

**UNIVERSAL NETWORK FOR KNOWLEDGE AND EMPOWERMENT AGENCY (UNKEA)**

**CONSTRUCTION WORK TECHNICAL SPECIFICATION**

**Contents**

- 1 GENERAL MATTERS ..... 2
  - 1.1 General Conditions of Contract ..... 2
  - 1.2. Instructions to Bidders ..... 2
  - 1.3. Scope of Contractor’s Obligations ..... 2
  - 1.4. Workmanship ..... 3
  - 1.5. Materials ..... 3
  - 1.6 Ordering of Materials ..... 3
  - 1.7 Samples ..... 3
  - 1.8 Rejected Workmanship and Materials ..... 3
  - 1.9. Existing and Adjacent Property ..... 3
  - 1.10 Storage of Materials ..... 3
  - 1.11. Foreman-in-Charge ..... 4
  - 1.12. Water for Works ..... 4
- 2.0 EXCAVATION ..... 4
  - 2.1. Clearance of Site ..... 4
  - 2.2. Trees and Bushes to be Preserved ..... 4
  - 2.3. Anthills ..... 4
  - 2.4. Removal of Vegetable Soil ..... 4
  - 2.5 Excavation for Foundations ..... 4
- 3.0 POLE PLANTING ..... 5
  - 3.1. 4’x4’ timber post. .... 5
  - 3.2 Setting and planting poles ..... 5
- 4.0 CONCRETE WORK ..... 5
  - 4.1. General Requirements ..... 5
  - 4.2. Cement ..... 5
  - 4.3. Aggregate for Concrete ..... 5
  - 4.4. Sand ..... 6
- 5.1. Timber ..... 6
- 5.2 Timber for Special Structures ..... 6

5.3 Preventive Treatment for Timber .....	6
5.4 Sawn Timber .....	6
5.5 Wrot Timber.....	6
5.6. Iron Sheets .....	7
5.7. Nails and Bolts.....	7
5.8 Sand.....	7
5.9 Mortars .....	7
5.10. Brick Walling of 3 courses .....	7
5.11. Wire mesh and Mosquito Gauze .....	8
6.0 ROOFING .....	8
6.1. General.....	8
6.2 Iron Sheet.....	8
7.0 WINDOWS, DOORS AND BLACKBOARD .....	8
7.1. Windows and Doors.....	8
7.2. Blackboard.....	8
8.0 CLEANING.....	8
8.1. Cleaning.....	8

## **1 GENERAL MATTERS**

### **1.1 General Conditions of Contract**

All clauses, definitions and procedures described in the General Conditions of Contract for the Procurement of Works, issued by Universal Network for Knowledge and Empowerment Agency (UNKEA) will apply to these specifications unless specifically ruled otherwise in Special Conditions of Contract.

### **1.2. Instructions to Bidders**

All clauses, definitions and instructions issued in the Invitation to Bid and Instructions to Bidders will apply to these specifications unless otherwise ruled in the Bid document.

### **1.3. Scope of Contractor's Obligations**

- The Contractor shall provide everything necessary for the proper execution and completion of the works, according to these specifications, the specification and/or the bills of quantities whether the same is particularly described or not.
- The Contractor shall provide all labor, building materials, tools, and whatever else may be required for the proper and efficient execution and completion of the works.
- The Contractor shall include in his rates, unit prices or tender for all charges for waste, establishment and overhead charges and profit.

## **1.4. Workmanship**

All workmanship shall be carried out by skilled operatives well versed in their respective trades.

## **1.5. Materials**

All materials shall be new unless otherwise directed or permitted by the Consultant Engineer, and Project Manager and in all cases where the quality of goods or materials is not described or otherwise specified is to be the best quality obtainable in the ordinary meaning of the word „best“ and not merely a trade signification of that word.

A reference to Standard Specifications shall be understood to mean the most recent and up to date edition of that specification as published by the Ministry of General Education and Instructions of Republic of South Sudan for Works. In absence of a specification of intended material does not exist in that Standard Specification, reference to a British Standard Specification may be used and shall be understood to mean the most recent and up to date edition of that specification as published by the British Standard Institution. The initials „B.S.“ used in this document are the abbreviated form of British Standard Specification.

