

Reveller Tower of London

on behalf of



**Historic
Royal Palaces**

21996

Draft Structural Specification

September 2025

HOCKLEY & DAWSON

CONSULTING ENGINEERS

5 Birtley Court Yard
Bramley
Surrey
GU5 0LA

01483548784

admin@hockleyanddawson.co.uk

Contents

Scaffold	1
C20 Demolition	6
C41 Repairing/ renovating/ conserving masonry	9
D30 Piling	11
E10 Mixing/casting/curing in situ concrete	14
F10 Brick/ block walling	17
G12 Isolated structural metal members	21
Z21 Mortars	23

Scaffold

Scaffold Performance Specification

The existing structure is a Grade I listed building, Scheduled Monument and World Heritage Site. All care is to be taken during the erection, use and dismantling of the scaffold to prevent any damage to the existing fabric.

Refer to contract preliminaries for specific contract limitations and phasing.

Your attention is particularly drawn to the following:

- A. **The scaffold and scaffold enclosure is to be designed for permanent condition to EN 1991-1-4 (>1 year) with no reduction factors applied to the wind load.**
- B. **No ties will be permitted to the historic fabric.**
- C. **There is to be no contact between the scaffold and the historic fabric unless expressly noted in the performance specification.**
- D. **The design drawings are to be fully annotated to show the magnitude, direction and location of any forces exerted on the historic fabric, where permitted.**
- E. **Scaffold to be fully alarmed.**
- F. **Scaffold contractor is to be a member of NASC or Scaffold Association.**

The design drawings are to be checked by the contractor for compliance with the Performance Specification before they are forwarded to the Architect and Engineer.

All tenderers are to confirm in writing that they have read and understood all elements of the performance specification.

1.0 Scaffold

- 1.1 Putlog scaffolds will not be permitted.
- 1.2 Scaffold Enclosure
- 1.3 The scaffold shall be designed as a general scaffold with working platforms and access platforms as required. The scaffold is to include hoisting as required.
- 1.4 Contractor to supply fully detailed drawings showing layout of scaffold enclosure giving full details of the location of all scaffold, scaffold lifts, buttresses, kentledge and the location, magnitude and direction of all forces, where permitted, exerted by the scaffold on the historic structure **fourteen days** before the programmed commencement of scaffold erection. A method statement is also required detailing the proposed method of scaffold erection.

- 1.5 Erection of the scaffold shall **not commence** until the drawings have been agreed with the Engineer, Architect, Client, and relevant authorities.
- 1.6 All kentledge to resist wind loadings shall be fixed and tested prior to the erection of roof and/or wall sheeting. Kentledge and self-weight only will be permitted to resist wind, imposed and internal loadings. No loads, if permitted, are to be applied to the existing structure except where shewn.
- 1.7 Water will not be permitted for kentledge unless by prior agreement with the engineer and client and only when the contractor has supplied proposals approved by the engineer and client for ensuring kentledge is not lost or compromised due to freezing or leakage.
- 1.8 Bolted ties will not be permitted to the Historic Structure. Any butting, **if permitted**, to the historic fabric is to be carried out as shewn on the performance specification drawing. Historic fabric to be protected with 150 x 150 x 50 pads on steel base plates of Dow Floormate 700A, or similar approved.
- 1.9 Butting, **if permitted**, is to be at floor levels only or to align with internal perpendicular walls. In the exceptional circumstance that bolted ties are permitted, they are also to be at floor levels or to align with internal perpendicular walls.
- 1.10 All access and working platforms to be protected with brick guards.
- 1.11 Transfer of scaffolding components is to be by hand, pulley, or hoist. Dropping or throwing of components is strictly forbidden.
- 1.12 **No** scaffold element is to be within **50 mm** of the historic fabric unless it is a butt tube with protection as specified.

2.0 Materials

- 2.1 All scaffold to be steel tube to BS EN 39:2001.
- 2.2 All scaffold fittings to be steel to the relevant British standard. **No** wedge fittings will be permitted.
- 2.3 All materials, tubes, fittings, and boards to be classed as new and to be clean and free from tape and miscellaneous markings. All scaffold tube, beams and fittings are to be the property of a single supplier, to be equally marked throughout the works with a uniform colour identification system, and to be free from damage, rust, dirt, and markings associated with other projects.
- 2.4 All scaffold boards are to be clean, sound, and complete with sound and properly fixed end straps. Where cutting is required, it is to be uniform and carried out with a suitable saw. Boards are to be sorted prior to delivery to ensure that no boards which are warped, or split are used for the works.
- 2.5 Scaffold to be sheeted in fire resistant Monarflex or similar. Shrink wrap will **not** be permitted.

