

PROGRAMME

SPECIFICATIONS

A GENERALLY

1 Description to apply

Description of materials and workmanship referring to items which are not included or required in this Contract shall be disregarded, unless subsequently introduced as variations.

2. Materials

All goods and materials are to be of the best quality unless otherwise described. All goods not otherwise specified are to be in accordance with the British Standard Institution Specification where such exist. Where not applicable goods and materials shall be of an approved standard consistent with the performance required. Where the terms BS and CP are used in these Bills of Quantities they shall mean British Standard and Code of Practice respectively at the current date of tender.

3. Testing Materials

The amounts set for Provisional Sums included for testing shall comprise only the transport of samples and the payment of testing fees. The Contractor shall include for all other costs. If any test shows that the materials are not in accordance with the Contract, the cost of such test shall be borne by the Contractor.

4. Calculation of Quantities

All work has, unless otherwise described, been measured net as fixed in position and the Contractor shall allow in his prices for all waste, laps, etc. The quantities given are therefore generally not suitable for the ordering of materials.

5. Fix

The term 'fix' shall include for all things necessary from the delivery of materials from the site to the final fixing in position, including unloading, getting in, placing in store, unpacking, checking, reporting of deficiencies and breakages, hoisting, moving in position, assembling and fixing in position. Such terms as 'erect' and 'lay' shall have the same significance as 'fix'.

6. Dimensions

Figured dimensions on drawings shall be followed in preference to scaled dimensions and large scaled drawings in preference to small.

7. Manufacturer's Recommendations

All branded materials shall be used strictly in accordance with manufacturer's recommendations or instructions unless otherwise instructed by the Architect. Should the Contractor obtain from the Architect recommendations or instructions varying from the manufacture's he shall notify the Architect in Writing and obtain his approval before proceeding with the work. The Contractor shall be responsible for obtaining from the manufacturer all relevant details regarding the use of their products and shall allow for all costs in connection therewith.

8. Amendments

Where descriptions in the measured works vary from those in the specifications, the description in the measured work shall take precedence. Unless the description of any item is given in full in the measured work the description in the specification shall apply.

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B. PRELIMINARIES

1. **Name of Job**
Construction of Animal housing compound
2. **Location**
Rabacca, St. Vincent and the Grenadines
3. **Name, Addresses, telephone Numbers, etc of Parties to the Contract**

Contracting Authority

The National Authorizing Officer
Ministry of Finance & Economic Planning
2nd Floor Administrative Building
Bay Street
Kingstown VC0100
St. Vincent & the Grenadines

4. **Nature of Project**
Construction of animal pen to house sheep and goats.
5. **Drawings**
See Volume 5
6. **Definitions**
Words importing singular include the plural and vice versa where the context requires.

Where the works equal and approved are indicated in the Bills of Quantities, the standard must be of an equal standard or higher and in all cases must be approved by the Architect.

The "Works" shall mean the whole of the Works described in these Bills of Quantities, Drawings, Specifications and any other information accompanying and forming part of the Tender issue to be completed and installed under the proposed Conditions of Contract.

Abbreviations

L.Y.	Linear Yard
C.Y.	Cubic Yard
S.Y.	Square Yard
Ab.	As before
Abd.	As before described
Sq.	Square
Yd.	Yard
Ft.	Feet or Foot
Ins.	Inches
Lb.	Pound
Lbs.	Pounds
Conc.	Concrete
Reinf.	Reinforcement
SMM	Standard Method of Measurement
BoQ	Bills of Quantities
GC	General Conditions

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Hr.	Hour
Hrs.	Hours
No.	Number
L.F.	Linear foot/feet
Avg.	Average
Dp.	Depth
Ht.	Height
Wd.	Width
Lgt'h:	Length
B.S.	British Standard
P.S.	Provisional Sum

7. Discrepancies

The Contractor shall verify on Drawings or on Site all dimensions shown or given before commencing construction. Work to figured dimensions, or in cases between figured dimensions bring the matter to the immediate attention of the Architect for a decision. For the purpose of construction, the Drawings shall take precedence over the Bills of Quantities, but in all cases of discrepancies between documents, bring the matter to the Architect whose decision shall be final and binding.

8. Employment of Labour

As far as possible local labour shall be employed on this Contract.

9. Coordination of Services

The Contractor shall be responsible for the Coordination of the various services Sub-contractors and for agreeing detailed pipe, cable and duct routes to avoid clashing of services.

The Contractor shall also be responsible for obtaining the Sub-contractor's requirements as regards to holes, mortices, chases etc. in the structure and finishes and he shall transfer all such requirements onto a Drawing for the Architect's approval prior to forming holes.

The Contractor shall be responsible for coordinating all works to be carried out by Government Agencies and/or Statutory Bodies

10. Site Instruction Book

The Contractor shall provide and keep on Site a Site Instruction Book for the use of the Architect and all Consultants for the purpose of confirming verbal Instructions. All Instructions must be signed and dated by the issuing Consultant

11. Photographs

The Contractor shall provide digital progress photographs taken at different angles of the Works as it proceeds. Each photograph shall be dated and identified.

The Photographs may be used by the Quantity Surveyor in such instances so as to determine any Works carried out for the purpose of Valuing these Works

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C EXCAVATION AND EARTHWORKS

1. General

The excavation is to be carried out to the lines and levels shown on the drawings unless or as otherwise instructed by the Architect/Engineer

Should rock or other hard material be encountered in any excavations it is to be removed by mechanical means. Blasting will not be permitted without written permission from the Architect.

If permission is granted, the blasting must be carried out by persons experienced and competent in this work and the Architect must be fully informed by the Contractor of the steps taken to safeguard the surrounding properties and the Contractor must take full responsibility for any damage or annoyance caused by reason of the blasting.

2. Nature of Ground

The Contractor must ascertain the nature of the ground and determine whether water or any other difficulties are likely to be encountered during excavations and whether cutting by hand or other means must be employed.

3. Approval of Bottoms

The excavation for all foundations shall be inspected by the Architect or his representative before any concrete is placed and the Contractor shall give a minimum of 24 hours notice that such an inspection will be required.

The bottom 3" of excavation shall be removed on the same day the blinding is placed on it. If the excavation should become disturbed or weakened by water or other means the Contractor will be required to remove a further thickness of soil as the Architect or his representative may direct, and to backfill the same with 1:4:8 concrete at the Contractor's expense.

4. Level and Ram

The bottoms of all excavations and all other surfaces which are to receive concrete shall be levelled and rammed.

5. Excessive excavation

Should excavation be taken below the specific levels, the difference in level shall be made up in concrete 1:4:8 at the Contractor's expense.

6. Backfilling

Backfilling shall be carried out with selected excavated material around foundations and at the back of retaining walls etc, up to the original ground level or as directed. It shall be carried out in horizontal layers not exceeding 9" loose thickness, moistened or dried as required and thoroughly compacted by mechanical or other approved means to a dry density not less than the surrounding soil.

No backfilling shall be carried out which covers work which has not been inspected and approved.

7. Disposal

Excavated material which is suitable for backfilling shall be immediately removed from the site. The balance of the excavated material shall be deposited in spoil heaps where directed. Instructions will be issued regarding the final disposal of this material.

8. Water

The Contractor shall be responsible for keeping the excavations free from water from any source at all times. If necessary the Contractor shall provide pumps for this purpose. If sump holes are necessary they are to be backfilled with 1:4:8 concrete. The necessity for pumping shall be discussed and agreed with the Architect.

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9. Sand or Gravel Arising

No sand, gravel or ballast found in the excavation shall be used by the Contractor without the written permission of the Architect.

10. Planking and Strutting

The Contractor shall provide adequate timbering or other shoring to prevent earth cuts where appropriate. The Contractor shall be entirely responsible for the excavations or any damage caused by them to other parts of the Works. Excavations are to be left exposed for as short a time as possible.

11. Hardcore

Hardcore is to be consist of clean broken stone, brick or concrete, free from clay, silt or organic and levelled with sand to present a uniform and even upper surface.

