

# **Scope of Work – LOT TWO**

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## A. Scope of Works

The works comprise the construction, completion and maintenance of **Evacuation Centres (Safe Haven), Kitchen Blocks, Bathroom Blocks, Pit Latrines** and associated external works at **Namwiri in Traditional Authority Mwambo in Zomba, Kalima in Traditional Authority Maseya in Chikwawa** and at **Mireme in Traditional Authority Jenala in Zomba, Malawi**.

The buildings will have concrete strip footings, reinforced concrete bases and ground beams, reinforced concrete ground floor slab, load bearing concrete block walls, roof clad with chromadeck roof sheets on steel structure, steel windows and doors, metal door frames, timber doors, joinery fittings and or electrical services.

Finishes generally comprise of:- Plaster and paint externally, lime putty plaster, paint internally to walls; cement sand screed to floors.

Total gross floor area of all completed buildings will be in excess of **771m2** broken down as follows

|                    |   |       |
|--------------------|---|-------|
| 1. Safe Haven      | - | 570m2 |
| 2. Kitchen Block   | - | 94m2  |
| 3. Bathrooms Block | - | 36m2  |
| 4. Pit Latrines    | - | 11m2  |

## B. Technical Specifications

### GENERAL

The scope and basis of this section

Together with Section 2 "Instructions to Bidders" this section directs the contractor to the relevant information necessary for pricing the Bills. It is therefore essential that the text contained therein be read in conjunction with the measured items which shall be priced accordingly.

Location information and other information which does not affect the bid shall be obtained from drawings and from the UNDP, through its named focal point in the usual manner as the work proceeds

It is assumed that the contractor's supervisory and estimating staff are fully conversant with the normal standards of good workmanship and relevant publications of trade and technical organisations.

Unless otherwise expressly stated in the System of Measurement or in the Preambles and descriptions to the items contained in the Bills of Quantities, the Contractor shall be deemed to have allowed in the rates he has inserted in the Bills of Quantities for all road, railway and other transport and other costs in bringing materials, to the site, all labour in unloading, unpacking, storing, stacking, sorting, protecting, making, assembling, hoisting, setting, fitting and fixing, return of empties, fabrication and manufacture of goods at the Contractor's works, all wastage on materials, all plant, tools tackle, ladders, approved scaffolding, formwork, centering, moulds and templates, delays and idle time caused by

inclement weather, flood and all other causes, loss or damage by theft, overtime, artificial lighting and facilities to enable the Works to be completed before or on the date for completion, all protective covers to prevent injury to finished work including protection against frost and excessive heat, transport of employees to and from the site, all royalties, rent and the like for getting out quarried materials, all customs and other statutory duties, increases in cost of transport, plant, scaffolding, formwork, temporary structures, tools and equipment and all other materials used in connection with the Works but not directly incorporated therein, indemnifying the Employer against claims in respect of the patent rights, design, trade-marks or other protected rights, in respect of any plant, and other Contractor's establishment charges and profit and anything else necessary for the proper completion of the Works to the complete satisfaction of the UNDP, through its named focal point.

Unless otherwise expressly stated to the contrary, all quantities throughout the Bills of Quantities are measured net as fixed and the Contractor's rates are to include for all straight cutting and waste. Raking and circular cuttings are measured separately unless otherwise stated.

### **Definitions**

The following are the definitions of terms used in the contract documents:

1. "Nominated sub-contractor" shall mean the person or firm nominated or selected by the UNDP, through its named focal point in accordance with the Conditions of Contract to execute a portion of the Works for which a Prime Cost or Provisional Sum, as hereinafter defined, is included in the Bills of Quantities.
2. "Approved" or "directed" shall mean respectively approved or directed in writing by the UNDP, through its named focal point.
3. "Or other equal and approved" or similar phrase shall mean an alternative of equal quality and price, which has been approved in writing by the UNDP, through its named focal point as being a satisfactory substitute for the item described.
4. "Making good" shall mean reinstatement to the complete satisfaction of the UNDP, through its named focal point.
5. "Take delivery and fix only" or similar phrase shall mean off loading at the nearest railway station or merchant's store or taking delivery of imported items from the customs and excise department, transporting to site, unloading, unpacking, and checking on arrival, immediately reporting any damage or deficiencies to the UNDP, through its named focal point and storing and protecting on site until required, taking from store, distributing and assembling as necessary and hoisting and fixing complete and, if required by the supplier, for returning crates and packing cases in good condition, carriage paid, and for making good any theft, loss or damage to the goods whilst on the site, in storage, whilst fixing and when in position. The Contractor shall carefully check the quantity, quality and condition of all items before taking delivery as any goods subsequently found to be missing or damaged shall be replaced at his own expense. It shall be the responsibility of the Contractor to make and pursue any claim against the Railways, Insurers or other parties in event of any loss or damage.
6. "Attendance" shall mean assisting and collaborating with any sub-contractors and specialists and their tradesmen in every respect including obtaining particulars of their requirements concerning work to be executed for them by the Contractor, supplying them with and taking responsibility for accurate dimensions, details and particulars relating to their work, providing full facilities to enable their employees

to execute their work, providing full use, free of charge, of storage and working space, lock up accommodation, standing scaffolding, ladders and other plant, maintaining, altering, shifting and removing same as required, unloading and hoisting their plant and materials or assisting to do so and providing them free of charge, with water, watching, artificial lighting and electric power, covering up and protecting their goods and materials and their work and making good any loss or damage and supplying all unskilled labour in respect of the foregoing.

- a. "Extra over" shall mean that a portion of the cost of the item following this term is included elsewhere in another item and only the extra cost of additional labour and/or materials is required to be priced with the item so described.
7. "Measured separately" shall mean that the work to which the term refers is included elsewhere in the Bills of Quantities for pricing and does not require pricing in the item in which it is so described.
8. "Small pipe" shall mean a pipe having an internal diameter of 55 mm or under, "large pipe" shall mean a pipe having an internal diameter exceeding 55 mm and not exceeding 110 mm and "extra large" pipe shall mean a pipe having an internal diameter exceeding 110 mm.
9. "M.B.S." shall mean the latest edition or amended edition of the relevant Malawi Bureau of Standards Specification published by the Malawi Bureau of Standards, Moir Road, P.O. Box 946, Blantyre.
10. "S.A.B.S." shall mean the latest edition or amended edition of the relevant South African Bureau of Standards Specification published by the South African Bureau of Standards, Private Bag X191, Pretoria, South Africa.
11. "B.S." shall mean the latest edition or amended edition of the relevant British Standards Specification published by the British Standards Institute, British Standards House, 2 Park Street, London, W1A 2BS, England.
12. "C.P." shall mean the latest edition or amended edition of the relevant British Standards Code of Practice or other approved Standard Code of Practice.
13. "Provisional Sum" shall mean a sum provided for work or for costs which cannot be entirely foreseen, defined or detailed at the time bidding documents are issued.
14. "Prime Cost Sum" or the abbreviation "P.C. Sum" shall mean a sum provided for work or services to be executed by a nominated sub-contractor or statutory authority or public undertaking or for materials or goods to be obtained from a nominated supplier. Such sums shall be deemed to be exclusive of any profit required by the Contractor and provision should be made for the addition thereof. P.C. Sums in respect of nominated suppliers shall mean the net amount to be paid to a supplier or merchant after deducting any trade or other discount, except the discount for cash defined hereinafter, and shall include the cost of packing and of carriage and delivery.

### **Alternative materials, components and goods specified**

Wherever materials, components and goods, whether basic or proprietary, are specified the Contractor may, subject to approval in writing, use materials, components and goods from an alternative source providing the quality, properties and design are similar.

All materials, components and goods shall be used and fixed in an approved manner and, where applicable, in accordance with the manufacturer's instructions.

### **Alternative standards**

Wherever reference is made in the Contract Documents to Malawi Bureau of Standards or British Standards and Codes of Practice or South African Bureau of Standards the latest or amended edition shall apply. Alternatively, the latest editions of the standards issued by other authoritative bodies shall apply, providing that the Contractor satisfies the Architect/Supervising Officer that the standards are equal or of better standard than the above standards.

