OUR TOWN HALL

SPECIFICATION FOR CLEANING & REPAIRS TO THE ALBERT MEMORIAL LOCATED IN ALBERT SQUARE

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OUR TOWN HALL PROJECT

CLAUSE SUFFIX LETTERS

This Purcell Specification is based upon the National Building Specification (NBS). The Contractor's attention is drawn to the suffix letters A, B and * that occur after some of the clause numbers in the work sections.

These suffix letters are used as follows:

n * is used for a new clause, not found in the NBS
n A is used for an NBS clause which has been altered in the Purcell Standard Specification.
n B is used for a new clause in this particular Job Specification or against an existing clause from the Purcell Standard Specification amended for this project.

No liability is accepted for the incorrect application of this convention in this Specification.

Rev	Issued By	Issued For	Issue Date	Reviewed By	Revision Notes
-	AH	Purcell internal review	22.05.20	-	
01	AH	For Review and Comment LBC following tender returns	23.11.20	JC	Additional clauses added to cover mortar analysis (MCC requirement) and provisional gilding specification
02	MP	Issued for Construction	17.02.21	JC	Issued for Construction
03	AB	Issued for Construction	17.05.22	AB	Section Z11 updated (following CSG VE exercise)

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Project Preliminaries

Project Preliminaries

GENERAL PRELIMINARIES AND REQUIREMENTS

110B INTRODUCTION

- These preliminaries record specific requirements in relation to the Albert Memorial Conservation Project and are to be read and followed in conjunction with all other necessary preliminaries, requirements and site protocols as stipulated by the Management Contractor (Lendlease)
- All works including site set-up and temporary works are to be undertaken by appropriately skilled and qualified personnel and in accordance with all relevant Health and Safety Legislation, HSE Guidance and Codes of Practice and the CDM Regulations 2015.
- All RAMS to be submitted and approved prior to works commencing.

111B GENERAL REQUIREMENTS OF OPERATIVES

- The Albert Memorial is a Grade 1 listed monument and is of exceptional architectural interest.
- All operatives will respect and protect the heritage of the monument at all times.
- A high standard of workmanship, professionalism and conduct is expected from all operatives at all times.
- All operatives involved will be briefed on the importance of protection to the monument.
- All operatives to receive the Lendlease site specific induction and have attended Lendlease IIF training before commencing any work.
- Any damaged must be reported to the site manager IMMEDIATELTY, then reported via management / supervision to Lendlease and or MCC.
- Operatives may only smoke in designated areas, this includes E-Cigarettes, designated areas will be confirmed on site induction.
- Mobile phone usage is permitted in designated safe zones only, safe zones will be confirmed on your site induction.
- Whilst working at the OTH project public interface will be inevitable, operatives are to be courteous and polite at all times when dealing with the public.
- Operatives to be made aware they are representing their respective companies as well as Lendlease and Manchester City Council.

120B SCOPE OF WORKS SUMMARY

- The Albert Memorial conservation and restoration works package consists of the following keyworks:.
  - Conservation cleaning of masonry
  - Removal of redundant/inappropriate modern fixtures and fittings
  - De-scaling deteriorating surfaces
  - Decorative stone consolidation
  - Dismantling and reinstatement of targeted areas of high-level stonework
  - Lifting and re-bedding of certain base steps
  - Repairs to masonry cracks and fractures
  - Replacement of damaged or eroded stone details and facing work.
  - Moulded and decorative stone indents
  - Mortar repairs
  - Re-pointing and grouting of masonry
  - Redecoration of metal elements
  - Re-cutting weathered inscriptions
  - Potential dismantling of corner pinnacles, removing modern supporting metal framework and replacing with alternative framework to improved design, and reinstating stonework.
  - Renewal of 4no. modern lamp housings to original known design, retaining and refurbishing original lamp posts (as per ARUP S4 design information)
  - Flushing and if possible improving water disposal provisions
  - Servicing of lighting conductor system (as per ARUP S4 design information)
  - Fabrication and installation of full decorative railing system at base of monument matching historic design. New railing system and arrangement to incorporate new lighting scheme designed by ARUP.

Project Preliminaries

121B DRAWINGS AND DESIGN CO-ORDINATION INFORMATION

- Refer to:
  - OTH-PUR-EX-ZZ-DWG-A-7102
  - OTH-PUR-EX-ZZ-DWG-A-7103
  - OTH-PUR-EX-ZZ-DWG-A-7107
  - OTH-PUR-EX-ZZ-DWG-A-7115
  - Lightning Conductor Servicing – refer to ARUP design information
  - Lighting (restoration of 4no. corner lamps) – refer to ARUP design information
  - Lighting (introduction of new lighting within base/new railings of monument) – refer to ARUP design information

131B SITE ACCESS, WORK AREA, COMPOUND, WELFARE, DELIVERIES

- To be proposed, coordinated and agreed with Management Contractor ensuring all site protocols are met including H&S, protection and security

132B TEMPORARY WORKS

- Temporary works will be the responsibility of the Contractor to ensure the constant stability of the structure throughout the works.

133B PROTECTION WORKS

- All protection works to the historic fabric and personnel will be the responsibility of the Contractor throughout the work and are to be maintained in good order throughout the duration of the contract.

134B HOT WORKS PROCEDURES

- The need for any proposed hot works are to be approved by the Contract Administrator/Design Team in conjunction with the Management Contractor.
- Any works to be carried that are approved must be carried out under Hot Works Permit
- Procedures and all other protocols as stipulated by the Management Contractor.

135B POWER AND WATER SUPPLY

- To be organized and implemented with Management Contractor

136B SCAFFOLDING

- Please note the following general requirements:
  - The scaffold design must be compliant with all relevant British Standards and Work at Height Regulations 2005
  - The structure shall be erected safely, maintained and inspected regularly by the scaffold owner to meet all legislative and site requirements
  - The scaffolding must be adequately protected and secure at all times, including secure solid hoardings, protective sheeting to each lift, lighting, and all other security requirements as required by the Management Contractor and Client.
  - Protection and suitable separation is to be provided where scaffold passes through existing openings or comes into contact with the building fabric (which should be avoided as much as possible). The scaffold is not permitted to make direct physical contact with the building without suitable compliant separation. No intrusive ties or anchors between the scaffold and historic fabric are permitted.
  - Full working access to the entire height of the Albert Memorial is required. Suitable flexibility should be inbuilt into the design to enable adaptations to reach all areas as required throughout the contract. The scaffold design should take full account of the types of works to be carried out to the memorial to ensure that these can be safely and adequately accomplished within the temporary works arrangements provided.
  - The scaffolding is to be fully vertically enclosed by Monoflex sheeting or similar, and enclosed at summit level. The potential for rainwater ingress into the scaffold enclosure should be kept to an absolute minimum with appropriate disposal measures in place.
  - The proposed arrangements should be submitted for comment and approval to the Design Team, including structural engineer, before temporary works proceed.

135B DISPOSAL OF WASTE

- All waste to be safely contained and disposed of by the contractor in full compliance with site regulations and protocols.

C11
Fabric Survey

C11 Fabric Survey

GENERAL REQUIREMENTS

111B INSPECTIONS GENERALLY

- Purpose: To validate and progress types and extent of repair & cleaning work as shown on drawings and described in associated reports and schedules ofwork.
- Key inspection stages:

  - Following erection of temporary works to carry out initial scope validation of all elements and agree areas for trials/control samples to be prepared
  - Following preparation of trial samples by contractor for approval, including works related to iron lamps, new railings and decorative finishes
  - Following conservation cleaning to assess any further defects revealed by cleaning process
  - Following survey and flushing of existing drainage provisions
  - Following dismantling of selected corner pinnacle/canopy to establish feasibility and methodology for reconstruction on alternative metal formwork
  - Following lifting of selected section of base steps to inspect substructure and ascertain need for any repairs
  - On completion
  - And at other times as necessary
- Parties involved: Design Team and Contractor.
- Timing: Contractor to notify Design Team that the project area is safe and ready for inspection and Design Team to inspect within 1 week of each inspectionstage
- Instructions issued during inspections: Any instructions to be confirmed in writing with updated specification and drawings/schedules if required. Preliminary confirmation on site or via email may be appropriate depending on context.

