Asbestos removal shall only be carried out by a Licensed Contractor. Asbestos cement boarding shall be removed from the building in complete sheets by loosening or cutting the fixing screws. They shall then be removed from site in complete sheets by careful handling, storing and loading.

MATERIALS FOR RE-USE

All materials that are identified on the drawings as being set aside for re-use shall be removed carefully, in one complete length between connections, and shall be stored on site in a safe position and manner.

HOARDINGS

The Contractor shall obtain the necessary consent and pay all licence fees for the erection of hoardings where defined on the drawings.

The hoarding shall be sheet plywood faced and shall be 2.4m high minimum above the adjacent pavement level and shall be constructed with the posts tight against the site edge of the pavement.

All gates where defined on the drawings shall be similarly boarded and shall be fitted with substantial padlocks to provide a secure site free from trespass.

All hoardings and gates shall be primed, undercoated and gloss white painted and constructed for a maintenance free life expectancy of not less than 18 months and shall be non-returnable.

REMOVAL OF FOUNDATIONS

Immediately following the removal of foundations, deep manholes and drain runs, the excavations shall be filled as necessary with an imported hogging material to provide a flush, level and safe surface free from steps, holes and other safety hazards. The contractor is to provide samples to the engineer for his approval prior to any filling of excavations.

CODES OF PRACTICE

All demolition work shall be carried out in accordance with this specification and Code of Practice for Demolition BS 6187: 1982.

PLANT AND EQUIPMENT

The Contractor shall visit the site and examine the works involved and shall allow for all plant and equipment necessary for the safe and satisfactory execution of the works.

DUST AND NOISE

Dust shall be kept to an absolute minimum by watering as necessary and precautions shall be taken to minimise noise and nuisance.

PROTECTION

Adequate measures shall be taken to protect adjoining properties, services, drains, manholes and the public from damage or injury at all times during the execution of the works.

STRUCTURES TO REMAIN

Demolition techniques and plant utilised shall be such that all structures to remain shall not be damaged.

TEMPORARY PROPPING

All temporary propping, as defined on the drawings or provided in addition, shall be constructed to the entire satisfaction of the Engineer.

The construction and efficiency of the propping shall be the responsibility of the Contractor. In the event of subsidence or any other damage occurring due to the inefficiency of the shoring or any other support provided, the damage shall be appropriately repaired by the Contractor.

DISPOSAL OF RUBBISH

The Contractor shall remove all demolished materials, rubbish and debris from the site. The burning of materials on site shall not be permitted.

HAZARDOUS MATERIALS

Any hazardous materials or substances found on site shall be brought to the immediate attention of the Supervising Officer and shall be disposed of as instructed.

ASBESTOS CEMENT BOARDING

Cutting of bricks or blocks shall be kept to a minimum and special or standard-special bricks used to maintain bond. When cutting of bricks or blocks is necessary, a bolster shall be used in preference to a trowel.

PROTECTION AGAINST WEATHER ETC.

Masonry shall not be built in temperatures below 36°F (2°C). All freshly laid masonry shall be protected from rain and frost and, as the work proceeds, new masonry shall be protected from mortar droppings and concrete spillage.

The use of frost resisting additives based on calcium chloride will not be permitted.

DEFECTS

All defects shall be made good as instructed by the Architect, the Contract Administrator or the Engineer or Architect at the Contractor's own expense.

STORAGE OF MATERIALS

Bricks and blocks are to be carefully unloaded from the lorries and placed on the site in different stacks, according to strength, and marked accordingly.

The stacks are to be protected from rain whilst allowing free circulation of air.

No masonry units shall be built into the work until 3 days have elapsed from the time of drawing form the kiln.

MOVEMENT JOINTS

Movement joints are to be provided within the masonry in accordance with manufacturers' recommendations i.e. approximately 6m centres, and 3m from the bonded corner, in blockwork and 12m in brickwork. Care is to be taken to ensure that the gap is free from debris by building-in the specified materials.

ADDITIVES

Additives can only be used where written approval has been obtained from the Engineer. Details are to be supplied by the Contractor for approval by the Contract Administrator or the 0Engineer two weeks prior to the work being carried out on site.

MAXIMUM LIFTS

No single lift shall be raised more than 3.0m or a storey height (whichever is less) in one day.

ERECTION OF WALLS

No wall is to be built, at any time, higher than one storey height above any other brick or block wall.

FLOORS CAST INTO WALLS

All load bearing walls shall be built prior to the floor being cast, unless otherwise detailed or agreed with the Contract Administrator or the Engineer.

Where a slab is to continue over a cavity, the cavity shall be sealed with one course of slates, which are to have a maximum of 25mm bearing on each leaf.

INSERTS FOR FIXINGS

No inserts for fixings shall be allowed. All fixings for skirtings, door frames, architraves, etc., shall be drilled, plugged and screwed.