## **DEMOLITIONS AND ALTERATIONS**

### **Inspection of the works**

The contractor is to inspect the site to ascertain for himself the full implications of the work required to be carried out in this section

No claim whatsoever will be allowed from the contractor due to his failure to so inspect the works

### **Protection**

The contractor is responsible for ensuring that adequate protection is afforded to the structure, fabric and services of the buildings being altered or refurbished, including those parts not actually being refurbished but within, adjoining, adjacent to or forming a part of the affected building. Particular attention should be paid to the protection of doors and windows, their frames and finishes generally and all equipment within the existing buildings. Any damage, howsoever caused, if in the opinion of the Architect, it could have reasonably been avoided shall be re-instated at the contractor's expense to the entire satisfaction of the Architect.

### **Workmanship**

All demolitions and alterations are to be carried out as indicated on the drawings

All requisite shoring, needling, strutting or other supports to foundations, walls, roofs and opening etc necessary for the protection and safety of the existing buildings to be provided. The contractor is to allow for maintaining, altering or adapting such temporary works as may be necessary from time to time including finale clearing away and making good as may be directed by the Architect.

The contractor will be held solely responsible for the safety of the existing building and the sufficiency of all temporary measures notwithstanding that such measure are to be agreed with the Architect prior to work commencing

All necessary protection for the new and existing works against the effects of inclement weather to be provided and any damage caused by failure to do so shall be made good by the contractor at his own expense to the entire satisfaction of the Architect

Unless otherwise noted on the drawings, making good is to be executed in materials and workmanship to match surrounding work and is to be properly bonded thereto all to the entire satisfaction of the Architect

Before commencing demolitions and refurbishment all electrical and mechanical services, sanitation and any other services affected shall be either disconnected or diverted to the satisfaction of the Architect

## **EXCAVATION AND EARTHWORKS**

### **GENERAL**

#### **Examine the site**

It shall be deemed that the Contractor has visited the site to make himself thoroughly acquainted with the nature of the material to be excavated and has consulted all available information concerning the nature of this material before submitting his bid as no extra cost will be allowed by reason of his failure to do so.

#### **Benchmarks, beacons and setting out**

The Project Manager/Supervising Officer will indicate and hand over to the contractor the various beacons and benchmarks and their coordinate and reduced level values. The contractor shall be responsible for establishing any further local beacons in order to carry out the detailed setting out by a competent surveyor.

#### **Clear site**

Clear site shall mean the clearing away of all rubbish, grass, shrubs, bushes, trees not exceeding 600 mm girth, measured 1000 mm above ground level, and tree stumps not exceeding 600mm girth, measured at ground level, and the grubbing up of roots. Root holes shall be cleaned out filled with earth and well rammed and consolidated. All unusable materials resulting from clearing the site shall be burned on an approved part of the site.

All timber on site shall remain the property of the Employer. The Contractor shall allow for cutting to portable lengths and stacking in an approved position on the site.

#### **Excavation**

The term "Excavate" shall mean excavating in all types of ground met with other than hard stones or rock of such size or position that it can, in the opinion of the UNDP, through its named focal point only be removed by barring, wedging, drilling, splitting or blasting and shall include excavating in made up ground, soft rock, gravel, shale, clay, etc. and shall also include for grubbing up and removing any minor obstructions including boulders not exceeding 0.14 cubic metres in volume, drains, clinker and gravel paths, tree roots, etc. and for filling in voids with approved material from the excavations.

The term shall also include for removing the excavated material from the trench and depositing in temporary spoil heaps in readiness for backfilling or removal from site.

Should excavations be made below or beyond the dimensions and levels shown or required to obtain a solid bottom, and in the case of tree stumps being removed, the Contractor must fill up the excavation to the correct level with weak concrete (Grade 10/40).

No concrete foundations shall be poured until the UNDP, through its named focal point and Local Authority have approved the excavations.

Notwithstanding any authorisation, approval or direction given by the UNDP, through its named focal point with regard to excavations or any matter or things connected therewith, the Contractor shall be responsible for taking necessary precautions against any damage from the operations.

#### **Measurement**

The measurement of all excavations and subsequent disposal are those before excavating or after compacting in the case of planking and strutting shall be allowed for by the Contractor in his rates.

Excavation and disposal items have been measured in accordance with the Standard Method of Measurement of Building Works in Malawi and the Contractor is to allow in his rates for any additional excavations, filling and ramming and any formwork which he may consider necessary to carry out the Works.

All excavations shall be deemed to commence from ground level or reduced level except where otherwise expressly stated and the Contractor is to include in his rates for any additional handling which he may incur.

Rates for excavations shall include levelling or grading, watering and consolidation to form a solid bottom and for trimming sides and for forming any necessary steps in foundations as directed.

The Contractor is to include in his items of excavation and disposal for any additional handling he may incur due to the manner or order in which he carries out the work.

### **Rock**

Should any rock be encountered, the Contractor shall notify the Quantity Surveyor immediately before excavating same in order that the quantity thereof may be assessed.

The Contractor is to include in his rates for excavating in rock and for removing any additional material arising from overbreak or overblast and for the additional filling occasioned thereby. The Contractor must provide for any method of removal which may be adopted as there is no guarantee given or implied that blasting will be permitted.

### **Backfilling**

Filling in of excavated material is measured after consolidation. All refilling of excavated material next to foundations, etc. is to be carried out, unless otherwise described, in layers not exceeding 150 mm thick with the best, clean, dry, excavated material free from rubbish or refuse and is to be approved by the UNDP, through its named focal point for this purpose. If excavated material is not suitable, imported laterite is to be used to the approval of the UNDP, through its named focal point. Every layer is to be well watered and rammed before another layer is deposited.

### **Hardcore**

Hardcore is to consist of hard stones, coarse gravel, sound slag, hard broken bricks or other inert material to pass a 100 mm diameter ring and is to be blinded with fine chippings, ash or sand ready to receive concrete slab.

The hardcore slabs and filling to make up levels shall be laid to the minimum finished thickness and compacted until a mechanical interlock is obtained and to a standard consistent with the use of a 2.5/3 tonne roller. The surface of the hardcore is then to be checked to ensure that a true level has been obtained over the whole area.

The rates for hardcore filling are to include for all necessary temporary retaining boards.

### **Ant repellent (Anti-termite treatment)**

The ant repellent is to be aldrin, dieldrin, shelldrite, chlordane or heptachlor diluted with water and applied by spray or watering can strictly in accordance with the manufacturer's instructions.

The Contractor is to ensure that the surface to be sprayed is cleaned of all foreign matter before and after application. Great care is to be taken to prevent disturbance of the treated surface and the Contractor is to include in his rates for providing raised barrow runs or other means to prevent disturbance of the treated surface.

The Contractor shall furnish the UNDP, through its named focal point a guarantee covering the content and quality of the work for a period of five years. Within this guaranteed period the Contractor must undertake to re-treat, without further charge, any areas showing re-infestation.

### **Water in the excavations**

Excavations shall be kept free from water at all times. The responsibility for removing water shall rest with the Contractor and no claim for expenses incurred will be entertained. Where pumping is necessary the material in and around the excavations shall not be disturbed by pumping, all sumps shall be formed clear of excavations for permanent work. The Contractor shall divert as required all ditches and other waterways wherever encountered during the progress of the Works.

### **Planking and strutting**

Plank and strut the sides of all excavations as necessary to ensure the safety of the workmen and to prevent any movement, all to the satisfaction of the UNDP, through its named focal point. All responsibility for the foregoing shall rest entirely with the Contractor and should any of the excavations, other than that required to be excavated, collapse due to the omission or the insufficiency of the planking and strutting, it will not be paid for as excavations and must be dug out and deposited on the site, backfilled or carted away and the depression filled in as directed by the UNDP, through its named focal point at the Contractor's expense.