3.0 **Design**

- 3.1 The scaffold and scaffold enclosure is to be designed to **EN 1991-1-4 (>1 year) the permanent condition with no reduction factors applied to the wind load** and unless otherwise stated to be entirely independent and not apply loads to the historic fabric.
- 3.2 The scaffold will be designed by a competent person. Scaffold to be designed to comply with EN 1991-1-4 (>1 year), BS EN 12811-1 and NASC TG20:21, SG4:22 & TG4 and all current codes and standards and current revisions.
- 3.3 The contractor shall submit a detailed design to the engineer and architect **fourteen days prior to the proposed erection of the scaffold**. The details should show principal dimensions of the structure and all necessary bracings, restraints, and any special connection requirements. Where proprietary elements, such as ladder beams, cluster props etc. are to be used, the manufacturer's details and recommendations for the use of those elements are to be provided with the calculations. The calculations should include a copy of the main contractor's instructions as to the numbers and locations of working levels and loading bays which are to be provided.
- 3.4 It is also required that the designer attends the site on the day that work starts, to ensure that the scaffolder's foreman on the site fully understands the requirements of the design and is to attend at intervals not exceeding one week thereafter throughout the erection period, to confirm that the requirements of the design are being met.
- 3.5 At the completion of the erection, the designer is to certify to the engineer and architect that the scaffolding and/or roof structures have been properly erected and checked. Give three working days' notice of completion of temporary scaffold structures.
- 3.6 Whenever planned or unplanned alterations are to be made to the scaffolding, the designer is to be consulted in advance of the alterations being undertaken, the designer is to obtain the agreement of the structural engineer and is to give any necessary instructions or advice in writing, with a copy to the architect.
- 3.7 The working lifts of the scaffolds shall be designed to accommodate a general-purpose scaffold with working lifts as below and access lifts as required.

Duty loading number required.

Inspection 0.75 kN/m² as required.
Light duty 1.50 kN/m² as required.
General purpose 2.00 kN/m² as required.
Heavy duty 3.00 kN/m² as required.

The number, location and loading of the working lifts is to be specified by the main contractor to suit the works.

- 3.8 The scaffold contractor shall be responsible for ascertaining the suitability of ground / floor conditions to support the proposed scaffold loadings and informing the structural engineer of any deficiency.
- 3.9 The scaffold contractor is to satisfy himself of the suitability of the proposed bearings for the scaffold, including the location of existing services and drains. The scaffold contractor is to ascertain from site Inspection the location of all manholes, gullies and drains and to satisfy himself that the applied loads will not cause damage or affect same.
- 3.10 Butt loads, where permitted, are to be applied at floor levels or against internal return walls. **Not** to be applied to reveal panels between openings.

4.0 Drawings and Design Information

- 4.1 Drawings to be at a common metric scale (1:20, 1:50, 1:100). Calculations to be presented as a coherent legible whole with any frame analysis results, except summary, omitted and on headed printout/paper.
- 4.2 Wind to be calculated to EN 1991-1-4 with clear definition of the factors used in the calculations.
- 4.3 Locations of specific elements in the analysis to be clearly marked on suitable sketches.
- 4.4 Transoms and butt tubes to be in the same plane and not stacked and suspended below the boarded lift support. **Minimum clear lift height of 1900 mm to be maintained.**
- 4.5 Unedited frame analysis printouts will **not** be accepted without clear annotation.

5.0 Maintenance

- 5.1 The contractor shall be responsible for maintaining the scaffold including:
All ties.
Kentledge.
Monarflex sheeting.
Ladders & stairs.
Boarded lifts.

6.0 Existing historic structure

- 6.1 Scaffold elements shall **not** be in contact with the existing structure except in locations agreed in advance and shewn on the performance specification, shewn on the drawings and with suitable protection.
- 6.2 **All** tubes shall have plastic end caps. Caps to be the same colour and be fitted prior to delivery to site.

7.0 Contractors

- 7.1 Contractors shall be members of the National Access and Scaffolding Confederation (NASC) or Scaffold Association.