FORMING OF CHASES AND HOLES

No horizontal or diagonal chases will be permitted.

Sleeves, chases and holes shall, as far as possible, be provided during the erection of the masonry. Chasing of completed holes or the formation of holes shall only be carried out with the written approval of the Contract Administrator or the Engineer and then only with a tool designed to clearly cut the masonry.

BONDING OF CROSS - WALLS

All block cross-walls will be correctly bonded with the external walls. Straight joints with ties will not be permitted, Structural cross-walls are to be racked back from the external walls. The external walls are not to be toothed or indented to receive the structural cross-walls. Block bonding of load bearing walls with other walls and partitions shall not be permitted.

NON - LOADBEARING WALLS

Non load bearing walls of bricks or blocks shall not be constructed at the same time as the load bearing walls, but shall be built at least 2 weeks after the floor shuttering is struck.

CUTTING OF BRICKS OR BLOCKS

Care must be taken to ensure that all joints will be filled with mortar. All cross joints shall be filled by well buttering the ends of the unit and then sliding it into position. Collar joints (those parallel to the outside face) shall be filled by buttering the stretcher side. All joints must be solidly filled and the thickness of the joint shall not exceed 12mm. All bricks shall be laid with the frog side up and the frog shall be filled. Raking out of joints for plaster or render will not be permitted.

COURSING

Brickwork shall be gauged four course including joints to 300mm in height except where matching or bonding to existing walls.

The blockwork shall rise at the rate of two courses in 450mm. Horizontal joints between brickwork and blockwork shall be coincident every 450mm in height, these being positions for wall ties.

LINE AND LEVEL

All load bearing walls shall be built plumb and true to line and level to a tolerance of +/- 6mm in any storey height or six metre length.

BOND

100mm thick leaves to be built in stretcher bond. All perpends are to be regularly kept and all faces to be plumb and true. All 225mm brickwork to be in Flemish Bond.

CAVITIES AND TIES

The two leaves of all load bearing cavity walls shall be held together with stainless steel wall ties (see Clause 6.2.6 in "materials"), at the maximum spacing of 900mm horizontally and 450mm vertically, staggered or as specified otherwise on the drawings. The ties shall be embedded into each leaf by not less than 50mm.

FORMING OF CAVITY WALLS

Cavity walls shall be of the overall thickness specified and shall be formed of either one leaf of brickwork and one leaf of blockwork or two leaves of blockwork, separated by a cavity not less than 50mm, nor greater than 75mm, according to the thickness of the leaves, and united by staggered wall ties at the rate specified above. Additional ties shall be provided within 150mm of the edge of the opening at 450mm from the edge of the opening at 450mm centre to centre vertically.

Ties shall be placed as the work proceeds and set dead level or with a slight slope towards the outside leaf. As the wall is built one leaf shall not, in general, rise higher than 900mm above the other. Where strip ties are used this difference shall be lifted to 450mm. Where it is essential to increase this difference, the wall ties must be built into the first leaf in appropriate positions and not pushed in afterwards. The cavity shall be kept clear of mortar as the work proceeds by the use of laths or hay bands. Mortar dropping reaching the base of the cavity shall be removed daily through temporary openings. On completion, the loose bricks or blocks shall be properly bedded and jointed after finally cleaning the cavity.

Sand shall comply with requirements of BS1200.

WATER

Unless the water is taken from a public water supply and complies with BS3148, the source shall be approved by the Contract Administrator or the Engineer. Samples shall be tested by an approved laboratory before the commencement of the Contract and the costs incurred shall be borne by the Contractor.

LIME

Lime shall be hydrated and shall comply with BS890.

WALL TIES

Wall ties shall be stainless steel and shall comply with the requirements of Type ©, Vertical-twist (BS1243), unless specified otherwise on the drawings.

Wall plate holding down straps shall be as specified on the Engineer's drawing.

ABSORPTION AND WETTING OF BLOCKS

The Contractor shall, before placing orders for blocks, satisfy the Contract Administrator or the Engineer that either the suction rate of the various blocks will not exceed 2 kg/m^2 per minute or that the rate will be adjusted by wetting on site so as not to exceed this figure.

MORTAR

The mortar mix by volume shall be as noted on the drawings but shall not be less than 1:1:6, cement: lime: sand.

Mortar plasticisers may be used as an alternative to lime in cement: lime: sand mortars and they shall be of an approved type and manufacture. They shall be used strictly in accordance with the manufacturer's instructions.

PROPORTIONS

The required proportions of the component materials shall be accurately gauged in either buckets or gauge boxes. The mixing of materials shall be thorough and the mortars are to be made in sufficient quantities to meet the demand, and shall be used fresh.
Shovel gauging or half bagging shall not be adopted.
All mortars shall be used before the initial set has taken place. Normally, this is within two hours of the cement being added. Any mortar left after this time is to be discarded. On no account may mortars be reconstituted or "knocked up".