Should the UNDP, through its named focal point reasonably consider that adequate safety is not provided he may instruct the Contractor accordingly and extra planking and strutting shall be provided at the Contractor's own expense.

## **CONCRETE WORK**

### **Generally**

Material and workmanship shall comply with B.S. 8110 Part 1 1985 "Structural Use of Concrete" except as varied by this specification.

### **Cement**

Cement shall comply with M.B.S. 006 and shall be delivered to the site in sealed and branded bags properly protected from the weather during transport. Admixtures shall be used only if instructed or approved.

The cement shall be stored in a waterproof shed on a dry floor raised above the ground and stacked in such a manner that individual consignments are used in the Works in the order in which they are received. Any cement found to be damp, contaminated or to have deteriorated will be condemned by the UNDP, through its named focal point.

### **Aggregates**



Fine and coarse aggregates shall comply with B.S. 882. Coarse aggregate shall satisfy the grading limits defined for 20 mm aggregate graded down to 5 mm. Aggregates shall be stored on concrete or other hard standing with dividing walls between each type of aggregate.

### **Water**

Water shall be clean, fresh from an approved source and shall be free from chemical or organic impurities or other deleterious matter.

### **Concrete proportions**

The proportions for concrete shall be as follows:-

| NOMINAL MIX (GRADE) | PROPORTIONS OF MIX BY VOLUME Cement Fine Agg. Coarse Agg.  | MINIMUM CRUSHING TRENGTH (CUBE STRENGTH) IN N/mm |         |
|---------------------|--|--|---------|
|                     |  | 7 Days   | 28 Days |
| 1:1.5:3<br>(25/20)  | 1 Cu.ft : 1.5 Cu.ft : 3 Cu.ft<br>50 Kg bag: 0.05 m <sup>2</sup> : 0.1 m <sup>2</sup><br>(up to 20mm) | 16.5   | 25      |
| 1:2:4<br>(20/20)    | 1 Cu.ft : 2 Cu.ft : 4 Cu.ft<br>50Kg bag : 0.07 m <sup>2</sup> : 0.14 m <sup>2</sup> (up to 20 mm)    | 13.5   | 20      |
| 1:3:6 (15/40)       | 1 Cu.ft : 3 Cu.ft : 6 Cu.ft<br>50 Kg bag: 0.1 m <sup>2</sup> : 0.2 m <sup>2</sup><br>(up to 40 mm)   | 10   | 15      |
| 1:4:8<br>(10/40)    | 1 Cu.ft : 4 Cu.ft : 8 Cu.ft<br>50 Kg bag: 0.14 m <sup>2</sup> : 0.28 m <sup>2</sup> (up to 40 mm)    |  |         |

The proportions given for the concrete mixes are by volume. The quantities in each batch shall be so calculated as to use one or more whole bags of cement in each batch. One pocket (bag) of cement is equivalent to one cubic foot. The use of cement from split bags will not be permitted.

The coarse and fine aggregate shall be measured in approved gauge boxes.

The quantity of water used shall be minimum to produce a dense concrete of adequate workability for its purpose. The workability shall be strictly maintained by careful control of water added.

### **Mixing**

The cement and aggregate shall be mixed dry in an approved revolving drum mixer for two minutes and then for a continuous period of at least two minutes after the water has been added until the whole mass is of uniform colour and consistency. The whole batch shall be discharged from the mixer before a fresh batch is added.

Hand mixing may be permitted in special circumstances. When permission has been granted for hand mixing, the Contractor shall use 10 per cent additional cement at his own

expense and produce concrete not inferior in strength to machine-mixed concrete. Mixing shall be carried out on a clean, close-jointed timber or metal mixing platform. Immediately on cessation of work the drum mixer and/or mixing platform shall be cleaned.

### **Transporting and placing**

Concrete shall be transported from the mixer to its position in the structure as quickly as possible and in such a manner as to avoid any risk of segregation, consolidation or drying out and shall be compacted into position before it has taken initial set.

Unless otherwise authorised by the UNDP, through its named focal point compacting shall be accomplished with the use of immersion vibrators together, if necessary, with rods, shovels and the like.

If the Contractor wishes to use an alternative means of compaction for any portion of the Works, he shall submit his proposals and shall receive the UNDP, through its named focal point's approval before commencing this portion of the Works.

Vibrators shall be of a suitable type and used in sufficient number to suit the nature of the work and quantities of concrete placed.

Only men experienced in the use of vibrators shall be employed on this type of work. Particular care shall be taken to fill all voids and to work the concrete against rock and existing concrete surfaces round the reinforcement and embedded fixtures and into corners of formwork.

Vibration shall be continued at each point until the concrete ceases to contract and a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear. Vibrators shall be inserted vertically to penetrate into the layer underneath at regular spacings which shall not exceed the distance over which vibration is visibly effective nor more than 750 mm. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids.

In reinforced concrete, great care shall be taken to prevent any displacement or damage to the reinforcement during compaction.

### **Protection and curing**

Immediately after compaction, the concrete shall be protected from cold, heat, drying winds, rapid evaporation of water and from running water. The concrete shall be kept constantly damp for the first 7 days of its hardening by means of spraying, damp sand, waterproof paper, polythene or other approved material.

Works shall not be permitted on slabs for 7 days or until the cube strength is 10N/sq.mm or twice the stress to which it will then be subjected, whichever is the greater period.

### **Construction joints**

The Contractor shall, well before concreting, submit to the UNDP, through its named focal point detailed proposals for methods of forming and location of construction joints.

Construction joints shall be as few as possible.

Construction joints shall be made at right angles to the main reinforcement and shall be formed square against firm stopping-off boards, slotted if necessary to allow continuity of reinforcement. The stopping-off boards shall be removed as soon as possible after placing the concrete without risk of movement to the concrete.

### **Placing of new concrete against old**

In re-starting work which has been stopped, the surface of the existing concrete shall be hacked, roughened, and thoroughly cleaned and hosed down with water to remove all loose particles. Before concreting is recommenced, the hacked and roughened surface shall be wetted and covered with a thin layer of freshly mixed mortar, composed of cement and fine aggregate in the same proportion as the concrete mix.

### **Testing**

As and when requested by the UNDP, through its named focal point, the Contractor shall, at his own expense, provide sets of four standard 150 mm test cubes, and carry out a slump test when each sample is made for making test cubes.

### **Sampling**

Each cube shall be made from a single sample taken from a randomly selected batch of concrete, where practicable, taken at the point of discharge from the mixer.

A batch of concrete is the quantity of concrete mixed in one cycle of operation of a mixer, the quantity carried by ready-mix vehicle, or the quantity discharge in one minute from a continuous mixer.

Concrete shall be sampled using a standard scoop (holding approximately 5 kg mass of concrete), referred to as a scoop below. In sampling to make test cubes, one test cube shall be from a sample consisting of two scoops taken from one batch of concrete. The batch nominally divided into a number of equal parts equal to the number of scoops required, a scoop being taken from each part but disregarding the very first part and last part of the discharge.

The number of scoops required will be:-

- One 150 mm cube - 2
- Slump test - 4

A sample shall be taken from one batch selected randomly from the following quantities of concrete:-

| <b>Sampling</b>          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| <b>Rate 1</b>            | <b>Rate 2</b>            | <b>Rate 3</b>            |
| 10 cu m or<br>10 batches | 20 cu m or<br>20 batches | 50 cu m or<br>50 batches |
| whichever is the lesser  |                          |                          |

At the commencement of the Works, the sampling rate shall be Rate 1. If concrete is satisfactory, Rate 2 may be applied. If subsequent failure to meet requirements occurs, Rate 1 shall be reapplied until results are satisfactory.

Fresh concrete samples shall at all stages be protected against gaining or losing water and excessive temperatures.

Samples shall be taken by a person charged with responsibility for taking samples who shall provide certificates giving the following information:-

- a. Date and time of sampling
- b. Location in the works of the concrete the sample represents
- c. Location of sample (e.g. mixer discharge or from heap)
- d. Sample identification mark

- e. Ambient temperature and weather
- f. Identification marks of cubes made from sample
- g. Slump test result
- h. Name of sampler
- i. Name of person responsible

### **Slump test requirements**

The slump shall not exceed 50 mm for mass concrete, 40 mm for vibrated concrete and 75 mm for hand compacted concrete.

