

**Water, Sanitation and Hygiene Programme**

**GOAL Uganda**

**Technical Specifications and Bills of Quantities**

**For**

**Drainable Latrine Construction in Primary Schools**

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# Introduction

These Specifications and Bill of Quantities are for the construction of **06No. Blocks of five (5) stances VIP drainable latrines for pupils** in schools in Butaleja with 4 units/blocks and Kaabong district with 2 units/blocks. The latrines are in two categories for **male and female pupils**. All the 6 blocks of drainable latrines will be built in primary schools in any of the sub-counties in the respective districts as shall be allocated**.**

The Bill of Quantities attached shall be read in conjunction with these Specifications and Drawings.

Contractors must comply with all Government of Uganda labour laws at all times as well as signing up to GOAL Uganda Policy and Code of Conduct on Child Protection and Beneficiary Interaction as well as attend regular sensitization sessions as organized by GOAL in relation to the above as well as construction best practice.

# Drawings

The following drawings list to be read in conjunction with these specifications:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Page | Drawing No. | Description | Date | Scale |
| 1 | Cover Page | Girls’ 5-Stance VIP Latrine Block 7 Incinerator | Sept-2024 | NTS |
| 2 | GVp [- -] 01 | Girls’ Block Floor Plan | Sept-2024 | NTS |
| 3 | GVp [--] 02-05 | Girls’ Block Elevations | Sept-2024 | NTS |
| 4 | GVp [--] 06 | Girls’ Block Foundation & Slab/Ground beam Layouts | Sept-2024 | NTS |
| 5 | Cover Page | Boys’ 5-Stance VIP Latrine Block  | Sept-2024 | NTS |
| 6 | BVp [- -] 01 | Boys’ 5-Stance Floor Plan | Sept-2024 | NTS |
| 7 | BVp [--] 02-05 | Boys’ Block Elevations | Sept-2024 | NTS |
| 8 | BVp [--] 06 | Boys’ Block Foundation & Slab/Ground beam Layouts | Sept-2024 | NTS |
| 9 | Cover Page | General Drawings | Sept-2024 | NTS |
| 10 | G/BVp [--] 02 | Typical Section through VIP Pit | Sept-2024 | NTS |
| 11 | G/BVp [--] 02a | Typical Section through VIP Pit-detail 06b | Sept-2024 | NTS |
| 12 | G/BVp [--] 03 | Door schedule & section- Roof details | Sept-2024 | NTS |
| 13 | G/BVp [--] 05 | PWD device and Squatting Details | Sept-2024 | NTS |
| 14 | G/BVp [--] 04 | Ramp and HWS details | Sept-2024 | NTS |
| 15 | G/BVp [--] 07 | Incinerator Details | Sept-2024 | NTS |
| 16 | G/BVp [--] 06 | Incinerator Details | Sept-2024 | NTS |

# PRELIMINARIES

## Access

To gain access to the various Sites for pricing, contact GOAL Office in Mbale in advance for details.

## Contract

Contract shall be the GOAL Contract Agreement and Schedule of Conditions. The Contractor should make himself familiar with the Contract and all its Conditions.

## Retention Sum

A retention amount of 10% shall be held till the completion of the six months after the date of Practical Completion (being the date on which the works are sufficiently complete to allow the latrines to be fully used by the beneficiaries as intended) and only after the making good of any defects in the works that may exist up to the end of the 6-month defects period (excluding defects due to normal use).

## Warranty Period

The contract shall have a warranty period of six months from the date on which the last group of latrines are completed.

## Insurances

The Contractor shall indemnify GOAL Uganda against all and any third-party claims to persons and property.

## Site Security

The Contractor shall always be responsible for site security during construction. The contractor should ensure that all necessary precautions and measures are put in place to ensure that the security of the site, works and all materials stored on site is properly and thoroughly provided throughout the project.

The Contractor is advised to visit the site and ascertain all local conditions and restrictions likely to affect the execution of the Works. No claims arising from failure to do so will be considered. Do not use the site for any purpose other than carrying out the Works.

## Disturbance & Adjoining Property

The Contractor shall carry out the works in such a manner as to minimize all and any disturbance and inconvenience to adjoining properties, the public and by-passers

## Works Access

Proper care and protection shall be provided to areas unaffected by the works.

## Services

Contractor to provide all services required to carry out the works including water and electric power.

## Site Safety

GOAL regards the safety of onsite workers, animals and third parties as being paramount. Allow for the provision of all necessary equipment to ensure compliance with GOAL Health and Safety rules (plywood sheets to protect excavations, appropriate PPE (Personnel Protection Equipment including hard hats/helmets, gloves and reflective jackets) for all staff, ladders, scaffolding etc. as required.

The site shall be kept tidy and safe during construction. Materials shall be stored in a secure and safe manner.

The works to be carried out using methods and equipment so as to ensure site safety. The Contractor to ensure that all workers to be fully trained in use of any equipment required to carry out the works.

Suitable First Aid assistance shall be provided on site.

## Site Supervision

The Contractor and **NOT** GOAL shall be responsible for the daily supervision of the works. A competent and experienced Site Supervisor shall be provided by the Contractor on site at **ALL** times, during working hours, who shall be authorized to accept and carry out instructions from GOAL.

Periodic site inspections shall be carried out by GOAL to check that works are being completed in accordance with the contract drawings and documents.

If at any time laxity or serious departures from set norms are observed by the Client, suitable action shall be taken by the Contractor to correct the situation.

The Contractor will provide to the Client a list of names and contact numbers for the site foremen who will be responsible for supervising the works on site.