JOINTS

BRITISH STANDARDS

All structural work shall be carried out in accordance with this specification, British Standard BS5628: 1992, "Code of Practice for use of Masonry" and other British Standards, as appropriate, and all relevant Engineer's and Architect's details. Where this specification is in conflict with Codes of Practice or British Standards this specification shall take precedence, and the Contract Administrator or the Engineer should be notified.

TEST CERTIFICATES

The Contractor shall supply the Contract Administrator or the Engineer with a copy of the block and brick Manufacturer's test certificate for each of the brick or block strengths shown on the Engineer's Drawings, two weeks prior to commencement of any work.

TEST ON MATERIALS

The Contract Administrator or the Engineer may call for tests on any of the materials to be carried out on the independent testing house.

The Contract Administrator or the Engineer shall be empowered to reject any material that in his opinion, is sub-standard.

The Contractor shall be reimbursed for all successful tests called for by the Contract Administrator or the Engineer.

APPROVALS

Any approval given by the Contract Administrator or the Engineer does not remove or diminish responsibility from the contractor.

BRICKS AND BLOCKS

All bricks and blocks shall have compressive strengths at least equal to the minimum noted on the drawings.

Manufacturer's test certificates shall be provided for examination by the Contract Administrator or the Engineer. If required by the Contract Administrator or the Engineer, the crushing strength of the bricks or blocks shall be determined by an independent testing laboratory on a group of 10 bricks or blocks selected at random. The sampling and testing procedure shall be as recommended in BS3921, "Bricks and Blocks of Fired Brickearth, Clay or Shale", or BS6073 "Pre-cast Concrete Masonry Units", Part 1, as appropriate.

CEMENT

Ordinary Portland cement shall be used unless otherwise specified and shall comply with BS12. Sulphate cement (complying with the relevant British Standards) shall not be used without the Contract Administrator or the Engineer's consent or unless specified.

SAND

QUALITY

The workmanship shall be of the quality specified herein or as described on the drawings. All personnel employed on the works or elsewhere in connection with the works shall be competent and skilled in their respective operations.

READY MIXED CONCRETE

General: Ready mixed concrete may be used in the works provided the approval of the Contract Administrator or the Engineer is obtained at least two weeks before any concrete is placed in the works.

The name and address of the supplier shall be submitted with the mix design information for approval by the Contract Administrator or the Engineer.

Concrete: Not withstanding any inspection and/or approval by the Contract Administrator or the Engineer, the Contractor shall take full responsibility that the ready mixed concrete complies in every respect to the requirements of all other parts of this specification.

Works test cubes must be taken on site as required by this specification, irrespective of any cubes that may be prepared by the supplier.

The supplier shall carry out regular routine tests at frequent intervals and shall record the results. These shall consist of tests of aggregates, cement and concrete in accordance with other parts of this specification, and if required by the Contract Administrator or the Engineer, shall furnish certificates at agreed intervals giving this information.

Transport of Concrete: Concrete shall be transported in a truck-type mixer complying with requirements of BS4251.

Placing of Concrete: The concrete shall be placed in its final position and left undisturbed within 2 hours maximum after either the introduction of mixing water to the cement and aggregate, or the introduction of cement to the aggregate, whichever is the longer.

If the temperature is less than 4°C or if the temperature is above 18°C this period shall be reduced to 1 hour.

No further water shall be added to the mix after the introduction of the design quantity.

Delivery: The Main Contractor shall ensure that a record is kept at the Supplier's works of the exact time when concreting materials are mixed. This time shall be inserted on the Delivery Note sent with the lorry driver, and shall be initialled by the responsible timekeeper at the mixing plant.

Truck Mixed Concrete: In case of truck mixed concrete mixed in which the mixing is carried out entirely in the truck mixer, the water shall not be added until the arrival of the truck mixer on site, and the Main Contractor shall keep a record of the exact time when the water is to be added.

all with g.g.b.f.s or p.f.a	*Poor*	*10 Days*	*7 Days*
All	*Good*	*Minimum 1 Day*	

Notes:
OPC: Ordinary Portland Cement (See BS 12)
RHPC: Rapid Hardening Portland Cement (See BS 12)
SRPC: Sulphate Resisting Portland Cement (See BS 4027)
Good: Damp and protected (Relative Humidity greater than 80%; Protected from sun and wind)
Average: Intermediate between good and poor
Poor: Dry or Unprotected (Relative Humidity less than 50%; Protected from sun and wind)

Table 2: Minimum Periods of Curing and Protection

CONCRETE MIX

Unless noted otherwise, all structural concrete shall be to the following design mixes, as specified on the drawings.