8.0 Protection & security

- 8.1 All scaffolds shall have suitable lightning protection and be suitably earthed. Location of earth rods is to be agreed with the archaeologist before being fixed. All in accordance with NASC SG3:08
- 8.2 Access to scaffold to be via system stair (Layher or similar) or tube and fitting stair with suitable protection to all connections, end joints etc. Where ladder access is appropriate proprietary protection gates are to be installed. Any ladders giving access to the scaffold shall be removed and secured at the end of each working day.
- 8.3 Exposed scaffold fittings are to be covered with Component Force Ltd standard joint cover or similar approved by the engineer.

9.0 Health & Safety

- 9.1 All consultants, clients' staff, residents, and contractors must comply with all current Health and Safety legislation including:
- Construction (Design & Management) Regulations 2015
Health & Safety at Work Act 1974
Building Safety Act 2024
- 9.2 The main contractor is to be responsible for safety standards during the erection, working life and dismantling of all scaffolds and to ensure all statutory checks are carried out and proper records kept of the scaffold.
- 9.3 The scaffold is to be fitted with a wireless anemometer, before it is used for building work, capable of recording wind speed, magnitude, and direction and issuing warnings at any given wind speed.
- 9.4 All scaffolds to be fitted with a suitable scaffold alarm connected to a suitable telephone response system.
- 9.5 Scaffold is not to be used if wind speeds exceed 25 mph.

C20 Demolition

General requirements

110 Desk study/ survey

1. Scope: before starting deconstruction/ demolition work, examine available information, and carry out a survey of: : The structure or structures to be deconstructed/ demolished
2. Report and method statements: submit, describing:
 - 2.1. Form, condition and details of the structure or structures, the site, and the surrounding area.
 - 2.1.1. Extent:
 - 2.2. Type, location and condition of features of historical, archaeological, geological or ecological importance.
 - 2.3. Type, location and condition of adjoining or surrounding premises that might be adversely affected by removal of the structure or structures, or by noise, vibration and dust generated during deconstruction or demolition.
 - 2.4. Identity and location of services above and below ground, including those required for the contractor's use, and arrangements for their disconnection and removal.
 - 2.5. Form and location of flammable, toxic or hazardous materials, including lead-based paint, and proposed methods for their removal and disposal.
 - 2.6. Form and location of materials identified for reuse or recycling, and proposed methods for removal and temporary storage.
 - 2.7. Proposed programme of work, including sequence and methods of deconstruction or demolition.
 - 2.8. Details of specific pre-weakening required.
 - 2.9. Arrangements for protection of personnel and the general public, including exclusion of unauthorized persons.
 - 2.10. Arrangements for control of site transport and traffic.
 - 2.11. **Special requirements:** Comply with Scheduled monument consent
3. Format of report: Written

120 Extent of deconstruction/ demolition

1. General: subject to retention requirements specified elsewhere, deconstruct/ demolish structures down to: : As shewn on drawings
2. Verification
 - 2.1. Submittals: provide methodology
 - 2.2. Timing: give 10 working days notice

150 Features to be retained

1. General: keep in place and protect the following: : All historic fabric

Services affected by deconstruction and demolition

220 Location and marking of services

1. Services affected by deconstruction/ demolition work: Locate and mark positions
2. Mains services marking: Arrange with the appropriate authorities for services positions to be located and marked
 - 2.1. Marking standard: In accordance with [Street Works UK](#) publication [Guidance on the Positioning and Colour Coding of Underground Utilities' Apparatus](#).

231 Services disconnection arranged by employer

1. General: the employer will arrange with the appropriate authorities and responsible private organizations for disconnection of services, and removal of fittings and equipment owned by those authorities and organizations, prior to deconstruction or demolition, as follows: electric supplies to existing cabins.
2. Timing: Do not start deconstruction or demolition until disconnections are completed.

270 Services to be retained

1. Damage to services: Give notice, and notify relevant service authorities and/ or owner/ occupier regarding damage arising from deconstruction or demolition works
2. Repairs to services: Complete as directed, and to the satisfaction of the service authority or owner

Deconstruction and demolition work

310 Workmanship

1. Standard: Demolish structures in accordance with [BS 6187](#).
2. Operatives
 - 2.1. Appropriately skilled and experienced for the type of work.
 - 2.2. Holding, or in training to obtain, relevant [Construction Skills](#) certification of competence.
3. Site staff responsible for supervision and control of work:: Experienced in the assessment of risks involved and methods of deconstruction and demolition to be used. Hold appropriate qualification or training certificates for their role.
4. Verification
 - 4.1. Submittals: Provide methodology
 - 4.2. Timing: Give 14 days notice

340 Health hazards

1. Precautions: Protect site operatives and the general public from health hazards, including those associated with vibration, dangerous fumes and dust arising during the course of the works.

