

20 QUEENS GATE PLACE MEWS

1004: Masonry specification

Revision Record

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-	26/02/14	Issued for planning purposes	dfp	dfp

BRICKWORK AND BLOCKWORK

1.0 GENERAL

1.1 Codes of Practice

All brickwork and blockwork is to be carried out in accordance with the latest amendments of BS 5628 : Parts 1, 2 and 3 'Code of Practice for Use of Masonry'.

1.2 Mortar Testing

All test cubes shall be made and tested in accordance with the requirements of BS4551. The following table shows the required 7 and 28-day strength for preliminary and work tests:

MEAN COMPRESSIVE STRENGTH OF 100mm MORTAR CUBES IN N/mm²

Grade Mix	7 days	28 days	7 days	28 days
(i) 1:0 to ¼:3	10.7	16.0	7.3	11.0
(ii) 1:½:4 to 4½	4.3	6.5	3.0	4.5
(iii) 1:1:5 to 6	2.4	3.6	1.7	2.5
(iv) 1:2:8 to 9	1.0	1.5	0.7	1.0

1.3 Preliminary Test

Preliminary tests shall be carried out in ample time for the results to be approved before brick laying is due to commence, and before any change is made in the mortar mix, materials of source or materials.

The mortar shall be made in the laboratory from the materials and in the proportions proposed for use on site. Where colouring pigments are to be used, they must be incorporated in the mix.

Mixing, moulding and curing shall be in accordance with BS 4551. Three no. cubes shall be tested 7 days after casting and 3 No. after 28 days. If the cubes do not attain the strength specified, the Contractor shall obtain materials from other sources, or with different grading, and repeat at his own expense the preliminary tests.

1.4 Site Control Tests

Mortar shall be taken from the spot boards, and made into four 100mm mortar cubes for each 100m² of wall, or for every storey whichever is more frequent, for each designation of mortar used. 2 no. cubes shall be crushed at 7 days and 2 no. at 28 days, and shall attain the strengths specified in the Table above for site tests.

Compressive strengths: final acceptance of the work will depend on the 28-day cube strength and the 7-day tests should be regarded as a guide to strength development and an early indication of defective mortar. The Contractor shall keep a record of the positions from which test cubes have been taken.

In the event of 7-day strengths falling below those specified, the Contractor may elect to continue work at his own risk while awaiting the 28-day result, or immediately take down the work represented by the defective cubes.

Where either the 7-day or the 28-day strength falls below that specified, the Contractor shall immediately investigate cause of the drop in strength, and take steps to prevent further low results including, where necessary, a change in the source of materials.

Work built with mortar represented by the defective cubes shall be liable to rejection by the Architect. The Architect's decision as to whether the work shall be retained or rejected shall be final, and the Contractor shall take down and re-build at his own expense the rejected work, together with any work which has to be removed to gain access.

2.0 MATERIALS

2.1 Bricks

Generally all bricks are to be the best of their respective kinds; hard, square cornered, sound and well burnt in accordance with the following:

- a) Fired - clay bricks to BS 3921
- b) Concrete bricks to BS 6073 Parts 1 & 2
- c) Special bricks to BS 4729

2.2 Common Bricks

All common bricks shall have a minimum average crushing strength of not less than 20N/mm². All special bricks, i.e. squints, 'pistols', radials, etc are to be manufactured and not cut from rectangular bricks.

2.3 External Facing Bricks

Facing bricks to be specified by the Architect.

2.4 Blocks

Generally all blocks are to be the best of their respective kinds; hard, square cornered and sound, in accordance with the following:

- a) Fired - clay blocks to BS 3921
- b) Concrete blocks to BS 6073 Parts 1 and 2

2.5 Compressive Strength

All bricks and blocks shall have the required minimum compressive strengths as specified on the drawings. The Contractor shall satisfy himself throughout the period of delivery, that batches of bricks and blocks used have the required minimum crushing strength as shown on the drawings. The Contractor shall obtain reports or certificates of such test carried out by the brick or block suppliers and produce evidence to show that a regular, efficient method of quality control as referred to in BS 3921 is in use. The category of manufacturing control, i.e. Normal or Special as defined in BS 5628 : Part 1, shall be obtained from the manufacturer.