Compaction of hardcore shall be by means of mechanical vibrating roller in layers not exceeding 9" thick.

12. Damp Proof Membrane

The damp proofing is to be polythene sheeting 1000 gauge (0.01" thickness) or as stated in the Bill Item and to be laid over levelled hardcore with a minimum 12" end and side laps.

13. Protection of Services

protected during the Works.

14. Termite Pre-Treatment

Termite pre-treatment shall consist of spray applied persistent organo-chlorine termicide or other approved termite treatment. The Contractor shall notify the Architect in writing of the source of manufacture and Trade Name of the proposed compound. The treatment shall be applied strictly in accordance with the Manufacturer's printed instructions in three (3) phases as follows:-

- i) To bottoms and sides of dry foundation, trenches and pits immediately prior to blinding.
- ii) To consolidated surfaces of blinded hardcore prior to damp-proof membrane.
- iii) Upon completion of the building and final site clearance, a perimeter strip 5'-0" wide all around the building.

A complete chemical barrier severing connection between the building and the sub-soil shall be obtained.

A certificate of warranty in an approved form valid for five years in the name of the Employer shall be provided.

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D. IN-SITU & PRE-CAST CONCRETE WORK

1. General

All concrete work is to be supervised by a foreman experienced in reinforced concrete construction

The whole of the concrete work as regards to materials, mixing, transporting, placing consolidating and curing shall comply in all respects with the requirements of the Code of Practice C.P. 110:1972 and shall be to the approval of the Engineer.

2. Concrete Mixes

Concrete mixes are given in the Bills of Quantities and or shown on the drawings. The proportions given being ratios by weight of cement, fine aggregate and coarse aggregate.

3. Testing Concrete

The Contractor shall keep four (4) 6" test cube molds and a slump cone on site at all times throughout the course of the Contract

The Contractor shall prepare a set of four(4) test cubes on any day that concrete is being poured, or as directed by the Engineer. Test cubes shall be marked with a number in consecutive order and the date taken. All cubes shall be left in molds for 24 hours and in water or damp sand until tested. Two (2) cubes of each set shall be tested after 7 days and two after 28 days. The crushing strengths obtained shall not be less than those specified on the working drawings and or in the Bills of Quantities. In the event of concrete with insufficient strength having been placed the Contractor shall cut and replace such work at the Contractor's expense.

The Contractor shall keep a record of all cubes manufactured. The record must give the number of the cube, date of manufacture, dates of crushing test, strength achieved and the positions where the cubes have been poured. This record must be kept on site and must be produced when required by the Engineer

Slump tests shall be carried out in accordance with BS 1881 and the slump shall be a minimum consistent with the requirements as to density strength and workability.

4. Mixing Concrete

Mixing of concrete shall be done in an approved mechanical mixer until there is uniform distribution of materials and the mass is uniform in colour. Mixing shall in no case continue for less than 2 minutes after the last ingredient have been added.

5. Placing Concrete

Concrete shall be handled so as to avoid segregation, pollution or loss of ingredients, and shall not be placed after 20 minutes after adding water to the mix. The placed concrete shall not be subsequently disturbed.

6. Vibrating Concrete

All concrete shall be vibrated with a poker vibrator and additionally rammed and tamped so as to thoroughly fill the shuttering and form a dense homogeneous mass.

7. Curing Concrete

Concrete after being cured shall be protected from the effects of sunshine and rain. Concrete is to be kept moist and well watered for at least 7 days after placing, and exposed surfaces are to be covered with approved material to effectively retain water

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8. Concrete Mixes

The reinforced concrete work shall be constructed in accordance, in all respects, with the structural drawings which will be issued by the Engineer.

9. Pre-cast Concrete Work

Construction of all precast elements shall be carried out in accordance with the BS Code of Practice 110 (1972). The standard of finishes is to be as specified for type 'O' in clause 6.106 of the Code.

The Contractor may construct any element shown as precast by an in situ method, subject to the Architect's and the Engineer's approval. The tolerance and standard of finishes required however will be the same as for precast construction.

10. Formwork Design

The formwork shall be so designed that it is adequately stiff and stable to support the loadings set out below, and the concrete while still supported by the formwork, shall be within the prescribed limits of tolerance (including shape, position and level) after the formwork has deflected. Special care shall be taken in the design of the formwork that the deflection of the boardings, sheeting or lining between main and secondary supports is acceptable to the Architect with regard to the finish required. The formwork shall be so designed that the concrete can be properly placed and compacted.

The formwork shall be capable of supporting its own weight, the weight and lateral pressure from the concrete, constructional live loads of not less than 75 lb/ft² of slab and beam plan area supported by the formwork plus any lateral loading such as wind loading.

11. Formwork Construction

The construction of the formwork shall allow for prefabrication of panels of convenient size for ease of handling and assembling and to permit striking without applying force or shock to the concrete. The construction shall allow the removal of sides without disturbing soffits and of soffits without disturbing any necessary props.

Re-propping shall not be permitted.

The material used in the formwork shall be suitable for the required finish. The qualities of finish shall be as indicated on the drawings and shall be described in the following classes.

Class 1 - This finish is for surfaces against which backfill or further concrete will be placed. The formwork shall consist of sawn boards, sheet metal or any other suitable material which will prevent the loss of ground when the concrete is vibrated.

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Class 2 - This finish is for surfaces which are permanently exposed to view but where the highest standard of finish is not required. Formwork to provide this finish shall be faced with wrought boards of uniform thickness with square edges arranged in uniform pattern. Alternatively, plywood, or metal panels may be used if they are free from defects likely to detract from the general appearance of the finished surface. Joints between boards and panels shall be horizontal and vertical unless otherwise directed.

This finish shall be such as to require no general filling of surface pitting, but fins, surface discolouration and other minor defects shall be remedied by methods approved by the Architect.

Class 3 - This finish is for surfaces prominently exposed to view where good appearance and alignment are of special importance. To achieve this finish which shall be free of board marks, the formwork shall be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved uniform pattern and wherever possible joints between sheets shall be arranged to coincide with architectural features sills, window heads or changes in direction of the surface. All joints between panels shall be horizontal and vertical unless otherwise directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets. Unfaced wrought boarding or standard steel panel shall not be permitted for this class of finish.

No formwork shall be constructed using wire ties. Embedded metal ties with or without removable cones or bolts which are subsequently withdrawn shall not be permitted on formwork to give concrete surface finish Class 3 or of moulded board finishes, exposed aggregate or tooled surfaces, unless express permission is given by the Architect. Where embedded metal ties with removable bolts are permitted or any fixing which leaves a hole or chase, all such holes or chases shall be made good in a manner and with a finish to the approval of the Engineer. The minimum concrete cover to a metal tie shall not be less than that detailed for the main reinforcement.

Temporarily removable panels shall be provided at intervals to facilitate final cleaning out and drainage.

Propping shall be carried out to an approved bearing.

12. Formwork Use

Formwork shall be thoroughly cleaned before every use. Prior to placing reinforcement, formwork to be in contact with the wet concrete shall be treated with the minimum amount of approved release agent required to obtain a clean release. No release agent shall be used on formwork in which any reinforcement has been placed. The use of a formwork applied cement retarder shall not be permitted except where a key for a further finish is required and then only after the Architect has given his express approval.

Formwork shall be grout tight under all conditions including vibration. Immediately prior to concreting, the formwork shall be thoroughly cleaned out and re-checked.

No placing of concrete shall commence until the Architect has inspected the formwork and reinforcement and given his permission for concreting to proceed. Such permission shall not relieve the Contractor of his responsibilities for the correctness and adequacy of the work.

After striking, if formwork is to be re-used it shall be cleaned, stacked and protected, and before re-use, shall be repaired, made good or replaced with new as may be necessary to maintain the finish and standard required.