### **Strength requirements**

Compliance with the specified characteristic strength shall be assumed if:-

The average strength determined from any group of four consecutive test cubes and the lowest strength of an individual cube shall exceed the values shown below:-

| Characteristic strength N/mm |       |       |
|------------------------------|-------|-------|
| 10                           | 13.33 | 80.50 |
| 15                           | 20.00 | 12.75 |
| 20                           | 27.50 | 17.00 |
| 25                           | 32.50 | 21.50 |

One cube fails to meet the requirements for an individual cube the result shall be considered to represent only the batch of concrete from which that cube was taken provided the result for the average strength is satisfied.

More than one cube result fails to meet the requirement for individual cubes or if the average cube result fails to meet the requirement for average strength then all the batches represented by all the cubes shall be deemed not to comply with strength requirements.

In the event of test cubes failing to meet the above requirements the Contractor shall be directed to take such remedial action as the UNDP, through its named focal point may consider necessary. This action may include the cutting out of the concrete or the taking of cores for further testing at the Contractor's expense.

From time to time, the UNDP, through its named focal point may direct that additional cubes be made to check the attained strength levels of parts of the structure or for other particular purposes. These cubes shall be taken, stored and tested in a manner suitable for their purpose as directed by the UNDP, through its named focal point. No extra payment will be made for such special cubes.

### **Reinforcement**

Reinforcement shall comply with the following:-

Mild steel and high tensile (rolled) B.S. 4449

Cold twisted steel

B.S. 4461

Steel fabric

B.S. 4482, 4483

All reinforcement shall be free from flaws, mill-scale, loose rust, oil, grease, dirt and the like that reduces strength or bond between the steel and the concrete.

Spacers shall be dense cement mortar or an approved purpose made plastics type. Reinforcement shall be tied securely together using 1.626 mm diameter soft annealed tying wire or approved purpose made clips.

The Contractor shall satisfy himself as to the accuracy of any bar bending schedules drawings. All reinforcement shall be provided in full lengths as indicated on the drawings or bending schedules, additional splices or modifications will not be permitted without written approval of the UNDP, through its named focal point. Bar reinforcement shall be bundled and identified with tags, showing the size and mark of the bar.

Reinforcement shall be accurately cut and bent cold to the shapes shown on the drawings and bending schedules in accordance with B.S. 4466. In special cases the approval of the UNDP, through its named focal point may be given for hot bending of mild steel bars at temperatures not exceeding 100C. Cooling by quenching will not be permitted. Mild steel bars projecting from concrete may be straightened or bent provided the radius of the bend is not less than that specified in B.S. 4466. Straightening or rebending of high yield bars will not be permitted.

All reinforcement shall be securely fixed using wire or clips in the positions and with laps and splices as shown on the drawings and with adequate spacers and chairs to hold the reinforcement accurately in position during placing and compaction of concrete. The specified concrete cover to the reinforcement or tying wire shall in no case be reduced by more than 5mm. The reinforcement shall be thoroughly cleaned should releasing agents applied to the form work come into contact with the reinforcement. The Contractor shall inform the UNDP, through its named focal point when the reinforcement has been fixed and the forms cleaned of any rubbish or deleterious matter and no concrete shall be poured until inspected and approved by the UNDP, through its named focal point.

The Contractor shall provide adequate chairs for supporting reinforcement. Bending schedules for chairs will not be provided. The Contractor shall include for all items such as chairs, spacers, tying, bar bending, laps and splices, required to provide adequate reinforcement fabrication.

The fabric reinforcement is to be lapped a minimum of 300 mm and wired at joints with 1.626 mm diameter soft annealed tying wire.

### **Formwork**

All formwork shall be accurately constructed to conform to the dimensions of the concrete shown on the drawings, of sufficient strength and adequately braced so as to remain rigid during the placing and compacting of concrete and with tight-fitting joints to prevent leakage of grout from the concrete.

All formwork shall be cleaned and wetted or coated with approved mould oil, if required, before the concrete is placed. The design of formwork of beams and slabs shall be such that the soffit forms are erected with an upward camber, as approved by the UNDP, through its named focal point, to prevent visible downward deflection under load and that the sides are removable without disturbance to the soffit forms or their supports.

All formed surfaces shall be free from voids, honeycombing or other large blemishes. The types of finish shall be as follows:-

Type F1: This type is intended for concealed work. Formed of rough sawn timber boards, sheet metal or any other suitable material which will prevent grout loss during concrete

compaction. Timber grain and joint marks and small blemishes due to entrapped air or water are permissible.

Type F2: This type is for surfaces exposed to view where good appearance and alignment are important. Formed of closely jointed wrot timber, plywood or steel forms arranged in an approved uniform pattern. Wherever possible, joints shall be arranged to coincide with architectural features or changes in direction of the surface. Joints shall be vertical and horizontal unless otherwise directed. Slight grain and joint marks and small blemishes caused by entrapped air or water are permissible.

Type S: Formed as F1 then scabbled to leave a keyed surface for subsequent rendering or as construction joint preparation.

Type SP: This type is for exceptional or special appearance. The surface shall be superior to F2, profiled or profiled with further surface treatment, as specified.

Uniformed surfaces shall be as follows:-

1. Type U1: The concrete shall be uniformly levelled and screeded to produce a plain, textured or ridged surface, prior to receiving an applied finish or where a superior finish is not required.
2. Type U2: After forming a surface finish Type U1 and the concrete has hardened sufficiently the surface shall be hand or machine floated sufficiently only to produce a uniform surface free from screed marks.
3. Type U3: After forming a surface finish Type U1 and after the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the surface shall be steel trowelled under firm pressure to produce a dense, smooth uniform surface free from trowel marks.

### **Removal of formwork and supports**

Formwork and supports shall be carefully removed without shock loading or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand without damage the stresses to which it may be subjected.

If the Contractor wishes to strip soffit formwork to beams or slabs before the due period for the supports, the formwork shall be suitable for removal without disturbing the supports.

The Contractor shall be responsible for the removal of formwork without damage to the concrete. The minimum periods given below between completion of placing concrete and removal of forms is given as guidance. If the period is determined by strength the attained strength must be determined by making test cubes and curing them under the same conditions as the concrete to which they refer.

| <b>Position of formwork</b> | <b>Minimum period for<br/>ambient temperature<br/>above 16C<br/>7C</b> | <b>Strength to be attained<br/>(fcu=specified characteristic<br/>cube strength</b> |
|-----------------------------|--|--|
|-----------------------------|--|--|

|   |         |         |  |
|---|---------|---------|--|
| Vertical or near vertical faces of mass |         |         |  |
| Concrete, columns, walls and beams      | 9 hrs   | 12 hrs  | 0.3 fcu  |
| Soffit (formwork only) to beams         | 8 days  | 14 days | ) 10 N/sq mm or<br>) twice the stress<br>) to which the<br>) concrete will be<br>) subjected -<br>) whichever is the )greater<br>) |
| Supports to slabs                       | 11 days | 14 days |  |
| Supports to beams                       | 15 days | 21 days |  |

The aforementioned periods of time apply for ordinary Portland cement only. The periods of time shall be increased for lower temperatures.

### **Dimensional tolerances**

Construction shall be sufficiently accurate so as not to significantly impair appearance or performance of the building. In addition, the following tolerances shall apply:-

Thickness of walls and slabs, width and depth of beams and columns, + 10 per cent or + 20 mm whichever is the lesser. Verticality of centre line of columns and walls, + 20 mm in one storey and + 40 mm in two or more storeys.

### **Sundry labours**

Perform all sundry labours necessary for the full and proper execution of the work.

### **Protection**

Include for the proper protection of all concrete work throughout the section.

### **Precast concrete**

The specification for in-situ concrete will apply except as varied in this section.