2.6 Delivery and Storage of Bricks and Blocks

All bricks and blocks shall be carefully unloaded and stacked. They shall be unloaded by hand or machine onto a reasonably dry and level site and not tipped from vehicles. In addition to this, common bricks are to be delivered to site in metal bands using the 'strapack' system of delivery and are to be off-loaded and placed in position of working before breaking the bands. Also particular attention must be paid to facing bricks and fair faced bricks and blocks, to preserve the arises and avoid face damage. All bricks and blocks must be protected from rain, snow and rising moisture. All bricks and blockwork are to be kept dry at all times.

2.7 Cement

The specification is the same as for FB1 cement, except that no PFA or GGBFS shall be used. Masonry cement is to be to BS 5224, but shall not be used in load-bearing walls.

2.8 Sand

In general the sand used in mortar shall comply with BS 1200 and be free from any deleterious substances. The use of sand which has been in contact with sea water shall not be permitted unless it has been washed adequately, so that the total quantity of soluble salts does not exceed 0.3%. The sand shall be stored away from other materials, where it will not become contaminated by deleterious matter, and extreme variations of moisture content shall be avoided.

2.9 Lime

The lime is to be hydrated and shall be hydraulic (calcium) lime or semi hydraulic lime to conform to BS 890 Class B, and a type deemed suitable by the Contractor. Lime shall be stored as cement.

2.10 Water

The water used for mixing shall be obtained from a statutory water undertaking, or shall satisfy the recommendations given in appendix of BS 3148. No sea water or water from excavations shall be used.

2.11 Admixtures

No admixtures will be permitted, however, a plasticizer conforming to BS 4887 may be used at the Contractors discretion. The use of calcium chloride will not be permitted.

2.12 Pigments

Any pigment used in mortar must conform to the requirements of BS 1014. Pigments containing 'carbon black' will not be permitted.

2.13 Mortar

Mortar shall consist of one of the following types of mix. The mixes to be used will be shown on the relevant drawings.

CEMENT:LIME: SAND	MASONRY CEMENT: PLASTICIZER	CEMENT:SAND
i) 1:0 to ¼:3	-	-
ii) 1:½:4 to 4½	1:2½ to 3½	1:3 to 4
iii) 1:1:5 to 6	1:4 to 5	1:5 to 6
iv) 1:2:8 to 9	1:5½ to 6½	1:7 to 8

Where sulphate resisting cements are used, the mortar designations shall be prefixed 'S'.

Ready mixed lime: sand for mortar is to be 1: 1: 5/6 range and shall be comply with the requirements of BS 4721.

Class i) Mortar to be used below dpc
Class iii) Mortar to be used above dpc

2.14 Damp Proof Course

Damp Proof Course shall be specified by the Architect and shall be stored in accordance with the manufacturer's instructions.

2.15 Reinforcement

Reinforcement where required in brickwork shall be Brickforce SBF60BSC manufactured by BRC (or similar approved).

2.16 Wall Ties & Anchors

All wall ties for cavity walls shall be in accordance with BS 1243. Metal ties for cavity wall construction shall be grade 18/8 austenitic stainless steel double triangle type or similar approved. The double triangle type of tie with the appropriate retaining washer shall be used for the support of cavity wall insulation, or similar approved.

Ties and anchors between brickwork and concrete shall be stainless steel butterfly type cast into concrete as work proceeds, at specified spacing to suit brick / Block coursing.

Ties and anchors between blockwork and concrete shall be 40mm x 5mm galvanised hoop iron, fixed into concrete as work proceeds at specified spacing to suit block coursing.

2.16 Joist Hangers, Holding Down Straps & Metal Fittings

Galvanised hot rolled strip used to provide stability between sections of walls, or between blockwork and the frame of a building, shall be in accordance with the requirements of EN2 (H.S.4B.) of BS 1449 : Part 1.

Joist hangers, wall and roof anchors, etc, shall be constructed from mild steel grade 43A, or its equivalent, i.e. EN2 (H.S.4B.) of BS 1449 : Part 1 for hot rolled strip. Joist hangers, and similar fabrication shall be galvanised after manufacture, with a minimum coating weight of 610 grm/m² to BS 729. All other fittings shall be galvanised to the above standard, or sheradized to BS 4921 Class 2 (minimum local thickness 15 microns). All such angles are to be formed from grade 18/8 austenitic stainless steel plate or sheet.

All bolts, sockets and shims used to fix such angles to the structure shall also be grade 18/8 austenitic stainless steel.

2.17 Externally Exposed Supporting Angles

Sealants used in brickwork joints shall be polysulphide stored in accordance with the manufacturer's instructions.

2.18 Metal in Walls

All metal embedded in external solid walls or the outside skin of external cavity walls shall be grade 18/8 austenitic stainless steel.