180 COMPETENCE

- Skill and experience: Appropriate for the type ofwork.
  - Evidence: Submit prior to commencement.

190 PROTECTION

- Protect the following: as per C40.

C40

Cleaning masonry/ concrete

C40 Cleaning masonry/ concrete

GENERAL/ PREPARATION

112 B SCOPE OF CLEANING WORKS SUMMARY

- The specification concerns the cleaning of the Albert Memorial, Albert Square, Manchester, only
- The following cleaning requirements are anticipated:
  - Hand removal of superficial deposits, vegetation, and guano
  - Steam (superheated water) removal of biological growth and dirt
  - Targeted removal of black pollution crusts using ammonium carbonate poulticing if needed
  - Targeted solvent-based cleaning by hand of sculpture, including marble

113 B TRIALS AND CONTROL SAMPLES

- The precise materials, methods and workmanship for each type of cleaning application shall be validated by small-scale trials on site to set a final control sample and specification prior to carrying out the full extent of cleaningwork.
- Parties involved: Design Team and Contractor.
- Timing: Contractor to notify Design Team that the project area is safe and ready for trials and Design Team to attend within 1 week. See 111Babove.
- Review period: Contractor to allow min. 1 week review period to allow any latent consequences of trials to be ascertained prior to reconvening with Design Team on site and concluding control standards and instructions.
- Control standards agreed by parties on site during inspection and recorded. Any instructions to be confirmed in writing with updated specification and drawings/schedules if required.

114B PROTECTION GENERALLY

- Surfaces not designated for cleaning: Prevent damage, including marking andstaining.
- Openings: Prevent ingress of water, cleaning agents and detritus.
  - Vents and grilles: Seek instructions before sealing up.
- Temporary mechanical fastenings:
  - In masonry: Locate in joints.
  - In other surfaces: Seekinstructions.
- Additional protection: 4no. decorative lamps at base; sufficient enclosure to scaffold to prevent spread of waste while maintaining safe working conditions

115B CLEANING - APPROVED OPERATIVES AND RAMS

- The work described in this section should be carried out by qualified operatives (including conservation masons/conservators for sculpture cleaning) working for an approved contractor whose name shall be supplied to the Design Team for approval before putting the work in hand.
- All H&S RAMS, technical submissions including product information and conservation methodologies to be submitted by the contractor for the approval of the Design Team prior to any work commencing on site.
- The contractor is to undertake all necessary steps to protect operatives and controlwaste.

143 B REMOVAL OF FITTINGS

- Timing: Before commencement of cleaning work.
- Disturbance to surfaces: Minimize.
- Items for disposal:
  - Any redundant wiring, grilles, fixing screws and any other items identified on stone repair elevations or in the course of the preliminary scaffold survey.
- Items to be kept for reuse:
  - As identified on the stone repair elevations, plus
  - 4no. corner lamp stands at base (for design information refer to ARUP S4 information)
  - Lightning conductor system (for design information refer to ARUP S4 information)

175 CONTROL AND DISPOSAL OF WASH WATER AND DETRITUS

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

180 COLD WEATHER

- Cleaning procedures using water: Do not use when air temperature is at or below 5°C. Protect damp surfaces from frost.
- Chemical cleaning agents: Do not use when surface temperatures are below those recommended by manufacturer.

190 CLEANING GENERALLY

- Operatives: Appropriately trained and experienced for each type of cleaningwork.
  - Evidence of training: Submit on request.
- Control of cleaning: Confine cleaning processes and materials to designated areas. Prevent wind drift.
- Detritus: Remove regularly. Dispose of safely.
- Monitoring: Frequently check results of cleaning compared to approved trial and control samples. If results established by trials are not achieved or latent issues emerge, seek instructions.
- Modifications to cleaning methods and materials: Seek instructions.

216 RECORD OF CLEANING WORKS

- Written report: Record all cleaning methods and procedures including trial stages used for each type of surface and deposit.
  - Content: Relevant attributes of cleaning methods used including: Equipment and settings.
    Dwell times.
    Number of applications.
    Ambient temperatures.
- Submission: At completion of cleaning works.

220B WATER

- Clean tap water only for general cleaning. See also 355B.

223B TRIAL RECORDING GENERALLY

- Following inspection with architect mark out areas to be treated on site with temporary media and transfer onto record drawing. Photograph areas to be treated prior to commencement of work and cross reference photograph to record drawing.
- Record trial operations during and on completion of work with summary report, photographs and additional drawing notes. Note dwell times of any cleaning products where applicable.
- Provide Design Team with high-resolution digital copies of all record material on completion of the work.

PRODUCTS/ EQUIPMENT

300 COMPATIBILITY OF CHEMICAL PRODUCTS

- Products: Compatible and produced by the same manufacturer.

354 B STEAM (SUPER-HEATED WATER) CLEANING EQUIPMENT

- Use: For removing biological growth, surface dirt and atmospheric soiling on all stone substrates.
- Approved Systems: Doff/Thermatech superheated water system

• Manufacturer/ Supplier: Restorative Techniques, 67a Gloucester Road, Rudgeway, Bristol BS35 3SG – web: www.restorative-products.com, or an approved alternative

355B AMMONIUM CARBONATE POULTICE

- Use: Targeted ammonium carbonate poultice applications may be required to soften and remove heavier sulphation in conjunction with other cleaning methods. This is applicable to both limestone and sandstone-based substrates.
- Use to be discussed and confirmed with Design Team prior to application including locations of application. All technical and method information to be provided for approval prior to commencement of work.
- Suggested poultice concentration to be typically 5-10% applied in paper pulp/fumed silica medium.
- Manufacturer/ Supplier: Restorative Techniques, 67a Gloucester Road, Rudgeway, Bristol BS35 3SG – web: www.restorative-products.com, or an approved alternative

355B DE-IONISED WATER

- Use: For targeted solvent-based cleaning by hand, including removal of superficial dirt to delicate carved and sculptural work, including marble
- Use to be discussed and confirmed with Design Team prior to application including locations of application. All technical and method information to be provided for approval prior to commencement of work.
- Manufacturer/ Supplier: Contractor to supply details for approval

356B WHITE SPIRIT

- Use: For targeted solvent-based cleaning by hand, including removal of superficial dirt to delicate carved and sculptural work, including marble
- Use to be discussed and confirmed with Design Team prior to application including locations of application. All technical and method information to be provided for approval prior to commencement of work.
- Manufacturer/ Supplier: Contractor to supply details for approval

APPLICATION

412 B GENERAL REMOVAL OF LOOSELY ADHERED DEPOSITS AND VEGETATION

- Timing: Before commencement of other cleaning methods.
- Surfaces: Clean by hand and prevent damage, including abrasion.
- Vegetation: See C41/132

417 B GENERAL REMOVAL OF BIRD GUANO

- Surfaces to be cleaned: Stone
- Method: – Dampen surface using hand-held mist spray to loosen deposits.
- Scrape off thicker deposits using wooden scraper.
- Apply further water mist and lightly scrub using a soft bristle brush.
- Ensure safe disposal of waste.

483 B STEAM (SUPERHEATED WATER) CLEANING

- Surfaces to be cleaned: Stone
- Nature of soiling to be removed: biological growth, surface dirt and atmospheric soiling
- Preparation: As clauses 113B, 114B, 143, 412 and 417.
- Cleaning system: As clause 354.
- Surfaces: Prevent damage, including abrasion.
- Equipment settings (including nozzle type and distance from surface): The minimum level of pressure, heat and water should be applied to achieve the approved level of clean without damage or saturation. Settings and method to be established by trials and control samples.
- Number of applications: allow for up to 3no. passes or applications to each area requiring treatment, each separated by an appropriate period of separation. Precise number to be established by trials and control samples.