Mix Designation and minimum Compressive Strength at 28 days	*Maximum Aggregates*	*Limitation of OPC per cubic metre of finished concrete*		*Maximum free water/ Cement ratio*
N/mm²	*mm*	*Min Kg*	*Max Kg*	
C40 (Reinf. Conc.)	*20*	*325*	*500*	*0.55*
C35 (Reinf. Conc.)	*20*	*300*	*500*	*0.60*
C30 (Reinf. Conc.)	*20*	*275*	*450*	*0.65*
C25 (Plain Conc.)	*20*	*250*	*400*	*0.70*
C25 (Plain Conc.)	*40*	*220*	*400*	*0.70*
C20 (Plain Conc.)	*20*	*220*	*350*	*0.80*
C20 (Plain Conc.)	*40*	*200*	*350*	*0.80*

Table 3: Concrete Mixes

WINTER CONCRETING

During winter, concreting operations shall be suspended when the air temperature is below 1°C (34°F) on a rising thermometer or below 2°C (36°F) on a falling thermometer.

If the air temperature is below 2°C (36°F) and below 4°C (40°F) work may proceed provided that the formwork is kept clear of ice and that the temperature of the mixed and cast concrete is maintained above 4°C (40°F) until the concrete has attained a strength of 7N/mm².

All concrete placed during cold weather should be protected from freezing be approved means, and the method should be notified to the Contract Administrator or the Engineer.

No frozen concrete shall be used or re-mixed for use in the work.

All structural concrete shall be vibrated using the maximum size internal poker suitable for the location of the concrete.

Internal vibrators shall penetrate the full depth of the layer and where the underlying is of fresh concrete, shall enter and re-vibrate that layer to ensure that successive layers are well knitted together.

Over vibration, causing segregation, surface laitance or leakage through formwork shall be avoided.

Internal vibrators shall be withdrawn slowly to prevent the formation of voids.

CURING OF CONCRETE

All surfaces of structural concrete members shall be cured for the minimum times specified in table 2 (Extract BS 8110: Pt 1: Table 6.5). Each day is 24 hours.

For each surface any of the following methods of curing may be adopted:

a) maintaining formwork in contact with concrete surface.
b) Covering the surface with an impermeable material such as polythene. This is to be well sealed and fastened.
c) Spraying the surface of the concrete with an approved curing membrane.
d) Covering the surface with an absorbent damp material that is not allowed to dry out during the required curing period.

The Contractor will be required to submit his proposals for curing the concrete before concrete work begins on site.

Type of Cement	*Ambient conditions after casting*	*Average Surface Temperature of Concrete*	
		5°C to 10°C	*Above 10°C*
OPC, RHPC, SRPC	*Average*	*4 Days*	*3 Days*
	Poor	*6 Days*	*4 Days*
All Except RHPC, OPC and SRPC and	*Average*		

The Contractor shall check the bending schedule against the drawings before ordering any reinforcement and shall bring any inaccuracies or omissions to the attention of the Contract Administrator or the Engineer.

All reinforcement when placed in the works shall be clean and free from loose rust and shale and free from mud, dirt, mould oil and any other detrimental material.

Reinforcement shall be fixed in a good workmanlike manner in the position indicated on the reinforcement drawings and shall have sufficient chairs and spacers to maintain the reinforcement in its correct position at all times during concreting operation. Reinforcement should be stored on racks clear of the ground.

All ends of blinding wire be bent back well clear of the formwork to maintain the required cover.

CONCRETE

Concrete shall be made from Ordinary Portland Cement to BS12, fine aggregate, coarse aggregate and water mixed together thoroughly in a mechanical mixer to the proportion as approved.

No admixtures will be permitted to use in the concrete, unless specified on the drawings, or permission has been received from the Contract Administrator or the Engineer. All materials shall be stored in such a way as to prevent contamination.

Water used in mixing concrete shall be free from lime, sulphate or other deleterious material.

No concrete shall be placed until the Contract Administrator or the Engineer or his representative has examined and approved the positioning, fixing and condition of the reinforcement and of any other items to be embedded and the cleanliness, alignment and suitability of the containing surfaces.

Once mixed, the concrete shall be transported to its position in the works quickly, ensuring that segregation does not take place. It shall be placed in the works carefully to prevent contamination and/or distortion of the formwork.

Partly set concrete is not to be used or remixed for use in the work.

PLACING OF CONCRETE

All placing and compacting should be carried out under suitable supervision and as soon after mixing as practicable. Delays in placing may be permitted providing that the concrete may still be placed without the addition of further water.

Construction joints shall be so positioned as to minimise the effects of shrinkage of the concrete.

In general the distance between construction joints in walls shall not exceed 7.5m and in slabs and beams shall not exceed 10m. The Contractor shall agree the position of all construction joints with the Contract Administrator r the Engineer prior to work commencing.

Joints in floor system shall be located within the middle third of the span of beams and slabs.

Construction joints in slabs shall be formed vertically against stop boards.

Construction joints in beams shall be formed by stop boards sloping backwards 75mm in 600 depth.