3.0 WORKMANSHIP

3.01 Setting out Brickwork & Blockwork

Refer to the Architects drawings.

3.02 External Facing Bricks

The Contractor is to allow in his prices for sorting and selecting facing bricks to match the approved sample panel and carefully selecting for size for building pier, projections and other sections of the work designed to brick modules or with tight tolerances.

The colour and texture of bricks delivered shall be approved by the Architect.

In order to ensure a uniform appearance of facing brickwork, the Contractor shall agree with the Architect on the provision of a stockpile of facing bricks of sufficient quantity and access for selection, so that throughout the face brickwork programme thorough mixing and selecting from pallets is possible.

The Contractor's attention is drawn to the fact that a high standard of workmanship

will be required for facing work generally and particular care must be taken to keep such work free from mortar droppings and other staining.

3.03 Cavity Walls

All bricks used in cavity walls shall be whole bricks and no snapped headers are to be used except to maintain bond. Every care is to be taken to prevent mortar droppings from falling down the cavity, for example, by the use of laths that should be drawn up the cavity as work proceeds. Any mortar which may unavoidably fall on the wall ties should be removed daily and temporary openings (coring holes or clean-outs) should be provided to permit the daily clearance of mortar droppings from the bottom of the cavity. Where coring holes are used, extreme care is to be taken to avoid any damage to the d.p.c.

In cavity walls the skins shall be tied together by wall ties embedded in the mortar, at the time the course is laid, with a minimum embedment into each leaf of 50mm. The ties shall not be placed at more than 450mm vertically (2 courses of blockwork maximum) or more than 900mm horizontally, staggered. Additional ties shall be provided near the sides of all openings, and at sides of all columns so that there is one for each 300mm of height, the ties being within 150mm of the openings or side column. At the edges of all panels, beams, etc, the first row of ties must be within 300mm of the edge. Wall ties shall be bedded with a slight fall to the outer skin.

3.04 Mortar

Mortar made on site must be mixed by machine, which must be cleaned before use to avoid contamination and must be cleaned out before changing mixes, and at the end of every working period.

All materials must be measured accurately by volume or weight, and not shovels. Powdered plasticizer must be dissolved in part of the mixing water before use.

Mortar should be used within 2 hours of the mixing of the cement and water, and any mortar not then used must be discarded and not re-tempered. This period of time may require reducing due to temperature and weather conditions.

3.05 Stability During Construction

During construction all walls shall be adequately restrained and laterally supported by Temporary supports able to resist forces as may be imposed by the wind and other loadings, until such time that the wall has been completed, achieved its full strength and is permanently restrained.

3.06 Bricklaying & Blocklaying

Unless otherwise specified by the Architect, the bonding of the brickwork shall be as follows:

- Walls of one brick thickness and over - English Bond
- Walls of half brick thickness - Stretcher Bond

Brickwork is to be constructed so that four courses equal a vertical dimension of 300mm and the bond is to be carried up regularly. No half bricks or bats are to be used except where required for the proper closures.

The rate of laying bricks must be such that it will prevent the squeezing of mortar joints. Blockwork is to be constructed such that the coursing coincides with the brickwork coursing where applicable.

Units should be laid in true and regular courses with adequate bond. All perpendents are to be truly kept and all joints properly flushed up or pointed as shown on the drawings.

Pointing should be carried out from the top of the wall downwards, unless specified, as work proceeds. The work is to be carried up to even heights all round so far as is practicable and no part is to rise more than scaffold height (i.e. maximum 2m) above any adjoining brickwork. One skin of a cavity wall should never be more than 450mm higher than the other. The construction of any portion of the works shall not rise by more than 1.5 metres in any one day.

All brickwork and blockwork shall be laid on a full bed of mortar, and vertical joints shall be filled up. The cavity faces of blockwork and brickwork are to be 'flushed up' as work proceeds. The average thickness of the vertical and horizontal joints shall be 10mm, exclusive of any key in the jointing surfaces of the units.

Where bricks have 'frogs' they are to be laid with the 'frogs' facing upwards. Clay bricks having a suction rate greater than 1.5 kg/m²/minute shall be wetted so as not to exceed this figure at the time they are laid.

Before orders for the clay bricks are placed, the Contractor shall satisfy himself that either that the suction rate of the brick does not exceed 1.5 kg/m²/minute or that he is able to adjust it consistently so as not to exceed this value. The method of testing will be as outlined in "The British Ceramic Research Association's Special Publication No. 56".