## Plant and Debris

The site is to be kept tidy and orderly during the work. Contractor shall provide all tools, plant, scaffolding, ladders, hoarding protection and all materials in all trades for the carrying out of the works.

Upon completion of the works, remove all rubbish, debris, plant and unused materials and leave site in a safe, tidy and finished condition.

## Variations

All and any variations shall not proceed without the written authorization of GOAL in advance.

## Discrepancies / Errors

Where there is a discrepancy between the Drawings and the Specification, consult GOAL for clarification.

## Working Hours

Shall be between 8.00 am and 6.00 pm Monday to Saturday.

## Quality

All materials and workmanship shall be the best of their respective kinds. All work shall comply with all relevant Building Regulations and Codes required by Uganda law. The Contractor is to provide, at his own expense, samples and test reports of all materials to be used in the works.

## Site Facilities

The Contractor shall provide toilet facilities for staff.

## Finish Complete

Include generally for finishing complete in all trades, all chasing, making holes, and making good and boxing-in.

## Approved Materials

The materials and workmanship shall, unless otherwise qualified in these specifications, conform to the Standard Specification of Materials and Workmanship for Building Works issued by the Ministry of Housing and Urban Development of the Republic of Uganda or the relevant British Standards.

## Building Regulations

The materials and workmanship shall, unless otherwise qualified in these specifications, conform to the Standard Specification of Materials and Workmanship for Building Works issued by the Ministry of Housing and Urban Development of the Republic of Uganda or the relevant British Standards.

## Protection Guidelines

Ensure every effort to protect completed work or existing materials & appliances. Ensure appropriate measures taken for protection and storage of all materials on site.

## Child Protection Policy

All works to be carried out fully in accordance with GOAL Child Protection Policy. For details on the Policy, contact GOAL Head Office in Kampala.

# GENERAL SPECIFICATION

## GENERAL ITEMS

**4.1.1** All materials used in the works shall be new and of the quality and kind specified.

**4.1.2** The Contractor is to provide, at his own expense, samples and test reports of all materials to be used in the works.

**4.1.3.** Where materials are specified by reference to a manufacturer's name or type the Contractor may offer alternative materials of equal or superior quality, details of which should be submitted with the tender document. If awarded the contract, the Contractor must submit samples of the alternatives proposed to substantiate the equality and obtain written approval from the Employer before purchase.

**4.1.4.** The materials and workmanship shall, unless otherwise qualified in these specifications, conform to the Standard Specification of Materials and Workmanship for Building Works issued by the Ministry of Works of the Republic of Uganda or the Ministry of Education and Sports.

**4.1.5.** Before starting work the contractor is required to survey the site and report any differences or discrepancies with the drawings.

## EXCAVATION AND EARTHWORK

**4.2.1** The Contractor is recommended to familiarize himself with the area of operation before tendering and to ascertain the probable nature of the ground to be excavated.

**4.2.2** Excavation may be hand or mechanical, as necessary to meet the specification.

**4.2.3** When it is specified that the Contractor must include in his tender for any variation in depths or sizes of foundations, care must be taken in calculating the total quantity of each type of excavation necessary to suit the site conditions of the works.

**4.2.4** Materials arising from the excavations are to remain the property of the Client unless the Contractor is specifically instructed to remove them from the site.

**4.2.5** The Contractor must inform the Employer when excavations are ready to receive other constructions and obtain the Employer's approval before commencing additional work. Any other work executed before excavations are inspected and approved must, if so directed, be removed and new work substituted to approval. No claim will be allowed for such removal and new work.

**4.2.6** All filling material is to be from a source and of a composition approved by the Employer and capable of being compacted as specified.

## CLASSIFICATION OF EXCAVATIONS

**4.3.1** Where quantities do not form part of the Contract, the Contractor will be deemed to have included in his tender for excavation in any class of material.

**4.3.2** Class 1: Material which cannot be removed except by blasting, use of metal wedges and sledgehammers or mechanical means. Boulders greater than 0.5m3 which constitute 50% or more of the volume of particular part of the excavation will be considered class 1 material throughout.

**4.3.3** Class 2: Normal soft material which can be removed without recourse to the methods in class 1, 3 and 4.

**4.3.4** Class 3: Compacted gravel or decomposed rock materials such as consolidated murrum or gravel, decomposed or stratified rock, stones and boulders less than 0.5m3, which can be excavated by ripping or using compressor tools.

**4.3.5** Class 4: Excavation requiring de-watering due to ground water.

## CLASSIFICATION OF FILL

**4.4.1** Normal: Subsoil, imported or resulting from the excavation, free from rubbish and vegetable matter.

**4.4.2** Hard: Aggregate, murrum, rock and hard-core filling.

**4.4.3** Murrum, otherwise known as laterite, should be of good quality, well graded and free from vegetation including roots. In order to minimize excessive breakdown of the murrum, compaction activities should be carefully planned and controlled, particularly for murrum with a nominal size that is less than 10mm. The murrum should be laid and compacted in 100mm layers.

## WORKMANSHIP

**4.5.1** Before starting work confirm with the Employer which, if any, trees are to be removed. Cut down, grub up roots and fill voids with approved material. Clear site of undergrowth after confirming with the Employer which bushes and shrubs are to be retained. Remove from site or burn on site all grass and vegetable matter arising from site clearance.

**4.5.2** Destroy all white ants nests within the perimeter and within 20 metres of the building. Destroy queen ants impregnate holes and tunnels with insecticide and fill voids with approved material.