Precast units shall have proper lifting attachments suitably located to minimise stresses during handling. The strength of the concrete shall be sufficient to withstand handling and placing stresses.

Units shall be placed in a manner that minimises shock loadings to the units and structure. Units shall be stored in a manner which shall not cause distortion or damage of the units. When stacked, units shall be separated by packings to prevent transmission of bending loads to lower units. Packings shall not discolour or otherwise permanently damage the units.

All units shall be of uniform appearance, of the same texture and colour, and where an approved sample has been used, they shall match the approved sample.

The Contractor shall use temporary supports required to resist all construction loads, including wind, likely to be encountered.

Unless shown otherwise on the drawings, units shall be bedded and jointed in (1:3) cement and sand mortar thoroughly compacted, pointed and finished as necessary to match surrounding work and carefully cleaned down on completion.

The Contractor is to include for all necessary moulds, formwork, templates, handling and lifting attachments, bolt fixings, temporary supports and the like associated with the construction of the units.

Any precast work damaged will be cut out and replaced, at the Contractor's expense. No patching will be allowed.

## **RATES TO INCLUDE**

### **Testing of Materials**

The costs of all preliminary and works tests required by the UNDP, through its named focal point to be carried out on cement, water, aggregates, steel or any other material for any reason shall be deemed to be included by the Contractor in his rates.

### **Formwork**

Rates for centering and formwork are to include for all straight cutting and waste, notchings, allowance for overlaps and passings at angles, horsing up, bolting, wedging, easing, striking and removing and, in the case of formwork described as wrot, shall in addition include for finishing the concrete perfectly smooth and true, stopping surface imperfections with cement and sand (1:1) and removing board marks and feathers.

### **Preparation of Surfaces**

#### **(a) Earth and Rock**

The preparation of all earth or rock foundation surfaces upon or against which concrete is to be cast is to be to the satisfaction of the UNDP, through its named focal point and the costs thereof shall be deemed to be included by the Contractor in his rates.

#### **(b) Existing Concrete**

Any bonding of new concrete to existing shall be carried out as directed by the UNDP, through its named focal point and the costs thereof shall be deemed to be included by the Contractor in his rates.

#### **(c) Precast Concrete**

Rates for precast concrete are to include for all necessary formwork and mould, including wrot or lined formwork to exposed faces, stopping surface imperfections in cement and sand (1:1), rubbing off board marks and for all necessary light wire reinforcement to prevent damage or breakage in handling, casting in the requisite lengths, hoisting, bedding and building in composition or cement mortar and covering up protecting exposed surfaces and cleaning down at completion and making good.

Reinforcing steel is measured in the Bills of Quantities according to the calculated weight as scheduled and the rates shall include for all cutting, bending, cranking, hooking at ends,



hoisting, assembling, placing, fixing and maintaining in the correct position, for wastage and rolling margin and for all wire and other fixing devices employed.

Rates for fabric reinforcement shall include for all bending, tying wire, distance blocks and 300 mm side and end laps.

### **Testing of Concrete**

Any works cubes, or cores cut from the Works, which fail to meet the strength or other requirements described herein shall be paid for by the Contractor.

## **BLOCKWORK**

### **Cement**

Cement shall be as specified in "Concrete Work".

### **Sand for mortar**

Sand shall be clean, sharp, uncoated grains of naturally occurring pit or fresh water sand, free from injurious amounts of dust, lumps, soft or flaking particles, shale, alkali, organic matter, loam or other deleterious substances, washed if necessary and shall pass a 5000 um (5 mm) B.S. sieve and not more than fifteen per cent (15%) by weight shall pass a 150 um (0.150 mm) B.S. sieve.

### **Lime**

Lime shall be non-hydraulic or semi-hydraulic well burnt quick lime from an approved source or hydrated lime to comply with B.S. 890.

Quicklime shall be thoroughly slaked, but not to saturation, for a period of from two to five days for lump lime and from one to three days for ground lime before mixing into wet mortar. Hydrated lime can be mixed into wet mortar without slaking.

### **Water**

Water shall be as specified in "Concrete Work".

### **Precast concrete or cement and sand blocks**

Blocks are to comply in all respects with a crushing strength of 3.5N/mm<sup>2</sup> and have metric sizes of 300 x 170mm and 150mm wide with an effective height of 167mm after bonding. In order to ensure perfect bonding, it will be necessary to cast blocks of sizes other than standard.

All blocks are to be sound, square and clean of even and uniform size, with sharp arrises and free from all defects

### **Mortar**

The nominal mix proportions are given below. Proportions shall be adjusted as necessary to meet strength requirements.

Mortar for brickwork below ground floor level, manholes, etc. and for external pointing shall be composed of one part cement, and four parts sand by volume.

Mortar for brickwork above ground floor level shall be composed of one part cement, one part lime and six parts sand by volume.

Composition mortar is to be mixed at least seven days before being required and kept damp with wet sacking. Immediately before use the cement is to be added with sufficient water to provide a proper consistency and any such mortar which has been mixed for more than one hour shall not be used on the Works.

The proportions shall be measured in approved gauge boxes. The mortar shall be mixed in an approved mixer or by hand on a clean, close-jointed timber or metal mixing platform.

If the mortar is mixed by hand, the materials shall be turned three times dry or until the mixture is of an even colour throughout and turned three times wet. All mortar shall be prepared in sufficient quantity for immediate use only. No mortar shall be re-tempered for re-use after it has taken initial set.

### **Plasticizers**

Plasticizers shall only be used following written permission from the UNDP, through its named focal point. Plasticizers shall comply with B.S. 4887 and be used strictly in accordance with the manufacturer's instructions.

### **Ties**

Ties shall comply with B.S. 1243. Walls in two skins have ties embedded in mortar at the time the course is laid, to a minimum depth of 50 mm, and placed staggered and evenly distributed. Tie spacing shall be 450 mm vertically and horizontally wherever possible but may be varied where necessary provided ties are placed at the rate of five per square metre. At the sides openings additional ties shall be used to provide ties at 300 mm spacing vertically.

Ties shall be galvanised mild steel and may be of the butterfly, double-triangle or vertical-twist strip type.

### **Damp proof courses**

The damp-proof courses are to be formed of one layer of three ply bituminous felt sheeting complying with B.S. 743 laid on a level bed of mortar under walls. The sheeting is to be slightly wider than the walls in which they are laid and laps at ends, etc. are to be not less than 150 mm or the thickness of the wall in the case of angles and intersections and thoroughly bedded in mastic.

Rolls of damp-proof course shall be stored on a level surface away from heat, in such a manner as to prevent damage by squashing and generally in accordance with the manufacturer's instructions.

### **Building in pressed metal windows and door frames**

Rates for building in pressed metal windows and door frames shall include for assembling all parts and fixing in accordance with the manufacturer's instructions including setting perfectly plumb and free from the slightest distortion and for cutting, pinning or building in lugs to brickwork or plugging and screwing to concrete, bedding and filling frames solid in cement mortar (1:4) and pointing in mastic, easing and adjusting windows, oiling hinges and fastenings and leaving in perfect working order on completion.

### **Building in timber windows, door frames and entrance screens**

Rates for building in timber windows, door frames and entrance screens are to include for setting and maintaining frames and screens perfectly plumb and free from the slightest

distortion, cutting and pinning cramps to brickwork, setting and fixing dowels in mortices and for protecting from damage and all substances likely to cause stains.

## **ROOFING**

### **Chromadeck Inverted Box Rib (IBR) Sheets**

- a. Chromadeck Inverted Box Rib (IBR) sheets will be used for roofing. The sheets are to be laid strictly in accordance with instructions and specifications. The contractor shall ensure that at all times, whether during the period that the sheets are being transported or during the period of storage at the site or after fixing, the sheets are adequately protected from damage.

## **METALWORK**

### **Mild steel**

All steel and steelwork is to be of approved manufacture and shall comply in all respects with B.S. 4, 449, 1775, 2994, 4360 and 4848 as applicable.

