Fine silicate based renovation coating, as M60/195C .

MATERIALS AND MAKING OF MORTAR

478 HYDRAULIC LIME

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

481 READY PREPARED LIME PUTTY

- Type: Slaked directly from CL 90 quicklime to BS EN 459-1, using an excess of water.
  - Maturation: In pits/ containers that allow excess water to drain away.
  - Density of matured lime putty: 1.3-1.4 kg/L.
- Maturation period before use (minimum): 90 days.
- Storage: Prevent drying out or wetting. Protect from frost.

495 MIXING

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

497 COLD WEATHER

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

PREPARING SUBSTRATES

510 SUITABILITY OF SUBSTRATES

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

541 BONDING AGENT APPLICATION

- General: Apply evenly to substrate to achieve effective bond of plaster/ render coat. Protect adjacent surfaces.

556 REMOVING DEFECTIVE EXISTING RENDER

- Render for removal: Detached, hollow, soft, friable, badly cracked, affected by efflorescence or otherwise damaged.
- Removing defective render: Cut out to regular rectangular areas with straight edges.
  - Horizontal and vertical edges: Square cut or slightly undercut.
  - Bottom edges to external render: Do not undercut.
  - Render with imitation joints: Cut back to joint lines.
- Cracks:
  - Fine hairline cracking/ crazing: Leave.
  - Other cracks: Cut out to a width of 75 mm (minimum).
    Dust and loose material: Remove from exposed substrates and edges.

568 EXISTING DAMP AFFECTED PLASTER/ RENDER

- Plaster affected by rising damp: Remove to a height of 300 mm above highest point reached by damp or 1 m above dpc, whichever is higher.
- Perished and salt contaminated masonry:
  - Mortar joints: Rake out.
  - Masonry units: Submit proposals.
- Faults in substrate (structural deficiencies, additional sources of damp, etc.): Submit proposals.
- Drying out substrate: Established drying conditions. Leave walls to dry for as long as possible before plastering.
- Dust and loose material: Remove from exposed substrate and edges.

BACKINGS/ BEADS/ JOINTS

640 BEADS/ STOPS GENERALLY

- Location: External angles and stop ends, except where specified otherwise.
- Corners: Neat mitres at return angles.
- Fixing: Secure, using longest possible lengths, plumb, square and true to line and level, ensuring full contact of wings with substrate.
  - Beads/ stops for external render: Fix mechanically.
- Finishing: After coatings have been applied remove surplus material, while still wet, from surfaces of beads/ stops exposed to view.

EXTERNAL RENDERING

810 APPLICATION GENERALLY

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

820 DUBBING OUT FOR RENDERING

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

840 UNDERCOATS GENERALLY

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

856 FINAL COAT - PLAIN FLOATED FINISH

- Finish: Even, open texture free from laitance.

880 CURING AND DRYING

- General: Prevent premature setting and uneven drying of each coat.
- Curing coatings: Keep each coat damp by covering with polyethylene sheet and/ or spraying with water.
  - Curing period (minimum): As render manufacturer's recommendations.
  - Final coat: Hang sheeting clear of the final coat.
- Drying: Allow each coat to dry thoroughly, with drying shrinkage substantially complete before applying next coat.
- Protection: Protect from frost and rain.

M60 Painting/ clear finishing

To be read with Preliminaries/ General conditions.

COATING SYSTEMS

130A GLOSS PAINT TO REFURBISHED SASH CASEMENTS AND BOX FRAMES, CASEMENT WINDOWS AND PATIO DOORS

- Manufacturer: Dulux Ltd., or equal / approved.
  - Product reference: Weathershield Exterior High Gloss, or alternative manufacturer's equivalent oil based gloss.
- Surfaces: Existing timber surfaces to the Orangery sash windows, box frames, and Patio Doors Ref. OS01 - OS11, Orangery casement windows and frames Ref OE01 - OE03, ON0-1 - ON11 and OW01.
  - Preparation: Remove all loose and defective coatings from existing surfaces, if necessary stripping back to bare wood. Remove and treat any mould, algae, lichen or moss with 'Weathershield Fungicidal Wash'. Remove defective glazing material and clean the rebates and any loose or open joints. Replace rotten wood and areas of troublesome knots etc with new. Undertake repairs to sash casements and frames as detailed on drawing Nos. 4306WR01, and schedules 4306/WS01 - WS04.
- Initial coats: Prime any bare wood with Dulux 'Weathershield Aquatech Preservative Basecoat', or alternative manufacturer's equivalent.
  - Number of coats: One, brush applied.
- Undercoats: Dulux 'Weathershield Exterior Undercoat', or alternative manufacturer's alternative.
  - Number of coats: Two, brush applied.
- Finishing coats: Dulux 'Weathershield Exterior High Gloss', or alternative manufacturer's alternative.
  - Number of coats: One, brush applied.

130B GLOSS PAINT TO NEW AND REFURBISHED CAST IRON RAINWATER GOODS

- Manufacturer: Dulux Ltd., or equal / approved.
  - Product reference: Weathershield Exterior High Gloss, or alternative manufacturer's equivalent oil based gloss.
- Surfaces: New cast iron rainwater pipes to the North Front of the Hall, as indicated on drawing No. 4306/RW01, new rainwater pipes to the Orangery roof, and redecoration of existing cast iron rainwater pipes to the Orangery, North Front, and East and West Loggias, South Front..
  - Preparation: None required to new cast iron rainwater pipes. Existing rainwater pipes, and gutters to the lower Orangery roof are to remain insitu, abrasive cleaned and degreased ready for recoating, including the rear of pipes and gutters as far as practical. Refer to manufacturer's product advice sheets.
- Initial coats: Dulux 'Trade Metal Primer', or alternative manufacturer's equivalent.
  - Number of coats: One, dipped on site to new rainwater pipes, one brush applied to redecrated rainwater goods.
- Undercoats: Dulux 'Weathershield Exterior Undercoat', or alternative manufacturer's alternative.
  - Number of coats: One, dipped on site to new rainwater goods, brush applied to existing ironwork redecorated.
- Finishing coats: Dulux 'Weathershield Exterior High Gloss', or alternative manufacturer's alternative.
  - Number of coats: Two, dipped on site prior to installation of new rainwater pipes. Brush down each coat following dipping to prevent paint runs, and touch up any scratches / damage by hand following installation. Two, brush applied to existing, redecorated, rainwater goods.