As soon as possible after formation of a construction joint and at a maximum one day from casting, the formwork shall be struck from the cast face and the laitence removed at that time, exposing the course aggregate but leaving no loose particles or damaged concrete. The joint face shall be treated with clean water prior to fresh concrete being deposited upon it.

SURFACE FINISH (UNLESS SPECIFIED OTHERWISE)

The surface of non-shuttered faces of concrete work shall be smoothed with a wooden float (or, if approved, with a steel trowel); however, the floating shall not be executed to the extent of bringing excess fine material to the surface.

The top faces of slabs intended to be recovered with screed shall be left with wood-rule tamped finish. The surface shall be completely level with special attention paid to the top surface at construction joints to ensure that it is free from honeycombed concrete and excess mortar.

STRIKING FAULTS AND FINISHING

After curing for the times previously specified formwork shall be removed taking care that no damage is done to the concrete faces arises.

No touching up or making good will be allowed until the as struck surfaces have been inspected.

After inspection and approval, honeycombed surfaces shall be cut back to dense concrete and made good straight away. Superficial water and air holes shall be filled. Fins, runs or other irregularities shall be removed with a carborundum stone with cement grout lubricant or similar.

REINFORCEMENT

Reinforcement shall be to the relevant British Standards and Codes of Practice, R being used on the drawings to denote mild steel bar and T being used on the drawings to denote high yield steel bar.

DIMENSIONS AND TOLERANCES OF FORMWORK

The dimensions, levels, sizes and dispositions specified as shown on the drawings are to be adhered to with the following tolerances in the absences of any other instructions:

(a) For sizes of beams or columns and slab thickness - plus or minus 10mm.
(b) For layout positions or dimensions, horizontal or vertical – plus or minus 20mm.
(c) Levels of floors, beams, lintels, etc - plus or minus 10mm, and no surface intended to be level shall slope more than 3mm in 3m, nor shall there be any abrupt changes in level.
(d) No line or surface intended to be vertical shall be more than 10mm in 3m out of plumb.

STRIKING TIMES

Formwork shall not be remove from the cast works until the following times have been exceeded. (Each day to be 24 hours).

MINIMUM PERIOD BEFORE STRIKING
SURFACE TEMPERATURE OF CONCRETE

Type of Formwork	*Surface Temperature of Concrete*		
	>16˚C	*7˚C*	*4˚C*
Vertical formwork to columns, wall and beams	*12 hours*	*1 day*	*1 day*
Soffit formwork to slabs	*4 days*	*6 days*	*7 days*
Props to slabs	*10 days*	*15 days*	*18 days*
Soffit formwork to beams	*10 days*	*15 days*	*18 days*
Props to beams	*14 days*	*21 days*	*26 days*

Table 1: Minimum Period before Striking

Any period during which the temperature is below 2˚C is to be added to the period given in table1.

This table is only given as a guide and in no way relieves the Contractor of the responsibility of properly supporting the various members until the concrete is sufficiently set and hardened.

CONSTRUCTION JOINTS

If so directed the Contractor will carry out any other special tests called for by the Contract Administrator or the Engineer and these will be paid for at rates to be agreed. This will exclude the tests related to defective work.

WORKS OFF SITE

All work off site shall be carried out in accordance with BS8110 and other relevant British Standards and Codes of Practice referred to therein.

WORK ON SITE

All work on site shall be carried out in accordance with BS8110 and all other relevant British Standards and Codes of Practice referred to therein unless specifically modified hereafter.

PREPARATION OF GROUND BELOW PERMANENT CONSTRUCTION

The bottom of excavation for all concrete foundation work shall be blinded with a minimum of 50mm thick layer of blinding concrete (C20 mix designation) unless described otherwise on the drawings. In the case of reinforced foundations, the concrete cover to reinforcement being entirely above this blinding layer. The bottom 75mm of soil in any such excavation shall not be removed until the blinding is about to be placed.

In the particular case of plain concrete foundations this blinding layer may be left out subject to the Contract Administrator or the Engineer's approval.

FORMWORK

All formwork shall be constructed to resist the forces imparted on them during construction.

All joints in the formwork and joists between formwork and previous work shall be grout tight.

Methods of fixing and locating formwork which results in holes through the concrete section when the formwork is removed shall not be used. No metal part of any device shall be cast in the concrete within the cover to the reinforcement.

All fixing, blocks, ends of brackets, bars, bolts, mortises, holes, chases, grooves, etc, shall be accurately set out in the formwork so they are formed in the concrete at the time of casting. In this respect the Contractor is expected to liaise closely with all his sub-contractors.

Formwork shall be coated with an approved mould oil to prevent the wet concrete adhering to it.

Temporary openings shall be provided if necessary to enable sawdust, shavings or any foreign matter to be washed or blown out and then conveniently closed before commencing to place the concrete.