Bolts and the use thereof shall comply in all respects with B.S. 325, 916, 1083, 1494, 1768, 1769, 2708, 3139, 3294, 3692, 4186, 4190, 4395, 4604 and 4933 as applicable.

### **Welding**

All welding is to comply with the relevant British Standard where applicable and electrodes to B.S. 639 and 4215. Welding is to be carried out by skilled operators in accordance with the principles set out in the British Standard Code of Practice C.P. 3012.

All welding is to be left in its original state and neatly finished off and polished after examination by the UNDP, through its named focal point. All connections are to be capable of transferring a load of ten per cent more than the members connected.

All members are to be in one length and butt welding will only be allowed with the UNDP, through its named focal point's approval.

### **Generally**

The details of construction may be decided by the Contractor to suit his methods of manufacture subject to the UNDP, through its named focal point's approval.

All steelwork is to be erected in its correct position, accurately levelled, lined and plumb.

### **Pressed metal windows**

The pressed metal windows are to be cottage section to B.S. 990 with an approved rust proof finish obtained from B. and C. Metal Products Ltd., P.O. Box 52, Blantyre, or other equal and approved manufacturer and complete with all necessary fixing lugs. Opening lights to metal windows are to be provided with friction stays or roto operators, matching ironmongery, hinges and fasteners of a type to be approved by the UNDP, through its named focal point.

### **Pressed metal door frames**

The pressed metal door frames are to be obtained from B and C Metal Products Ltd., P.O. Box 52, Blantyre or other equal and approved manufacturer. Frames are to have an approved rust proof finish. Frames are to be provided with lock striking plates, rubber buffers, loose hinges and pins, stay bars to feet and fixing lugs.

## **PLUMBING**

### **Galvanised sheet steel**

All sheet steel is to be galvanised of an approved brand and of the gauge specified.

Rates are to include for clips, welged edges, wedging and fixing.

### **U.P.V.C. gutters, rainwater pipes, fittings and fixing**

The U.P.V.C. gutters, pipes and fittings are to be to B.S. 4514 and shall be obtained from a manufacturer approved by the UNDP, through its named focal point.

The pipes and fittings shall be jointed in accordance with the manufacturer's instructions.

Rates for eaves gutters shall include for fixing on purpose made bolted brackets to falls.

### **U.P.V.C. soil, waste and ventilating pipes, fittings and fixing**

Rates for rainwater pipes are to include for temporary supporting the pipes in position while the mortar packing is placed around and for all loose pipe sockets, double sockets, straight couplings, union couplings, expansion couplings, short lengths and for forming all joints and cutting and waste and all necessary jointing materials. All other fittings are measured and rates shall include for extra joints.

The U.P.V.C. pipes and fittings are to be to B.S. 4514 and shall be obtained from a manufacturer approved by the UNDP, through its named focal point.

The pipes and fittings shall be jointed and fixed in accordance with the manufacturer's instructions. Vertical and horizontal pipe runs shall be supported and fixed with clips drilled, plugged and screwed to walls and soffits and where necessary suitable hangers shall be provided.

All branch connections to main soil, waste and ventilating pipes shall be swept in the direction of the flow, and pitcher tees only shall be used.

Generally, soil pipes where "horizontal" shall fall at 2.50% towards the main vertical pipes, "horizontal" waste pipes shall fall at 1.50% towards the main vertical pipes and "horizontal" ventilating pipes shall rise at 1.50% away from the traps they serve.

Expansion joint couplings shall be fixed in pipe runs at intervals in accordance with the manufacturer's instructions.

Rates for pipes are to include for fixing with all necessary clips, holder-bats and hangers and drilling, plugging and screwing or cutting and pinning to walls and soffits and for making good the finishings to surfaces to which the pipes are fixed and for all loose pipe sockets, double sockets, straight couplings, union couplings, expansion couplings, short lengths and for forming all joints and cutting and waste and all necessary jointing materials. All other fittings are measured and rates shall include for extra joints.

### **Medium duty galvanised steel tubing, fittings and fixing**

The galvanised steel tubing is to be medium weight in accordance with B.S. 1387 and joints are to be screwed with red lead and hemp.

Fittings are to be galvanised wrought steel to B.S. 1740. All bends shall be long radius and elbows shall not be used to substitute for bends in any pipe run.

Long and short nipples shall be used as required, running nipples will not be permitted. Unions shall be used at the final connection to all fittings, after all valves and on vertical

pipe runs in ducts at each floor level. They shall be of the types having galvanised malleable cast iron bodies with ground spherical or taper gunmetal seating faces.

All screwed tubing and fittings shall be connected by means of joints having taper or taper threads complying with B.S. 21. Prior to making any joint the male end of the connection shall be coated with "Boss White" as manufactured by Crane Ltd. or other equal and approved compound.

Welding of galvanised tubing will not be permitted. No joints shall be made within an unobstructed distance of 600 mm of any electrical cable, conduit or component, nor shall any joints be formed with the thickness of any wall, slab, etc.

Rates are to include for fixing pipes with approved pipe clips or galvanised holder butts including cutting and pinning and making good the finishings to the surfaces to which the pipes are fixed.

Rates for tubing of 20 mm diameter and less are to include for all labour to bent pipes and all fittings such as bends, elbows, tees, crosses, connectors, nipples, sockets, unions, reducing sockets, back-nuts, plugs and the like and for all short lengths and cutting and waste.

Rates for tubing exceeding 20 mm diameter shall include for all parallel sockets, nipples, unions and for all short running lengths and cutting and waste. All other fittings and labours are measured and the rates for fittings shall include for extra red lead joints.

### **Pipework generally**

All internal pipework shall be executed in collaboration with the work of any specialist employed for electrical work, etc. so that all trades provide a neat and workmanlike finish.

Cutting of holes, chases, etc. through reinforced concrete shall be carried out only with the written authority of the UNDP, through its named focal point and all holes, chases, etc. shall be properly made good on completion.

Plumbing work shall be carried out strictly in accordance with the plumbing and drainage plans and details and written authority shall be obtained from the UNDP, through its named focal point before any change or variation from the plan is made.

Pipes shall be arranged and fixed in a neat workmanlike manner, straight, parallel in line and with the fittings set true and plumb.

Exposed pipes shall be so fixed that there will be not less than 25mm clear space everywhere between the pipes or pipe fittings and the finished wall, ceiling or beam face. Where such a clearance does not appear to be practicable or workmanlike, the UNDP, through its named focal point shall be consulted before fixing the piping and his written approval obtained. Access plates and fittings shall be used only where shown on the drawings.

All service and distribution pipe runs shall be set out and fixed to avoid traps and air locks, and branches taken from vertical pipes shall have a constant slight rise or fall as the case may require for the release of air and to enable the system to be drained and a gauze thimble shall be soldered in the free end of all overflow pipes.

Pipework of unlike materials shall be jointed in an approved manner in accordance with the best standard practice.

### **Brasswork and sundries**

All taps, valves, traps, etc. shall comply with the type and B.S. specified and to any requirements of the Local Authority. Samples of taps, valves, etc. are to be submitted to the UNDP, through its named focal point before fixing.

Taps shall be marked with an approved colour or letter identification. Cold water taps shall in every case be fixed at the right hand side of sanitary fittings.

All ball valves shall comply with B.S. 1212 and shall be of the sizes and for the pressure indicated or directed. The loose orifice seats shall be of nylon for sizes 13 mm and 19 mm and bronze for sizes 25 mm, 38 mm and 51 mm. Ball valves shall be supplied and fixed complete with copper floats to B.S. 1968 or with plastic floats not less robust and having lifting effort not less than a B.S. 1968 copper float for the same duty.

Rates for taps, valves, traps, etc. are to include for jointing to pipes including making joints and any necessary connectors to suit the particular type of pipe to which they are fitted and for supplying samples and for providing and handing to the UNDP, through its named focal point three valve keys for each type and size of gate valve installed in the Works.

## **SANITARY FITTINGS**

### **General**

Sanitary fittings not specified in reference to manufacturer's catalogue shall be in accordance with B.S. 1125, 1188, 1189, 1206, 1213, 1244, 1254, 3380 (Part 1) and 3402 as applicable.