484 B AMMONIUM CARBONATE POULTICE

- Surfaces to be cleaned: Stone including sculpture
- Nature of soiling to be removed: stubborn pollution crusts not removed by superheated water.
- Preparation: Apply following first pass of superheated water/water-cleaning by hand exercise, allowing crust to dampen and soften before localised application onto affected area. General preparation as clauses 113B, 114B, 143, 412 and 417.
- Formula: Suggested poultice concentration to be typically 5-10% applied in paper pulp/fumed silica medium in a single application.
- Dwell time: established by trial and control stage seeking to achieve satisfactory level of sulphation removal without staining, harm or loss to fabric.
- Removal: remove poultice with wooden scraper without marking substrate and cleanse surface with superheated water or de-ionised water if concerning delicate work. Waste to be safely bagged and removed for disposal.

485 B SOLVENT-BASED CLEANING BY HAND

- Surfaces to be cleaned: Stone, including sculpture and marble surfaces where superheated water may be inappropriate
- Nature of soiling to be removed: superficial dirt
- Materials: de-ionised water and white spirit (separate options)
- Preparation: General preparation as clauses 113B, 114B, 143, 412 and 417.
- Methodology: established by small localised trials and control samples. Apply and remove in small sections to control clean and run-off. Apply and remove with soft sponges/cotton swabs, or similar soft media. Proceed to white-spirit clean only if de- ionised water proves to be ineffective.
- Waste to be safely bagged and removed for disposal.

C41

Repairing/ Renovating/ Conservingmasonry

C41 Repairing/ Renovating/ Conserving masonry

GENERALLY/ PREPARATION

110B SCOPE OF WORKS SUMMARY

- The Albert Memorial stonework conservation and restoration package consists of the following works:.
  - Conservation cleaning (as C40)
  - Removal of redundant/inappropriate modern fixtures and fittings
  - De-scaling deteriorating surfaces
  - Decorative stone consolidation
  - Dismantling and reinstatement of targeted areas of high-level stonework
  - Lifting and re-bedding of certain base steps
  - Repairs to cracks and fractures
  - Replacement of damaged or eroded stone details and facing work.
  - Moulded and decorative stone indents
  - Mortar repairs
  - Re-pointing and grouting of masonry
  - Redecoration of metal elements
  - Re-cutting weathered inscriptions
  - Potential dismantling of corner pinnacles, removing modern supporting metal framework and replacing with alternative framework to improved design, and reinstating stonework.
- Records of masonry to be repaired: Before starting work, use measurements and photographs as appropriate to record bonding patterns, joint widths, special features, etc.

112 REPAIR PRINCIPLES

- The following broad principles have been followed for specifying the proposed masonry repairs:
  - Every intervention will be seeking to safeguard or enhance the significance of the Albert Memorial
  - The use of mortar repairs will be limited to filling holes, fractures and relatively minor damage. They will not be used to build up complex mouldings or repair areas that will be exposed or difficult to access in the future.
  - Where functional projecting weathering features such as string courses or hood moulds are damaged, the defective elements will be replaced with new matching sections to a sufficient compressive bed depth to allow them to be fitted without the need for additional dowels, cramps or the use of modern adhesives.
  - Where facing stones are very heavily eroded they will be replaced with new stone components to a sufficient compressive bed depth to allow them to be fitted without the need for new restraint, with the height respecting the original coursing pattern.
  - The width of replacement stones can be varied to reduce the loss of original fabric whilst ensuring logical spacing of vertical joints.
  - Where indent repairs are carried out the size and shape of the repair and position of dowels should avoid reliance on adhesives for retaining the stone.
  - These repairs are specified alongside the expectation that regular planned maintenance and inspection of the Albert Memorial will continue beyond delivery of the project.

122B SITE INSPECTION

- Purpose: To confirm and validate type and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work, to identify trials and control sample locations and to approve the same.
- Parties involved: Design Team and Contractor
- Timing: As C11/111B

132 REMOVAL OF PLANT GROWTHS FROM MASONRY

- Plants, root systems and associated soil/ debris: Carefully remove from joints, voids and facework.
- Removal of roots:
  - Root systems must be fully traced and removed in their entirety.
  - Where growths cannot be removed completely without disturbing masonry seek instructions.

133 B PROTECTION OF WORK

- Ensure adequate protection of work at all times, including all lime work.
- Protect masonry with doubled hessian, periodically dampened in warm/windy conditions, and maintained in place until mortars have satisfactorily cured
- Contractor to maintain a temperature and weather log on site for the duration of the works, recording

conditions at the start, mid-point and end of the working day and ensure materials are not being applied in detrimental conditions.
- Refer to C41/185

134 B CONTROLSAMPLES
- General: Complete an agreed area of each of the following types of work, and arrange for inspection and approval before proceeding with the remainder:
  - Cleaning methods as per section C40
  - De-scaling deteriorating surfaces
  - Decorative stone consolidation
  - Lifting and re-bedding of certain base steps (allowing period to inspect substructure with Design Team when defective steps are lifted)
  - Repairs to cracks and fractures
  - Replacement of damaged or eroded stone details and facing work.
  - Moulded and decorative stone indents
  - Mortar repairs
  - Re-pointing and grouting of masonry
  - Redecoration of metal elements
  - Re-cutting weathered inscriptions
  - Dismantling of corner pinnacles, removing modern supporting metal framework and replacing with alternative framework to improved design, and reinstating stonework (see C41/135B)

135 B INVESTIGATION OF CORNER PINNACLES/CANOPIES WITH MODERN METAL FRAMES
- Requirement: To establish feasibility and methodology for reconstruction of pinnacles and canopies on alternative metal formwork by trial dismantling and appraisal
- Parties: Design Team and Contractor
- Timing: During preparation stage
- Instructions: Allow sufficient time in programme to enable Design Team to establish and instruct preferred solution once pinnacle has been dismantled and inspected
- Defects/constraints revealed during work: Pause working, notify Design Team and await instruction.

136 B INVESTIGATION OF SUBSTRUCTURE BELOW BASE STEPS
- Requirement: To understand any underlying defects beneath displaced steps by trial lifting, inspection and appraisal
- Parties: Design Team and Contractor
- Timing: During preparation stage
- Instructions: Allow sufficient time in programme to enable Design Team to establish and instruct preferred solution once inspection has taken place beneath steps.
- Defects/constraints revealed during work: Pause working, notify Design Team and await instruction.

137 B INVESTIGATION OF EXISTING DRAINAGE PROVISIONS
- Requirement: Survey and flush/unblock as necessary to fully understand operation and condition of water disposal systems of memorial, including embedded lead-lined drainage runs. Target establishing proper functionality of existing system.
- Parties: Design Team and Contractor
- Timing: During preparation stage
- Instructions: Allow sufficient time in programme to enable Design Team to establish and instruct preferred solution once inspection has taken place.
- Defects/constraints revealed during work: Pause working, notify Design Team and await instruction.
- Co-ordinate survey and solution with ARUP/Ramboll (public health and below ground drainage design)

138 B EXISTING MORTAR ANALYSIS
- Requirement: To obtain samples of original pointing and bedding mortars for laboratory analysis and reporting where identifiable.
- Parties: Design Team and Contractor
- Timing: During preparation stage
- Instructions: The contractor should allow for identification on site with the design team and MCC conservation officer a total of 5no. locations of appropriate historic mortar samples for laboratory analysis. The samples will be carefully selected to represent original bedding and pointing mortars (if still present in discreet areas) and the findings of the analysis may be used to inform any further decision making or specification adjustment as necessary. As a minimum for each sample the analysis should seek to characterise and establish:
  - The nature and hydraulicity of the binder

- The character and make-up of the aggregate
- The presence and type of any additional constituents, such as pozzolanic materials
- The present ratio of binder:aggregate:[additives]
- The likely original ratio of binder:aggregate:[additives] when the mortar was originally made and placed
- Any deleterious constituents present in the mortar which may have affected performance of the mortar or adjacent masonry, including soluble salts

- The above to be delivered in a written illustrated report by the laboratory and shared with all relevant parties and stakeholders for consideration.
- The location of each sample should be clearly recorded by the contractor on a clean photo-elevation drawing of the Albert Memorial, with accompanying record photography, including contextual references and photographs where useful. The presumption should be to remove selected samples by small hand tools only. Mechanised tools will only be permitted for use by the design team and conservation officer, and only by those personnel with demonstrable skill in using them, and only if mechanical retrieval is confidently deemed to be less intrusive or damaging than by traditional means by hand.