360 Structures to be retained

1. Extent: As drawings
2. Parts which are to be kept in place: Protect. Give notice and notify service authority or owner of damage arising from the execution of the works.
3. Interface between retained structures and deconstruction or demolition: Cut away and strip out with care to minimize the amount of making good needed

391 Asbestos-containing materials – unknown occurrences

1. **Discovery:** Stop work and give immediate notice of suspected asbestos-containing materials when they are discovered during deconstruction and demolition work. Avoid disturbing such materials.
2. **Removal:** Submit statutory risk assessments and details of proposed methods for safe removal.

410 Unforeseen hazards

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

Materials arising

511 Employer's property

1. **Components and materials to remain the property of the employer:** All historic fabric
2. **Protection:** Maintain until these items are removed by the employer or reused in the works, or until the end of the contract
3. **Special requirements:** liaise with archeologist

Ω End of Section

C41

Repairing/ renovating/ conserving masonry

Generally/ preparation

110 Scope of work

1. **Schedule:** Consolidation of exposed masonry as appropriate
2. **Records of masonry to be repaired:** Before starting work, use measurements and photographs, as appropriate to record bonding patterns, joint widths, special features, etc.
3. **Identification of masonry units to be removed, replaced or repaired:** Mark clearly, but not indelibly, on face of masonry units or parts of units to be cut out and replaced. Transcribe markings to drawings/ photographs.

120 Site inspection

1. **Purpose:** To confirm type and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.
2. **Parties involved:** Contract administrator/Engineer
3. **Timing:** At least 10 working days before starting each section of work
4. **Instructions issued during inspection:** Confirm in writing, with drawings and schedules as required, before commencing work

140 Record of work

1. **General:** Record work carried out to masonry clearly and accurately using written descriptions, sketches, drawings and photographs, as necessary.
2. **Specific records:** as requested
3. **Documentation:** Submit on completion of the work.
 - 3.1. **Number of sets:** One in electronic form

Workmanship generally

150 Power tools

1. **Usage for the removal of mortar:** Not permitted

155 Putlog scaffolding

1. **Usage:** Not permitted

160 Protection of masonry units and masonry

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

165 Structural stability

1. **General:** Maintain stability of masonry. Report defects, including signs of movement that are exposed or become apparent during the removal of masonry units.

170 Disturbance to retained masonry

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

180 Workmanship

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

185 Adverse weather

1. General: Do not use frozen materials or lay masonry units on frozen surfaces.
2. Air temperature: Do not bed masonry units or repoint:
 - 2.1. In 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.
 - 2.2. In hydraulic lime:sand mortars when ambient air temperature is at or below 5°C and falling or unless it is at least 3°C and rising.
 - 2.3. In non-hydraulic lime:sand mortars in cold weather, unless approval is given.
3. Temperature of the work: Maintain above freezing until mortar has fully set.
4. Rain, snow and dew: Protect masonry by covering during precipitation, and at all times when work is not proceeding.
5. Hot conditions and drying winds: Prevent masonry from drying out rapidly.
6. New mortar damaged by frost: Rake out and replace.

Materials/ production/ accessories

260 Bricks

1. Standard: To [BS EN 771-1](#)
2. Manufacturer: Bulmer Brick & Tile
 - 2.1. Product reference: To be agreed
3. Size: To be agreed
4. Special shapes: None
5. Environmental performance requirements: BES 6001
 - 5.1. Environmental rating: N/A
 - 5.2. Recycled content: None permitted
6. Verification: supply samples
 - 6.1. Submittals: supply samples for approval
 - 6.2. Timing: 6 weeks before use

Ω End of Section

D30 Piling

General

110 Piling specification

1. **Standard:** Comply with the current edition of 'Specification for piling and embedded retaining walls' (SPERW).
2. **Recognized British Standard for SPERW requirements:** None
3. **References to Engineer in SPERW:** For the purpose of this contract, interpret such references as being to the person named in section A10 as administering the Contract on behalf of the Employer.