The Engineer and Project Manager reserves the right to substitute, amend, alter, enlarge upon, correct, or revise any of the foregoing and where this is intended it will be expressly stated herein.

## **1.6 Ordering of Materials**

The Contractor shall be solely responsible for ordering all materials required for use on the works. The Contractor shall order all materials, other than those covered by Prime Cost or Provisional Sums, as early as necessary after the Contract is signed to ensure that such material will be on site when required for incorporation in the works. Materials which are the subject of Prime Cost or Provisional sums in these documents shall be ordered immediately after written instructions are received to do so from the Project Manager. The Contractor is to take his own measurements for the ordering of materials. No responsibility will be accepted by UNKEA for surplus, shortage, loss or expenses if the goods are wrongly ordered.

## **1.7 Samples**

The Contractor shall furnish at the earliest possible opportunity before work commences and at this own cost, any samples of materials or workmanship that may be called for by the Project Manager for his approval or rejection and any further samples in the case of rejection until such samples are approved. Such samples when approved shall be of not less than the minimum standard for the work to which they apply.

## **1.8 Rejected Workmanship and Materials**

Any workmanship or materials not complying with the requirements of the specification or approved samples which have been damaged, contaminated, or have deteriorated, must be immediately removed from the site and replaced at the Contractor's expense, as directed by the Project Manager.

## **1.9. Existing and Adjacent Property**

The Contractor must take all steps necessary to safeguard the existing property and adjacent property, make good at his own expense any injury to persons or damage to property caused thereon, and hold UNKEA indemnified against any such claim arising. The Contractor shall take all necessary precautions to avoid damage to the surrounding ground, grass, plants, shrubs and trees and reinstate at his own expense any damage caused thereto.

## **1.10 Storage of Materials**

The Contractor shall provide erect and maintain and clear away on completion suitable watertight sheds and other protection for the storage of materials including those of all Sub-Contractors.

Floors of sheds used for the storage of cement and other perishable materials shall be raised at least 200 mm above ground level. Cement stacks or bags shall be placed on timber pallets approved by the Engineer and Project Manager.

### **1.11. Foreman-in-Charge**

The Contractor shall keep a Foreman-in-Charge in constant attendance upon the works. He shall be capable of reading, writing and speaking English and he shall keep copies of all drawings, details, specifications, letters, instructions, etc. on the works.

He shall also be required to keep a day today record in the Works Diary of the weather on the site.

### **1.12. Water for Works**

The Contractor shall provide at his own risk and cost all water for use in connection with the Works (including the work of Sub-Contractors whether Nominated or otherwise). Where a main supply is not available locally, he will be required to bring in water by tanker or other approved method and pay all costs and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc. as he may consider necessary and clear way at completion.

All water shall be fresh, clear, and pure, free from earthly vegetable or organic matter, acid or alkaline substance, in solution or suspension.

## **2.0 EXCAVATION**

### **2.1. Clearance of Site**

Clearance of the site of the Works shall be done to the extent as directed by the Engineer and Project Manager but not otherwise. This shall include demolition and removal of all obstruction, removal of rubbish, cutting down vegetation, shrubs, bushes, and trees and grubbing up stumps and roots and burning or clearing away from site, as appropriate. Holes made in grubbing up stumps and roots shall be filled in and rammed solid with approved material deposited in layers not exceeding 150mm thick.

### **2.2. Trees and Bushes to be Preserved.**

Trees and bushes which are to be preserved shall be marked with paint by the Project Manager's Supervising Officer on site and the Contractor shall carefully protect these as required until completion of the Works.

### **2.3. Anthills**

All anthills, nests, queen ants and grubs shall be removed as necessary, and the ground sterilized either by lighting fires and burning for not less than 24 hours or use of an approved insecticide, and filling any holes excavated with approved material, rammed solid in layers not exceeding 200 mm thick.