WORKMANSHIP GENERALLY

151 B POWER TOOLS

- Use of fine bladed multi-tool cutters for removal of mortar will be permitted subject to the following requirements:
  - Method statement for proposed use to be submitted for approval.
  - Specific tools and blades to be agreed before use.
  - Methodology to be demonstrated on site in an agreed samplearea that will then form control.

160B PROTECTION OF MASONRY

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

165 STRUCTURAL STABILITY

- 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 aspossible.
- Existing retained masonry: Do not cut or adjust to accommodate new or reusedunits.
- Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

180 WORKMANSHIP

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

185 ADVERSE WEATHER

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

MATERIALS/ PRODUCTION/ ACCESSORIES

220 RECORDING PROFILES

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

225 B STONE MASON'S DRAWINGS AND SCHEDULES

- Accurately record profiles of all units to be replaced.
- Ensure unique references for each unit to be replaced are marked on drawings.
- Prepare schedule recording the following information: − Unique stone reference based on Architect's repair drawings.
- Drawing reference and detail number showing profile.
- Overall length, course height and bed depth of stone unit.
- Stone finish: To match existing and by hand.

230 INSPECTION OF DRAWINGS, TEMPLATES, CASTS, ETC

- Timing: Before starting production of masonry units associated with the following items: Profiles for all stone features.
- Period of notice (minimum): Two weeks prior to commencement of manufacture ofcomponents.

232 INSPECTION OF DRAWINGS, TEMPLATES, CASTS,ETC

- Timing: Before starting production of masonry units.
  - Period of notice (minimum): Two weeks prior to commencement of manufacture of components.

241 B STONE: Millstone Grit Sandstone

- Supplier: Subject to confirmatory stone characterization and matching advice from the British Geological Survey (contractor to commission report on 2no. samples of stone):
  Johnsons Wellfield, Crossland Hill Quarry, Huddersfield, West Yorkshire HD4 7AB 01484 652311
  Email. sales@johnsons-wellfield.co.uk Type:
  Crossland Hill Sandstone.
- Quality: Free from vents, cracks, fissures, discolouration, or other defects that may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.
  Samples: to be provided at commencement of project for approval

242 B STONE:Granite

- Supplier: If required, or an approved alternative Fyfe
  Glenrock
  Academy Way
  Colpy Road Industrial Estate
  Oldmeldrum, Inverurie
  Aberdeenshire AB51 OBZ Email.
  sales@fyfe-glenrock.com Type: To
  match existing
- Quality: Free from vents, cracks, fissures, discolouration, or other defects that may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.
  Samples: to be provided at commencement of project for approval

243 B STONE: White Marble (for decorative idents, assumed Carrara)

- Supplier: If required, or an approved alternative
- Alberti Lupton & Co., Ltd 541
  Moston Lane
  Moston
  Manchester
  M40 9GE
  Phone: 0161 681 1272
  E-mail: info@albertilupton.co.uk
  Type: To match existing

- Quality: Free from vents, cracks, fissures, discolouration, or other defects that may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.
  Samples: to be provided at commencement of project for approval

245 REPLACEMENT STONE UNITS

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

247 DRESSING AND FINISHING REPLACEMENT STONE UNITS

- Replacement stone including all carved work is to be finished to match the original as closely as possible.
- Any machined stones are to be left with an allowance for hand finishing by complete removal of the mechanical surface.
- Stone to be free of snips, spalling or other defects.

250 STONE ORIENTATION

- Orientation of natural bed:
  - In plain walling: Horizontal.
  - In projecting stones and copings: Vertical and perpendicular to wall face.
  - In carved work: Horizontal and in compression depending on context
  - In arches: Perpendicular to line of thrust.

255 ASHLAR BLOCKS/ DRESSINGS

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

284 B DOWELS FOR NEW DECORATIVE STONE TO PINNACLES

- Material: Phosphor bronze
- Sizes – 3/8" / 9.5mm diameter
- Length: – tbc assume 300mm (150mm embedment above and below)

286 B REPLACEMENTS FOR CRAMPS DISCOVERED DURING COURSE OF REPAIR WORK

- Currently unidentified cramps:
  - Record location found.
  - Tag and retain cramps for records.
  - Confirm details to Design Team
- Replacement cramps:
  - Material: Phosphor bronze
  - Size: To match original in every respect. Allow 225mm L x 40mm W x 40mm D on return lugs for tender purposes. The exact requirements to be specified once elements are dismantled and exposed on site as this clause.

290 BEDDING AND GROUTING MORTAR

• Bedding mortar: As section Z21 – Mix 1: 2.5 NHL 3.5 Natural Hydraulic Lime : Aggregate
– Lime: St Astier NHL 3.5
– Aggregate: 2 parts sand : 0.5 parts fine crushed stone
– Sand source/ type: Leighton Buzzard sharp sand
– Crushed stone: Crossland Hill crushed sieved sandstone 300 microns down.

291B POINTING MORTAR FOR STONE

• Mix 1 : 2.5 NHL 3.5 Natural Hydraulic Lime : Aggregate
• Lime: St Astier NHL 3.5
• Aggregate: 2 parts sand : 0.5 parts fine crushed stone gauged with 5% natural iron oxide pigment – Sand source/ type: Leighton Buzzard sharp sand
– Crushed stone: Crossland Hill crushed sieved sandstone 300 microns down.
• Iron Oxide pigment: – Supplier: Coloured Earth Pigments
– web: www.colouredearch.co.uk
– Type: Cyprus Umber Cocoa - 121 natural iron oxide
– Particle size: 50 micros (325 mesh)
– Gauging: 9.5 parts aggregate to 0.5 iron oxide by volume.

292 B POINTING MORTAR FOR BRICK (CORE STRUCTURE)

• To be confirmed following inspection below displaced steps
• Mix 1 : 2.5 NHL 3.5 Natural Hydraulic Lime : Aggregate

• Lime: St Astier NHL 3.5
• Aggregate: 2 parts sand : 0.5 parts fine crushed stone gauged with 5% natural iron oxide pigment – Sand source/ type: Leighton Buzzard sharp sand
– Crushed stone: Crossland Hill crushed sieved sandstone 300 microns down.
• Iron Oxide pigment: – Supplier: Coloured Earth Pigments
– web: www.colouredearch.co.uk
– Type: Cyprus Umber Cocoa - 121 natural iron oxide
– Particle size: 50 micros (325 mesh)
– Gauging: 9.5 parts aggregate to 0.5 iron oxide by volume.

298 B POINTING MORTAR FOR GRANITE ELEMENTS IN CONTACT WITH SANDSTONE

• Mix 1 : 2.5 NHL 3.5 Natural Hydraulic Lime : Aggregate
• Lime : St Astier NHL 3.5
• Aggregate: 2 parts sand with 5% natural iron oxide pigment – Sand source/ type: Leighton Buzzard sharp sand
• Iron Oxide pigment: – Supplier: Coloured Earth Pigments
– web: www.colouredearch.co.uk
– Type: India black - 145 natural iron oxide
– Particle size: 50 micros (325 mesh)
– Gauging: 9.5 parts aggregate to 0.5 iron oxide by volume.

299 B BEDDING AND GROUTING MORTAR FOR GRANITE STEPS AT BASE

• Bedding mortar: As section Z21 – Mix 1: 2.5 NHL 5 Natural Hydraulic Lime : Aggregate
– Lime: St Astier NHL 5
– Aggregate: 2 parts sand : 0.5 parts fine crushed stone
– Sand source/ type: Leighton Buzzard sharp sand
– Crushed stone: Crossland Hill crushed sieved sandstone 300 microns down.