**4.5.3** Hard materials arising from site clearance may be re-used as hardcore if complying with the specification for hard filling material and approved by the Employer.

**4.5.4** Before beginning excavation, excavate topsoil as specified or as necessary and keep separate from excavated sub soil. Unless otherwise directed or approved, remove from site topsoil containing vegetable matter or spread and level on site where directed or as shown on drawings.

**4.5.5** Excavate to the widths and depths required for the constructions shown on the drawings, including working space where necessary. Excavation in excess of requirements must be backfilled as specified at the Contractor's expense. Fill and compact in well rammed layers not exceeding 150mm.

**4.5.6** Support sides of excavation as may be necessary, using planking and strutting. The Contractor will be held responsible for the execution and subsequent removal of all necessary sheeting, timbering, strutting and shoring to ensure the safety of work people, to secure the excavations and to prevent any movement.

**4.5.7** Where casting of concrete against vertical earth surfaces is shown on the drawing or permitted by the Employer, trim earth faces neat and true to line and take precautions to prevent contamination of the concrete, to the satisfaction of the Employer.

**4.5.8** Back fill foundation trenches, working space and the like with earth or murrum filling well compacted in layers not exceeding 150mm thick. Avoid damage to adjoining construction and do not backfill against brickwork or the like until mortar has set hard.

**4.5.9** Maintain all excavation free from water, including spring and running water and storm water. If it is likely that standing water will occur in excavations before the placing of concrete or other constructions, do not excavate the final 100 to 150mm of soil until immediately before construction takes place.

**4.5.10** Where waterlogged material is encountered in the excavation, inform the Employer and obtain his instructions as to the measures to be employed.

**4.5.11** Spread and level on site or remove from the site all surplus material as directed or shown on the drawings.

**4.5.12** Treat the top surface of all hard-core and aggregate filling with insecticide applied in accordance with the manufacturer's instructions.

**4.5.13** Spread and level hard-core in layers not exceeding 150mm thick and consolidate with a smooth steel wheeled roller or by other approved means. Where mechanical consolidation might endanger completed or partially completed construction consolidate with hand rammer to the approval of the Employer.

**4.5.14** Place and compact porous fill in layers brought up 100mm in advance of general filling material adjoining.

## CONCRETE WORK

4.6.1 Include for taking samples of aggregates, cement, reinforcement, concrete and the like as specified herein, for preparing 2 test cubes at 7 days and 2 at 28 days transporting samples to M.O.W Kampala. The number of test is subject to Employer's requirements.

**4.6.2** The Contractor shall deliver samples of sufficient quantity of the material to the laboratory for preliminary trial tests of the proposed mixes.

**4.6.3** Preliminary trial tests must be carried out at the Contractor's expense and satisfactory test results submitted to the Employer before mixes can be sanctioned.

**4.6.4** A record of all tests shall be kept on site identifying the tests with the corresponding parts of the works.

**4.6.5** Should the Contractor either fail to carry out any test described in the specification or fail to produce the relevant test certificate, further tests will be specified and carried out at the Contractor's expense.

4.6.6 If the strength of the works cubes fail to comply with the requirements of this specification, or if the concrete placed in the works is in opinion of the Employer unsatisfactory in any other way, the relevant mix shall no longer be used and the concrete work will be rejected.

4.6.7 The term "cubes" mentioned above, shall be made and cured in accordance with BS 1881 PART 3.

## MATERIALS

4.7.1 Cement, sand and water shall be as described in section G - Walling.

4.7**.2** Aggregates shall be to BS 882, hard, durable, clean, and free from deleterious materials in form or in sufficient quantity such as to affect adversely the strength or durability of the concrete or to produce corrosion of the reinforcement.

## WORKMANSHIP

4.8.1 Store each type and size of aggregate separately in an area covered by well drained tightly laid wood planks, sheet metal, hard compact gravel, concrete or other hard, clean surface. Prevent the mixing of different types of aggregate and the intrusion of the foreign matter.

4.8.2 Store cement delivered in bags in a waterproof shed on a wooden floor raised at least 150mm above the surrounding ground.

4.8.3 Provide samples for testing in accordance with a programme agreed with the Employer. Carry out workability tests on site under the supervision of the Employer if required. Indicate on the works test records the parts of the structures represented by the sample tested, and provide copies to the Employer.

4.8.4 All concrete shall be mixed in a batch type mechanical mixer of approved type or as agreed on site. The quantity of cement shall be determined by weight. The quantity of fine and coarse aggregate may be measured by weight or volume using correctly calibrated gauge boxes. The quantity of water must be accurately controlled to ensure a constant water cement ratio.

4.8.5 Concrete with a slump value greater than the specified maximum must not be used in the work.

In thin walls, beams and the like 75mm maximum

In larger sized members 50mm maximum

In suspended slabs 75mm maximum

For mass concrete (un-vibrated) 100mm maximum

4.8.6 Cube Tests: Take a sample of fresh concrete from the point of placing as specified in BS 1881 Part 1, clause 2. Where specified that more than one cube is to be made, take each sample from a different place. If a concrete mix fails to pass any specified test, cease concreting immediately and do not recommence until instructions have been obtained from the Employer.

4.8**.7** The specified mixes are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade** | **Max Agg Size** | **Max w:c ratio** | **Min crushing strength N/mm2****7 days** | **Min crushing strength N/mm2****28 days** |
| **30** | 20mm | 0.45 | 21 | 31.5 |
| **25** | 20mm | 0.5 | 18 | 26.5 |
| **20** | 20mm | 0.58 | 2 | 21 |

4.8**.8** When transporting concrete, avoid contamination, segregation or loss of ingredients. The method of transporting concrete must permit placing and compaction within the times specified for each mix.