130C GLOSS PAINT TO INTERIOR SURFACES OF REFURBISHED SASH CASEMENTS AND FRAMES

- Manufacturer: Dulux Ltd., or equal / approved.
  - Product reference: Trade High Gloss, or alternative manufacturer's equivalent oil based gloss.
- Surfaces: Existing internal timber surfaces to the refurbished windows and doors noted in clause 130A.
  - Preparation: Remove all loose and defective coatings from existing surfaces, if necessary stripping back to bare wood, ensuring all surfaces are clean, dry, free from all defective or poorly adhering material, dirt, grease, wax etc. Replace rotten wood and areas of troublesome knots etc with new. Undertake repairs to sash casements and frames as detailed on drawing Nos. 4306/WR03, and schedules 4306/WS01 - WS04.
- Initial coats: Prime any bare wood with Dulux 'Trade Primer', or alternative manufacturer's equivalent.
  - Number of coats: One, brush applied.
- Undercoats: Dulux 'Trade Undercoat', or alternative manufacturer's alternative.
  - Number of coats: One, brush applied.
- Finishing coats: Dulux 'Trade High Gloss', or alternative manufacturer's alternative.
  - Number of coats: Two, brush applied.

130D GLOSS PAINT TO NEW BOX SASH WINDOWS, SASH CASEMENTS, AND PATIO DOORS

- Manufacturer: Dulux Ltd., or equal / approved.
  - Product reference: Weathershield Exterior High Gloss, or alternative manufacturer's equivalent oil based gloss.
- Surfaces: New timber surfaces to the new sash windows and patio doors with fanlights over to the Orangery south wall, OS01 - OS11, as drawing No. 4306/WR02 and WR04.
  - Preparation: Ensure surfaces are clean and free of grease and dust, and prime as manufacturer's recommendations.
- Initial coats: Prime with Dulux 'Weathershield Aquatech Preservative Basecoat', or alternative manufacturer's equivalent.
  - Number of coats: One, brush applied.
- Undercoats: Dulux 'Weathershield Exterior Undercoat', or alternative manufacturer's alternative.
  - Number of coats: Two, brush applied.
- Finishing coats: Dulux 'Weathershield Exterior High Gloss', or alternative manufacturer's alternative.
  - Number of coats: One, brush applied.

130E GLOSS PAINT TO INTERIOR SURFACES OF NEW BOX SASH WINDOWS, SASH CASEMENTS, AND PATIO DOORS

- Manufacturer: Dulux Ltd., or equal / approved.
  - Product reference: Trade High Gloss, or alternative manufacturer's equivalent oil based gloss.
- Surfaces: Internal surfaces to the new windows, casements and doors noted in clause 130D.
  - Preparation: Ensure all surfaces are clean, and free from dust and grease, and prime as manufacturer's recommendations.
- Initial coats: Prime with Dulux 'Trade Primer', or alternative manufacturer's equivalent.
  - Number of coats: One, brush applied.
- Undercoats: Dulux 'Trade Undercoat', or alternative manufacturer's alternative.
  - Number of coats: One, brush applied.
- Finishing coats: Dulux 'Trade High Gloss', or alternative manufacturer's alternative.
  - Number of coats: Two, brush applied.

135A POLYESTER POWDER COATING TO REFURBISHED GRATINGS AND PLATES, SOUTH ORANGERY

Manufacturer: Thomas Howse Limited, or Contractor's choice to C/A approval.

- Paint System: Polyester Powder Coating.

- Surfaces: Existing iron / steel gratings and plates over apertures into perimeter duct around south elevation of Orangery.
  - Preparation (in shop): High pressure abrasive water blast or slurry blast to remove all traces of old coating (where applicable), detergent wash to remove salts and any other contaminants, and degrease the surface.
    Fill any blow holes with suitable filler, remove any excess, and allow to cure.
    Dry blast clean to ISO 8501-1: 1998 (Sa 2.5) or SSPC-SP6, maximum profile 75-80 microns.
    Ensure all spent grit and other contaminants are removed within the regulation parameters..
- Primer (in shop): Epoxy Zinc Rich Primer, HMG Powder Coatings Ltd, or Contractor's choice to C/A approval.
  Dry Film Thickness: 60 - 70 microns (nominal).
  Colour: To be specified..
  - Number of coats: One
- Finishing coats: Polyester Powder coating as manufacturer's data sheets, recommendations to be sent to C/A for review prior to finishing.
  - Number of coats: One.
    Dry Film Thickness: 60 microns (nominal).
    Colour: To be a confirmed prior to coating.
    Site Protection: Overcoat with a clear polyester lacquer to manufacturer's recommendations.
    Colour: clear.

135B POLYESTER POWDER COATING TO NEW HANDRAIL SUPPORT LEGS, SOUTH ORANGERY

Manufacturer: Thomas Howse Limited, or Contractor's choice to C/A approval.

- Paint System: Polyester Powder Coating.

- Surfaces: New 20x20mm stainless steel sections to south elevation of Orangery.
  - Preparation (in shop): Specialist supplier to advise for C/A approval..
- Primer (in shop): Epoxy Zinc Rich Primer, HMG Powder Coatings Ltd, or Contractor's choice to C/A approval.
  Dry Film Thickness: 60 - 70 microns (nominal).
  Colour: To be specified..
  - Number of coats: One
- Finishing coats: Polyester Powder coating as manufacturer's data sheets, recommendations to be sent to C/A for review prior to finishing.
  - Number of coats: One.
    Dry Film Thickness: 60 microns (nominal).
    Colour: To be a confirmed prior to coating.
    Site Protection: Overcoat with a clear polyester lacquer to manufacturer's recommendations.
    Colour: clear.

175A PROTECTIVE COATING TO CORRODED STEEL BEAM: WEST LOGGIA

- Manufacturer: RIW, or Contractor's choice to C/A approval.
  - Product reference: RIW LAC high build liquid asphatic composition coating, or Contractor's choice to C/A approval.
- Surfaces: Existing corroded steel beam.
  - Preparation: Remove all render and associated backing to expose the web of the steel for the full extent of its length. Thoroughly clean all exposed edges to remove dust, dirt, mortar, render, including any paint residues, (which should be assumed to contain lead). Blast clean with extraction filters if practical, if not adopt manual cleaning using hand and power tools, such as rotating wire brushes, needle guns and the like, in accordance with BS EN ISO 8504:Part 3.
- Initial coats: Epoxy zinc phosphate primer. Minimum total dry film thickness 150 microns. (W & J Leigh & Co. Epigrip C400 V3 Primer/Buildcoat, or similar). Contractor's choice to C/A approval.
  - Number of coats: 1 No.
- Undercoats: as above.
  - Number of coats: 1 No.
- Finishing coats: High build heavy duty bitumen. Minimum total dry film thickness 200 microns. (RIW LAC, or similar). Contractor's choice to C/A approval.
- Application: As manufacturer's recommendations to a thickness of approx. 600 microns at the recommended coverage.
  - Number of coats: 2 No.

195A SPECIAL COATING TO RENDER, REAR PARAPET WALLS TO ORANGERY.