300 B LIME:CASEIN GLUE FOR FIXING DECORATIVE STONE INDENTS

• Mix 1:1 non-hydraulic mature lime putty : casein powder
– Lime: Buxton mature lime putty
– Casein powder: 1 part
– Source: Contractor to submit details for approval
– Method: Add lime to casein powder until glue is formed and fluid.
– Dampen stones to be fixed and apply a thin layer of glue to relevant faces
– Secure in place and allow to cure for minimum 24hrs. Protect until cured
– Periodic wetting with a mist spray may aid carbonation

DISMANTLING/ REBUILDING

310 DISMANTLING MASONRY FOR RE-USE

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

REPLACEMENTS AND INSERTIONS

330 B PREPARATION FOR REPLACEMENT MASONRY

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

335 B REPLACEMENT OF GENERAL FACING STONE

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

339 B REPLACEMENT STRING COURSES AND HOOD MOULDS

- Stone: As clause 241
- Finish to match existing.
- Profile: – To match original.
- Site recording as clause 220.
- Drawings and templates as clause 230.
- Sizes: Taken from existing
- Bedding depth: minimum 150mm
- Length: As shown on drawings and confirmed by mark up of stone on site.
- Fixing: – Grouted and pointed.
- Bedding and Grouting Mortar: – As clause 290 where originally fitted.

349 B OTHER REPLACEMENT STONE DETAILS – MOULDED AND DECORATIVE INDENTS

- Stone: To match existing, either sandstone, marble or granite
- Finish to match existing.
- Size and Profile: – To match original in every respect.
- Site recording as clause 220.
- Drawings and templates as clause 230
- Fixings: – Dowels as clause 284 if required.
- Cramps as clause 286 if required
- Bedding and Grouting Mortar: – As clause 290.
- Rake back 15mm for pointing mortar
- Pointing mortar: – As clause 291
- Joints: Flush

353 B STONE INSERTS TO FINE MOULDED AND DECORATIVE DETAILS

- Stone: To match existing, either sandstone, marble or granite
- Finish: Flush and moulded/carved to match existing.
- Site recording as clause 220.
- Drawings and templates as clause 230

Preparation and insertion:

- Pockets to receive inserts: – Cut out accurately.
- Damaged and eroded stone to be cut out to appropriate corner or inset section of moulding where appropriate.
- Adjust depth so that insert stands proud of existing stone for finishing in situ
- Approximate size: As indicated on drawings and confirmed on site.
- Final size: To be agreed and marked on component on site before cutting out.
- End fixing profile: Dovetail profile to be formed at ends of indents to vertical or soffit details.
- Joints between existing masonry and repair sections: 1-2mm
- Fixing: Dovetailed into existing moulding with lime:casein glue to back face only and other joints grouted and pointed.
- Glue: lime:casein: As clause 300
- Joints: Very fine.
- Additional support dowels: if required, carbon rod sized to context (allow 3mm diam.) and fixed in glue as clause 300

386 LAYING REPLACEMENT MASONRY UNITS

- Bed depth for new masonry units: Minimum 125mm
- Exposed faces of new material: Keep to agreed face lines.
- Faces, angles and features: Align accurately. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
- Joint surfaces: Dampen to control suction as necessary.
- Laying units: On a full bed of mortar, all joints filled.
- Exposed faces: Keep clear of mortar and grout.

390 B GROUTING JOINTS

- Grout mix: tbc following trials and setting of control sample.
- Joints that cannot be fully filled with bedding mortar: Grout thoroughly around replacement masonry units.
- Grouting: Keep grout back from exposed face to allow for the depth of pointing, using an approved temporary sealing material. Prevent grout staining exposed face.

REMOVING REDUNDANT FIXTURES AND FITTINGS

411 REMOVAL OF BOLTS, SCREWS, NAILS, THREADED SLEEVES AND OTHER METAL FIXINGS

• Prior to removal: Confirm extent and type of removals to ensure damage will be avoided
• Parties involved: Design Team andContractor.
• Timing: Contractor to notify Design Team that the project area is safe and ready for inspection and Design Team to inspect within 1 week.
• Instructions issued during inspection: Any instructions to be confirmed in writing with updated specification and drawings/schedules if required.
• Removal: Cut out carefully, causing the least possible disturbance to surrounding masonry. – Remove any associated rust debris.
• Making good: As clause 518.

412 B REMOVAL OF REDUNDANT FITTINGS,GRILLES

• Prior to removal: Confirm extent and type of removals to ensure damage will be avoided
• Parties involved: Design Team andContractor.
• Timing: Contractor to notify Design Team that the project area is safe and ready for inspection and Design Team to inspect within 1 week.
• Instructions issued during inspection: Any instructions to be confirmed in writing with updated specification and drawings/schedules if required.
• Removal: Carefully remove causing the least possible disturbance to masonry. – Remove all associated fixing brackets, screws, nails and nylon plugs.
– Remove any associated rust debris.
• Making good: As clause 518.

TOOLING/ DRESSING STONE IN SITU

456 DESCALING STONE

• Requirement: Carefully remove loose scaling and powdering from stones to the extent agreed.
• Method: Suitable bristle brushes, wooden spatulas or carborundum blocks. Do not use wire brushes or mechanised tools.

459 REDRESSING STONE

• Requirement: Carefully dress back stones by hand to the extent agreed.
• Method: Suitably graded carborundum blocks or tooling as appropriate. Do not use mechanised tools.

460 B RE-CARVING MEMORIAL INSCRIPTIONS INSITU

- Identify areas of work and inscription contents prior to commencing work. Record.
- Provide sample of lettering on separate stone for approval by Design Team
- Apply washable chalk outline of inscription to be re-carved on existing masonry
- Re-cut lettering to match existing
- To be carried out by competent persons with demonstrable skills and examples of work only
- Record on completion

461 B FIXING POINTS FOR NEW RAILINGS AND LIGHTING SYSTEM AT BASE OF MEMORIAL

• Requirement: Use all existing historic fixing points where possible. For lighting form new if necessary.
• Method: Remove existing metal stubs/lead by hand. Create any new fixing points with hand tools in locations agreed with Design Team. Consult Design Team if power tools are required and confirm approval.
Samples: Provide control samples of each type of intervention for approval.

DECORATIVE STONEWORK CONSOLIDATION

461 B TREATING FRIABLE SURFACES

• Requirement: Carefully remove loose scaling and powdering from carved stones to the extent agreed back to a sound surface that can be left untreated or as preparation for a protective mortar repair.
• Method: Suitable small tools, wooden spatulas or carborundum blocks. Do not use wire brushes or mechanised tools.

MORTAR REPAIRS

509 MORTAR REPAIR PRINCIPLES

- Mortar repairs are to be confined to the following types ofdefect:
  - Filling relatively minor erosion, damage and recesses.
  - Filling holes where bolts, screws, timber plugs or scaffolding tie sleeves have been removed.

- Filling natural fissures in face of stone.
- Filling other small holes not exceeding 20mm diameter.
- Filling cracks and widened mortar joints where ties, pinning or other remedial work is considered unnecessary.
- During review with the Design Team at validation stage or otherwise during the course of the works consideration will be given to the context of the repairs identified and any future maintenance requirements that these may present.

516 MORTAR REPAIRS GENERALLY

- Preparation:
  - Repair area: Scribe area of masonry to be removed using straight horizontal and vertical lines parallel to joints. Where repair area abuts joints, maintain existing joint widths and do not bridge joints.
  - Decayed masonry: Cut back carefully to a minimum depth of 20 mm to a sound background. Where the depth of removal exceeds 50 mm, seek instructions.
  - Precautions: Do not weaken masonry by removing excessive material. Do not damage adjacent masonry.
  - Top and vertical reveals of repair area: Undercut.
- Repair:
  - Dampen inside of hole and surrounding stone to control suction.
  - Mortar: As clause 291.
  - Finish: Flush with surrounding stone as clause 555

518 MORTAR REPAIRS

For repairs to holes and fissures.