Rates for sanitary fittings are to include for assembling all parts and making all necessary joints in assembling, cutting and pinning or building in or plugging and screwing all brackets, W.C. pans, etc. and for leaving sound and in working order. Joints to valves and outlets are measured separately.

### **FIRE FIGHTING EQUIPMENT**

- a. The fire fighting equipment shall be of the type specified and shall be guaranteed by the manufacturer.
- b. Rates shall include for fixing complete including drilling, plugging and screwing or bolting brackets to walls.

### **Pipe sleeves**

All pipes shall be sleeved where passing through concrete roofs, suspended floors and where directed through walls. Sleeves shall be of galvanised mild steel tubes and of such bore as to provide an annular space not less than 3mm wide at any point. They shall project 40mm above finished floor levels and as directed above roof level but in all other cases shall finish flush with finished surfaces. The annular space shall be caulked with lead wool and approved wall plates shall be fixed where directed.

### **MARKING OF PIPES AND VALVES**

The Contractor is to include in his rates for providing aluminium identification labels wired on to all valves and for marking and labelling all exposed pipes to indicate the paint identification colour in accordance with B.S. 1710 and at completion of the Works, for

providing the UNDP, through its named focal point with a valve chart and "as fixed" drawings indicating the valve number, position and purpose of each respective valve.

The Contractor is to include in his rates for painting identification colour bands 300 mm wide on all concealed pipework in accordance with B.S. 1710 at access points.

The Contractor is to include in his rates for painting pipework, all brackets, pipe clips, holderbats, hangers, etc. and for painting in all various identification colours in accordance with B.S. 1710.

### **Testing of pipes**

All pipelines shall be hydraulically tested after laying to pressure equal to the maximum working pressure plus at least 50 per cent in accordance with Clause 602 of C.P. 310 (1962). The test pressure shall be maintained for a period of thirty minutes without measurable loss. Pipelines shall be tested in sections by closing off at stop valves or by inserting temporary stop ends. Each class of pipe shall be tested separately. The pipelines shall be tested in lengths as approved by the UNDP, through its named focal point.

As soon as a length of pipeline of the same class of pipe not exceeding 1000metres or the distance between successive valves on each class of pipeline, whichever is the lesser, is laid and jointed, the pipeline shall be tested before further pipe laying and joint proceeds unless otherwise approved by the UNDP, through its named focal point. The Contractor shall supply, fix, strut and secure all temporary stop ends for testing purposes and the costs thereof shall be deemed to be included in the costs for testing. In the event of a fault or suspected fault occurring subsequent to testing a pipeline, the UNDP, through its named focal point may require a further test and this shall be carried out by the Contractor without extra payment. The cost of testing shall be included in the various rates for laying pipes. Immediately a section has been passed by the UNDP, through its named focal point, it shall be backfilled to avoid subsequent damage.

The position of the pressure gauge for recording the test pressure shall be at a point in the section being tested where the working pressure is greatest.

## **ELECTRICAL INSTALLATION**

All the preambles for Electrical Installation will be used as a separate document to specialist sub-contractor.

### **FLOOR, WALL AND CEILING FINISHINGS**

#### **IN-SITU FINISHINGS**

##### **Cement, lime, water, etc.**

The cement, lime, water, etc. are to be as previously described in "Concrete Work" or "Brickwork" sections.

The method of mixing of materials for screeds and grounds, pavings, plastering and undercoats are to be as previously described for mortar in "Brickwork".

##### **Sand**

The sand shall be approved, clean, naturally occurring sand, crushed stone or crushed gravel sand. The sand for screeds and grounds, cement and sand pavings, internal and external plastering shall comply with B.S. 1199 and is to be graded in accordance with Table 1 or Table 2 as applicable.

### **Internal or external plastering**

The internal or external plastering is to be executed in accordance with C.P. 221 and shall be composed of one part of cement to four parts of sand or one part of cement to one part of hydrated lime to six parts of sand by volume as hereinafter specified applied in one coat not more than 20 mm and not less than 13 mm thick unless otherwise described and finished with a steel or wood float as specified to a perfectly smooth and even surface.

## **GLAZING**

### **Glass generally**

All glass is to be of the best quality complying with B.S. 952 and free from flaws, specks, scratches and other defects. All glass shall be stored to prevent the accumulation of moisture between sheets.

### **Putty**

The putty for glazing to wood frames is to be best quality linseed oil putty complying with B.S. 544. The putty for glazing to metal frames shall be an approved specially manufactured compound for glazing to metal.

### **Glazing generally**

All glazing is to be in accordance with the recommendations and standard of workmanship contained in C.P. 152. All rebates are to be clean and dry and painted before glazing. All glass is to be well bedded, back puttied and sprigged to wood or secured with approved pegs or spring clips for glazing to metal. All glass is to rest on properly placed locating blocks with a minimum clearance of 2 mm between the face of the glass and the rebate. All edges of glass shall be cut clean and a clearance at edges of 2 mm shall be provided for glass glazed to wood and 3 mm for glass glazed to metal. In the case of solar control glasses, opaque glass with painted surfaces, ordinary glass exposed to sunshine or when used with a dark background, glazing clearance at edges shall be a minimum of 3 mm all round where the longer dimension is less than 750 mm and not less than 5 mm all round where the longer dimension exceeds 750 mm. All glazing to metal sashes or surrounds shall be in accordance with the metal window manufacturer's instructions and all putty shall be stripped at an angle to prevent accumulation of water.

## **PAINTING AND DECORATING**

### **Paints, etc.**

All paints, knotting, etc. are to comply with the relevant British Standard where applicable. Colours are to be in accordance with B.S. 3810 or 4800 where applicable and the identification of pipelines is to be in accordance with B.S. 1710.

All paints are to be the best of their respective types. Paints described as hard gloss are to be those named as synthetic enamels, hard gloss enamels or super gloss enamels. Paints described as P.V.A. emulsion are to be those named as "Acrylic P.V.A. or Acrylic emulsion".

All paints, etc. are to be delivered to the site in sealed containers and must be used strictly in accordance with the instructions of the manufacturer and without adulteration or



dilution. Where recommended by the manufacturer, all surfaces are to be treated with one coat of sealer, primer or petrifying liquid suitably bodied for opacity.

All containers are to be properly labeled stating the name of the manufacturer, brand, type, colour and quality, interior or exterior, of the contents.

Any paint which is defective or unsatisfactory shall immediately be returned to the manufacturer.

Undercoats and priming coats are to be of types recommended by the manufacturer for use on the particular material or surface and suitable for the subsequent coats specified. Undercoats are to be of similar but distinctive tints to the finishings coats.

Finishing coats are to be of colours selected and approved in accordance with the painting schedule prepared by the UNDP, through its named focal point and the Contractor is to include in his rates for painting in varying colours as directed by the UNDP, through its named focal point.

### **Workmanship generally and preparatory work**

All workmanship is to be in accordance with C.P. 231.

Clear away all dirt, rubbish and superfluous material as it accumulates and keep the work swept clean and the floors washed over while painting operations are in progress, and take all necessary precautions to keep down dust.

All surfaces to be painted shall be clean, free from dust, dry and sound, not friable or unduly absorbent and shall have reached a stable condition prior to painting. Painting shall not be carried out in unfavourable weather or unsuitable conditions.

All paint shall be applied uniformly in thickness appropriate to the particular type of paint used.

All paint containers shall be emptied and cleaned with a suitable solvent each day after use. All brushes, knives, etc. shall be cleaned after use.

Adequate time shall be allowed to elapse between the application of successive coats of paint. Generally, each coat of paint shall be lightly rubbed down with fine glass paper and dusted before applying the next coat.

All metal fittings and fastenings and flyscreens are to be removed before preparatory processes are commenced, cleaned and refixed in position on completion.