The Contractor shall ensure that those parts of the structure supporting formwork for other parts have attained sufficient strength to carry the loads thus imposed without causing any deflections greater than 1/300th of the minimum span of such a part.

The Contractor is responsible for verifying all site dimensions shown on the Engineer's and Architect's drawings and reporting any discrepancies to the Contract Administrator or the Engineer before setting out the works or putting any work in hand.

CUBE TESTS

All cube tests called for by this Specification will be paid for unless they are required because of the Contractor's non-compliance with this Specification. Transport of the cubes to and from the laboratory will be at the Contractor's expense.

The results of all the tests shall be communicated to the Contract Administration or the Engineer as soon as they are available.

All tests shall be carried out in accordance with BS 812 and BS 1881.

WORKS CUBES

On every day of use of each grade of concrete, three concrete cubes shall be made from each $20m^3$ maximum batch. One cube shall be tested at seven days, one shall be tested at twenty-eight days and one left as a spare.

None of the twenty-eight day results shall have strength less than 3 N/mm^2 lower than the specified strength and the average strength determined from any group of four consecutive tests shall exceed the specified strength by 3 N/mm^2.

A record of the concrete on site, from which the concrete for the cubes was taken, shall be kept.

CEMENT

The manufacturers test certificate for cement used in the works shall be copied and sent to the Contract Administrator or the Engineer, at least two weeks prior to concreting on site.

MIXING PLANT

Weigh batching plant shall be checked with approved weights once a week. Any fault shall be rectified immediately.

WORKABILITY

Whenever works cubes are made a slump test must be carried out by the contractor who shall keep a record on site and shall at the end of concrete operations submit a report to the Contract Administrator or the Engineer.

OTHER TESTS

CODES OF PRACTICE

All concrete work shall be carried out in accordance with this Specification and British Standard BS 8110 as appropriate.

DEFECTIVE WORK

Where in the opinion of the Contract Administrator or the Engineer, the materials, standard of workmanship or standard of finish is less than that required by this Specification such material, workmanship or work shall be classed as defective. Defective work shall either be cut out and removed from the works or, alternatively, shall be tested, whichever method the Contract Administrator or the Engineer deems necessary. The extent of the work and the method of execution are subject to the Contract Administrator or the Engineer's approval. Any testing or cutting out and making good on defective work is to be paid for by the Contractor.

MIX DESIGN

At least two weeks prior to commencement of concreting the mix design for each of the concrete grades specified shall be submitted to the Contract Administrator or the Engineer for approval. The mix shall be designed in accordance with the requirements of BS5328, for the specified grade twice the standard deviation. The standard deviation shall be $3N/mm^2$.

TESTING AUTHORITY

An independent Testing Authority nominated by the Contractor and approved by the Contract Administrator or the Engineer shall carry out all tests required by this specification.

REINFORCEMENT

The name of the reinforcement supplier shall be submitted to the Contract Administrator or the Engineer for approval: at least two weeks prior to commencement of fixing.

CONCRETE

The source of supply and type of fine and coarse aggregates, shall be submitted to the Engineer for approval. The method of vibrating and curing wet concrete shall be submitted to the Contract Administrator or the Engineer for approval. Both at least two weeks prior to commencement of concreting.

SUB - CONTRACTOR

If any of the in-situ concrete works are to be sub-contracted, the Contractor is to submit a list to the Contract Administrator or the Engineer for approval at least two weeks prior to the commencement of the work.

SETTING OUT

Structural Specification For The New Boat House At 38 Third Avenue Worthing West Sussex

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Prepared by George Mah Consulting
8.08.2008

SURFACE STRIP

All turf, vegetation and topsoil shall be removed from the areas to be levelled or excavated.

TEMPORARY SHORING AND SUPPORT

The contractor shall be responsible for providing, maintaining and the subsequent removal of all necessary sheeting, timbering, strutting and shoring to excavations to ensure the safety of the work force and freedom from damage to any structures, buildings, streets, services etc.

EXCAVATIONS

All excavations shall be carried out to the required lines and levels, widths and depths, so that the dimensions of the permanent work shall not be less than shown on the working drawings or as otherwise directed by Engineer.

If in the opinion of the Engineer or the Building Control Officer, the ground at the required depth is not suitable for the designed foundation pressure, further excavation or widening will be required.

Excavations shall be left open for as short a period as possible.

BOTTOM OF EXCAVATIONS

The bottoms of all excavations shall be trimmed, levelled and rammed prior to the placing of concrete.

The last 150mm of excavation shall not be carried out until all preparations for obtaining for obtaining approval have been made.

If, through the operations of the Contractor, any excavated surface is cut up by traffic, softened or otherwise made unsuitable, the Contractor shall at his own expense re-excavate to an approved formation and back-fill with concrete as required by the Engineer.