130 Piles

1. **Standard:** To SPERW, sections B2-B9, as appropriate to the pile type.
2. **Permitted types:** Steel herlical screw piles
3. **Project specification:** Submit proposals to cover the SPERW requirements in clause B1.2 and listed under this heading for the chosen pile type.
4. **Other requirements:** no vibration

155 Screw piles

1. **Standard:** To SPERW, section B7.
2. **Type:** Steel screw piles
3. **Coating:** Galvanised
4. **Other requirements:** None

System performance

210 Contractor design

1. **Structural requirements**
 - 1.1. **Generally:** As section B50.
 - 1.2. **Modifications:** None
2. **Design responsibility**
 - 2.1. **Piles:** Complete design of piles in accordance with the designated code of practice to satisfy specified performance criteria
 - 2.2. **Other:** Pile caps
3. **Pile layout:** As drawing 22120 1 02
4. **Pile design criteria:** as drawing
5. **Other requirements:** None
6. **Submission of information:** As required by SPERW, table B1.1 and elsewhere, as appropriate for the pile type, materials and tests specified.
 - 6.1. **Amendments to requirements specified in SPERW for information required**
 - 6.1.1. **Prior to commencing design:** None

- 6.1.2. **Prior to commencing the works:** Confirmation that installation of piles will not damage adjacent structures/ services Details of size and weight of plant to be used Details of special equipment to be used to determine the depth and verticality of bore

220 Design and construction

1. **Requirement:** Option 1 of SPERW, clause B1.4 applies.
2. **Standards used for design:** BS EN 1992-1-1
3. **Design features:**
4. **Design suitability:** Confirm acceptance of design as appropriate for the particular ground conditions or submit alternative design proposals, accepting full responsibility for them.
5. **Submission of information:** As required by SPERW, table B1.1 and elsewhere, as appropriate for the pile type, materials and tests specified.
 - 5.1. **Amendments to requirements specified in SPERW for information required prior to commencing construction of working piles:** Confirmation that installation of piles will not damage adjacent structures/ services Confirmation that proposed rig/ auger configuration is not susceptible to fighting for pile diameters and soil conditions under consideration Details of size and weight of plant to be used Details of special equipment to be used to determine the depth and verticality of bore

260 Specified working loads for piles

1. **Pile group designation:** as drawing 22120 1 03
 - 1.1. **Load magnitude:** Axial load of 50 kN

290 Basis for setting out

1. **Site datum:** Local datum
2. **Site grid:** As Architect drawings

340 Installation tolerances for piles

1. **Requirement:** Substitute the following for the standard installation tolerances given in SPERW, table B1.4: Deviation from the vertical at any level, 1 in 250.
2. **Application/ reason:** All piles

Products

460 Proprietary coating

1. **Description:** Galvanised
2. **Purpose:** Protection against corrosion
3. **Manufacturer:**
 - 3.1. **Product reference:** submit proposals
4. **Surface preparation, primer and finishing coats:** As recommended by manufacturer to suit ground and water conditions on-site.
5. **Adhesion test:** Not required

Execution

610 Method statement

1. **Requirement:** Submit proposed method of installation to achieve the design parameters, including:

- 1.1. Details of equipment.
- 1.2. Programme showing sequence and resources.
- 1.3. Confirmation that performance requirements for load and settlement will be achieved.

680 Prohibition of support fluid

1. Usage: Not permitted.

690 Disposal of pile heads

1. Cutting down and disposal: Contractor's responsibility.

Completion

910 Health and safety file

1. Piling completion report: Collate and submit a full set of pile records for inclusion in the health and safety file.
2. Content and date for submission: As SPERW, clause B1.12.2.
 - 2.1. Record plan: Give the number of each pile and its final location relative to
 - 2.2. Additional requirements:

Ω End of Section

E10

Mixing/casting/curing in situ concrete

Concrete

101 Specification

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

110 Basic designated concrete

1. Designation: RC35/45
2. Coarse recycled aggregates: As permitted by BS 8500-1
3. Consistence class: Contractor's choice
4. Additional requirements: Submit proposals.

Materials, batching and mixing

218 Site mixed concrete

1. Batching by mass
 - 1.1. Restrictions: None
 - 1.2. Accuracy of measuring devices: To BS EN 206, clause 9.6.2.2.
 - 1.2.1. Tolerances for quantity of constituent material: To BS EN 206, Table 27.
2. Batching by volume
 - 2.1. Restrictions: None
3. Mixing: To BS 8000-2.1, subsections 2, 3 and 4.

415 Admixtures

1. Calcium chloride and admixtures containing calcium chloride: Do not use.

490 Properties of fresh concrete

1. Adjustments to suit construction process: Determine with concrete producer . Maintain conformity to the specification.

Project testing/ certification

520 Testing laboratory

1. Laboratory: Accredited by UKAS or other national equivalent.
 - 1.1. Name and UKAS reference number: Submit well in advance of making trial mixes or concrete for use in the works.