Blockwork shall be laid strictly in accordance with the manufacturer's recommendations, which may vary with weather conditions, temperature, exposure, etc. Movement joints shall be formed where shown on the drawings in accordance with the details given and care is to be taken to ensure that the gap is free from debris. Brickwork and blockwork joints to be provided at not greater than 12.0m and 6.0m respectively – joint location to be specified by Architect to suit elevation treatments

All internal walls to be fully bonded/ toothed-in to external walls u.n.o. All internal and external masonry to be restrained at the head at not less than 600mm centres to the underside of the roof and/or floor construction, steelwork or suitably designed masonry restraints

No finishes or fixings shall be tied across movement joints. In addition, particular attention shall be paid to the manufacturer's recommendations for spacing and formation of contraction and expansion joints and in the reinforcement to prevent cracking around openings, joints in return walls and movement joints. Where the manufacturer's recommendations are not in accordance with the details, such variations shall be drawn to the Architect's attention.

All vertical loadbearing walls are to be built prior to the construction of the floor over. Non loadbearing walls shall not be completed until at least two weeks after any structural propping to the floor over is removed. Load bearing walls shall not be block bonded to non loadbearing walls. Internal non loadbearing walls shall not be block bonded to external cavity walls, but must be tied to provide the necessary restraint as specified. This also applies to any walls on separate foundations.

Where insitu finishes are to be applied to work other than faced work, the faces of all brick walls are to be prepared with an adequate key to receive plastering, rendering, etc.

3.07 Faced Brickwork and Blockwork

In addition to the requirements for bricklaying and block laying, the following apply to Faced brickwork and blockwork. Facing bricks, bricks for fair faced brickwork and fair faced blocks are to be handled carefully on site to preserve the arises and to avoid damage. Units are to be carefully laid and faces kept free of mortar splashes and smears. The responsibility for protection of completed work is with the Contractor and polythene sheeting or similar covering must be arranged and the walls clearly labelled as finished work.

The Contractor is to provide a "Clipper" saw or similar machine for cutting all blocks for face work. Cut ends must be built in. In the construction of faced work:-

- All bed joints are to be true and level.
- All perpendents to be kept true.
- Units are to be laid to the bond as required by the Architect.
- Gauge rods must be used for both horizontal and vertical coursing from datum.

Water content of mortar must be adjusted to avoid smearing on the face of any faced work and excess mortar is to be lifted away with the edge of the trowel.

"Making good" of faced work is impossible; therefore, the greatest accuracy must be exercised in cutting and boring holes for services. Intersections in fair faced work are to be butt jointed and tied together. Heads of walls shall be finished true and level. Faced work in course of erection must be adequately protected against rain and weather, and adjacent scaffold boards turned back at night.

3.08 Pointing

Fair faced brickwork internally is to be pointed with a neat flush joint as the work proceeds. The joints of all external facings are to be pointed with a bucket handle joint as the work proceeds. Fair faced blockwork internally is to be pointed with a bucket handle joint as the work proceeds.

3.09 Sample Panels

Sample panels for all faced work shall be built on site in a protected position before commencement of the works, to provide an agreed standard for the work and treatment of joints. Such panels shall be maintained throughout the contract and removed on completion.

3.10 Work in Cold Weather

Continuing Work

The Contractor shall make every endeavour to continue working in cold weather which may be permitted by the Architect, providing the Contractor adopts the measures below to safeguard the work at all stages. The cost of these precautions shall be deemed to be included in the Contractor's tender.

Before the Contractor carries out any brickwork or blockwork at an air temperature of 4°C or below, he shall consider the recommendations in BS 5628: Part 1, The Structural Use of Masonry; the DOE Advisory Leaflet 8, "Bricklaying in Cold Weather" and BDA Special Publication "Bricklaying under Winter Conditions".

Brick and block laying shall not be carried out when units are frozen nor shall mortar be mixed when sand is frozen.

When there is a risk of frost occurring, stacked bricks must not be wetted and in addition finished work shall be protected by sacking, tarpaulins, insulating quilts, windbreaks,

braziers or otherwise. Any brickwork or blockwork damaged by frost shall be taken down and replaced by new work at the Contractor's own expense.

Suspending Work

Should the Contractor not wish to adopt adequate measures to allow bricklaying and blocklaying to continue as outlined above, then no work shall be done if the air temperature falls below 4oC and continues to fall nor be commenced until the temperature has risen to 2oC and continues to rise.

3.11 Services Holes and Chases

The position of chases and holes shall be agreed between the Contractor and Architect/Engineer before work commences. Unless otherwise agreed with the Architect, the following conditions shall apply.