13. Striking Formwork

It shall be the responsibility of the Contractor to ensure that no distortion, damage, overloading and undue deflection is caused to the structure by the striking of formwork which shall be removed without shock to, or vibration of the concrete. Formwork shall not be struck until the concrete has sufficiently hardened and the Architect reserves the right to delay the time of striking in the interests of the work.

The striking times given in days (24 hours) in the following table, are the minimum that will be permitted.

STRIKING TIME IN DAYS (24 HOURS)			
	Ordinary Portland Cement	Rapid Hardening Portland Cement	
Soffit Formwork:			
Slabs	3	2	
Props to Slabs	7	4	
Beams	7	4	
Props to Beams	16	8	
Plain Vertical Formwork:			
Side of slab and beams up to 12 in. deep	0.5	0.25	
Columns and beams over 12 in. deep	1	0.67	

Where the formwork is supported from slabs or other members already cast, the Contractor shall allow for the retention of the props under these members for a longer period than that stated above where so required by the Architect.

14. Making good Defective Surfaces

On a surface finish of Class 3 described previously no making good of blemishes will be permitted. The panel incorporating any defective work will be cut out completely and renewed.

On other surface finishes where minor blemishes may be permitted, a treatment consisting of rubbing down with a cement and sand mortar of the same richness as in the concrete and incorporating a proportion of white cement, shall be carried out to the satisfaction of the Architect. Such remedial work shall be carried out immediately subsequent to the removal of the formwork.

Pockets from shutter tie cones and other such holes shall be well dampened, but not saturated and filled in layers with a 1:4 mix cement: sand mortar of very stiff consistency. Each layer shall be well compacted with a hammer applied to a hardwood timber former, slightly smaller than the size of the hole.

For larger holes, concrete incorporating small sized aggregate if necessary, shall be used and a similar procedure adopted.

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The permissible tolerances for the surface types as specified under "formwork" or for precast concrete units, shall not exceed the limits shown in the following table, unless otherwise noted on the drawings.

Class of Finish Precast	Tolerance (ins.)		
	1	2	3
Departure of centre line of members from grid lines horizontally and vertically	+ - 1/4	+ - 1/4	+ - 1/4
Variation in sectional sizes of concrete members	+ 2 - _	+ _ - 0	+ 1/16 - 0
Variation in slope of columns, walls and slabs per 10 ft. length	+ - 1/4	+ - 1/4	+ - _
Abrupt changes on face of concrete	+ - 1/4	+ - _	+ - 1/16
Plumb of Columns and walls in full height of building	+ - 1/2	+ - 1/2	+ - 1/2
Variation in position of cast in bolts etc. relative to adjacent frame member	+ - 1/16	+ - 1/16	+ - 1/16

These tolerances are not cumulative.

18. Holes, Pockets, Chases, cast-in Fixtures

On no account shall holes, pockets or chases be cut in the reinforced concrete work without the express approval of the Architect. Where holes, pockets or chases are shown on the Drawings, including pockets for railings and balustrades etc. the Contractor shall ensure that these are carefully formed in their correct positions by satisfactory means prior to the placing of the concrete. Sleeves shall be provided and cast in where heating, plumbing, sprinkler or similar pipes are required to pass through the concrete. Conduits, pipes and any special fixing requiring to be cast in shall be accurately positioned before concreting and maintained in position during concreting. It shall be the responsibility of the Contractor to arrange for the appropriate Sub-Contractor to install any such conduits, pipes and the like in sufficient time so as not to delay any concreting work.

19. Placing & Fixing Reinforcement

Reinforcement shall be placed in the formwork in the positions as shown on the Drawings to a tolerance of + _". It shall be securely fixed and tiled at sufficient intersections with 16 gauge soft iron wire so that it shall not be displaced during concreting.

The designated cover shall be maintained by the use of approved spacers. These shall be of fine concrete, mortar, nylon or plastic, or other approved material. Where a concrete surface is to remain exposed no spacers shall be used to that face and the correct cover shall be achieved by other approved means.

Where blocks are used to ensure the correct cover to the reinforcement, these shall be made of mortar, or of fine concrete not leaner than one part cement to three parts of aggregate. The blocks shall have tying wire cast in and projecting for tying to the reinforcement.

All chairs, cradles and like spacers and supports shall be detailed on the Bonding Schedule and the positions shown on the Drawings.

Care shall be taken when placing and fixing the reinforcement to avoid damaging any tanking or damp-proof membranes or formwork for surfaces which will remain exposed.

AGRICULTURE MODERNIZATION DEVELOPMENT

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The insertion of bars into concrete already placed shall on no account be permitted.

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No placing of concrete shall commence until the Architect has inspected the reinforcement in place and passed it as being satisfactory.

Welding of reinforcement will not be permitted except on the written approval of the Architect.

20. Pre-cast Concrete Sills, lintels, etc.

Precast concrete sills shall comply with BS 4374. Precast concrete lintels shall comply with BS 1239. Other precast units shall be cast using a Standard Mix giving a minimum cube strength of 3750 lbs/m² at 28 days.

Where the surface of a precast unit is to be exposed it shall have a Class 3 finish.

21. Cover

Unless otherwise shown on the drawings, the cover to the reinforcement shall comply with Clause 307 CP 114: Part 2.

21. Samples

All materials referred to in this specification and Bill of Quantities shall be subject to the Architect's approval of samples and the approved samples shall form the standard of quality for all materials in the work.

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E. BLOCKWORK AND MASONRY

1. General

The Specification for Concrete Work shall apply to this work so far as is consistent with the clauses following:

2. Storage

All blocks shall be properly stacked on level hard standing and shall be adequately protected from inclement weather.

3. Laying

All blocks are to be well wetted before being laid and shall be wet at the time of laying.

All beds and joints shall be 3/8" thick and shall be completely filled with mortar. All joints shall be thoroughly flushed up with mortar as the work proceeds. Joints of blockwork to be rendered shall be thoroughly raked out to form a key.

All blockwork shall be built uniform, true and level with all perpends of alternate courses vertical in line. No work shall rise more than 5 feet above adjoining work and all such risings are to be raked back.

All work shall be in stretcher bond and the courses shall be horizontally aligned. Where two walls meet or intersect the intersection shall be fully bonded.

Intersection between ends of walls and other walls where the blockwork cannot be bonded shall be tied with 24 gauge metal lathing 12" long at every third blockwork course.

4. Chases and Reveals

All chases, holes through walls etc. shall be made good with mortar.

All reveals at door and window openings are to be made solid with fine concrete flushed up inside the blockwork.

5. Reinforcement at Openings

Blockwork adjacent to openings, corners and open ends shall have one cavity filled solid with concrete 1:2:4 mix well rammed and reinforced with one 10 mm diameter mild steel rod.

6. Junction with Reinforced Concrete Work of Steelwork

Blockwork shall be tied at its junction with vertical concrete work with 24 gauge metal lathing 12" long cast into the concrete or shot fired to the steel and built into every third course of blockwork.

7. Rubble Walling

Rubble walling shall be solidly built in 1:3 cement: sand mortar with the joints recessed 1/2" and the work left free of mortar stains on exposed faces. Care should be taken in the selection of stones to ensure that joints are of minimum width. The Contractor is to take care that no voids are left in the wall. All work is to be kept clean as the work proceeds.

8. Horizontal Reinforcement, Lathing etc.

All horizontal reinforcement, lathing used for ties etc. shall be galvanised.

9. Samples

All materials referred to in this Specification and Bill of Quantities shall be subject to the Architect's approval of samples and the approved samples shall form the standard of quality for all materials in the work.

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F. CARPENTER AND JOINER WORK

1. General

All timbers shall be the best quality of their respective kinds, carefully selected, thoroughly seasoned, free from sapwood bluewood, large loose or dead knots, waney edges or any other defects. Timbers shall be sawn square.

2. Softwood

All softwood shall be pitch pine or white pine, properly seasoned. It shall have a minimum density of 45 lbs. per cubic foot and a maximum moisture content of 25% unless otherwise specified.