530 Tests results

1. Submission of reports: Within one day of completion of each test. Within one day of completion of each test.
 - 1.1. Number of copies: Three
-

2. Reports on site: A complete set, available for inspection.

Placing/ compacting/ curing and protecting

648 Adverse temperature conditions

1. **Requirement:** Submit proposals for protecting concrete when predicted ambient temperatures indicate risk of concrete freezing or overheating.

650 Surfaces to receive concrete

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

670 Transporting

1. **General:** Avoid contamination, segregation, loss of ingredients, excessive evaporation and loss of workability . Protect from heavy rain.
2. **Entrained air:** Anticipate effects of transport and placing methods in order to achieve specified air content.

680 Placing

1. **Records:** Maintain for time, date and location of all pours.
2. **Timing:** Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
3. **Temperature limitations for concrete:** 30°C (maximum) and 5°C (minimum), unless otherwise specified. Do not place against frozen or frost covered surfaces.
4. **Continuity of pours:** Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
5. **Discharging concrete:** Prevent uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
6. **Thickness of layers:** To suit methods of compaction and achieve efficient amalgamation during compaction.
7. **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

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

720 Vibrators

1. **General:** Maintain sufficient numbers and types of vibrator to suit pouring rate, consistency and location of concrete.
2. **External vibrators:** Obtain approval for use .

810 Curing generally

1. **Requirement:** Keep surface layers of concrete moist throughout curing period, including perimeters and abutments, by either restricting evaporation or continuously wetting surfaces of concrete.
 - 1.1. **Surfaces covered by formwork:** Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.
 - 1.2. **Top surfaces:** Cover immediately after placing and compacting. If covering is removed for finishing operations, replace it immediately afterwards.
2. **Surface temperature:** Maintain above 5°C throughout the specified curing period or four days, whichever is longer.
3. **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

1. **Sheet coverings:** Suitable impervious material.
2. **Curing compounds:** Selection criteria:
 - 2.1. **Curing efficiency:** Not less than 75% or for surfaces exposed to abrasion 90%.
 - 2.2. **Colouring:** Fugitive dye.
 - 2.3. **Application to concrete exposed in the finished work:** Readily removable without disfiguring the surface.
 - 2.4. **Application to concrete to receive bonded construction/ finish:** No impediment to subsequent bonding.
3. **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.

840 Protection

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

Ω End of Section

F10 Brick/ block walling

Types of walling

110 Clay facing brickwork

1. Description: beneath slabs
2. Bricks: To BS EN 771-1.
 - 2.1. Manufacturer: Bulmer Brick & Tile
 - 2.1.1. Product reference: Fired light brown as North Moat wall repair.
 - 2.2. Recycled content: None permitted
 - 2.3. Special shapes: None
3. Mortar: As section Z21.
 - 3.1. Standard: To BS EN 998-2
 - 3.2. Mix: 1:5 masonry cement:sand
 - 3.3. Additional requirements: None
4. Bond: Flemish
5. Joints: Flush
6. Features: None

Workmanship generally

430 Conditioning of clay bricks and blocks

1. Bricks and blocks delivered warm from manufacturing process: Do not use until cold.
2. Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

460 Mortar designations

1. Mix proportions: For a specified designation select a mix from the following:
 - 1.1. Designation (i) (BS EN 998-2 M12 equivalent)
 - 1.1.1. 1:0-¼:3 (Portland cement:lime:sand with or without air entraining additive).
 - 1.1.2. 1:3 (Portland cement:sand and air entraining additive).
 - 1.2. Designation (ii) (BS EN 998-2 class M6 equivalent)
 - 1.2.1. 1:½:4-5 (Portland cement:lime:sand with or without air entraining additive).
 - 1.2.2. 1:3 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.2.3. 1:2½-3½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.2.4. 1:3-4 (Portland cement:sand and air entraining additive).
 - 1.3. Designation (iii) (BS EN 998-2 class M4 equivalent)
 - 1.3.1. 1:1:5-6 (Portland cement:lime:sand with or without air entraining additive).
 - 1.3.2. 1:3½-4 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).

- 1.3.3. 1:4-5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
- 1.3.4. 1:5-6 (Portland cement:sand and air entraining additive).
- 1.4. Designation (iv) (BS EN 998-2 class M2 equivalent)
 - 1.4.1. 1:2:8-9 (Portland cement:lime:sand with or without air entraining additive).
 - 1.4.2. 1:4½ (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.4.3. 1:5½-6½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.4.4. 1:7-8 (Portland cement:sand and air entraining additive).
- 2. **Batching:** Mix proportions by volume.
- 3. **Mortar type:** Continuous throughout any one type of masonry work.