4.8.9 Prior to placing concrete ensure that all surfaces on which concrete is to be placed are clean, with no debris or free water. When concreting care should be taken to prevent damage to or displacement of reinforcement formwork and freshly placed concrete.

4.8**.10** Obtain approval from Employer of the formwork, reinforcement and surfaces on which concrete is to be placed.

4.8**.11** Record the date and time of each concrete pour and supply a copy to the Employer.

4.8**.12** Place concrete made on site with ordinary Portland cement within 20 minutes of the addition of water to the mix.

4.8**.13** Do not discharge concrete through obstructions in any way which may cause uneven dispersal, segregation or loss of ingredients. Place concrete in a single continuous operation up to construction joints.

4.8**.14** Do not place concrete on both sides of a movement joint at the same time without the approval of the Employer. Joints will be permitted only in the positions shown on the drawings or as agreed with the Employer.

4.8**.15** Before placing concrete in foundations ensure that the excavated bottom is clean and to the profile shown on the drawings or approved by the Employer. Where concrete is to be cast against the sides of excavation without the use of formwork, trim vertical surfaces neat and true to line. If any excavation is made wider or deeper than specified, the void must be filled with concrete of the same class as that specified for the foundation, at the Contractors' expense. Do not place concrete in foundations before the excavation has been inspected and approved by the Employer. Unless otherwise directed, **concrete grade 20 and upwards shall be compacted by mechanical vibration** so as to ensure a dense homogeneous mass throughout every part of the works and to produce a good surface finish.

4.8**.16** After placing and compacting, cover concrete surfaces for a continuous period of not less than seven days unless otherwise directed by the Employer. The structure must not be loaded before the concrete has attained the required strength. Loads in excess of the design loads must not be imposed on the concrete.

4.8**.17** Particular care must be taken when concreting above finished work, e.g. ring beam above fair face brickwork, to ensure no grout leakages cause damage. Any damage so caused will have to be rectified at the Contractor's expense.

## WALLING

4.9**.1** The Contractor will submit the following numbers of material samples for testing. Those samples will be selected under the supervision of the Employer, and the Contractor is to include for all testing, packing & transportation to the M.O.W laboratory in Kampala or another laboratory approved by the Employer.

4.9**.2** The Contractor will be required to provide additional samples for testing in the event that the quality changes.

4.9**.3** Include for cutting, bonding and junctions, levelling courses and plumbing angles, forming all openings, filling ends of hollows blocks, building off beams or slabs and building overhand or off scaffolding.

## MATERIALS

4.10**.1** Unload and handle bricks, blocks, tiles and stones without soiling, chipping or otherwise damaging. Do not tip bricks or blocks from vehicles. Stack bricks and blocks on edge on level hard standing.

4.10**.2** All cement used for making mortar shall be Portland cement complying with BS 12, should be kept on pallets, and protected from water and damp.

4.10**.3** All sand used for making mortar shall be clean well graded silicone sand of good sharp quality equal to samples which shall be approved by the Employer. It shall be free from lumps of stone, earth, loam, dust, salt, organic matter and any other deleterious substance, sieved through a fine sieve and washed if so directed by the Employer.

4.10**.4** The water shall be potable, clean, free from dirt, vegetable matter, mineral salts or other impurities. To be tested if required.

4.10**.5** Clay used for mortar shall be free from organic matter and shall be visually inspected for cohesiveness. It shall be prepared and mixed three days prior to use to allow proper permeation of water.

## WORKMANSHIP

4.11**.1** The cement mortar (1:3) shall be composed of 42.5kgs of Portland cement to 0.085m3 of sand. The cement mortar (1:6) shall be composed of 42.5kgs of Portland cement to 0.17m3 of sand measured in specially prepared gauge boxes and thoroughly mixed in an approved manner with water added afterwards until all parts are completely incorporated and brought to a proper consistency. **The use or re-tempering of wholly or partly set mortar is not allowed**. Cement lime sand mortar shall be composed of a mix ratio of 1:1:10 batched by volume. Cement clay sand mortar shall be composed of a mix ratio of 1:5:10 batched by volume. Lime clay sand mortar shall be composed of a mix ratio of 1:2:4 batched by volume.

## BRICKWORK & BLOCKWORK

4.12**.1** Prepare a panel approx. 1m2 for each type of brickwork including jointing or pointing and obtain the approval of the Employer before proceeding with the work.

4.12**.2** The Contractor shall provide setting out rods and set out all work on the same course for openings, heights, etc. and shall build the walls, piers, etc. to the width, depths and heights indicated on the drawings.

4.12**.3** Bricks shall be kept wet before being laid. All walls throughout the work shall be carried up evenly no part being carried up more than four courses at one time, all walls shall be levelled round at each stage.

4.12**.4** All faces of walls to be plastered are to have all the joints raked out as key for plaster.

4.12**.5** Walling at all angles and intersections shall be coursed into the full thickness of the adjoining wall. All walling shall be built up entirely solid without voids. All prepared, surfaces reveals and angles of the walling shall be flushed up and grouted or raked for pointing as the work proceeds.

4.12**.6** All putlog holes shall not be less than one course deep and carefully filled with a brick cut to fit size of opening with beds and joints filled with mortar well tamped in after scaffolding is removed and if in fair faced wall to match facings.

4.12**.7** All new brickwork shall be toothed into existing walls every third course.