3. Hardwood

All hardwood shall be as stated in the Bill of Quantities properly seasoned. Samples for use in the work shall be previously submitted for the Architect's approval. Hardwood for finishings shall be kiln dried.

4. Plywood

Plywood shall be interior grade (unless described as exterior grade) of the full thickness stated with both faces for varnishing and shall be free from defects.

Plywood for exterior doors and where used externally shall be exterior grade.

5. Preservative

All pitch pine, white pine, yellow pine and plywood shall be pressure treated with woolman 'tanalith' or other approved pressure impregnated timber treatment.

6. Glass

All glass shall be the full thickness or weight and the quality specified. Sheet glass shall be ordinary glazing quality and no glass showing noticeable distortion of sight shall be used. Float and plate glass shall be perfectly flat and true.

All glass shall comply with BS 952 and shall be the best of its respective kind, free from scratches, air holes, bubbles or other defects.

7. Putty

Linseed oil putty for glazing to wood shall comply with BS 544. Approved steel sash putty shall be used for glazing to metal windows.

Exposed timber shall be secret nailed where possible. Where it is not possible to secret nail, nails shall be punched below the surface and the depression filled flush with plastic wood and sanded off.

8. Storage

All materials shall be protected from the weather during transit and shall be stored under cover, clear of the ground.

9. Priming Woodwork

All external woodwork shall be primed before fixing. The bottom edges of all doors and the backs of all external door frames shall be primed and painted one under-coat immediately prior to fixing.

10. Exposed Faces

All exposed faces of dressed timbers are to be hand planed and sanded. All hidden faces can be sawn (rough) or dressed as the Contractor chooses.

11. Arrises

All arrises (edges) exposed in the finished work shall be pencil rounded.

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12. Timber Sizes

Except where dimensions are stated to be "finished size" nominal dimensions are given for dressed timber. A reduction of 1/8" from the nominal size will be allowed for each dressed face.

13. Fixing to Blockwork or Concrete

Where timber is described as plugged the price shall include for cutting holes as required in blockwork or concrete and supplying and fixing wooden plugs treated with termite fluid. Alternatively plugs may be "Rawl plug" or other approved proprietary make.

14. Ironmongery

No ironmongery, with the exception of hinges shall be finally fixed until the painter work is completed. All locks, latches, handles and other ironmongery are to be well oiled and left in perfect working order at the completion of the contract.

15. Glazing

Where glass is to be glazed into timber sashes with beads, it shall be neatly back puttied.

16. Rebates and Beads

All rebates and beads in wood shall be sealed or primed (as measured in Painter Work) before glazing is commenced.

17. Edges of Glass

All glass shall have clean out edges, cut to fit rebates with the due expansion and contraction allowance.

18. Nails, Screws and Connectors

No nails, screws or bolts are to be placed in any split end of wood. If splitting is likely, holes for nails are to be pre-bored. Lead holes are to be drilled for all screws.

Wire nails shall comply with BS 1202. Wood screws shall comply with BS 1210. Joint Connectors shall comply with BS 1597.

19. Mirrors

Mirrors shall be of selected quality polished plate glass, silvered and protected using electro copper backing.

20. Breakages

The Contractor shall be responsible for all breakages of glass.

21. Cleaning

The Contractor shall clean down all glazing on completion of the Works.

22. Ironmongery

The Contractor's prices for ironmongery shall include for supply of ironmongery, matching screws, for fixing to softwood, hardwood, blockwork, masonry or concrete backgrounds and for providing samples before placing a firm order for supply of ironmongery.

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G. ROOFING

1. Metal Roofing

Galvanize sheets shall be fixed at 12" centers to the timber purlins at spacing indicated with No. 12 self drilling, self tapping galvanised steel screws of suitable length complete with a steel washer and separate neoprene washer. The sheets shall be fixed at side laps at 18" centres with No. 12 x 3/4" long self tapping galvanised steel screws with a steel washer and separate neoprene washer. The sheets shall be lapped at sides for one corrugation and at ends (where required) 9".

All joints shall be sealed with a butyl rubber mastic sealing compound to form a watertight roof to the approval of the Architect.

Where indicated standard 'R' panel sheets may be used at ridge cappings and expansion joints over roof sheeting in long lengths well lapped at joints and sealed.

All laps in roof sheeting shall be etched and primed with one coat of Berger Metal Primer Zinc-Chromate Red Oxide, or other equal and approved rust inhibitor.

2. Roof Screed

The sand:cement screed shall be laid to fall as shown on the drawings and shall comply with the requirements detailed under the heading FLOOR SCREEDING later in these preambles.

3. Roof Finish

The roof finish shall be THOROSEAL foundation coating applied in strict accordance with the manufacturer's printed instructions.

The concrete must have been cured for at least one month before the membrane is applied. The waterproofing shall not be applied in direct sunlight.

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H METAL WORK

1. Generally

Mild steel plates, bars, sections, tubes, etc., shall conform to BS 4360 Part 1.

The surfaces of steel and iron work shall be smooth, clean and free from rust. Loose rust and scale shall be removed by scraping or steel wire-brushing.

2. Welding

Weld by an approved method giving ductility and tensile strength comparable with that of the metal joined. fillet welds only shall be used. Prefabricate units in the shops wherever possible. Only the minimum of site welding shall be employed.

Grind all soldered or welded joints, seams, etc., to a smooth finish, remove all rough edges and leave the whole perfect to the satisfaction of the Architect. Where galvanising or other protective coating is destroyed or damaged by welding, the area so affected shall be wire-brushed and given a suitable protective coating immediately after completion of the welding.

3. Forged Work

Clean all forged work and put together in the best and most workman -like manner, drill all holes and clear off burrs and ensure that all counter-sinkings are concentric and threads and tappings are accurately fitted.

4. Bolts

All bolts unless otherwise described shall be British Standard Whitworth black bolts with hexagonal heads and nuts and round washers. Use splayed washers where necessary to effect tight joints.

Bolts shall comply with BS 4190.

Unless otherwise described all bolts shall be provided with two washers, one under the head and one under the nut, and the prices shall include for these washers and nuts. All nuts shall be tightened at fixing and retightened after completion of the work or before covering up with other work. Holes for bolts and screws shall be countersunk, if required.

5. Screws

Screws shall comply with BS 1210.

All screwed work shall project at least two threads through nuts.

6. Galvanising

Galvanising shall comply with BS 729 Part 1.

7. Ordering of Factory Made Articles

The Contractor shall be responsible for the prompt ordering of factory made articles and shall satisfy himself that they arrive on site in perfect condition and shall arrange for their storage and safety until such time as they are installed and the building handed over. Delivery shall be checked and all missing items replaced. The articles shall be fixed strictly in accordance with the manufacturer's instructions and the Contractor shall be responsible for their satisfactory operation after the fixing is complete.

8. Storage of Materials

All components shall be stacked under cover and clear of the ground surface. Galvanised components shall not be stacked on rough surfaces.

PROGRAMME

9. Fabrication Generally

All smithing and bending shall be soundly and neatly executed, care being taken not to overheat the metals being worked.

10. Priming and Painting

Priming and painting shall comply with the specification clauses given in the Painting and Decoration Section of the Preambles Bill.

11. Holes

Holes shall be made to the exact sizes stated and all burrs shall be removed before connections are made.

12. Grinding

Grinding shall be carried out by using a hard file or a suitable abrasive powder, the method chosen being suitable to obtain the finish described.

13. Connections

Drift pins, where used, shall not distort the work nor enlarge the holes.

All bolts shall be fitted with the correct washer and no thread shall bear upon the thickness connected.

14. Fixing

Form all mortices, chases, etc., and securely anchor to the structure all metalwork and make good the surfaces to which they are fixed.

15. Leave Clean

Clean all exposed metal surfaces on completion with water or an approved petroleum product such as Methylated Spirit or Kerosene. Make good any damage caused by the use of an improper cleaning material.

PROGRAMME

I PLUMBING AND DRAINAGE

Plumbing

1. General - Layout of Installation

The Contractor shall carefully consider the layout of the whole piping system for the Contract, but the Architect's and Local Authority's permission shall be obtained before proceeding with the work.