500 Laying generally

- 1. **Mortar joints:** Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
- 2. **AAC block thin mortar adhesive and gypsum block adhesive joints:** Fill vertical joints. Lay blocks on a full bed.
- 3. **Clay block joints**
 - 3.1. **Thin-layer mortar:** Lay blocks on a full bed.
 - 3.2. **Interlocking perpend:** Butted.
- 4. **Bond where not specified:** Half-lap stretcher.
- 5. **Vertical joints in brick and concrete block facework:** Even widths. Plumb at every fifth cross joint.

520 Accuracy

- 1. **Courses:** Level and true to line.
- 2. **Faces, angles and features:** Plumb.
- 3. **Permissible deviations**
 - 3.1. **Position in plan of any point in relation to the specified building reference line and/ or point at the same level:** ± 10 mm.
 - 3.2. **Straightness in any 5 m length:** ± 5 mm.
 - 3.3. **Verticality up to 3 m height:** ± 10 mm.
 - 3.4. **Verticality up to 7 m height:** ± 14 mm.
 - 3.5. **Overall thickness of walls:** ± 10 mm.
 - 3.6. **Level of bed joints up to 5 m (brick masonry):** ± 11 mm.
 - 3.7. **Level of bed joints up to 5 m (block masonry):** ± 13 mm.

560 Coursing brickwork

- 1. **Gauge:** Four brick courses including bed joints to 300 mm.

580 Laying frogged bricks

- 1. **Single frogged bricks:** Frog uppermost.
- 2. **Double frogged bricks:** Larger frog uppermost.
- 3. **Frog cavity:** Fill with mortar.

635 Jointing

1. **Profile:** Consistent in appearance.

665 Pointing

1. **Description:** TO ALL WALLING
2. **Joint preparation:** Remove debris. Dampen surface.
3. **Mortar:** As section Z21.
 - 3.1. **Standard:** To BS EN 998-2
 - 3.2. **Mix:** 1:5 masonry cement:sand
 - 3.3. **Additional requirements:** None
4. **Profile:** Flush

690 Adverse weather

1. **General:** Do not use frozen materials or lay on frozen surfaces.
2. **Air temperature requirements:** Do not lay bricks/ blocks:
 - 2.1. In cement-gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
 - 2.2. In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising, or as manufacturer's/ supplier's recommendations.
 - 2.3. In thin-layer mortars when outside the limits set by the mortar manufacturer.
3. **Temperature of walling during curing:** Above freezing until hardened.
4. **Newly erected walling:** Protect at all times from:
 - 4.1. Rain and snow.
 - 4.2. Drying out too rapidly in hot conditions and in drying winds.

Additional requirements for facework

710 The term facework

1. **Definition:** Applicable in this specification to brick/ block walling finished fair.
 - 1.1. **Painted facework:** The only requirement to be waived is that relating to colour.

750 Colour consistency of masonry units

1. **Colour range:** Submit proposals of methods taken to ensure that units are of consistent and even appearance within deliveries.
2. **Conformity:** Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.
3. Facing bricks should be blended on site from a minimum of three packs to ensure an even distribution of colour and texture variation.
4. **Finished work:** Free from patches, horizontal stripes and racking back marks.

760 Appearance

1. **Brick/ block selection:** Do not use units with damaged faces or arrises.
2. **Cut masonry units:** Where cut faces or edges are exposed cut with table masonry saw.
3. **Quality control:** Lay masonry units to match relevant reference panels.

- 3.1. **Setting out:** To produce satisfactory junctions and joints with built-in features and components.
- 3.2. **Coursing:** Evenly spaced using gauge rods.
4. **Lifts:** Complete in one operation.
5. **Methods of protecting facework:** Submit proposals.

790 Putlog scaffolding

1. **Use:** Not permitted in facework.

830 Cleanliness

1. **Facework:** Keep clean.
2. **Mortar on facework:** Allow to dry before removing with stiff bristled brush.
3. **Removal of marks and stains:** Rubbing not permitted.