4.12**.8** Keep all face work clean during construction and after completion. Rubbing to remove stains will not be permitted.

4.12**.9** Protect all walling from weather and damage while mortar is setting.

## BRICKS

4.13**.1** Bricks shall be of the "common" classification unless otherwise specified. The Contractor shall, at the commencement of the work, provide a sample of 24 bricks for the approval of the Employer.

4.13**.2** All clay bricks shall be sound, hard, well burnt and free from cracks. The contractor shall be entirely responsible for the selection of bricks, free from defects, from batches delivered to site, and will not be paid or reimbursed for rejected or broken bricks.

4.13**.3** Clamp fired clay bricks may only be used when specified, and acceptance by the Employer, but will be of dimensions suitable for coursing in header and stretcher bond in full brick thickness walls. The dimensions of bricks will be within 5 millimetres of the nominal length, width and height, as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimensions** | **Nominal** | **Max** | **Min** |
| **Length** | 215 | 220 | 210 |
| **Width** | 100 | 105 | 95 |
| **Height** | 75 | 80 | 70 |

4.13**.4** The damp proof course is to consist of a 10mm screed of cement and sand (1:2) laid over the area of the walls and finished to a level surface and covered with and including an approved fibre based bituminous damp proof course weighing not less than 2.7 kgs per square metre and lapped 225mm at all joints and intersections or polythene damp proof membrane as may be specified G1000 and lapped 150mm at ends. All walls are to be carefully cleaned and wetted before the screed is laid.

## SHEET ROOFING

4.14**.1** Do not allow any person other than operatives fixing the roofing to have access to the area below while roofing is under construction. Do not allow any person to go onto roofing without using crawling boards.

4.14**.2** Lay and fix roofing sheets and accessories in accordance with manufacture's recommendations and to make the whole sound and watertight. Do not damage or weaken structural members when fixing sheets, which must be of a size and pattern to suit the roof members. Bolt, screws and nails must be supplied complete with plastic washers.

4.14**.3** Galvanised mild steel corrugated sheets to BS 3083, not less than 0.376mm (28swg) thick. Sheets must be free from twist or buckle. Galvanising must be clean, free from surface defects, and firmly bonded to the steel. Ridges, valleys, flashings and the like, to be of the same profile and quality as the roofing sheets.

4.14**.4** Galvanised mild steel ridges and valleys must be not less than 0.376mm (28swg) thick, of a profile to suit the specified construction, and not less than 300mm wide.

4.14**.5** All fixing bolts, screws and nails must be fitted with approved plastic washers suitable for the profile of the sheeting in use.

4.14**.6** Punch fixing holes from underside of mild steel sheets.

4.14**.7** Lay all sheets with end laps of not less than 150mm. Lay 75mm standard corrugated sheets with one and a half-corrugated side lap. Lay super seven sheets with single corrugation side lap. Lay all sheets with open joint of side lap to face away from the prevailing wind.

4.14**.8** Fix accessories in accordance with manufacturer's recommendations using where possible the same fixing as secures the sheeting. Otherwise fix accessories to sheeting with roofing bolts or roofing nails.

4.14**.9** Structural timber will be joined using bolts and washers or screws where appropriate. Nails will be used as necessary with approval. All battens, roof boarding and other members to be fixed using galvanised steel wire nails. The contractor is to leave all the roofs complete and watertight unmarked with cement or bitumen, particularly flashings and external finishes and with joints in straight and even lines.

4.14.**10** No nails, screws or bolts are to be placed in any end split. If splitting is likely or is encountered in the course of the work, holes for nails are to be pre-bored at diameters not exceeding 4/5ths of the diameter of the nails. Clenched nails must be bent at right angles to the grain. Lead holes are to be bored for all screws.

4.14**.11** Joints in joinery must be as specified or detailed and so designed and secured as to resist or compensate for any stresses to which they may be subjected. All knots, springs, etc. are to be punched and puttied.

4.14**.12** Loose joints are to be made where provision must be made for shrinkage, glued joints where shrinkage need not be considered and where sealed joints are required. All glued joints shall be cross-tongued or otherwise reinforced.

## CARPENTRY

4.15**.1** All timber for permanent work in the building shall, before use, be approved by the supervising officer and shall be of the best quantity in accordance with appropriate specifications for its respective grade.

4.15**.2** Include for cutting, scribing, splaying, notching, halving, mortising, tenoning, ends, angles, stops and mitres, including any additional materials required. Include for slightly rounding arises in wrot work

4.15**.3** Structural timber is to be sawn on all faces and edges unless described as wrot.

4.15**.4** Include for fixing by means of nails or steel screws except where otherwise specified or shown on the drawings.

## MATERIAL

4.16**.1** Timber for structural use is to be cedar, pine, cypress, or other approved species.

4.16**.2** All carpentry timbers are to be used seasoned to a moisture content of not more than 18% of the dry weight. All joinery timbers are to be seasoned to a moisture content of not more than 15% of the dry weight.

4.16**.3** All timber necessary for the works is to be purchased immediately the contract is signed and when delivered is to be open stacked for such further seasoning as may be necessary. Preparation of the timber is to be commenced simultaneously with the commencement of the works generally. All timber and assembled woodwork is to be protected from the weather and stored in such a way as to prevent attack by decay, fungi termites or other insects.