- Manufacturer: Keim Mineral Paints Limited.
  - Product reference: Keim Royalan.
- Surfaces: Existing render patch repaired with Keim Universal Render as Section M20, and new Keim Universal Render where existing defective render removed.
  - Preparation: Newly rendered surfaces left min. 15 days to dry out, then surfaces prepared by washing down with clean cold water to remove all surface dirt, dust and contaminants.
- Initial coats: As recommended by manufacturer.
  - Number of coats: As above.
- Undercoats: Keim Royalan.
  - Number of coats: 1 no. diluted approximately 20% by weight with Keim Royalan Dilution .
- Finishing coats:
  - Type: Keim Royalan.
  - Number of coats: 1 no.

195B SPECIAL COATING TO RENDER, NORTH ORANGERY GARDEN WALL.

- Manufacturer: Keim Mineral Paints Limited.
  - Product reference: Keim Royalan.
- Surfaces: New Keim Universal Render on brick background following removal of defective render.
  - Preparation: Newly rendered surfaces left min. 15 days to dry out, then surfaces prepared by washing down with clean cold water to remove all surface dirt, dust and contaminants.
- Initial coats: As recommended by manufacturer.
  - Number of coats: As above.
- Undercoats: Keim Royalan.
  - Number of coats: 1 no. diluted approximately 20% by weight with Keim Royalan Dilution .
- Finishing coats:
  - Type: Keim Royalan.
  - Number of coats: 1 no.

195C SPECIAL COATING TO ALL OTHER RENDERED WALLS OF THE HALL AND NORTH ORANGERY.

- Manufacturer: BEECK kompromisslos mineralisch.
  - Product reference: Renosil Fine.
- Surfaces: New hydraulic lime / sand render on brick background following localised removal of defective render, new hydraulic lime / sand skim coats over eroded rendered surfaces, existing paint finishes / cement renders.
  - Preparation: Newly rendered surfaces to be left sufficient time to dry out, then surfaces prepared by washing down with clean cold water to remove all surface dirt, dust and contaminants, and prime with BEECK Fixative and 5 parts water in accordance with manufacturer's recommendations. Existing surfaces to have cracked less adherent old coatings removed as pore deep as possible, then thoroughly clean firmly adhering coatinga and renders. Prepare and re-treat algae infested surfaces with with BEECK Fungicide , and prime highly absorbent or crumbling surfaces with BEECK MBA-Fixitive, thinned with 2 parts water, all in accordance with manufacturer's recommendations and data sheets.
- Initial coats: BEECK Quartz filler / BEECK Bonding Coat / BEECK Renosil Course as recommended by manufacturer, and dependent on substrate.
  - Number of coats: As above.
- Undercoats: BEECK Renosil Fine applied with roller, brush or airless spray in accordance with manufacturer's recommendations and data sheets.
  - Number of coats: 1 no. adjusted to substrate by adding water in accordance with manufacturer's recommendations.
- Finishing coats:
  - Type: BEECK Renosil Fine applied with roller, brush or airless spray in accordance with manufacturer's recommendations and data sheets.
  - Number of coats: 2 no.

GENERALLY

215 HANDLING AND STORAGE

- Coating materials: Deliver in sealed containers, labelled clearly with brand name, type of material and manufacturer's batch number.
- Materials from more than one batch: Store separately.

240 SURFACES NOT TO BE COATED

External masonry and surrounding internal finishes generally .

280 PROTECTION

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

PREPARATION

400 PREPARATION GENERALLY

- Standard: To BS 6150, Section 4.
- Preparation materials: Types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared.
- Substrates: Sufficiently dry in depth to suit coating.
- Efflorescence salts: Remove.
- Dirt, grease and oil: Remove. Give notice if contamination of surfaces/ substrates has occurred.
- Surface irregularities: Abade to a smooth finish.
- Joints, cracks, holes and other depressions: Fill with stoppers/ fillers. Work well in and finish off flush with surface. Abrade to a smooth finish.
- Dust, particlaes and residues from abrasion: Remove.
- Water based stoppers and fillers:
  - Apply before priming unless recommended otherwise by manufacturer.
  - If applied after priming: Patch prime.
- Oil based stoppers and fillers: Apply after priming.
- Doors, opening windows and other moving parts:
  - Ease, if necessary, before coating.
  - Prime resulting bare areas.

440 PREVIOUSLY COATED SURFACES GENERALLY

- Preparation standard: To BS 6150, Section 6.
- Removing coatings: Do not damage substrate and adjacent surfaces or adversely affect subsequent coatings.
- Loose, flaking or otherwise defective areas: Carefully remove to a firm edge.
- Alkali affected coatings: Completely remove.
- Contaminated surfaces: Give notice of:
  - Coatings suspected of containing lead.
  - Substrates suspected of containing asbestos.
  - Significant rot, corrosion or other degradation of substrates.
- Retained coatings:
  - Thoroughly clean to remove dirt, grease and contaminants.
  - Gloss coated surfaces: Abrade to provide a key.
- Partly removed coatings:
  - Additional preparatory coats: Apply to restore original coating thicknesses.
  - Junctions: Abrade to give a flush surface.
- Completely stripped surfaces: Prepare as for uncoated surfaces.

456 PREVIOUSLY COATED SURFACES - BURNING OFF

- Risk assessment and action plan: Prepare, and obtain approval before commencing work.
- Adjacent areas: Protect from excessive heat and falling. scrapings.
- Exposed resinous areas and knots: Apply to coats of knotting.
- Removed coatings: Dispose of safely.

461 PREVIOUSLY COATED WOOD

- Degraded or weathered surface wood: Abrade to remove.
- Degraded substrate wood: Repair with sound material of same species.
- Exposed resinous areas and knots: Apply two coats of knotting.

471 PREPRIMED WOOD

- Areas of defective primer: Abrade back to bare timber.

481 UNCOATED WOOD

- General: Abrade to a smooth, even finish with arrises and moulding edges lightly rounded or eased.
- Heads of fasteners: Countersink sufficient to hold stoppers/fillers.
- Resinous areas and knots: Apply two coats of knotting.

490 PREVIOUSLY COATED STEEL

- Defective paintwork: Remove to leave a firm edge and clean bright metal.
- Sound paintwork: Abrade to provide key for subsequent coats.
- Corrosion and loose scale: Abrade back to bare metal.
- Residual rust: Treat with a proprietary removal solution.
- Bare metal: Apply primer as soon as possible.
- Remaining areas: Degrease.

500 PREPRIMED STEEL

- Areas of defective primer, corrosion and loose scale: Abrade back to bare metal. Reprime as soon as possible.

622 ORGANIC GROWTHS

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

631 PREVIOUSLY PAINTED WINDOW FRAMES

- Paint encroaching beyond glass sight line: Remove.
- Loose and defective putty: Remove.
- Putty cavities and junctions between previously painted surfaces and glass: Clean thoroughly.
- Finishing:
  - Patch prime, reputty as necessary, and allow to harden.
  - Seal and coat as soon as sufficiently hard.