- Remove redundant fixings, bolts and metal sleeves as clause 411.
- Dampen inside of hole and surrounding stone to control suction.
- Mortar: As clause 291.
  Finish: Flush with surrounding stone as clause 555

542 APPLYING MORTAR

- Surfaces to receive mortar: Clean, and free from dust and debris. Dampen to control suction.
- Applying mortar: Apply mortar firmly, ensuring good adhesion with no voids. Finishing mortar coat: Flush with adjacent masonry.
- Protect completed repairs from adverse weather until mortar has set.

555 FLOAT FINISH TO MORTAR REPAIRS

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

CRACK REPAIRS/ TIES/ REINFORCEMENT

611 B MORTAR REPAIR OF CRACKS

- Mortar: As clause 291. Adjustment of aggregate to allow adequate filling to be confirmed following trials and control sampling on site.
- Preparation: Clean out cracks to remove debris, dust and dirt. Dampen recesses, as necessary, to control suction.
- Applying mortar: Press well into cracks so that they are fully filled. Ensure that mortar does not encroach upon exposed faces. Finish mortar flush with masonry face.

642 PINNING ACROSS CRACKS IN ASHLAR STONE

- Manufacturer: Helifix
  - Web: www.helifix.co.uk
- Ties/ Pins:
  - Type: 316 grade stainless steel helical bar
  - Diameter: 8mm
- Installation:
  - Carefully drill 5mm diameter pilot hole diagonally across crack to be stiched.
  - Fit special DryFix PDA instrtion tool to an electric hammer drill.
  - Load the DryFix tie into the insertion tool.
  - Power-drive the tie into position until its outer end is recessed below the face of the stone.
  - Make good hole: As clause 693.

676 JOINT REINFORCEMENT

- Existing construction: Ashlar stone facing, with brick backing likely.
  - Joint width: 3mm approx.
- Reinforcement:
  - Type: 2.5mm diameter 316 grade stainless steel threaded bar.
- Installation: Remove existing mortar without damaging adjacent masonry or widening joints. Form recess to depth recommended by reinforcement manufacturer. Remove dust and debris. Install reinforcement using methods recommended by manufacturer.
- Joints: Repoint as clause 820.

693 MAKING GOOD TO INJECTION AND INSERTION HOLES

- Preparation: Clean out holes thoroughly.
  - Dampen inside of hole and surrounding stone to control suction.
  - Mortar: As clause 291.
- Finish: Flush with surrounding stone

MORTAR FLAUNCHINGS TO IMPROVE RUN-OFF

710B NEW MORTAR FLAUNCHINGS

- Discreet mortar flaunchings may need to be applied to high-level elements to improve the run-off of rainwater.
- Application: Confirm with Design Team following site assessment. Specific needs and locations TBC.
- Apply to clean dampened stone. The need for any keying or armature support TBC following site assessment.
- Mix: 1 part Vicat Prompt Natural Cement Mortar to 2 parts clean sharp and well- graded sand.
- Protect well until fully cured.
- Confirm application, mix and finish by trial and control sample on site in approved location.

POINTING/ REPOINTING

806 COMPLETE REPOINTING

- Where complete repointing is indicated the whole are is to be prepared and repointed in accordance with clauses 812 and 821.

812 B PREPARATION FOR REPOINTING ASHLAR STONE

- Existing mortar:
  - Working from top of monument downwards, remove mortar carefully to a minimum depth of 30mm or back to sound mortar without damaging adjacent masonry or wideningjoints.
  - Mortar is loose or missing from some perp joints to a depth of 40 to 50mm ensure deeply recessed perps are identified and all loose material is removed.
- Raked joints: Remove dust and debris.

821 POINTING ASHLAR STONE

Preparation of joints:

- Remove mortar as clause 812.
- Dampen joints and surrounding stone to control suction.
- Ensure deeply recessed joints are fully packed with mortar.

- Mortar: As clause 291. Joints profile/ finish: Flush.

823B FILLING DEEPLY RECESSED JOINTS ASHLAR STONE PRIOR TO CLEANING

Preparation of joints:

- Remove mortar as clause 812.
- Dampen joints and surrounding stone to control suction.
- Fully pack deeply recessed joints with mortar.

- Mortar: As clause 290.
  Joints profile/ finish: Raked back 15mm

840 B POINTING WITH TOOLS/ IRONS

- General: Press mortar well into joints using pointing tools/ irons that fit into the joints, so that they are fully filled. Allow mortar to stand proud of joint within joint but not over edges of masonry.
- Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly.

862 B FINISH TO JOINTS

- Timing: After initial mortar set has taken place remove excess proud mortar and laitance with small tools back to flush with stone, followed by removal of any excess fines by light brushing

M60
Painting/ Clear Finishing

M60 Painting/clear finishing

COATING/PAINT ANALYSIS

130 B PAINT SAMPLING TO INFORM DECORATION OF EXISTING METALWORK

- Requirement: Retrieve required number of samples annotated on drawings OTH-PUR-EX-ZZ-DWG-A- 7102 and OTH-PUR-EX-ZZ-DWG-A-7103. Findings of analysis to inform material, method and colour specification for redecoration of existing metalwork elements of memorial, including painting and gilding:
- Personnel: suitably qualified in architectural paint research and conservation
- Elements: 4no. existing lamp columns with new lamp housings, metal finial to spire, embedded railing stubs in base steps.
- Methodology:
  - Collection of samples: collected on-site using a scalpel or fine wood chisels. Each sample to be provided with a unique label and sample sites recorded photographically. Each sample to be approximately 10mm2 min. and to contain all paint layers and substrate. Retrieve into sealed bags to prevent cross- contamination.
  - Analysis: Samples to be mounted in clear casting resin and polished to provide a cross section through the paint layers. Assessment at 40x or 100x magnification in incidental light to allow layer structure to be assessed, and 200 x magnification for more detailed evaluation of specific layers. In addition, fluorescence microscopy to be employed to identify the stratigraphy of paint schemes (for example, differentiation between degraded paint films) and to establish basic composition of paint films.
  - Photomicrographs: to be included in a final the report, photographed at 100x magnification in visible incidental light (3200k) or as required.
  - Micro-chemical analysis of paint films: Further chemical techniques should be carried out including stain tests in order to assess the presence of lead, zinc and any other heavy metal compounds to assist with pigment identification, and also to identify binding media within the paint layers. This information will inform the preparation of colour swatches.
  - Colour references and recommendations: In order to better interpret the results of cross-section analysis of samples, further small areas of uncovering in situ on the subject elements may be required take specific colour references from earlier paint films. Discreet uncovering can be undertaken using mechanical and chemical means and colour readings taken using a handheld colour measurement tool. The provision of NCS colour references and swatches for the historic colour schemes identified is required, together with details of materials and methods required to replicate or emulate the preferred historic scheme(s).
- Reporting: electronic written/illustrated report provided to Design Team and Contractor covering aims, objectives, methodology, historic context (advised by others), sample locations, results, recommendations including any further research that may be required.

COATING SYSTEMS

135 EPOXY PAINT FINISH TO NEW DECORATIVE CAST IRON RAILINGS

- Manufacturer: Tikkurila, Unit 18, Roundwood Point, Roundwood Drive, St Helens, Merseyside WA9 5JD
  Tel: 01744 881 888
- System: High durability epoxy/ polyurethane coating
- Surfaces: New cast iron.
- Preparation:
  - General as clause 400.
- Initial coat: Temabond ST200 2 pack high solids epoxy aluminium anti-corrosive primer.
  - Dry film thickness: 125 microns
  - Number of coats: One
  - Colour: TBC
- Undercoat: Temacoat RM40 two pack high build epoxy primer/ undercoat
  - Dry film thickness: 100 microns
  - Number of coats: Two
  - Colour: TBC
- Finishing coats: Temadur 50 2 pack semi-gloss polyurethane finish
  - Dry film thickness: 55 microns
  - Number of coats: Two.
  - Colour: TBC

- Samples: Provide samples of proposed colours/combinations for approval

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. Allocate to distinct parts or areas of the work

220 COMPATIBILITY

- Coating materials selected by contractor:
  - Recommended by their manufacturers for the particular surface and conditions of exposure.
  - Compatible with each other.
  - Compatible with and not inhibiting performance of preservative/fire retardant pre-treatments.