2. Bye Laws

The whole of the Plumbing Installation shall comply with the relevant regulations and bye-laws of the Local Authority concerned and shall be executed to the satisfaction of the Architect and Local Authority.

3. Setting Out

The position of all pipe runs including joints and connections shall be agreed with the Architect before work is commenced.

4. Joints Generally

All joints shall be perfectly smooth inside without excrescences.

5. Bends and Tees

All bends shall be sweep bends or easy right-angle bends. No elbows shall be used on rainwater or sanitation pipes. All tees shall be pitcher tees.

6. Testing

The Contractor shall as required from time to time to suit the progress of the building work air-test the plumbing and internal drainage in sections, to the satisfaction of the Architect.

At the completion of the works all soil pipes and branches and waste pipes and other parts of the internal drainage works connected directly to any sewage drain or sewage drain ventilating pipe or soil pipe, shall be subjected to a water test and be proved capable of resisting a pressure of 5 feet head of water and the Architect may also direct that smoke or any other testing be applied to any other parts of the drainage or ventilation system as he thinks desirable, and everything necessary for these tests shall be supplied by the Contractor.

7. Cleansing

On completion of the works, immediately before handing over, the Contractor shall thoroughly cleanse the whole of the system and prove that it is functioning freely to the satisfaction of the Architect.

8. Habitation Certificate

On completion the Contractor shall obtain a Habitation Certificate from the Local Authority and forward it to the Architect.

9. Galvanised Steel Pipes and Fittings

All joints shall be screwed and socketed. Pipes shall be fixed clear of walls and soffits with approved pipe rings and back plates.

10. Pipe work Generally

Pipes shall be in the maximum lengths possible to avoid unnecessary jointing. The Contractor shall allow for and include in his rates all straight couplings between lengths of pipes.

Pipes shall be fixed to sufficient falls to prevent air locks and to enable the system to be drained through the draw-offs and drainage taps provided.

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11. Brass Work

Drainage taps with loose keys shall comply with BS 2879, Type B.

Ball valves shall be 'Portsmouth' type with silencer pipe complying with BS 12112 for high or low pressure as described. Floats not exceeding 6" diameter shall be plastic type complying with BS 2456; larger floats shall be copper type complying with BS 1968.

Bib taps shall comply with BS 1010 and shall be of brass with fixed jumpers and where so described shall have nozzles screwed for house union.

12. Drainage

The work under this heading covers all soil waste and rainwater lines below ground level.

The specifications to all other sections shall apply to this work as far as is consistent with the following clauses.

13. Drainage Regulations

All work shall comply with the requirements of the Sanitary Authority regulations and the Public Health Ordinances and shall be executed to the satisfaction of the Architect and the relevant Local Authority.

14. Drain Pipes and Fittings

PVC Drain Pipes and Fittings shall be Class B to comply with BS 3506. Pitch Fibre Pipes and fittings shall comply with BS 2760 Parts 1 and 2.

15. Manhole Covers

Manhole covers and frames shall comply with BS 497.

16. Step Irons

Step irons shall be galvanised malleable cast iron step irons complying with BS 1247.

17. Keys

Two sets of each type of key for locking covers and gratings shall be provided and handed over to the Architect.

18. Setting Out

The Contractor shall set out all drains in accordance with the drawings and provide all profiles etc., necessary for the execution of the work.

19. Excavation and Backfilling Trenches

The bottom of all excavations shall be trimmed and consolidated to the correct levels. Unauthorised excavations below the required levels shall be filled with concrete of the same composition as for drain beds at the Contractor's expense. Where the bottom of the excavation is insufficiently firm, the Contractor shall excavate until, in the opinion of the Architect a firm bottom is obtained, and the level shall be made up with concrete of the same composition as for drain beds. Backfilling to the bottom of the trenches and to a height of 12" above the top of the pipes shall be of selected material, handpacked and watered if necessary and well rammed on either side of the pipe. The remainder of the backfilling shall be in 12" layers, each layer wetted if necessary and well rammed to provide effective consolidation.

The Contractor shall give notice to the Quantity Surveyor when excavations are ready to receive concrete or pipes and when it is intended to cover up any of the permanent work with backfilling.

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20. Concrete beds, Haunching, Surround

Beds for drains shall be a minimum thickness of 6" below the pipes and shall be 12" wider than the external diameter of the pipe and finished to correct gradients.

Beds for manholes shall be a minimum thickness of 6" reinforced concrete.

21. Concrete beds, haunching, Surrounds Cont'd

After testing the drains shall be haunched up on both sides in similar concrete to the full diameter of the pipe.

Vertical pipes and other drains where so directed shall be entirely surrounded with concrete 6" thick.

Gullies, shoes, etc., shall be set on a base of similar concrete 6" thick and the sides encased in concrete 6" thick.

22. Testing Drains, Manholes etc.

Testing of Drains etc. shall be done in the presence of the Architect and/or Authority concerned before trenches are filled in. Any drains which fail to stand the test shall be taken up and either replaced or thoroughly rejointed until watertight all at the Contractor's expense.

Testing shall be to a head of water of 5 ft. as the work progresses.

23. Alterations to Sewer, Water etc. services

No sewer, drain water, telephone or electric cables, etc., shall be interfered with unless and until arrangements have been previously made by the Contractor with the Local Authority, Water Board or other companies and persons concerned.

If the authorities decide to make the alterations required themselves the Contractor shall give every facility to enable them to do so, and any assistance as may be directed by the Architect, and shall pay all charges required by the Authority, Board etc. concerned in connection therewith. If the Contractor is directed to do the work he shall carry out such work to the entire satisfaction of the Authority, Board etc., concerned.

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J. ELECTRICAL INSTALLATIONS

1. Description to Apply

Description of materials and workmanship referring to items that are not included in this contract shall be disregarded, unless subsequently introduced as variations.

2. Weights and measures

All weights and measures mentioned in these Bills of Quantities are those normally in use in the country in which the works are to be carried out. Unless otherwise described, tons shall be “long” tons of 2240 lbs. and gallons shall be imperial gallons.

3. Materials

All goods and materials are to be of the best quality unless otherwise described. All goods not otherwise specified are to be in accordance with the British Standards Institution Specifications where such exist. Where not applicable, goods and materials shall be of an approved standard consistent with the performance required. Where the terms “B.S.” and “C.P.” are used in these Bills of Quantities they shall mean the British Standards and Code of Practice respectively current at the time of tender.

4. Testing Materials

The amount, which shall be set off against the provisional sum included for testing, shall comprise only the transport of samples and the payment of testing fees. The contractor shall include in his tender for all other costs. If any test shows that any materials are not in accordance with the contract, the cost of such test will be borne by the contractor.

5. Calculation of Quantities

All work has, unless otherwise described, been measured net as fixed in position and the contractor shall allow in his prices for waste laps, etc. The quantities given are therefore not suitable for the ordering of materials.

6. Dimensions

Figured dimensions on drawings shall be followed in preference to scaled dimensions and large scale drawings in preference to small ones.

7. Testing

The architect shall have full power to require any materials or work to be tested at the contractor's expense in order to prove their soundness and efficiency. The cables, conduits, sheath and duct shall be tested for insulation and continuity with the I.E.E. regulations as work progresses, before any connections are made to switches and distribution terminals.

On completion, the electrical insulation shall be tested in conformity with the I.E.E. regulations to the satisfaction of the various inspection authorities.

The following tests shall be carried out: -

- a) Insulation tests
- b) Continuity tests
- c) Line-earth loop tests
- d) Polarity tests
- e) Earthing resistance tests

The contractor shall provide all facilities for testing and in inspection, carry out all works required to obtain satisfactory certificates and pay all necessary fees incurred therein.

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The contractor shall submit, on behalf of the Employer and to the supply authority, an application for electrical connection together with the inspection certificate received from the inspection authority. He shall also pay all the necessary fees incurred therein and liaise with the supply authority for the mentioned electricity connection to the building.