640A EXTERNAL POINTING TO EXISTING FRAMES

- Defective sealant pointing: Remove.
- Joint depth: Approximately half joint width; adjust with backing strip if necessary.
- Sealant:
  Point between window frames and masonry with mastic formed from burnt sand and boiled linseed oil worked to a neat chamfer, on backing of lime mortar, on old newspapers, rolled up, soaked in water, rinsed and firmly tamped into raked out joints.
  - Preparation and application: As section Z22.

APPLICATION

711 COATING GENERALLY

- Application standard: To BS 6150, Section 5.
- Conditions: Maintain suitable temperature, humidity and air quality during application and drying.
- Surfaces: Clean and dry at time of application.
- Thinning and intermixing of coatings: Not permitted unless recommended by manufacturer.
- Overpainting: Do not paint over intumescent strips or silicone mastics.
- Priming coats:
  - Thickness: To suit surface porosity.
  - Application: As soon as possible on same day as preparation is completed.
- Finish:
  - Even, smooth and of uniform colour.
  - Free from brush marks, sags, runs and other defects.
  - Cut in neatly.

730 WORKSHOP COATING OF CONCEALED JOINERY SURFACES

- General: Apply coatings to all surfaces of components.

731 SITE COATING OF CONCEALED JOINERY SURFACES

- General: After priming, apply additional coatings to surfaces that will be concealed when fixed in place.
  - Components: Fascia boards.
  - Additional coatings: One undercoat.

740 CONCEALED METAL SURFACES

- General: Apply additional coatings to surfaces that will be concealed when component is fixed in place.
  - Components: Gutter Brackets and rainwater goods fixing 'ears'.
  - Additional coatings: One undercoat.

790 PUTTY GLAZING

- Setting: Allow putty to set for seven days.
- Sealing:
  - Within a further 14 days, seal with an oil based primer.
  - Fully protect putty with coating system as soon as it is sufficiently hard.
  - Extend finishing coats on to glass up to sight line.

Q10 Kerbs/ edgings/ channels/ paving accessories

To be read with Preliminaries/General conditions.

TYPES OF KERBS/EDGINGS/CHANNELS

200A SPECIAL EDGINGS TO BOUND GRAVEL PATHS

- Manufacturer: Rainbow Professional Ltd.
  - Product reference: 'Stable-Edge' aluminium landscape edging.
- Size: 75m upstand x 2438mm lengths.
- Type/ Material: aluminium.
  - Finish: natural.
  - Colour: none.
- Accessories: 250mm annular spikes for fixing into sub-grade, or concrete haunch if considered necessary.
- Bedding: None.
- Joints: Proprietary interlocking joints between sections.
  Preparation: Cut back existing paving back to an agreed line, forming a neat edge. Ensure sub grade is suitably compacted to accept fixing of edge trim, and fix with annular spikes to manufacturer's recommendations. Patch fill any voids between the trim and existing cut back surface on completion of the bound gravel works.

LAYING

510 LAYING KERBS, EDGINGS AND CHANNELS

- Cutting: Neat, accurate and without spalling. Form neat junctions.
  - Long units (450 mm and over) minimum length after cutting: 300 mm.
  - Short units minimum length after cutting: The lower of one third of their original length or 50 mm.
- Bedding of units: Positioned true to line and levelled along top and front faces, in a mortar bed on accurately cast foundations or on a race of fresh concrete.
- Securing of units: After bedding has set, secured with a continuous haunching of concrete or on a race of fresh concrete with backing concrete cast monolithically.

530 CONCRETE FOR FOUNDATIONS, RACES AND HAUNCHING

- Standard: To BS 8500-2.
- Designated mix: Not less than GEN0 or Standard mix ST1.
- Workability: Very low.

540 CEMENT MORTAR BEDDING

- General: To section Z21.
- Mix: (Portland cement:sand): 1:3.
  - Portland cement: Class CEM I 42.5 to BS EN 197-1.
  - Sand: to BS EN 12620, grade 0/4 or 0/2 (MP).
- Bed thickness: 12-40 mm.

543 LIME MORTAR BEDDING

- General: To section Z21.
- Mix: 1:3 Lime:Sand, NHL 3.5.
- Bed thickness: 12-40 mm.

620 ACCURACY

- Deviations (maximum):
  - Level: ± 6 mm.
  - Horizontal and vertical alignment: 3 mm in 3 m.

Q20 Granular sub-bases to roads/ pavings

To be read with Preliminaries/ General conditions.

110 THICKNESSES OF SUB-BASE/ SUBGRADE IMPROVEMENT LAYERS
- Thicknesses: See sections:
  - Q25 Slab/ brick/ sett/ cobble pavings.

120 CHECKING OF SUBGRADES
- Anticipated subgrade conditions:
  - Soil type: Refer to Report on Site Investigation.
  - Plasticity index: As Above.
  - CBR (minimum): As above.
  - Depth below formation level to groundwater table: As above.
- Subgrade variation: If material appears to vary from anticipated conditions, or if there are extensive soft spots, Report condition and await instruction before proceeding.
- Submit: Results and obtain instructions before proceeding.

130 HERBICIDES
- Type: Contractor's choice to CA approval.
- Application: To subgrade of paved areas.

140 EXCAVATION OF SUBGRADES
- Final excavation to formation/ subformation level: Carry out immediately before compaction of subgrade.
- Soft spots and voids: Give notice.
- Old drainage and service trenches: Give notice.
- Wet conditions: Do not excavate or compact when the subgrade may be damaged or destabilized.

145 PREPARATION AND COMPACTION OF SUBGRADES
- Timing: Immediately before placing sub-base.
- Soft or damamged areas: Excavate and replace with sib-base material, compacted in layers max 300mm thick.
- Compaction: Thoroughly, by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed roads/ pavings when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

180 NOTICE
- Give notice: After preparation of Subgrades.
  - Period of notice: To be determined by CA.

211 GRANULAR MATERIAL

- Quality: Of a known suitability for use in sub-base, free from excessive dust, well graded, all pieces less than 75 mm in any direction, minimum 10% fines value of 50 kN when tested in a soaked condition to BS 812-111 or a resistance to fragmentation of LA50 for the Los Angeles test to BS EN 1097-2, and in any one layer only one of the following:
  - Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
  - Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
  - Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
  - Natural gravel.
  - Natural sand.
- Filling: Spread and levelled in 150 mm maximum layers, each layer thoroughly compacted.

220 FROST SUSCEPTIBLE GRANULAR MATERIAL

- Definition (non frost susceptible material): To Highways Agency 'Specification for highway works' clause 801.8.
- Depth of frost susceptible material below final surface of paving (minimum): 450mm.
- Testing: Test materials used if required and supply certificates.