4.16**.4** Flush doors shall, unless otherwise stated in the Bills of Quantities be 3mm plywood faced doors with solid or semi-solid cores, in accordance with BS 459 part 2 obtained from a manufacturer approved by the Employer and equal in every respect to a sample to be submitted to and approved by the Employer. Doors shall be lipped with hardwood strips on all edges and shall be finished for painting on faces and edges unless otherwise stated. Plywood for use on external doors shall be of exterior grade as described later. The proportion of solid area in semi-solid doors shall not be less than 50% of the total and shall be evenly distributed throughout the door.

4.16**.5** Plywood shall be in accordance with BS 255 and shall be of second grade.

4.16**.6** Plugs must be masonry type fixed in accordance with the manufacturer’s instructions. No wooden plugs are to be used.

4.16**.7** All timber, whether graded or ungraded, including shuttering, scaffolding and the like shall be free of live borer beetle or other insect attack when brought upon the site. The Contractor shall be responsible up to the end of the maintenance period for executing at his own cost all work necessary to eradicate insect attack to timber which becomes evident including the replacement of timber attacked or suspected of being attacked, notwithstanding that the timber concerned may have been inspected and passed as fit for use.

4.16**.8** Timber not specified to be wrought shall be as from the solid and full to the nominal dimensions stated. No undersized shall be permitted but oversize to the following tolerance may be allowed

1. 1.5mm oversize on dimensions up to 25mm
2. 3mm oversize on dimensions up to 50mm
3. 6mm oversize on dimensions over 50mm

Where "Nominal" dimensions are stated for wrot timber a tolerance of 3mm shall be allowed for such wrot face. Before putting in hand any joinery work, whether built in or fixed later the joiner is to ascertain and check on site all dimensions which affect or govern the joinery work.

4.16**.9** All joiner's work shall be wrot unless otherwise specified.

4.16**.10** Only timbers specified in these Bills of Quantities are to be used for the works, unless alternatives are authorised by the supervising officer.

## WORKMANSHIP

4.17**.1** Include for priming the backs of frames in contact with concrete, plaster, brickwork or masonry, also for touching up priming during progress of work.

4.17**.2** Ends of timbers required to be built into walls shall have 12mm space between same and walling.

4.17**.3** The Contractor is to clear up and destroy or remove all cut ends, shavings and other wood waste from all parts of the building and the site generally as the work progresses and upon conclusion of the works.

4.17**.4** Ends of timber built into walls shall be thoroughly brush treated with creosote or other approved preservatives and clean air space maintained around the timbers where they adjoin the walls.

4.17**.5** Joints must be made as specified or detailed and the execution of all jointing shall be to the satisfaction of the Employer. All connections exposed to weather are to be thickly primed except where gluing is specified. Surfaces are to be in good contact over the whole area of the joint before fastenings are applied.

## JOINERY

4.18**.1** Moisture content at the time of manufacture shall not exceed 13% for external components and 10% for internal components.

4.18**.2** Softwood species to be selected wrot podo or wrot cypress.

4.18**.3** Hardwood species to be prime grade Mvule or other approved hardwood.

## WORKMANSHIP

4.19**.1** All joinery shall be accurately set out on boards to full size for the information and guidance of artisans with all joints, ironwork and other works connected therewith fully delineated. This setting out shall be submitted to the Employer and approved before the work is commenced.

4.19**.2** All joinery shall be executed with workmanship of the best quality in accordance with the detailed drawings.

4.19**.3** All framed work shall be cut, properly tenoned, shouldered etc., and framed together as soon after the commencement of the building as is practicable but shall not be wedged up until the building is ready for fixing the same and any portions that warp, wind, develop shakes or other defects shall be replaced with new. As soon as required for fixing in the building the framing shall be glued together and properly wedged or pinned, etc., as directed.

4.19**.4** All plugs described as fixing for joinery etc., shall be approved plugs such as rawlplugs or philplugs set into holes drilled in masonry in accordance with the manufacturer's instructions. No wooden plugs are to be used.

4.19**.5** Any fixed joinery which is liable to become bruised or damaged in any way shall be properly cased and protected by the Contractor until the completion of the works.

4.19**.6** Before putting in hand any joinery work, whether to be built in with the carcass or fixed later, the joiner is to ascertain and check all dimensions on the site which affect or govern joinery work.

4.19**.7** All wrot timber dimensions given in the Bills of Quantities are finished sizes unless otherwise stated.

4.19**.8** Should any of the joinery shrink, warp, wind or develop any other defects within the maintenance period specified in the Contract the same shall be removed and new fixed in its place together with all other work which may be affected thereby all at the Contractor's expense.

4.19**.9** Reasonable tolerance shall be provided at all connections between joinery works and the building carcass, so that any irregularities, settlement or other movements shall be adequately allowed for.

4.19**.10** The arrangement, jointing and fixing of all joinery shall be such that shrinkage in any part and in any direction shall be compensated for and not impair the strength or appearance of the work or cause damage to adjacent structures.

4.19**.10** All pencil marks are to be removed before oiling or varnishing joinery work. Leave all joinery work perfect and clean without nail holes; clean up all waste and protect finished work from staining or damage.

## IRONMONGERY

4.20**.1** The Contractor is to check consignment of ironmongery upon receipt and store them in safe keeping until required for fixing.

4.20**.2** All ironmongery shall be fitted and fixed in accordance with the manufacturer's instructions. Rates for fixing are to include for all cutting, sinking, boring, mortising and fitting in hardwood or softwood and for supplying all necessary and matching screws. Rate for door furniture shall also include for fixing before painting, removal during painting operations and afterwards fixing and for labelling all keys with door references and handing to the Employer upon completion.

4.20**.3** All locks, springs and other items of ironmongery with movable parts shall be properly tested, oiled, cleaned and adjusted where necessary and left in perfect working order upon completion of the works by the Contractor who shall include for this in his prices for fixing.