WATER IN EXCAVATIONS

Where water is encountered in an excavation a sump shall be formed outside the limits of the excavations and the water pumped out.

The Engineer shall be notified whenever water is encountered.

CONSTRUCTION OF SUB-BASE UNDER SLABS

The sub-base material shall be a granular material consisting of broken bricks, concrete blocks, concrete or stones, hogging, or other granular material approved by the Engineer without excessive fines.

All sub-base material shall be free of deleterious material such as lime, mortar, plaster or any source of sulphate contamination and shall pass a 150mm diameter ring.

The material shall be deposited and consolidated in layers not exceeding 150mm thick.

Consolidation of the sub-base shall be achieved by using an eight tonnes roller or equivalent mechanical vibrating roller. Consolidation process shall continue until there is no creep of the sub-base material ahead of the roller, all voids are filled and the surface of the sub-base is smooth and even. Additional sub-base material shall be added where necessary to even out local imperfections of level and to fill voids.

ADDITIONAL EXCAVATIONS

Additional excavations shall be filled up to the formation level shown on the Engineer's drawings with Class C20/40mm aggregate concrete vibrated into place using a mechanical poker, unless otherwise directed by the Engineer.

CONCRETE AND FOUNDATIONS

All concrete for foundations shall be of the class specified on the drawings and shall be mixed, transported and placed in accordance with the Specification for Structural Works: Plain And Reinforced Concrete.

In sulphate bearing ground, concrete for blinding and backfill required under Clause "Additional Excavation" shall be of the same grade as that specified for the main foundation supported by the blinding or backfill.

BRITISH STANDARDS

All structural steelworks shall be carried out in accordance with this specification and British Standard 5950 and all documents referred to within.

GRADE

Unless stated otherwise on the working drawings the grade of steel for hot rolled sections shall be 43 in accordance with BS1449, Part 1 (280 N/mm^2 Yield Stress).

SECTIONS

Sections shall be rolled to comply with the following British Standards, as applicable:-

Plates	BS4360: 1990
Angles	BS4848: Part 4: 1972
Rolled Hollow Sections	BS4848: Part 2: 1991
UCs, UBs and RSCs	BS4: Part 1: 1993
Cold rolled sections	BS1449: Part 3A

BOLTS AND NUTS

All bolts and nuts shall comply with the following British Standards, as applicable:-

ISO metric black bolts	BS4190 or 4933
ISO metric precision bolts	BS3692
High strength friction grip bolts	BS4395: Parts 1 and 2

WASHERS

All washers shall comply with the following British Standards, as applicable:-

Washers for ISO metric bolts	BS4320
Washers for hsfg bolts	BS4395

WELDING ELECTRODES

Welding electrodes shall be in accordance with BS639 of the grade compatible with the characteristics of the parent metal.

BRITISH STANDARDS

The standard of preparation and painting shall comply with the following, as applicable:-
BS Code of Practice 5493, 1977 : Protective Coating of Iron and Steel Structures against Corrosion.

BS4232, 1967 : Surface Finish of Blast Cleaned Steel for painting.

SURFACE PREPARATION

The method of surface preparation shall be as defined on the Engineer's drawing and shall comply with the following specifications as appropriate:-

DEGREASING

All dirt, grease and oil shall be removed by emulsion cleaners followed by rinsing with water, or by steam-cleaning, or by high pressure water jets.

MANUAL CLEANING

The surfaces shall be thoroughly clean, free from all loose or semi-adherent mill-scale, and suitable for painting. Mechanical scrapers, chippers and wire brushes shall be used unless the steel has weathered such that hand tools will achieve the required surface preparation.

All surface defects, likely to be detrimental to the protective painting system, shall be removed. All fins at saw cuts, burrs and sharp edges shall be removed.

The Engineer shall be informed when the steelworks is to be cleaned so that an inspection of the method and standard of workmanship may be made.

BLAST CLEANING

The surface shall be blasted free from all mill-scale, rust and other contamination and shall be cleaned to the standard as defined in BS4232, 1967 :Second Quality or as defined in the Swedish standard SA 2.5.

The maximum variation in profile shall be 100 microns.

All surface defects likely to be detrimental to the protective painting system shall be removed. All fins at saw cuts, burrs and sharp edges shall be removed.

After blasting all spent shot or grit shall be removed by vacuum cleaning or by air line and brush.

The maximum time between the commencement of blast cleaning and the application of the first coat or primmer shall be 2 hours, provided that the work has been carried out under cover.

The Engineer shall be informed when the steelworks is to be blasted so that an inspection of the method and standard of workmanship may be made.

PAINTS AND PAINTING

The type, number of coats and coat thickness shall be as defined on the Engineer's drawings and/or the detailed accompanying paint specifications. All paints shall be prepared and applied in strict accordance with the manufacturer's instructions and no thinners or cleaners shall be used other than those recommended by the paint manufacturer. The paint for each coat shall be from the same manufacturer, compatible with the underlying coat and shall be a different colour for ease of identification.