230 PLACING GRANULAR MATERIAL GENERALLY

- Preparation: Loose soil, rubbish and standing water removed.
- Structures, membranes and buried services: Ensure stability and avoid damage.

250 LAYING GRANULAR SUB-BASES FOR PEDESTRIAN AREAS

- General: Spread and levelled.
- Compaction:
  - Timing: As soon as possible after laying.
  - Method: By roller or other suitable means, adequate to resist subsidence or deformation of the sub-base during construction and of the completed paving when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

310 ACCURACY

- Permissible deviation from required levels, falls and cambers (maximum):
  - Subgrades:
    Roads and parking areas: +20 -30 mm.
    Footways and recreation areas: ± 20 mm.
  - Sub-bases:
    Roads and parking areas: +20 -20mm.
  - Footways and recreation areas: +12 -12mm.

330 COLD WEATHER WORKING

- Frozen materials: Do not use.
- Freezing conditions: Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.

340 PROTECTION

- Sub-bases: As soon as practicable, cover with subsequent layers, specified elsewhere.
- Subgrades and sub-bases: Prevent degradation by construction traffic, construction operations and inclement weather.

Q25 Slab/ brick/ sett/ cobble pavings

To be read with Preliminaries/ General conditions.

GENERAL

110A NATURAL STONE SLAB PAVING SYSTEM TO RENEWED DEFECTIVE PAVING AND LOCALISED REPAIRS: SOUTH ORANGERY

- Subgrade improvement layer: Not required.
  - Compacted thickness: Not applicable.
- Granular sub-base: As existing.
  - Compacted thickness: Paving laid on mortar bed on existing sub-base.
- Base: Not required.
  - Thickness: Not required.
- Laying course: Site mixed mortar.
  - Accessories: None.
- Paving units: Natural sandstone slab paving to match existing and previous replacement to duct around building, from Fletcher Bank Quarry, or similar to match existing colour / texture. Contractor to submit proposals for C/A approval. Nominal 75mm thick by exsiting plan sizes.
- Jointing: Site mixed mortar.
  - Bond: To match existing.
- Accessories: None.

110B NATURAL STONE SLAB PAVING SYSTEM TO NEW STEPS AND RAMPS: SOUTH ORANGERY

- Subgrade improvement layer: Not required.
  - Compacted thickness: Not applicable.
- Granular sub-base: As drawing 4306/OE01,150mm well consilidated hardcore to paving, 150mm concrete footing and carriage to steps on 150mm hardcore .
  - Compacted thickness: 150 mm.
- Base: Not required.
  - Thickness: Not required.
- Laying course: Site mixed mortar.
  - Accessories: None.
- Paving units: Natural sandstone slab paving to match existing and previous replacement to duct around building, from Fletcher Bank Quarry, or similar to match existing colour / texture. Contractor to submit proposals for C/A approval. Nominal sizes 75mm thick to paving and step tread, 50mm thick to step riser, approximate plan sizes as indicated on drawing No. 4306/OE01.
- Jointing: Site mixed mortar.
  - Bond: To match existing.
- Accessories: Insert to step nosing as Clause 490A.

110C NATURAL STONE SLAB PAVING SYSTEM HAZARD WARNING PAVING TO NEW STEPS AND RAMPS: SOUTH ORANGERY

- Subgrade improvement layer: Not required.
  - Compacted thickness: Not applicable.
- Granular sub-base: As drawing 4306/OE01.
  - Compacted thickness: 150 mm.
- Base: Not required.
  - Thickness: Not required.
- Laying course: Site mixed mortar.
  - Accessories: None.
- Paving units: Natural sandstone slab paving to match existing and previous replacement to duct around building, from Fletcher Bank Quarry, or similar to match existing colour / texture. Contractor to submit proposals for C/A approval. Nominal sizes 400X400X50mm thick as indicated on drawing No. 4306/OE01.
- Jointing: Site mixed mortar.
  - Bond: To match existing.
- Accessories: Insert to step nosing as Clause 490A.

SYSTEM PERFORMANCE

210 DESIGN - NATURAL STONE SLAB PAVING SYSTEM

- Design: Complete the design of the natural stone slab paving system in accordance with BS 7533-4.
  - Site category: IV.
- Ground conditions: As existing.
- Performance criteria: See drawing No. 4306/OE01.
- Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

PRODUCTS

310 NATURAL STONE SLABS YORK STONE REPALCEMENT / NEW / HAZARD PAVING: SOUTH ORANGERY

- Standard: To BS EN 1341.
- Supplier: Contractor's choice.
  - Product reference: Contractor's choice.
  - Quarry: Fletcher Bank, or Contractor to submit alternative for C/A approval.
- Petrographical description/ stone type: York Stone.
- Finish: Sawn.
- Sizes: As detailed on drawing 4306/OE01.
  - Plan dimension deviation class: No requirement.
  - Diagonal deviation class: No requirement.
  - Thickness deviation class: T1.
- Arrises: Square.
- Breaking strength: Class 2.
- Slip resistance: PTV to BS 7976-2 of 49.
- Skid resistance: No requirement.
- Surface treatment: None.

320 TACTILE FLAGS AND SLABS TO NEW RAMPS AND STEPS: SOUTH ORANGERY
- Standard: To DD CEN/TS 15209.
- Material: Natural stone.
  - Manufacturer: As Clause 310, or Contractor's choice to C/A approval.
    Product reference: Contractor to submit proposals for C/A approval.
- Recycled content: Not applicable.
- Nominal sizes: 400 x 400 x 50mm.
- Colour: Natural.
- Type of surface: Corduroy / Rib type finish, exact profile to be agreed with C/A .

375A SAND/ FINE AGGREGATE FOR SITE MIXED MORTAR BEDDING AND POINTING TO NEW RAMP AND REPLACEMENT PAVING: SOUTH ORANGERY
- Standard: To BS EN 12620, designations:
  - Flag and slab paving laying course: GF85 0/4 (MP).
  - Flag and slab paving jointing: GF85 0/1 (MP).

380 LIME FOR SITE MIXED MORTAR BEDDING AND POINTING TO NEW RAMPS AND REPLACEMENT PAVING: SOUTH ORANGERY
- Standard: Nonhydraulic to BS EN 459-1, -2 and -3, type CL 90 or, if ready-mixed lime:sand, to BS EN 998-2.

490A APPLIED SLIP RESISTANT CAST INSERTS TO EDGE OF NEW STEPS: SOUTH ORANGERY.
- Manufacturer: Contractor's choice to C/A approval.
  - Product reference: Contractor's choice to CA approval.
- Material: Silicone carbide resin carrier with self adhesive backing.
  - Format: Strip for casting-in, 8.0 mm thick, for site sanding and finishing.
    Predrilled: Not applicable.
  - Slip resistance - water wet (minimum): PTV to BS 7976-2 of 40.
- Size/ Coverage: As drawing 4306/OE01.
- Colour: Brown.
- Accessories/ Features: n/a.