320 INSPECTION BY COATING MANUFACTURERS

- General: Permit manufacturers to inspect work in progress and take samples of their materials from site if requested.

PREPARATION

400 PREPARATION GENERALLY

- Standard: In accordance with BS 6150.
- Refer to any pre-existing CDM Health and Safety File.
- Refer to CDM Construction Phase Plan where applicable.
- Suspected existing hazardous materials: Prepare risk assessments and method statements covering operations, disposal of waste, containment and reoccupation, and obtain approval before commencing work.
- 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: Remove.
- Joints, cracks, holes and other depressions: Fill flush with surface using lead stopping filler, to provide smooth finish.
- Dust, particles and residues from preparation: Remove and dispose of safely.
- 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 area.

405 HAND AND POWER TOOL CLEANING PREVIOUSLY COATED FERROUS METAL

- Standard: ISO 8501-2 Preparation grades for previously painted steel substrates after localised removal of previous coatings
- Preparation grade: P St 2 Thorough localised hand and power tool cleaning
- Preparation:
- Remove grease, oil and all other surface contamination with Rust-Oleum ND14.
- Remove rust scale, loose mill scale, loose rust and loose coatings by scraping, wire brushing or sanding.
- Sand previous coatings that are in good condition to roughen the surface slightly.

M60

Painting/ Clear Finishing

451 PREVIOUSLY COATED SURFACES - BLAST CLEANING

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

522 UNCOATED FERROUS METAL - MANUAL CLEANING

- Oil and grease: Remove.
- Corrosion, loose scale, welding slag and spatter: Remove.
- Residual rust: Treat with a proprietary removal solution.
- Primer: Apply as soon as possible.

523B TREATING EXISTING SURFACE-CORRODED METAL IN SITU - FERTAN

- Fertan is suitable for treating steel and iron surfaces, even if they have to be left for weeks or months prior to final painting. Fertan can be overcoated with oil or water based paints, epoxy, lacquer, wax and similar media.
- Fertan is a complex, patented tannic acid, water based non toxic product. It offers exceptional protection against rust and is also environmentally friendly.
- Fertan converts loose rust to powder that can be rinsed away leaving a converted stable and inert surface.
- Fertan when kept in closed containers and reasonable conditions has an unlimited shelf life.
- APPLICATION – to manufacturer's instructions
  - Brush off loose rust and remove dirt, oil or silicone products that will prevent Fertan reaching the metal surface.
  - Apply Fertan by brush, roller or spray and leave for 24 hours at 68°F, extending this to 48 hours in lower temperatures.
  - Dampen the treated surface with water to maximize penetration.
  - Remove any black powdery dust with a damp cloth and leave to dry.
  - Paint the treated surface with paint within 6 months to ensure long-term results.

537 PREVIOUSLY COATED CAST AND WROUGHT IRON - BLAST CLEANING

- Only if instructed by Design Team
- Purpose: To provide adequate key for application of paint finish.
- Oil and grease: Remove.
- Blast cleaning:
  - Atmospheric conditions: Dry.
  - Abrasive: Fine, hard non-metallic (alumina or silica), free from fines, moisture and oil.
  - Surface finish: To BS EN ISO 8501-1, preparation grade 2 minimum.
- Primer: Apply as soon as possible and within four hours of blast cleaning.

539 CHEMICAL PAINT REMOVAL

- Only if instructed by Design Team
- Method: Chemical paint removal
- Manufacturer: Dumond Architectural, Industrial and Marine Solutions
- Product: Smart Strip Pro
  - Description: Professional strength paint remover for multiple coats of oil-based, water-based, acrylics, varnishes, epoxies, urethanes, elastomeric and lead paint.
  - It is formulated without methylene chloride, is non-carcinogenic, noncaustic, and non-flammable.
  - UK Supplier: Sherwin-Williams Protective and Marine Coatings - Web: www.swpaintonline.com
  - Available pack sizes: 18.9 litres
- Application method: Apply paste using a brush or plastic trowel. Use nylon brush to apply paste details and mouldings. Dwell time: 3 to 24 hours
  - Removal: Using plastic scraper and nylon brush. Care should be taken to avoid damage and scratching of the surface. Rinse with clean water and dry thoroughly.
  - Allow for several applications of paint remover. It should not be assumed that all paint will be removed following one application.
  - Accessories: Dumond laminated paper.

540 ACID PICKLING FOR PREVIOUSLY PAINTED CAST AND WROUGHT IRON COMPONENTS

- Only if instructed by Design Team
- Preparation:
  - Blast cleaning as clause 537or
  - Chemical cleaning as clause539
- Method: Acid Pickling
- Method: Immerse components in warm bath of dilute phosphoric acid.
- Rinsing: Thoroughly rinse remove allacid

542 B GILDING WORK TO SPIRE FINIAL

- The specified historic paint analysis exercise will determine the extent of gilding and redecoration required. For tendering purposes allow to re-gild the whole metal finial down to the top of the stone spire. The specification will be confirmed through analysis of the existing surfaces as part of the above but for tendering purposes please refer to the following:

- Ensure work is to be carried out by a suitably competent person experienced in decorative gilding of historic metals
- Carefully clean down finial and remove any failing surface material to leave a sound substrate free of all dirt and grease
- Apply up to two coats of Rustoleum red oxide metal primer for ferrous elements and Hammerite Special Metals Primer for non-ferrous elements and allow 24 hours to dry
- Gently sand-off by hand any paint debris and clean surface with a damp cloth ensuring substrate is stable. Allow to dry
- Apply single coat of selected oil-based gilding size and allow time to cure according to manufacturer's instructions
- Apply loose pure gold leaf sheet with soft brush to treated surface. Overlap sheets to ensure complete coverage
- Gently remove loose gold with a soft brush. Locally size and re-apply gold in the event of any spot gaps in coverage.
- Gently finish with a soft brush and cloth to complete

Z11
Purpose made Metalwork

FOR NEW DECORATIVE IRON RAILINGS AT BASE OF MONUMENT

310 MATERIALS GENERALLY

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

311B INSPECTION OFF SITE:

- The CA/Design Team will carry out periodic inspections of the works being carried out off site. Allow for the CA/Design Team reasonable access to view the work on and off site and to carry out tests for quality and conformity with the specification. Inspections may be either announced or unannounced.

3.12 B REFER TO DRAWINGS/DESIGN INFORMATION:

- OTH-PUR-EX-ZZ-DWG-A-7102
- OTH-PUR-EX-ZZ-DWG-A-7103
- OTH-PUR-EX-ZZ-DWG-A-7107
- ARUP Lighting Design information for the design and inclusion of all relevant brackets, fixings conduits and the like that must be incorporated into the new railing system to facilitate the lighting scheme to the Albert Memorial

3.13 B BRITISH STANDARDS FOR CAST IRON:

- All materials and workmanship to comply with appropriate British Standards and Codes of Practice where applicable, including the following:
- (a) BS EN 1561 (2011): Specification for grey iron castings;
- (b) BS EN 1562-WIH (2012): Whiteheart malleable iron castings;
- (c) BS EN 1562-WIH (2012): Blackheart malleable iron castings;

3.14 B FIT FOR PURPOSE:

- All materials used are to be fit for their purpose and for the methods of working used. In particular, the contractor is to ensure that no materials or combinations of materials are used which give rise to electrolytic corrosion.

3.15 B WORKMANSHIP:

- To be in accordance with all appropriate Codes of Practice and standards of good practice appropriate to the trades concerned.

3.16 B CLEANING:

- Remove all burrs and sharp arrises which would be visible after fixing or a hazard to the user. Preparation for treatment and decoration as M60.

3.17 B MECHANICAL JOINTS:

- To be tight with no visible gaps.

3.18 B MECHANICAL JOINTS OF COMPONENTS:

- Which will be located externally to be bedded in a water-resistant resin bedding, including all mating surfaces, cleats and other fixings.

3.19 B BOLTED JOINTS:

- Minimum of two screw threads to pass through nuts. All bolts to have one washer, splayed if necessary.