### **Painting on plasterwork, brickwork and concrete work**

Should the surface to be painted or the quality of the paint to be used be such that it will not provide an acceptable finish within the number of coats specified then the Contractor is to include in his rates for painting a "mist" coat, priming coat, sealing coat or coat of petrifying liquid to the approval of the UNDP, through its named focal point in addition to the number of coats specified.

All plasterwork is to be thoroughly dry and mature before painting is commenced. Under no circumstances will plasterwork showing efflorescence or blowing or pitting due to unslaked lime be decorated.

All defective plasterwork, both internally and externally, is to be cut out and made good before decoration.

Small cracks are to be made good with Alabastine filler and large cracks are to be cut out with edges undercut, given one coat of oil paint filled flush with "Gipsy" or other approved stopping plaster.

#### **Painting on metalwork**

The metalwork is to be clean and dry and is to be free from rust and scale with steel wire brushes or other means and all oil, wax and grease is to be removed before the initial priming coat is applied.

Special attention shall be given to the painting of edges, reentrants, protuberances such as bolt heads, rivets, etc.

On metalwork described as galvanised, the initial priming coat is to be of the self-etching type.

#### **Painting on woodwork**

All woodwork is to be carefully prepared, cleaned and dry and glass-papered and dusted. Large or loose knots are to be cut out and filled with sound wood or hard stopping. Small knots are to be treated with two coats of approved knotting free from resin and consisting of a solution of shellac in methylated spirit. All nail holes are to be filled with an approved hard stopping.

Woodwork that is to be painted shall be properly seasoned to a moisture content appropriate to its use in the building. In no case shall the moisture content at the time of painting exceeds 18 per cent.

External woodwork or woodwork in damp situations internally shall be painted with strongly adhesent, water resistant, flexible and otherwise suited paint for the particular conditions of exposure

All machined and finished surfaces of joinery whether to be visible or concealed shall receive one coat of appropriate primer, end grain surfaces are to receive a second coat after the first has dried. All surfaces of parts to be jointed but not glued shall also receive one coat of priming paint and wherever practicable, shall be brought together while the paint is wet.

#### **Rates to include**

In addition to the foregoing, the Contractor is to include in his rates for painting in narrow widths and to bands which have been included in general wall surfaces.

The Contractor is to include in his rates for Painter's time and the necessary materials for executing sample panels of paint in different colours so that the appearance on site may be judged and a selection made.

### **EXTERNAL WORKS**

#### **Stone pitching**

The stone pitching shall be constructed with an approved local stone not more than 25 per cent of which shall pass a 150 mm ring but not a 60 mm ring and not less than 75 per cent of which shall not pass a 150 mm ring. The stone pitching shall be placed and compacted to a finished thickness of not less than 100 mm and is to be grouted up in cement mortar (1:3) and finished with neat flush joints.

### **Preparation of road formation**

Where the sub-grade is below existing ground level, the Contractor shall excavate to sub-grade level. Where the sub-grade is above existing ground level, the Contractor shall fill to sub-grade level with approved material. The sub-grade shall be compacted to a CBR of not less than 5 per cent.

The final surface of the sub-grade shall not vary more than 25 mm from the true elevation.

### **Compaction of sub-grade**

The area to be compacted shall be scarified and watered evenly, mixed in for the full depth to be compacted until a uniform mixture is obtained with a moisture content within the range of 1 per cent of the optimum.

During the full compaction process, the material shall be kept at the optimum moisture content, the surface if necessary being occasionally lightly watered to counteract the effects of evaporation.

Compaction shall be carried out by means of an 8/10 tonne smooth wheeled roller or a combination of such a roller and approved pneumatic roller. Rolling shall continue until 93 per cent of the modified A.A.S.H.T.O. density has been obtained over the full area compacted.

The surface of each compacted layer which is to be followed by an overlying layer of less than 100 mm compacted depth, shall be lightly scarified before the succeeding layer is placed on it. Notwithstanding the provision of any other clause of this Specification, each compacted layer shall be to the satisfaction of the UNDP, through its named focal point in all respects and no material shall be placed on a compacted layer until the approval of the UNDP, through its named focal point has been obtained.

### **Sub-base course**

The sub-base course is to consist of approved laterite, free from all vegetable matter, earth, rubbish or other deleterious material and uniformity graded in accordance with the following requirements:-

- a. Plasticity index not greater than 12.
- b. Percentage passing a B.S. 200 sieve not greater than 30.

The laterite is to be spread and leveled, mixed evenly with water to within 1 per cent of the optimum moisture content and compacted in layers not exceeding 150 mm consolidated thickness until 95 per cent of the modified A.A.S.H.T.O. density is obtained. The sub-base course is to be graded to cambers, falls and cross-falls as necessary.

### **Base course**

The base course is to consist of approved laterite, free from all vegetable matter, earth, rubbish or other deleterious material and uniformly graded in accordance with the following requirements:-

- a. Plasticity index not greater than 12.
- b. Percentage passings a B.S. 200 sieve not greater than 30.

The laterite is to be spread and leveled, mixed evenly with water to within 1 per cent of the optimum moisture content and compacted in layers not exceeding 150 mm consolidated thickness until 98 per cent of the modified A.A.S.H.T.O. density is obtained. The base course is to be graded to cambers, falls and cross-falls as necessary.

## **DRAINAGE**

### **Excavation of trenches and backfilling**

Excavation of drains shall be commenced at the outfall end of each drain. Trenches shall be accurately cut to the correct depths and gradients required, for pipes and shall be of sufficient width to afford room for the proper laying. In the event of any excavations being made below the required level, they shall be filled up with concrete at the Contractor's expense. No trench shall be filled in until the drain therein has been tested and approved. Earth filling to a height of 230 mm above the top of pipes shall be selected fine material free from stones, well watered and lightly rammed and consolidated around the pipe without causing any damage thereto. The remainder of the trench shall be filled with earth filling in 150 mm layers, each layer well watered and consolidated and the ground level made good to the satisfaction of the UNDP, through its named focal point.

### **U.P.V.C. drain pipes and fittings and laying and jointing**

#### **Pipes and fittings**

The U.P.V.C. drain pipes and fittings are to be to B.S. 4660 and obtained from a manufacturer to be approved by the UNDP, through its named focal point.

#### **Jointing of pipes and fittings**

The pipes are to be jointed with ring seals used strictly in accordance with the manufacturer's instructions.

#### **Laying**

Pipes shall be laid to straight lines, to even gradients, to the levels indicated and strictly in accordance with the manufacturer's instructions. Pipes shall be laid in such a manner that the pipe shall have a firm bearing for the entire length. Socket pockets shall be kept free from mud, silt, debris or other obstruction during the laying thereof and until completion.

#### **Rates to include**

Rates for pipes are to include for all necessary cutting waste, short running lengths and for all instruments, boning rods, sight rails, etc. required for the proper execution of the Works. Rates for fittings are to include for cutting and waste on pipes and extra joints.

## C. Drawings

|                            |            |
|----------------------------|------------|
|                            |            |
|                            |            |
| <b>1. SAFE HAVEN BLOCK</b> |            |
| Floor Plan                 | 2019/SH/02 |
| Elevations                 | 2019/SH/03 |
| Section                    | 2019/SH/04 |
| Door & Window Schedule     | 2019/SH/05 |
|                            |            |
|                            |            |
| <b>2. KITCHEN BLOCK</b>    |            |
| Floor Plan                 | 2019/KT/01 |
| Elevations                 | 2019/KT/02 |
| Section                    | 2019/KT/03 |
| Door & Window Schedule     | 2019/KT/04 |
|                            |            |
|                            |            |
| <b>3. BATHROOMS BLOCK</b>  |            |
| Floor Plan                 | 2019/BT/01 |
| Elevations                 | 2019/BT/02 |
| Section                    | 2019/BT/03 |
| Door & Window Schedule     | 2019/BT/04 |
|                            |            |
|                            |            |
| <b>4. PIT LATRINES</b>     |            |
| Floor Plan and Elevations  | 2019/PL/01 |
| Section                    | 2019/PL/02 |
| Door & Window Schedule     | 2019/PL/03 |