Care shall be taken during the loading, unloading, stacking and erection of the painted steelworks to minimise damage to the protection system. All slings, ropes and chains used to handle the steelworks shall be protected with rubber sheaths, or similar.

No steelworks shall be stacked directly onto other steelworks: timber bearers shall be used. When steelworks is stored on site it shall be raised above the ground by timber baulks.

All areas of paint damaged during handling and erection shall be made good with the same number, colour and thickness of paint specified for the protection on the Engineer's drawings.

FABRICATION DETAILS

The steelwork fabricator shall prepare all necessary detail drawings for the fabrication of the steelwork as shown on the Engineer's drawings.

Duplicate copies of all detail drawings shall be submitted to the Engineer for general approval at least two weeks before fabrication commences.

The Engineer's approval shall not relieve the Contractor of responsibility for any error subsequently discovered.

WELDING

All welding shall be carried out in accordance with BS5134 using plant in accordance with BS638.

Surfaces to be welded shall be properly prepared and left clean and free from all extraneous matter during welding.

MACHINING

The faces of caps, bases, stanchions and all butt joints in compression members shall be squared and trued by machinery or other approved means unless the load is to be transferred by designed welds or bolts.

CONNECTIONS

All connections shall be designed and detailed to safely support the loads and moments shown on the Engineer's drawings. Two copies of calculations and details should be provided for comment by the Engineer two weeks before fabrication commences. Once comment has been given a further three copies amended as necessary are required. Where a connection is subject to impact, vibration or reversal of stress, unless such reversal is due solely to wind, or where for some other reason slipping of bolts is not permissible, then high strength friction grip bolts or welding shall be used.

BOLTING

Holes shall be drilled or punched to the required tolerances and clearances given in BS4286 and burrs removed.

Holes in separate piles of a joint shall be correctly aligned so that the bolts may be freely placed in position without being driven.

All bolts shall be fitted with washers of the correct taper and they shall be correctly aligned to afford a nut and bolt seating square to the bolt axis.

Only bolt thread shall cross a shear plane between connected members.

All bolts shall be of adequate length to provide a minimum of one clear thread past the nut.

FOUNDATION BOLTS

Foundation bolts and anchorages for the structure shall be supplied as required for building into the foundations as work proceeds.

Bolt boxes shall be maintained free of dirt or other obstructions until they are grouted.
The Steelwork Contractor shall check the setting out, projection and diameter of all foundation bolts prior to starting erection.

ERECTION MARKS

All steelwork members shall be clearly marked in accordance with the approved working drawings.

The centre line of all column bases and beam bearings shall be accurately scribed on the steel to assist in the correct alignment of the work.

ERECTION

The Steelwork Contractor shall supply all necessary cranes and lifting tackle of adequate proportions and capacity to lift all the members without stressing them beyond their working stress and without causing undue distortions.

The Steelwork Contractor shall supply all necessary temporary supports, guys, stays, etc to ensure the safety and stability of the structure during erection.

LINE AND LEVEL

The Contractor shall be responsible for the correct lining and levelling of all steelwork for the accurate plumbing of stanchions (See Genaral Conditions).

The Contractor shall afford to the Engineer all necessary assistance in checking the setting out of the works.

GROUTING AND DRY PACKING

The Contractor shall not grout bolt boxes, dry pack under stanchion bases, or grout under intermediate posts until the line and level of the steelwork has been checked and approved by the Engineer.

DESCRIPTION

The works to be carried out under the contract shall be in accordance with this specification, the latest edition of BS5268 Parts 2 and 3 and such relevant specification and codes referred to in BS5268. In addition, the works shall comply (for the trussed rafters) with the recommendations of the Truss Plate Association.

TRUSSED RAFTERS

Design: The Truss Supplier shall provide calculations and drawings in accordance with the above codes and recommendations for all the trussed rafters shown on drawings.

Details: All truss designs and details shall be submitted to the Contract Administrator or the Engineer for comment at least two weeks before fabrication commences. The whole of the work must be carried out to the satisfaction of the Local Authority and not with standing any omission of such requirements in this specification or on the plans.

Preservative: All timbers used in the construction of the rafters shall be vacuum impregnated to the manufacturer's specification with Protim Prevac 80 or similar approved preservative.

OTHER STRUCTURAL TIMBER

Preservative: All loose timbers used in the construction shall be vacuum impregnated to the manufacturer's specification with Protim Prevac 80 or similar approved preservative. Timber joists bearing onto wall to be painted with two coats of Bitumastic paint at bearings.

Grade: All other timbers used shall be a minimum of SC3 grade and/or as specified on the drawings.

Notching and Drilling: No structural timber will be notched, cut or drilled for services or for any other reason without first obtaining approval with regard to size and position, from the Contract Administrator or the Engineer.