8. Making Good

Any cutting out and making good by the contractor due to the contractors failure to comply with the above will be at the sub/contractors expense.

9. Standards

a) The work shall be carried out in accordance with the rules, regulations and requirements of the Electricity Supply Authority, Statutory Electricity regulations, and the regulations for the electrical Equipment of Buildings as issued by the I.E.E., London, U.K.

b) Where Mandatory, the work must be tested on completion by the Government Inspector, and a certificate of approval obtained.

10. Workmanship

The work shall be carried out in a straightforward manner to a high standard by skilled workmen and under the continuous supervision of an experienced foreman.

11. Rejection of Work

The Architect may reject any work he considers unsuitable or carried out in an un-workmanlike manner or incorporating unsuitable materials. Such rejected work shall be repaired or replaced immediately and satisfactorily to the approval of the Architect, and at the contractor's expense.

12. Examination of Work

Before starting his work and from time to time as the work progresses the contractor shall examine the work and materials installed by other trades insofar as it affects his own work and shall promptly notify the Architect or his agent any/conditions exist that will/such prevent him performing satisfactory result in his work. The contractor will be required to have an agent and sufficient workmen on site during the whole period of construction to ensure that all conduit, duct, sleeves, etc., can be placed as the work progresses.

13. Switches

Lighting switches shall be rated as follows: -

For filament and discharge lamps and/or fluorescent tube loads not exceeding 600W at 230 Volts – 5 amp rating.

For filament and discharge lamps and/or fluorescent tube loads over 600W and not exceeding 1500W at 230 Volts – 20 amp rating.

For filament and discharge lamps and/or fluorescent tube loads exceeding 1500W contactor shall be used with 5 amp switches operating the contactor coil circuits.

All switches shall be of quick make and break types, and shall be fitted in rustproof boxes; multiple switches shall be ganged under common cover plates. Separate boxes shall be provided for A.C. circuits connected to different phases.

Generally, all switches for interior use shall be flush type except where otherwise specified on the drawings. Type of switches will be indicated on the relevant drawings.

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Where rows of ceiling outlets occur special care shall be exercised regarding alignment of such outlets.

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14. Pull Wires

This contractor shall furnish and install a No.12 iron pull wire in every empty conduit or trunking installed, to facilitate the future installation of wires. Identify each terminus of pull wire with linen tags with complete information as to service and the location of the other terminus of the wire.

15. Plates

Wall plates shall be insulating high heat non-hygroscopic plastic white colour. All plates shall be smooth surface without moulded decorative patterns of any type. Where required or specified plates shall be of non-rusting non-tarnishing metal of Cadmium plated or stainless steel finish manufactured in accordance with an approved code or industry standard.

16. Lighting Fittings

Light fittings shown on the drawings shall be supplied and installed under this contract.

All light fittings shall be installed in the locations shown on the drawings. Recessed fittings shall supported independently, and the ceiling shall not be used as the sole support.

The fittings shall be properly aligned, leveled and free from warps dents or other defects at the time of acceptance. Hangers, frames, supports trims shall be of the non rusting non tarnishing type and be installed in an approved manner.

Fittings shall be cleaned and installed complete with lamp or tubes as detailed.

At the time of acceptance of installation all lighting all lighting fittings shall be equipped with lamps of correct type and wattage and functioning correctly.

The inter-connection to the device shall be with PVC covered galvanised steel flexible liquid tight conduit which itself shall be so positioned that it shall not form an obstruction to passage and be inherently protected from damage by its intrinsic qualities or by a separately applied construction. A-proved liquid tight connectors shall be used.

Conductors shall be sized and selected in accordance with the duty consumption and environment and at all times shall be generally protected from accidental damage resulting from the legitimate use of the space.

17. Outlet Boxes

All outlet boxes shall be steel galvanised by an approved industry standard method which applies the galvanise plating after the boxes are cast, pressed, drilled or threaded.

Pressed steel outlet boxes will be permitted for concealed work in hung ceilings and where encased in the construction.

All flush or surface mounted exterior outlet boxes and all interior surface mounted ceiling and wall outlet boxes shall be galvanised or Cadmium plated cast iron or malleable iron conduit connections. Covers shall be watertight type complete with gasket.

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Outlet boxes for lighting switches shall be mounted at a standard height of 1375mm from floor and shall be located 230mm from jamb on the lockside of the door as finally hung, whether so indicated on the plans or not. Wall outlet boxes for receptacles, telephone and other devices shall be located at a height of 300mm from the floor, except where otherwise noted, directed or required.

Attention is called to the fact that the locations of outlets for apparatus, or equipment on the contract drawings are only approx. outlets shall be installed to clear all ductwork and piping.

18. Low Voltage Conductors

All wires shall be of soft-drawn annealed copper having a conductivity of not less than 98% of that of pure copper. Each wire shall be continuous without weld, splice or joint throughout its length, shall be uniform in cross-section, free from flaws, scales and other imperfections, and shall be provided with a heavy uniform coating of tin.

No wire smaller than 1.5mm² or 3/029 may be used except for signal control circuits. All receptacle circuits shall be wired with 2.5mm² Or 7/029 conductors unless otherwise scheduled or noted.

All lighting circuits shall be wired with 1.5mm² or 3/029 for wire or conduit runs of less than 30 meters, 2.5mm² or 7/029 wire should be used for longer runs, where necessary in all cases limiting the voltage drop from the panelboard to load to 2 ½ %.

No wire shall be drawn into a conduit until all work of a similar nature that may cause injury is completed.

Powdered soapstone or an approved cable pulling compound may be used as a lubricant where necessary.

No material that may be injurious to the wire covering or insulation shall be used.

Mains and feeder shall run their length in continuous pieces without joints or splices.

Joints in branch circuits shall occur only where such circuits divide as shown on the plans, and shall then consist of one through circuit to which shall be spliced the branch from this circuit.

19. Motor Wiring

Connections between the fixed wiring and particular machinery, equipment, motors, etc., shall generally emanate from an isolator switch or combination isolator/starter rigidly fixed to a suitable support.

Adaptable junction switch or outlet boxes shall be accessible and have removable covers whether on surface or buried. Switch and outlet boxes shall be provided with earth terminal and screw. PVC conduit tubing shall be fixed to boxes with sprouts by use of manufacturers recommended adhesive applied to the female part of the joint and the male portion twisted into it to ensure total coverage and a solid joint. Tubing fixed to boxes without sprouts whether they be of steel or PVC composition shall be use of manufacturer approved PVC tubing adapters having female socket for plain tube adhesive joint but with female thread at the other end for receipt of a male screwed bushing.

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No conduit smaller than 20mm diameter shall be used. All cuts shall be made square and done with a hacksaw. Bending of PVC conduit not exceeding 25mm diameter shall be normally done cold using the manufacturers recommended bending spring if available.

If unavailable and to bend larger sizes of PVC conduit shall be heated until it is pliable for bending by inserting in a large sized steel pipe over a burner or blow lamp. A 90 degrees bend shall have a radius of not less than four times the outside diameter of the tube. During installation all conduits, unfinished runs and terminations in pull boxes, cabinet's etc., shall be capped in an approved manner.

There shall be not more than three 90-degree bends or 15M of continuous runs without pull boxes. An insulated earth continuity conductor shall be drawn into the conduit for all light and power wiring systems.

All hangers and supports shall be substantial and designed for the duty, be non-rusting and non-tarnishing and installed at a frequency in keeping with approved North American or British codes having relevance.

The length of thread shall be no more than is absolutely necessary. All joints shall be painted with metallic paint. Ends of conduit shall be plugged and threads that are likely to remain exposed for any length of time shall be painted with metallic paint to prevent rust.

All corners shall be turned by means of slow hand made bends, or where these cannot be accommodated, by means of malleable cast iron boxes. The radius of any bend shall be in accordance with the code.

The electrical sub-contractor must take tests of the continuity of the conduit as erection proceeds.