4.20**.4** The Contractor's price, whether for new or repaired locks, is deemed to include for two keys to be handed over to the Client for each lock. Each set of two keys is to be attached to a spring metal key ring, with a plastic name tag attached and clearly labelled with the door or room identification.

4.20**.5** All door ironmongery not requiring replacement is to be checked and adjusted, and all moving parts lubricated. Faulty or weak springs are to be replaced at no extra cost to the Contract.

## METAL WORK

4.21**.1** All materials shall be of the best of their respective kinds and conform at least to the relevant BS where such exists. All work shall be carried out strictly as directed and approved by the Employer before fixing.

## MATERIALS

4.22**.1** Welding shall comply with the provisions of B.S.538

4.22**.2** Mild steel shall be of approved manufacture complying with the requirements of B.S.15 welding to comply with the requirements of B.S.538, 938 and 1856. Screws, bolts, washers, etc. to comply with the requirements of B.S.916 and 294.

4.22**.3** Galvanised steel sheet shall be approved manufacture, free from all defects and shall hold to the gauge specified. Galvanising shall be to B.S.729 part 7.

4.22**.4** All bolts to be the best screw bolts with hexagonal heads and nuts and round washers. Set screws to be similar but with circular flat slotted head for screwing or with round countersunk slotted head similar to a wood screw, the threaded end suitable for screwing into tapped steel to the required depth.

4.22**.5** Aluminium sheet shall comply with the requirements of BS 270 and be suitable for the purpose required. Extruded aluminium sections shall be obtained from an approved source and be equal to samples to be submitted to and approved by the Employer. The surface finish shall be as specified.

4.22**.6** Provide 25mm wide 24-gauge hoop iron reinforcement and anchors to be laid where specified under masonry and anchored in ring beams.

## WORKMANSHIP

4.23**.1** Prices for all welded work shall include for preparing, welding and grinding to a smooth finish.

## FLOOR AND WALL FINISHES

4.24**.1** The contractor is to include for any scaffolding, ladders and cradles which may be required for working at any height.

4.24**.2** The Contractor is to include for any additional material required to make up for irregularities in the substrate.

4.24**.3** Unless otherwise instructed, vee-joints will be formed in the plaster at the junction of dissimilar backgrounds, or at expansion joints.

4.24**.4** Around door and window openings and where irregular movement cracks occur, include for metal lathing, not less than 300mm wide, fixed along both edges, for the whole length of the crack or weakened area.

4.24**.5** Prepare a specimen panel of not less than 6m2 of each mix and surface finish of plastering and rendering to be used in the work. Do not proceed with the work until specimen panels have been approved by the Employer.

4.24**.6** All surfaces to be plastered or rendered shall be brushed clean and be well wetted before plaster is applied. All plaster and rendering shall be kept continuously damp for seven days after application. All arises shall be finished true and slightly rounded except where otherwise stated, and shall be run at the same time as the adjoining plaster. No partially or wholly set plaster or rendering will be allowed to be used or remixed.

4.24**.7 MATERIALS**

4.24**.7.1** Samples of all materials and each completed finish in situ will be submitted to the Employer for approval before work commences, and when required, on not more than three occasions at no extra cost to the Contract, during the course of the work.

4.24**.7.2** All sand shall be hard, clean durable and free from contaminants. In case of sand being considered unsuitable, the general standard will be required to the relevant BS 1198-1200 "Building Sands".

4.24**.7.3** Ordinary Portland cement to BS 12, delivered to site in sealed bags marked with the approved manufacture's name.

4.24**.7.4** Waterproofing agents, bonding agents or plasticisers may only be used with the permission of the Employer.

4.24**.7.5** Steel lathing for plaster shall be to BS 1369, plain expanded unless otherwise specified or directed by the Employer weighing not less than 1.6kg/m and finished with black bitumen solution. The span of the mesh must not exceed 15mm and the width must not be less than 5mm.

4.24**.8 WORKMANSHIP**

4.24**.8.1** Base course: cement-sand screed 1:3, not less than 20mm thick, followed by topping not less than 5mm thick.

4.24**.8.2** Lay concrete screed in bays of not more than 10m2. Allow at least 24 hours between placing adjacent bays.

4.24**.8.3** Compact material thoroughly to full depth. Do not bring excessive laitance to the surface, and remove any which appears. Do not wet surface.

4.24**.8.4** Finish surface of screed to receive thin sheet or tile finish smooth with a steel hand trowel.

4.24**.8.5** Do not wet the surface or sprinkle with cement. Repeat trowelling process at least three times within ten hours of laying.

4.24**.8.6** After laying, protect surfaces from wind draughts and strong sunlight, keep constantly damp for not less than 7 days mop up and scrub with a fibre brush and clean water. Allow to dry.

4.24**.8.7** Masonry substrates shall be raked out; concrete substrates hacked, unless the application of a bonding agent is approved by the Employer.

4.24**.8.8** Backgrounds shall be cleaned by removing any efflorescence, laitance, dirt and loose material by brush.

4.24**.8.9** Existing adjacent finishes will be protected from droppings or staining. Any contamination of other finished work or adjacent surfaces is to be cleaned immediately.

4.24**.8.10** The Contractor shall cut out and make good all cracks, blisters and other defects and leave the whole of the plastering and rendering perfect at completion. When making good defects the plaster shall be cut out to a rectangular shape with edges undercut, to form dovetailed keys and all finishes flush with the face of the surrounding plaster.