3.20 B BRAZING/WELDING

- Preparation:
  - Remove any grease, dirt, moisture and oxide from edges to be welded. Remove scale and residue from arc and power cutting, by machining or hand grinding.
  - • Prepare parent metal prior to welding/brazing by pre-heating area to between 20-40°C to reduce risk of fracture.
- Accuracy
  - Ensure accurate fit using clamps and jigs where practical; use tack welds for temporary attachment where jigging is not practical;
  - Tack welding: Use only for temporary attachment unless otherwise specified;
  - Welds: Make joints with parent and weld metal fully fixed throughout with no inclusions, holes, porosity or cracks;
  - Keep all cast welding rods in a heated quiver prior to workshop use.
  - Testing: When required, submit samples of welding to an approved laboratory for testing to appropriate BS or as

specified by CA/Design Team;

- Finishing
  - Spatter: Prevent weld spatter falling on surfaces of materials which will be self-finished and visible in completed work;
  - Residues: Ensure complete removal of flux residues and slag;
  - Butt welds: As these will be visible in completed work they are to be finished smooth, flush with adjacent surfaces.

3.21 B DRAWINGS BY CONTRACTOR:

- For approval by CA/Design Team: For all new cast iron work, the contractor is to prepare detailed fabrication drawings and method statements for approval prior to the carrying out of the works.

3.22 B SITE DIMENSIONS ETC:

- Take all site dimensions and details and make templates and patterns as required including the preparation of patterns for all new castings in durable materials which are subsequently to be handed over to the CA/Design Team free of charge on completion of the works.
- New railing design to match historic design including setting-out to previous fixing points in stone steps.

3.23 B TEMPORARY SUPPORTS ETC:

- Provide all necessary temporary supports and weather protection and protection to the Albert Memorial and setting prior to and throughout works. Remove on completion when safe and appropriate to do so.

3.24 B CONTRACTOR TO INSPECT SITE:

- The Contractor will be expected to be fully conversant with the requirements and restrictions imposed by the site and the works in progress, and no claim will be considered which arises from want of such knowledge.

4.10 B METALWORK FIXINGS:

- (a) Grade 316 stainless steel bolts with domed nuts and washers;
- (b) Grade 316 stainless steel bolts with countersunk heads, nuts and washers;
- (c) Grade 316 stainless steel rectangular washers;
- (d) Grade 316 stainless steel round washers;
- (e) Grade 316 stainless steel nuts and washers;
- (f) Separating washers in plastic, neoprene or other approved.

4.11 B METAL FILLERS: Lead stopping filler is to be used on cast iron and wrought iron to make good areas of corrosion, production and casting flaws. Polyester fillers are not acceptable.

4.12 B NEW CAST IRON COMPONENTS – UPSTANDS AND RAILS AND INFILL PANELS:

- All castings to be fabricated in accordance with BS EN 1561:2011
- Application: For upstand and rail sections of new railings, link collars AND filigree infill panels.
- Refer to Drawing OTH-PUR-EX-ZZ-DWG-A-7107.
- Ensure all casting vents, surface pits and the like are filled and stopped with lead stopping prior to surface treatment and redecoration.

4.13 B NEW WROUGHT OR PURE IRON COMPONENTS – DECORATIVE SECTIONS:

- All new wrought or pure iron materials to be manufactured from traditional materials and techniques.
- Application: Decorative finials and adornments to top rail (brattishing).
- Refer to Drawing OTH-PUR-EX-ZZ-DWG-A-7107.
- Ensure all surface pits and the like are filled and stopped with lead stopping prior to surface treatment and redecoration.

510B ANTI-CORROSION TREATMENT

- A.C.T. Works generally: The Anti Corrosion Treatment (ACT) to metal surfaces
- Refer: To Iron Elements in M60 specification
- Compliance with British Standards and Codes of Practice: Works shall conform to all relevant British Standards or Codes of Practices. A certificate of compliance with the relevant British Standards shall be provided to the CA/Design Team at their request.
- Avoid contamination: At any time during the process of applying the corrosion protection systems on site or in the shop. During shop work the articles are to be kept indoors between and during all stages of the treatment processes.
- Comply with specification Comply with all the standards referred to and laid down in this specification. If any conflict arises between these requirements consult the CA/Design Team.
- Comply with Standards: Of good practice set by the Thermal Spraying and Surface Engineering Association (TSSEA).
- Proprietary materials: The names of any firms or proprietary materials is only an indication of the class, quality and performance required. Alternatives of equivalent class, quality and performance may be offered to the CA for approval.

QUALITY CONTROL

5.11 B INFORMATION ON CONTAINERS:

- Materials are to be delivered in sealed containers, clearly labelled with the following information, if applicable:
- (a) Manufacturer's name, initials or recognized trade mark;
- (b) Title and specification number;
- (c) Whether primer, undercoat, or finishing coat;
- (d) Whether lead free (if required);
- (e) Whether for internal or external use where appropriate.
- (f) Colour reference from BS 4800 (2011) or BS 381C (1996), where appropriate;
- (g) Method of application;
- (h) Batch number and date of dispatch or re-test;
- (i) Detailed instructions for storage and use if highly flammable or toxic;
- (j) Statutory markings;
- (k) Official type approval reference number (OTAR No.).

5.12 B STORAGE OF MATERIALS:

- Store materials in a clean, dry area raised above ground level and protected from extreme temperatures. Highly flammable materials to be used and stored in accordance with DOE Standard Fire Precautions for Contractors.

5.13 B SAMPLES OF MATERIALS AND WORKMANSHIP:

- When directed by the CA/Design Team supply samples of materials to be used for the work, in their original unopened containers. Also carry out samples areas of treatments, to specimen plates on and

  off site as directed. These will be used as a reference for the standard to be attained throughout the works. Obtain approval for samples before carrying out remainder of the work. Also supply samples of sealer collected from the paint kettles or other application plant.

5.13 B SAMPLES OF MATERIALS AND WORKMANSHIP: RAILING SECTIONS

- A representative sample of the fabricated and finished work is to be provided for CA/Design Team approval prior to commencing full fabrication. See drawing OTH-PUR-EE-ZZ-DWG-A-7107
- The contractor should also allow for a preliminary mock up of a full section of the railings to co- ordinate and assess the new lighting arrangements and requirements with ARUP. Refer and co- ordinate with ARUP design information.

5.14 B INSPECTION OF WORK IN CONTRACTOR'S WORKSHOPS AND ON SITE:

- Allow the CA/Design Team reasonable access to view the work in progress on site and in the workshops and to carry out tests for quality and conformity with the specification. The inspections may be announced or unannounced.

5.15 B INSPECTION OF WORK:

- The contractor will be responsible for checking and reporting on the standard at each varying stage of the works.

5.16 B QUALITY PLAN:

- The contractor is to provide a detailed method statement and quality assurance plan in accordance with BS 5750 or IS0 9002 (1994) for each part of the ACT works at the time of tendering. These documents to be agreed by CA. Provide sufficient time for comment and approval by the CA.

COMPLETION

910B DOCUMENTATION

- Submit:
  - Manufacturer's maintenance instructions.
  - Guarantees, warranties, test certificates, record schedules and log books.

920 COMPLETION

- Protection: Remove.
- Cleaning and maintenance: Carry out in accordance with procedures detailed in fabricators' guarantee

Z21
Mortars

Z21 Mortars

LIME:SAND MORTARS

310 LIME:SAND MORTAR MIXES

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

320 SAND FOR LIME:SAND MASONRY MORTARS

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

350 STORAGE OF LIME:SAND MORTAR MATERIALS

- Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free- draining bases.
- Ready prepared nonhydraulic lime putty: Prevent drying out and protect from frost.
- Nonhydraulic lime:sand mortar: Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.
- Bagged hydrated hydraulic lime: Store off the ground in dry conditions.

360 MAKING LIME:SAND MORTARS GENERALLY

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

390 KNOCKING UP NONHYDRAULIC LIME:SAND MORTARS

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

400 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.
- Working time: Within limits recommended by the hydraulic lime manufacturer.