EXECUTION

610 MATERIAL SAMPLES
- Samples representative of colour and appearance of designated materials: Submit before placing orders.
  - Designated materials: Natural stone slab paving; reference sample to BS EN 1341.

615 CONTROL SAMPLES
- Sample areas: Complete as part of the finished work.
  - Types of paving: Natural stone slab paving.
  - Location: South Orangery.
  - Size (minimum): 1.5 x 1.5 m.
  - Included features: Junction with building facade.
- Approval of appearance and surface: Obtain before proceeding.

620 ADVERSE WEATHER

- General:
  - Temperature: Do not lay or joint paving if the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.
  - Frozen materials: Do not use. Do not lay bedding on frozen or frost covered bases.
- Paving with mortar joints and/ or bedding:
  - Protect from frost damage, rapid drying out and saturation until mortar has hardened.
- Paving laid and jointed in sand:
  - Stockpiled bedding sand: Protect from saturation.
  - Exposed areas of sand bedding and uncompacted areas of sand bedded paving: Protect from heavy rainfall.
  - Saturated sand bedding: Remove and replace, or allow to dry before proceeding.
  - Laying dry-sand jointed paving in damp conditions: Brush in as much jointing sand as possible. Minimize site traffic over paving. As soon as paving is dry, top up joints and complete compaction.

625 LAYING PAVINGS - GENERAL

- Appearance: Smooth and even with regular joints and accurate to line, level and profile.
- Falls: To prevent ponding.
- Bedding of paving units: Firm so that rocking or subsidence does not occur or develop.
  - Bedding/ Laying course: Consistently and accurately graded, spread and compacted to produce uniform thickness and support for paving units.
- Slopes: Lay paving units upwards from the bottom of slopes.
- Paving units: Free of mortar and sand stains.
- Cutting: Cut units cleanly and accurately, without spalling, to give neat junctions with edgings and adjoining finishes.

630 LEVELS OF PAVING

- Permissible deviation from specified levels:
  - Generally: ± 6 mm.
- Height of finished paving above features:
  - At gullies: +6 to +10 mm.
  - At drainage channels and kerbs: +3 to +6 mm.

637 REGULARITY - TO BS 8300

- Maximum undulations in the surface of pavings (except tactile paving surfaces) under a 1 m straight edge placed anywhere on the surface (where appropriate in relation to the geometry of the surface): 3 mm.
- Joints between paving units or utility access covers:
  - Joints flush with the surface: difference in level between adjacent units to be no more than twice the joint width (with a 5mm max difference in level).
  - Recessed, filled joints: difference in level between adjacent units to be no greater than 2 mm; the recess to be no deeper than 5 mm.
  - Unfilled joints: difference in level between adjacent units to be no greater than 2 mm.
- Sudden irregularities: Not permitted.

645 PROTECTION

- Cleanliness: Keep paving clean and free from mortar droppings, oil and other materials likely to cause staining.
- Materials storage: Do not overload pavings with stacks of materials.
- Handling: Do not damage paving unit corners, arrises, or previously laid paving.
- Mortar bedded pavings: Keep free from traffic after laying:
  - Pedestrian traffic (minimum): 5 days.
  - Vehicular traffic (minimum): N/A.
- Access: Restrict access to paved areas to prevent damage from site traffic and plant.

655 CONDITION OF SUB-BASES/ BASES BEFORE SPREADING LAYING COURSE

- Trenches and excavation of soft or loose spots in subgrade: Fill and thoroughly compact.
- Granular surfaces: Lay and compact so as to be sound, clean, smooth and close-textured enough to prevent migration of bedding/ laying course materials into the sub-base during compaction and use, free from movement under compaction plant and free from compaction ridges, cracks and loose material.
- Prepared existing and new bound bases (roadbases): Sound, clean, free from rutting or major cracking. Remove sharp stones, projections and debris.
- Sub-base/ Roadbase level tolerances: To BS 7533-7, Annex A.
- Levels and falls: Accurate and within the specified tolerances.
- Drainage outlets: Within 0-10 mm of the required finished level.
- Features in sand bedded paving (including mortar bedded restraints and drainage ironwork): Complete to required levels; adequately bed and haunch in mortar.
- Sub-bases containing cement/ hydraulic binder: Cure for minimum times specified in BS 7533-4.

695 SITE MIXED MORTAR LAYING COURSE FOR NEW AND REPLACEMENT STONE SLAB PAVING: SOUTH ORANGERY

- Mix: 1:3 lime:sand.
- Consistency: Workable.
- Admixtures: None.

715 LAYING FLAG AND SLAB PAVING - MORTAR LAYING COURSE AND JOINTING

- Standard generally: In accordance with BS 7533-4.
- Flag installation and cutting: To Interpave 'Concrete flag paving'.
- Laying course:
  - Nominal thickness: 30 mm before laying paving slabs.
- Laying and jointing: As drawing No. 4306/OS01.
- Joint width (nominal): 8 mm.

COMPLETION

915 COMPLETION OF PAVING WITH DRY SAND OR FINE AGGREGATE FILLED JOINTS

- Sand dressing: Not required.
- Final compaction of the surface course: In accordance with BS 7533-3.
- Vacuum cleaning machines: Not allowed.

920 COMPLETION OF GRASSED PAVINGS

- Protection: Protect from traffic for 6-8 weeks or until grass can tolerate traffic.

R10 Rainwater pipework/ gutters

RAINWATER PIPEWORK/ GUTTERS

To be read with Preliminaries/ General conditions.

TYPES OF PIPEWORK/ GUTTER

130A CAST IRON PIPEWORK FOR EXTERNAL USE NEW, FULL LENGTH, RAINWATER PIPES TO NORTH FRONT (3 no.) AND ORANGERY (1 no.)

- Pipes, fittings and accessories:
  - Standard: To BS 460.
  - Manufacturer: Hargreaves Foundary Drainage Ltd., Water Lane, Halifax, HX3 9HG .
  - Type: Circular section R4001E single socket with ears, 1829mm / 6' lengths cut to suit where necessary.
  - Nominal sizes: 100mm / 4" Diameter .
  - Finish as supplied: Dipped primed for painting.
  - Finish / Colour: Apply 1 No. undercoat and 2 No. gloss by site dipping prior to installation. Hang vertically and brush down each coat to avoid paint runs. Touch up any damage / scratches when fixed. See Section M60/130D.
- Accessories: Offset bends as necessary around plinth, and 100mm / 4" Eared Anti Splash shoe to discharge over extg. gully .
- Fixing: Stainless steel fixing screws through new HW timber bobbins to rendered brickwork / stone features as necessary .