4.24**.8.11** Sand: proportions of mixes are for dry mix. Allow for expansion of moist sand in mixes. Saturated materials are not to be used.

4.24**.8.12** All batches to be made using gauge boxes, excess materials to be struck off with an edge. Batching of mixes with shovels will not be allowed.

4.24**.8.13** No finishes to be applied from mixes whose initial set has taken place.

## PAINTING AND DECORATING

4.25**.1** The Contractor will be required to paint a specimen panel of 5m2 and obtain the approval of the Employer before proceeding with the work.

4.25**.2** The whole of the work shall be executed to the entire satisfaction of the Employer and all work rejected is to be re-executed by the Contractor at his own expense. Subject to the foregoing, the method of application shall be by brush, unless otherwise described.

## MATERIALS

4.26.1 All paints shall be first grade and shall be applied strictly in accordance with the manufacture's specification. Notwithstanding the foregoing, thinning of paint will only be permitted with the written authorisation of the Employer. Swamps and drains shall not be used for the disposal of waste or dirty water.

4.26**.2** Any deviation from the materials and brands specified must be approved in writing by the Employer to whom application must be made before decoration starts.

4.26**.3** All paints used should be obtained from one of the following manufacturers after obtaining the Employer's approval and of the product specification herein after described. All primers, undercoats, finishing coats and thinners to be applied to any surface shall be supplied from the same manufacturer.

a) Robbialac

b) Crown paints

c) Delux paints

d) Sadolins

## WORKMANSHIP

4.27**.1** Before the painting or decorating is started the Contractor shall arrange that all other trades have been completed and other tradesmen removed from the vicinity of the area to be painted. All plaster, mortar, oil or stains of any kind shall be removed by the Contractor from work to be decorated before painting commences. The Contractor shall make good after other trades have carried out maintenance work. In cases where the defective work is carried out by or is the responsibility of another Contractor or his Subcontractors, the Employer will make arrangement for payment with the party concerned. Where cracks have been made good, apply two coats to the new filling and one coat to the whole wall in which the crack has appeared.

4.27**.2** Store materials in a clean, dry area protected from extremes of heat. Store inflammable materials in a lockable, well-ventilated store, separated from other combustible material and any risk of sparks or naked flames.

4.27**.3** Clean surfaces to ensure that mortar and plaster splashes and loose and flaking material are removed. Remove surface salts with a coarse dry cloth and leave for 48 hours. Repeat process as necessary until efflorescence ceases.

4.27**.4** All ironmongery already fixed is to be removed before painting doors and refixed on completion of the finishing coat. If any paint should get on to ironmongery, it must be removed with chemical solvents and not scratched off.

4.27**.5** All materials shall be delivered on site intact in the original containers and shall be mixed and applied strictly in accordance with the manufacture's printed instructions. No addition or dilution will be allowed to be made locally without the express permission of the Employer.

4.27**.6** The priming undercoats, and finishing coats shall each be of differing tints, the priming and undercoats shall be the correct brands and tints to suit the respective finishing coats, in accordance with the manufacturer's instructions. All finishing coats shall be of the colour and type specified by the Employer.

4.27**.7** The Contractor will be required to paint trial panels and will be required to adjust tints as necessary.

4.27**.8** Plastered and rendered surface to the decorated shall be allowed to dry for a minimum of two weeks before decoration commences.

4.27**.9** Plaster finished with a steel float and fair face concrete surface shall be well rubbed down, filled and made good as necessary and thoroughly cleaned down immediately before decoration is applied.

4.27**.10** Plaster finished with a wood float or other rough textured surface of a similar nature shall be made good as necessary and brushed clean immediately before decoration is applied.

4.27**.11** Woodwork to be painted shall be well rubbed down. All knots shall be covered with good knotting compound before priming and all defects shall be filled with hard stopping after priming. Plywood shall be brush filled over the entire surface.

4.27**.11** Unprimed steelwork shall be primed with a red lead primer.

4.27**.12** Woodwork shall be primed with an approved wood primer.

4.27.13 The numbers of coats stated in the descriptions in these bills of Quantities shall be applied in addition to any primers, stoppers, fillers, sealers, knotting, etc., required. The Contractor's prices shall be deemed to include for supplying and applying all such preparatory materials as may be required by the standard specification as recommended by the manufacturer of the finishing coat for the particular surface to be covered. The Contractor's prices shall further include for all other preparatory works needed. Unless otherwise described prices for painting surfaces of woodwork and metalwork shall include for painting internally and externally.

## EXTERNAL WORKS

4.28**.1** The specification in other sections of this document shall apply to external works in addition to the following clauses.

## MATERIALS

4.29**.1** Murrum for backfill shall be well graded laterite generally conforming to MOW specification for road materials for base and sub-base as appropriate.

## WORKMANSHIP

4.30**.1** The Contractor is to include for all setting out.

4.30**.2** The Contractor is to ensure that all earthworks are carried out at optimum moisture content and provide suitable compaction to achieve 95% of the maximum dry density obtained in the BS standard compaction test.

4.30**.3** Where lime or cement is to be mixed with the base or sub-base the proportion shall be 5% by weight unless otherwise specified. Calculations shall be submitted to the Employer before mixing showing quantity to be used for any area to be prepared.

## WINDOWS AND DOORS

4.31**.1** Provide and erect 1800x800mm steel casement door fabricated from 38x38x3mm steel section frames and 1.2mm thick steel sheet metal complete with metal door frame and ironmongery well fabricated to suit and primed before fitting in place and painted in two finishing coats grey (see drawings)