1. Depth of horizontal chases shall not exceed one-sixth of the thickness of the single leaf at any point in non loadbearing walls.
2. Horizontal chases will not be allowed in loadbearing walls.
3. Depth of vertical and diagonal chases (up to 30o from vertical) should not exceed one quarter of the thickness of the single leaf at any one point.
4. Where chases are necessary back to back, the total depths of the two chases must not exceed the depths shown above.
5. All chases shall be cut with a saw, and cut out cleanly without damage to the wall, and without over cutting. Reciprocating hammers of any type shall not be used.
6. Cutting of isolated holes may be permitted up to a maximum of 300mm square to the Architect's/Engineers approval.
7. No holes or chases shall be cut through walls within a line spreading at 45o from the bearing of a beam or other concentrated load, for a depth of 1.0m below the load.

In the event that the rules are not complied with, the remedial works shall be at the Contractor's expense.

3.12 Bearing of Lintels

Details of bearings for lintels and beams will be shown on the drawings. In the absence of specific information, the following rules shall be adopted:-

1. The minimum bearing for lintels onto brickwork shall be 150mm.
2. The minimum bearing for lintels onto blockwork shall be 300mm.
3. Lintels shall bear on whole blocks not cut blocks.
4. Lintels are to be bedded in mortar similar to that used for laying the units.

3.13 Fixing of Brick Support Angles

After slabs and edge beams have been cast and formwork props removed, the Contractor is to accurately survey the positions of the cast in sockets. He is then to make templates from the results of his survey to enable holes to be accurately drilled in the stainless steel angles. The enlargement of holes in the angles will not be permitted.

The Contractor is to allow in his tender for providing stainless steel shims to fill gaps between the angles and edge beam caused by tolerances in the position of the edge beam or the cast in sockets protruding from face of the beams. The depth of the shim is to be the full depth of the angle.

3.14 Damp Proof Course

The damp proof course shall be laid in accordance with the requirements of SP56 – Model Specification for Clay and Calcium Silicate Structural Brickwork (BCRA).

3.15 Fixing Cavity Wall Insulation

Cavity wall insulation shall be fixed in accordance with the manufacturer's instructions. Damaged boards shall not be used and the cavity shall not be bridged by the insulation.

The Contractor shall provide facilities free of charge for the Architect or Clerk of Works periodically to satisfy themselves that all precautions are being taken to ensure that the cavity is not bridged. Notwithstanding the foregoing item no claim by the Contractor will be admitted by the Architect should it be necessary to carry out remedial works as a result of bridging the cavity.

TABLE 1 - SPACING OF WALL TIES

Cavity Width	Horizontally	Vertically
50 - 75 mm	900 mm	450 mm
75 - 100 mm	750 mm	450 mm
100 - 150 mm	450 mm	450 mm
Openings	Maximum 150 mm from reveal	225 mm

Note : Wall ties are to be evenly spaced and staggered.

TABLE 2A - MORTAR MIXES (LOCATION)

MORTAR GROUP				
Type of Construction	Weather Exposure	Type of Bricks or Blocks	No risk of frost during construction	Frost may occur during construction
Loadbearing, engineering	Any	Clay (DPC class A or B)	1	
Retaining walls	Any	Clay (Class A or B)	1 or 2	
Sills & Copings	Any	Clay (generally class A or B)	1 or 2	
Parapet walls (rendered)	Any	Clay (with low sulphate content)	3	5
Parapets (not rendered) external freestanding walls, work below dpc	Any	Clay (with low sulphate content)	1, 2 or 3	
External walls between eaves and DPC	Severe exposure	Clay	3	
External walls between eaves and DPC	Sheltered or moderate exposure	Clay	3 4	5
Backing to external solid walls	-----	Clay	3 4	5
Inner leaf of cavity walls	-----	Clay or concrete block	3	3
Inner walls	-----	Clay or concrete block	4 or 6	3

TABLE 2B - MORTAR MIXES (COMPOSITION OF INGREDIENTS)

Mortar Group	Hydraulic Lime:Sand	Cement Lime:Sand	Cement Sand with Plasticiser
1	----	1:0 - 3 : 3	----
2	----	1:2:4-42	----
3	----	1:1:5-6	1:5-6
4	1:2-3	1:2:8-9	1:7-8
5	----	1:2:8-9 with plasticiser to entrain 8 to 12% air	1:7-8
6	1:3	1:3:10-12	1:8