130B CAST IRON PIPEWORK FOR EXTERNAL USE NEW SHORT LENGTH RAINWATER PIPES TO ORANGERY (3 no.)

- Pipes, fittings and accessories:
  - Standard: To BS 460.
  - Manufacturer: Hargreaves Foundary Drainage Ltd., Water Lane, Halifax, HX3 9HG .
  - Type: Circular section R4003E single socket with ears, 914mm / 3' lengths cut to suit where necessary.
  - Nominal sizes: 100mm / 4" Diameter .
  - Finish as supplied: Dipped primed for painting.
  - Finish / Colour: Apply 1 No. undercoat and 2 No. gloss by site dipping prior to installation. Hang vertically and brush down each coat to avoid paint runs. Touch up any damage / scratches when fixed. See Section M60/130D.
- Accessories: Special casting 250mm long throw 100mm / 4" Eared shoe to discharge over lower roof areas .
- Fixing: Stainless steel fixing screws through new HW timber bobbins to rendered brickwork / stone features as necessary .

INSTALLATION

400 PREPARATION

- Timing: Before commencing work specified in this section.
- Work to be completed:
  - Below ground drainage. Alternatively, make temporary arrangements for dispersal of rainwater without damage or disfigurement of the building fabric and surroundings.
  - Painting of surfaces which will be concealed or inaccessible.

410 INSTALLATION GENERALLY

- Discharge of rainwater: Complete, and without leakage or noise nuisance.
- Components: Obtain from the same manufacturer for each type of pipework/ guttering.
- Electrolytic corrosion: Avoid contact between dissimilar metals where corrosion may occur.
- Plastics and galvanized steel pipes: Do not bend.
- Protection:
  - Fit purpose made temporary caps to prevent ingress of debris.
  - Fit access covers, cleaning eyes and blanking plates as the work proceeds.
- Fixings/ Fasteners: As section Z20.

450 RAINWATER OUTLETS

- Fixing: Securely, before connecting pipework.
- Junctions between outlets and pipework: To accommodate movement in structure and pipework.

460 FIXING PIPEWORK

- Pipework: Fix securely at specified centres plumb and/ or true to line.
- Branches and low gradient sections: Fix with uniform and adequate falls to drain efficiently.
- Externally socketed pipes/ fittings: Fix with sockets facing upstream.
- Additional supports: Provide as necessary to support junctions and changes in direction.
- Vertical pipes:
  - Provide a loadbearing support at least at every storey level.
  - Tighten fixings as work proceeds so that every storey is self supporting.
  - Wedge joints in unsealed metal pipes to prevent rattling.
- Wall and floor penetrations: Isolate from structure.
  - Pipe sleeves: As Section P31.
- Allowance for thermal and building movement: Provide and maintain clearance as fixing and jointing proceeds.
- Expansion joint pipe sockets: Fix rigidly to building. Elsewhere, use brackets/ fixings that allow pipes to slide.

465 JOINTING PIPEWORK/ GUTTERS

- General: Joint using materials, fittings and techniques which will make effective and durable connections.
- Jointing differing pipework/ gutter systems: Use adaptors recommended by manufacturers.
- Cut ends of pipes/ gutters: Clean and square with burrs and swarf removed. Chamfer pipe ends before inserting into ring seal sockets.
- Jointing or mating surfaces: Clean, and where necessary lubricated, immediately before assembly.
- Junctions: Form using fittings intended for the purpose.
- Jointing material: Strike off flush and remove surplus. Do not allow to project into bore of pipes, fittings and appliances.
- Surplus flux, solvent, cement: Remove.

510 ELECTRICAL CONTINUITY - PIPEWORK

- Joints in metal pipes with flexible couplings: Use clips (or suitable standard pipe couplings) supplied for earth bonding by pipework manufacturer to ensure electrical continuity.

560 INTERNAL PIPEWORK TEST

- Preparation: Temporarily seal open ends of pipework with plugs. Fill traps.
- Test apparatus: Connect a 'U' tube water gauge and air pump to pipework via a plug.
- Testing: Pump air into pipework until gauge registers 38 mm.
- Required performance:
  - Allow a period for temperature stabilization, after which the pressure of 38 mm is to be maintained without loss for not less than 3 minutes.
  - Traps must maintain minimum 25 mm water seal.

570 GUTTER TEST

- Preparation: Temporarily block all outlets.
- Testing: Fill gutters to overflow level and after 5 minutes closely inspect for leakage.

Z10 Purpose made joinery

To be read with Preliminaries/ General conditions.

110 FABRICATION

- Standard: To BS 1186-2.
- Sections: Accurate in profile and length, and free from twist and bowing. Formed out of solid unless shown otherwise.
  - Machined surfaces: Smooth and free from tearing, wooliness, chip bruising and other machining defects.
- Joints: Tight and close fitting.
- Assembled components: Rigid. Free from distortion.
- Screws: Provide pilot holes.
  - Screws of 8 gauge or more and screws into hardwood: Provide clearance holes.
  - Countersink screws: Heads sunk at least 2 mm below surfaces visible in completed work.

120 CROSS SECTION DIMENSIONS OF TIMBER

- General: Dimensions on drawings are finished sizes.
- Maximum permitted deviations from finished sizes:
  - Softwood sections: To BS EN 1313-1:-
    Clause 6 for sawn sections.
    Clause NA.2 for further processed sections.
  - Hardwood sections: To BS EN 1313-2:-
    Clause 6 for sawn sections.
    Clause NA.3 for further processed sections.

130 PRESERVATIVE TREATED WOOD

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

140 MOISTURE CONTENT

- Wood and wood based products: Maintained within range specified for the component during manufacture and storage.

250 FINISHING

- Joinery surfaces: Smooth, even and suitable to receive finishes.
  - Arrises: Eased unless shown otherwise on drawings.
- End grain in external components: Sealed with primer or sealer as section M60 and allowed to dry before assembly.

Z11 Purpose made metalwork

To be read with Preliminaries/ General conditions.

310 METAL PRODUCTS
- Standards: Generally, as specified in the following clauses.
- Fasteners: Generally, same metal as component, with matching coating and finish.

510 PREPARATION FOR APPLICATION OF COATINGS
- General: Complete fabrication, and drill fixing holes before applying coatings.
- Paint, grease, flux, rust, burrs and sharp arrises: Remove.

515 FABRICATION GENERALLY
- Contact between dissimilar metals in components: Avoid.
- Finished components: Rigid and free from distortion, cracks, burrs and sharp arrises.
  - Moving parts: Free moving without binding.
- Corner junctions of identical sections: Mitre.
- Prefinished metals: Do not damage or alter appearance of finish.