Ω End of Section

G12

Isolated structural metal members

Products

320 Steel members

1. Description: as drawings 2212 1 02 & 03
2. Manufacturer: Contractor's choice
3. Standard: To BS EN 10025-2.
4. Steel: To BS EN 10025-2.
 - 4.1. Grade: S355 JR
 - 4.2. Section properties and dimensions: To [BS EN 10055](#)
 - 4.3. Surface condition: Galvanised
5. Fire performance: N/A
6. Environmental performance: N/A
 - 6.1. Environmental rating: N/A
 - 6.2. Recycled content: Submit proposals
7. Verification: N/A
 - 7.1. Submittals: N/A
 - 7.2. Timing: N/A

340 Bolt assemblies

1. Description: High strength
2. Manufacturer: submit proposals
 - 2.1. Product reference: N/A
3. Standard: [BS EN ISO 4014](#)
4. Designation: Black bolts
5. Property class: 8.8
6. Size: as drawings
7. Nuts and washers: Material grade and finish to suit bolts.
8. Coating applied by manufacturer: Galvanised
9. Other requirements: Diameter of washers in contact with timber faces to be minimum three times bolt diameter, with a thickness not less than 0.25 times bolt diameter
10. Fire performance: N/A
11. Environmental performance: N/A
 - 11.1. Environmental rating: N/A
 - 11.2. Recycled content: submit proposals
12. Verification: N/A
 - 12.1. Submittals: N/A
 - 12.2. Timing: N/A

Fabrication

510 Fabrication of steel members

1. Cuts and holes: Accurate and neat.
2. Welding: Metal arc method to [BS EN 1011-2](#).
 - 2.1. Welded joints: Fully fused, with mechanical properties not less than those of the parent metal.
 - 2.2. Site welding: Obtain approval
3. Joints: Location and layout of fastenings to suit fabrication drawing package.

Execution

610 Installation

1. Accuracy: Members positioned true to line and level using, if necessary, steel packs of sufficient area to allow full transfer of loads to bearing surfaces.
2. Fixing: Use washers under bolt heads and nuts.
 - 2.1. Tapered washers: Provide under bolt heads and nuts bearing on sloping surfaces. Match taper to slope angle and align correctly.

Ω End of Section

Z21

Mortars

Cement gauged mortars

110 Cement gauged mortar mixes

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

120 Sand for site made cement gauged masonry mortars

1. **Standard:** To BS EN 13139.
2. **Grading:** 0/2 (FP or MP).
 - 2.1. **Fines content** where the proportion of sand in a mortar mix is specified as a range (e.g. 1:1: 5-6):
 - 2.1.1. **Lower proportion of sand:** Use category 3 fines.
 - 2.1.2. **Higher proportion of sand:** Use category 2 fines.
3. **Sand for facework mortar:** Maintain consistent colour and texture. Obtain from one source.

160 Cements for mortars

1. **Cement:** To BS EN 197-1 and CE marked.
 - 1.1. **Types:** Portland cement, CEM I.
 - 1.1.1. **Portland limestone cement,** CEM II/A-L or CEM II/A-LL.
2. **Portland slag cement,** CEM II/B-S.
3. **Portland fly ash cement,** CEM II/B-V.
 - 3.1. **Strength class:** 32.5, 42.5 or 52.5.
4. **White cement:** To BS EN 197-1 and CE marked.
 - 4.1. **Type:** Portland cement, CEM I.
 - 4.2. **Strength class:** 52.5.
5. **Sulfate resisting Portland cement**
 - 5.1. **Type:** To BS EN 197-1 Sulfate resisting Portland cement, CEM I/SR and CE marked.
6. **To BS EN 197-1 fly ash cement,** CEM II/B-V and CE marked.
 - 6.1. **Strength class:** 32.5, 42.5 or 52.5.
7. **Masonry cement:** To BS EN 413-1 and CE marked.
 - 7.1. **Class:** MC 12.5.

200 Storage of cement gauged mortar materials

1. **Sands and aggregates:** Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
2. **Factory made ready-mixed lime:sand/ ready to use retarded mortars:** Keep in covered containers to prevent drying out or wetting.
3. **Bagged cement/ hydrated lime:** Store off the ground in dry conditions.

210 Making cement gauged mortars

1. **Batching:** By volume. Use clean and accurate gauge boxes or buckets.

- 1.1. **Mix proportions:** Based on dry sand. Allow for bulking of damp sand.
2. **Mixing:** Mix materials thoroughly to uniform consistency, free from lumps.
 - 2.1. **Mortars containing air entraining admixtures:** Mix mechanically. Do not overmix.
3. **Working time (maximum):** Two hours at normal temperatures.
4. **Contamination:** Prevent intermixing with other materials.

Lime:sand mortars

320 Sand for lime:sand masonry mortars

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

Ω End of Sec