20. Surface Conduit Runs

All surface conduits shall fit in with architectural features, all runs being horizontal and vertical. Diagonal runs are not permitted. All accessories shall lie on the same horizontal and vertical lines, corners and angles shall be neatly turned and runs shall be kept straight.

Branches shall be taken off at right angles surface conduits shall be secured with galvanised cast iron spacing saddles (reform saddles), giving a minimum clearance of 13mm between conduit and fixing surface, spaced at even intervals of not more than four feet, arranged so that a saddle is not more than 230mm from a joint, bend or accessory.

Expanding soft metal plugs and brass screws shall be used in all brick and concrete fixings.

21. PVC Conduits

Conduit for electrical work shall be heavy and approved gauge PVC conduit of standard weight except where otherwise noted, directed or required.

Conduits may be jointed to each other or to accessories by permanent binding of the two parts, by weatherproof expansion joint or by threaded joint or by PVC cement. Factory made elbows bends, tees, shall not be used.

Each length of conduit shall be perfectly smooth inside and outside and free from flaws and imperfections of any kind. The ends of all conduit shall be carefully reamed out free from all burrs before installation and after threading. All cuts shall be made square and done with a hacksaw. The end of each box, outlet box, cabinet, etc. shall be fitted with a locknut bushing. All light and power conduit runs shall form a permanent and continuous ground return back to the service ground connection point. The whole of the conduit shall be erected complete before any wiring is commenced.

All conduit fittings shall be galvanised malleable cast iron with long bushed sprouts, except where conduits are run on the "loop-in" principle. When they shall be of the multiple back outlet type. All box covers shall be of heavy cast iron type faced edges and for sunk conduit boxes shall have 13mm overlap all round to cover all unsightly edges of plaster.

All boxes shall have machine faced edges , and covers shall be fixed to boxes by means of greased brass

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screws. Covers shall have a gasket if exposed to the elements.

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Malleable cast iron adaptable boxes shall be fitted at every point where conduits cross to avoid unnecessary offsets.

Conduit with cable greater than 7/029 (2.5mm²) shall have long draw-in trough type boxes of the following minimum lengths at every turn or every two lengths.

<u>Conduit mm</u>	<u>diameter</u>	<u>20mm</u>	<u>25mm</u>	<u>32mm</u>	<u>38mm</u>
Trough mm	long	90mm	100mm	165mm	250mm

All buses, switching devices and connections should be of sufficient size to limit the temperature rise to 30 degrees "C" over the average air temperature inside the enclosure and all bus contact surfaces shall be silver plated.

Busbars shall be of such dimensions that at full load the current density in any busbar shall not exceed 160 amperes per square centimeter of cross section. At fixed contacts current density shall not exceed 24 amperes per square centimeter of cross section. Where current density requires heavy busbars, they shall be laminated.

The neutral busbar framework (busbar, insulations, supports, etc) shall be rigid, easily accessible and free from vibration. Each lug will be attached to busbars by at least two bolts.

Each circuit breaker shall be equipped with an engraved nameplate, which indicated the name of the equipment (motor panelboard etc.) to which feeder conductors are connected. The nameplate shall also indicate the size of trip required.

22. Cabinets

Each door shall be provided with a substantial flush type tumbler type lock and catch. All locks shall be keyed alike. Fronts and boxes shall be shop painted with an anti-corrosive prime coat. Circuit breaker panel boxes may be used as cabinets.

23. Ridged Metallic Conduits

Where shown on drawings, all heavy gauged screwed, welded or solid drawn conduit shall be rigid galvanised steel. Conduit shall be the hot dipped galvanised type to be approved industry standard, and solid elbows, screwed bends, tees and split fittings shall not be used. All fittings shall be of inspection type.

All fittings are to be malleable cast iron screwed type. Both conduit and fittings are to be made to BS 31 clause "B". No conduit smaller than 20mm OD shall be used.

During installation all conduits, all unfinished runs, and terminations in pull boxes, cabinets' etc., shall be capped in an approved manner.

Caps shall be left in place until ready for installation of conductors. There shall be no more than 90-degree bends or 15M of continuous run without pull boxes. Radius of bend shall not be less than ten times the diameter of the conduit.

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24. Method of Conduit Installation:

General

Conduits must be kept well clear of all other services by at least 150mm and must on no account be run in the same trench as the other.

In timber-joisted roof and floors, conduits shall as far as possible run with the joist, they shall be run at right angles to the joists. Diagonal runs across joists will not be permitted.

A conduit box or other ironclad fittings must be fixed at every outlet point. Where a surface mounted accessory such as an isolating switch ball, etc., is fixed to a sunk conduit, a flush fitting conduit box is to be fitted behind the accessory to obviate conduit bending out of plaster wall surface, the surface accessory having a bushed hole provided in the back for the purpose. Boxes for light fittings shall be fixed independently of the conduit.

Conduit is to be connected to unspouted accessories such as fuseboard, switchgear, lighting switches socket outlets, adaptable boxes, etc., by means of machine faced screwed solid hexagonal couplings and hexagonal smooth bore male bushes. Spanners must be used to tighten these fittings.

All locknuts shall be of the heavy screwed hexagonal type.

A back outlet box shall be provided where a surface conduit turns and passes through a wall.

Conduits shall be screwed tight into coupling boxes and accessories.

25. Circuit Breaker Panelboard

Panels of type and size described in drawings shall be installed as shown. Only the holes or entrances necessary to accommodate the required number of conduits or trunking shall be knocked out. The insides of the panels shall be free from all sharp edges, or projection likely to cause damage to wires and cables. All wires and cables in the panel shall be free from splices, be neatly packed, and laced and fully insulated to the point of termination.

Each panelboard shall contain a 5" x 8" directory under glass plastic. The directory shall have description of the load on each branch circuit and the trip size of each branch. The sizes of the feeder cable and conduit (where used) shall also be on the directory as well as whether the panel is sub-fed or sub-feeds another panel.

Function-indicating nameplates shall be installed on all equipment panels and sub-panels.

All panelboards shall be of the circuit breaker type and shall be equipped with quick make, quick break circuit breakers of the numbers of poles as required by the panelboard schedules.

Panelboards shall be surface or flush mounted as called for on the plans or as indicated in panel schedules. Cabinets shall be manufactured of code gauge steel and shall be hot dipped galvanised after fabrication.

Cabinets and covers shall receive at least two coats of shop paint before delivery to the site.

All circuit breakers shall be of the stationary type and shall be removable without disturbing studs on buswork. Where future breaker spaces only is called for, all studs, copper work, and provisions for mounting breakers shall be provided so that when the breaker is added, no additional parts or changes to the structure of the buswork is required.

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K FLOOR, WALL AND CEILING FINISHES

1. Generally

Where proprietary systems are specified in the measured item for wall, floor and ceiling finishes, the work shall be carried out in accordance with the manufacturer's instructions.

2. Preparation of Surfaces

Surfaces to receive render or screeds shall be dry brushed to remove all loose particles, dust, laitence, efflorescence, etc., and any projecting fins or concrete shall be hacked off.

3. Preparation of Surfaces Cont'd

All traces of mold oil shall be removed from concrete surfaces by scrubbing with water containing detergent and rinsing with fresh water. Surfaces shall be wetted and rewetted as required to equalize suction before any render is applied.

Concrete floors to receive screeds shall be hacked to remove concrete mortar or render droppings and well brushed to remove all loose particles and dirt. Concrete floors shall be well wetted before the screeds are laid.

4. Mixing of Materials

All materials shall be thoroughly mixed in the specified proportions measured by volume. No mixes of render or screed other than those described shall be used. Mixing boards and gauge boxes shall be thoroughly cleaned after each mix and due care and attention shall be given at all times to their cleanliness. Cement shall be used within the hour of the addition of water. Cement shall not be re-tempered and the use of the water brush shall be kept to a minimum.

Cement and sand for screeds shall be in proportion of 1:4 by volume. An approved plasticiser can be used.