535 WELDING AND BRAZING GENERALLY
- Surfaces to be joined: Clean thoroughly.
- Tack welds: Use only for temporary attachment.
- Joints: Fully bond parent and filler metal throughout with no inclusions, holes, porosity or cracks.
- Surfaces of materials that will be self-finished and visible in completed work: Protect from weld spatter.
- Flux residue, slag and weld spatter: Remove.

545 WELDING OF STAINLESS STEEL
- Method: TIG welding to BS EN 1011-3.
- Butt welds: Double bevel.

565 FINISHING WELDED AND BRAZED JOINTS VISIBLE IN COMPLETE WORK
- Butt joints: Smooth, and flush with adjacent surfaces.
- Fillet joints: Neat.
- Grinding: Grind smooth where indicated on drawings.

Z20 Fixings/ adhesives

To be read with Preliminaries/ General conditions.

110 FIXINGS GENERALLY
- Integrity of supported components: Types, sizes and quantities of fasteners/ packings and spacings of fixings selected to retain supported components without distortion or loss of support.
- Components/ substrates/ fasteners of dissimilar metals: Fixed with isolating washers/ sleeves to avoid bimetallic corrosion.
- General usage: To recommendations of fastener manufacturers and/ or manufacturers of components, products or materials fixed and fixed to.
- Appearance: As approved samples.

130 FASTENER DURABILITY
- Fasteners in external construction:
  - Fasteners not directly exposed to weather: Of corrosion resistant material or with a corrosion resistant finish.
  - Fasteners directly exposed to weather: Of corrosion resistant material.

140 FIXINGS THROUGH FINISHES
- Penetration of fasteners/ plugs into substrate: To achieve a secure fixing.

150 PACKINGS
- Function: To take up tolerances and prevent distortion of materials/ components.
- Materials: Noncompressible, noncorrodible, rot proof.
- Locations: Not within zones to be filled with sealant.

160 CRAMP FIXINGS
- Cramp positions: Maximum 150 mm from each end of frame sections and at 600 mm maximum centres.
- Fasteners: Cramps fixed to frames with screws of same material as cramps.
- Cramp fixings in masonry work: Fully bedded in mortar.

230 PELLETED COUNTERSUNK FIXINGS
- Finished level of countersunk screw heads: Minimum 6 mm below timber surface.
- Pellets: Cut from matching timber, grain matched and glued in to full depth of hole.
- Finished level of pellets: Flush with surface.

510 ADHESIVES
- Storage/ Usage: In accordance with manufacturer's and statutory requirements.
- Surfaces: Clean. Regularity and texture adjusted to suit bonding and gap filling characteristics of adhesive.
- Finished adhesive joints: Fully bonded. Free of surplus adhesive.

Z21 Mortars

10 MORTAR MIXES
- Specification: Proportions and additional requirements for mortar materials are specified elsewhere.

25A SAND FOR LIME:SAND MASONRY MORTARS
- Type: Cefn Graianog Zone 2 well graded washed sand, Nosterfield, Leighton Buzzard, or contractor's choice to CA approval. Fuel Ash may also be required depending on analysis of existing mix.
  - Quality, sampling and testing: To BS EN 13139.
  - Grading/ Source: As specified elsewhere.

30A LIME FOR GAUGED MASONRY MORTARS
- Standard: To BS EN 998-2.
- Lime: St. Astier NHL 3.5.
- Mortar Mix ratio 1:3.

40A CEMENTS FOR MORTARS RIDGE TILE BEDDING
- Cement: To BS EN 197-1 and CE marked.
  - Types: Portland cement, CEM I.
    Portland limestone cement, CEM II/A-LL.
    Portland slag cement, CEM II/B-S.
    Portland fly ash cement, CEM II/B-V.
  - Strength class: 32.5, 42.5 or 52.5.
- White cement: To BS EN 197-1 and CE marked.
  - Type: Portland cement, CEM I.
  - Strength class: 52.5.
- Sulfate resisting Portland cement:
  - Types: To BS 4027 and kitemarked.
    To BS EN 197-1 flay ash cement, CEM II/B-V and CE marked.
  - Strength class: 32.5, 42.5 or 52.5.
- Masonry cement: To BS EN 413-1 and CE marked.
  - Class: MC 12.5.

50 ADMIXTURES FOR SITE MADE MORTARS
- Air entraining (plasticizing) admixtures: To BS EN 934-3 and compatible with other mortar constituents.
- Other admixtures: Submit proposals.
- Prohibited admixtures: Calcium chloride, ethylene glycol and any admixture containing calcium chloride.

60 MAKING MORTARS GENERALLY
- Batching: By volume. Use clean and accurate gauge boxes or buckets.
- Mix proportions: Based on dry sand. Allow for bulking of damp sand.
- Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
  - Mortars containing air entraining admixtures: Mix mechanically. Do not overmix.
- Contamination: Prevent intermixing with other materials.

70 MAKING HYDRAULIC LIME:SAND MORTARS
- Mixing hydrated hydraulic lime:sand: Follow the lime manufacturer's recommendations for each stage of the mix.
  - Water quantity: Only sufficient to produce a workable mix.

Z22 Sealants

31 JOINTS BETWEEN TIMBER AND MASONRY
- Primer, backing strip, bond breaker: Types recommended by sealant manufacturer.

EXECUTION

61 SUITABILITY OF JOINTS
- Presealing checks:
  - Joint dimensions: Within limits specified for the sealant.
  - Substrate quality: Surfaces regular, undamaged and stable.
- Joints not fit to receive sealant: Submit proposals for rectification.

61A SUITABILITY OF JOINTS
- Before commencing, check that:
- Joint dimensions are within limits specified for the sealant.
- Surfaces are smooth and undamaged
- Preparatory work which must be done before assembly of the joint has been carried out, Inform CA if joints are not suitable to recieve sealant and submit proposals for rectification.

62 PREPARING JOINTS
- Surfaces to which sealant must adhere:
  - Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.
  - Clean using materials and methods recommended by sealant manufacturer.
- Vulnerable surfaces adjacent to joints: Mask to prevent staining or smearing with primer or sealant.
- Backing strip and/ or bond breaker installation: Insert into joint to correct depth, without stretching or twisting, leaving no gaps.
- Protection: Keep joints clean and protect from damage until sealant is applied.

63 APPLYING SEALANTS
- Substrate: Dry (unless recommended otherwise) and unaffected by frost, ice or snow.
- Environmental conditions: Do not dry or raise temperature of joints by heating.
- Sealant application: Fill joints completely and neatly, ensuring firm adhesion to substrates.
- Sealant profiles:
  - Butt and lap joints: Slightly concave.
  - Fillet joints: Flat or slightly convex.
- Protection: Protect finished joints from contamination or damage until sealant has cured.