5. Screeded Beds

Screeds shall be laid to the thicknesses described and finished with a steel trowel or, where described, with a keyed surface to receive in situ finishings specified.

Provide an adequate bond between screeds and concrete either by the use of an approved concrete bonding agent or by well hacking, wetting and applying cement grout immediately prior to laying screed.

Fill joints of cracks with an approved plastic material and finish joints and cracks flush with surface. Prime chalky or dusty surfaces with a primer recommended by the flooring sub-contractor and approved by the Architect.

Ensure that the levels of screeds within any one area and between adjoining areas are level unless specifically described or shown to be otherwise. Make up for any variations in thickness or irregularities in the surface of the structural base by adjusting the thickness of the screed as necessary.

6. Rendering

Mix rendering of cement and sand, in the proportion and lay to the thicknesses described with a plasticiser additive at the rate of a quarter pint of plasticiser to every bag of cement, the plasticiser to be mixed beforehand to the gauging water. The work shall be minimum 1/2" thick and shall be applied in either one or two coats provided that the finish achieved is to the satisfaction of the Architect.

Mix only quantities which can be used at once and reject rendering which has begun to set before being required.

Carefully float all work and finish to the stated thicknesses with surfaces perfectly flat to stand the straight

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edge every way, free from all cracks, blisters or after effects and leave perfectly clean.

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Throw all rendering and plaster on to the wall and give the minimum of working to ensure a plumb and even finish. Use only wood floating unless otherwise described.

External arrises shall be true and slightly rounded.

Include in the prices of all work for preparing and wetting all surfaces prior to commencement of all operations, for any additional thicknesses required in dubbing out and for working round and behind pipes with their connections and fixtures.

The wall rendering is to be executed and left off as necessary whenever chases, ducts, etc., occur and rates must include for any extra cost entailed in returning and completing the work over chases, etc., at a later date and for neatly jointing up and making good to general wall render.

7. Glazed Wall Tiling

Glazed wall tiles shall be accurately fixed to floated backings with an adhesive approved by the manufacturer and grouted with white cement. Tiles shall be well soaked in clean water immediately prior to laying.

8. Ceramic Floor Tiles

Ceramic floor tiles shall be accurately laid in a bed of cement and sand (1:3) and grouted with white cement. Joints between tiles shall be not more than 1/8" wide, unless otherwise specified. Tiles shall be well soaked in clean water immediately prior to laying.

9. Vinyl Floor Tiles

Tiles shall only be laid on a thoroughly prepared and cleaned sub-floor as specified earlier. The tiles shall be laid by an experienced layer with an adhesive recommended by the manufacturer. Tiles shall be cut and fitted cleanly and neatly and tiles shall be cleaned down immediately after laying so that no adhesive shows on the face of the tile. When the installation is complete to the satisfaction of the Architect it shall be cleaned and waxed.

10. Dividing Strips

Dividing strips shall be set accurately in position, all joints being closely made at points of completely visible.

11. Curing and Protection

In-situ floor finishings shall be cured and protected by covering with polythene sheet or other impervious material for at least five days after final trowelling or grinding. Floor tiling shall be similarly covered until practical completion of the Works.

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L PAINING AND DECORATING

1. Approval

The preparation of all surfaces must be seen and approved by the Architect before any coatings are applied.

2. Generally

All floors shall be cleaned before painting is commenced. No painting shall be carried out while dust is present.

3. Plaster, Concrete and Blockwork

All plaster or mortar splashes, etc., shall be removed from plaster, concrete and blockwork by careful scraping. All holes, cracks, etc., shall be stopped and the whole of the surfaces shall be brushed down to remove dust and loose material. In addition, all traces of mold oil shall be removed from concrete surfaces by scrubbing with water and detergent and rinsing with clean water to remove all detergent. When efflorescence has occurred or is suspected, painting shall be deferred for a period as required by the Architect.

4. Iron and Steel

All rust and scale shall be removed from iron and steel surfaces by wire brushing, scraping, hammering, flame cleaning, etc.

5. Plywood

Surfaces of plywood to be painted shall be filled as required with plaster base filler for internal work and a filler, as previously described, as for stopping for external woodwork, for external work and then rubbed down and all dust and loose materials brushed off. After priming, all imperfections shall be stopped, rubbed down and brushed off.

6. Woodwork to be Painted

Before fixing woodwork all surfaces which will be visible after fixing shall be rubbed down and all knots and resin pockets shall be scorched back and coated with knotting.

After priming and fixing, all nail holes and other imperfections shall be stopped and the whole surface shall be rubbed down and all dust brushed off. The Contractor shall include for all rubbing down in his rates.

7. Woodwork to Receive Clear Finish

All holes and other imperfections in surfaces to receive a clear finish shall be stopped and the whole surface shall be rubbed down and all dust brushed off.

8. Previously Painted Surfaces

All old paint surfaces which are to be repainted shall be washed down with a solution of sugar-soap and water. All loose or flaky material shall be removed and the edges rubbed down with abrasive paper. Bare areas, holes, cracks, etc., shall be spot primed, filled to a smooth surface and brought forward with undercoat. Areas of old paintwork on metal surfaces showing signs of corrosion or of corrosion taking place beneath the paint film shall be thoroughly scraped and cleaned before applying primer, undercoat and finishing coats.

9. Preparation of Materials

The contents of all cans and containers of all materials must be properly and thoroughly prepared before and stirred during use and shall be suitably strained as and when necessary.

10. Manufacturer's Instructions

All materials shall be used strictly in accordance with the printed instructions issued by the manufacturer concerned.

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11. Brush Work

Unless otherwise described all coatings shall be applied by brush. Written permission must be obtained from the Architect for the application of coatings by spray or roller where not so described and if permission is granted such applications shall not result in extra cost to the Employer.

12. Priming of Joinery

Joinery shall be delivered to the site unprimed and shall be protected from rain and damp during transit. It is to be stored in clean, dry, ventilated structures and no primer shall be applied while the timber is in any way damp. The stores and drying rooms shall be of adequate size to allow for proper working space and for the proper coating and storage of primed work. Primers shall be applied as soon as possible after inspection and acceptance of the joinery by the Architect.

13. Coatings to be Dry

All coatings shall be allowed to dry thoroughly before succeeding coats are applied.

13. Rubbing Down

All undercoats for oil paints and clear finishes shall be rubbed down to a smooth surface with abrasive paper and all dust removed before the succeeding coat is applied.

14. Differing Colours of Undercoats

Each succeeding coat of priming and undercoating paint shall be sufficiently different in colour as to be readily distinguishable.

15. Painting in Unsuitable Conditions

No coating shall be applied to surfaces affected by wet, damp or foggy weather, or other unsuitable conditions, or to any surface damp with moisture.

16. Protection of Wet Surfaces

Adequate care must be taken to protect surfaces while still wet by the use of screens and 'wet paint' signs where necessary.

17. Damage to Adjoining Surfaces

Care must be taken when storing materials, preparing surfaces or painting etc., not to damage or stain other work. The Contractor shall remove all such stains, make good and touch up.

18. Painting Next Glass

The Contractor shall allow for cutting back the painting of window frames, mullions, transoms and glazing bars from the surface of glass to the edges of compounds or beads.

19. Cleanliness

All brushes, tools and equipment shall be kept in a clean condition and surfaces shall be clean and free from dust during painting.

Painting shall not be carried out in the vicinity of other operations which may cause dust.

The Contractor shall provide a suitable moveable receptacle, onto which are to be placed all the liquids, slop washings, etc., which on no account are to be thrown down any of the gullies, manholes, sinks, lavatories, water closets or any other sanitary fittings. All solid refuse or inflammable residue must be removed from the site or burned.

20. Removal of Ironmongery, etc.,

All fittings and fastenings are to be removed before preparatory work is begun and fittings and fastenings cleaned and refixed on completion.

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21. Generally

If in the opinion of the Architect, any of the paint is deficient in covering power owing to dilution or defective workmanship, further coats must be applied at the Contractor's expense.