### **2.4. Removal of Vegetable Soil**

The Contractor shall excavate over surface of site of roads, paths, embankments, terraces, etc., and to a distance of not less than 3 m around any building, and remove vegetation and top soil to a depth of not less than 200 mm below the average existing ground level or to such other average existing ground level or to such other depth as directed by the Project Manager, Vegetable soil shall be removed to a spoil heap within the boundary of the site or as otherwise directed and carefully preserved for reuse in top soiling to embankments and areas of cut or fill.

### **2.5 Excavation for Foundations**

The Contractor shall excavate for pole holes, stanchion bases, etc., all to the widths and depths as shown on the drawings or as directed by the Project Manager.

### **3.0 POLE PLANTING.**

#### **3.1. 4'x4' metallic post.**

4x4 hardwood metallic posts should be made from carefully selected wood and are fully pressure treated to ensure a durable and stable pillar post. They should be guaranteed to resist against rot, decay, and wood-attacking insects. The metallic should come in finely finished and having flat ends and smooth edges.

#### **3.2 Setting and planting poles.**

Put the end of the post on top of your gravel in the middle of the hole. Use a two-sided level to check if your post is straight and plumb. Mix fast setting concrete, pour the concrete into the hole until its 2-inch to 3-inch below ground level. Use shovel or spade to pour the concrete. Make sure to evenly pour the concrete on all the sides of your posts so the hole fills in completely. 2-inch to 3-inch hole left after pouring concrete should be pour later after the first one has set. Check using level or plum bob for levelness.

### **4.0 CONCRETE WORK**

#### **4.1. General Requirements**

All concrete work shall be carried out in accordance with these specifications except that in the case of reinforced concrete the provisions of B.S 8110-1: 1997: Structural Use of Concrete Code of Practice for Design and Construction shall apply in so far as they override, modify, or supplement the clauses contained herein. The Contractor shall submit to the Engineer and Project Manager full details of all materials which s/he proposes to use for making concrete.

#### **4.2. Cement**

The cement shall, unless specifically stated to the contrary, be common cement complying with the requirements of South Sudan Standard US 310 – 1& 2: 2001. Where other cements are specified, they shall comply with the requirements of the relevant European Norms (EN) Standards.

All cement shall be obtained from recognize manufacturers. Where cement is to be imported, prior approval of the Project Manager shall have to be obtained.

The Contractor shall supply, when requested by the Project Manager, test certificates relating to each type of cement used certifying that it complies with the appropriate South Sudan Standard.

Unless approval is given for bulk handling, all cement shall be transported and delivered in sound and properly secured bags and stored in a dry, weatherproof, well ventilated shed with a raised floor or in such a building as is approved by the Project Manager.

Each delivery of cement in bags shall be stacked in one place. The bags shall be closely stacked to reduce air circulation but shall not be stacked against an outside wall. Where pallets are used, they shall be constructed so that the bags are not damaged during handling and stacking. No stack of cement bags shall exceed 3 m in height. Different types of cement in bags shall be clearly distinguished by visible markings and shall be stored in separate stacks. Cement in bags shall be used in the order in which it is delivered.

Bulk cement shall be stored in weatherproof silos, which shall bear a clear indication of the type of cement contained in them. Different types of cement shall not be mixed in the same silo.

Cement shall be delivered or stored on site in such quantities to ensure that the concrete work on any section of the Works can be carried out without interruption. Each consignment shall be kept separate and distinct.

Any cement that has been injuriously affected by dampness or any other cause shall not be used and shall immediately be removed from the site. Cement which has become hardened and lumpy shall be removed from site.

#### **4.3. Aggregate for Concrete**

Aggregates for concrete shall consist of clean natural sands, gravel, crushed stone or other material which have been approved for use by the Project Manager and shall apply in respect of quality with the requirement of BS EN 12620 "Coarse and Fine Aggregates from Natural Sources for Concrete". Tests shall be made at frequent intervals or when called for to determine the number of impurities in the aggregates and if ordered by the Project Manager fine aggregates shall be washed at the contractor's own expense.

BS EN 12620 requires that aggregates shall be hard, durable clean and free from adherent coatings such as clay.

They shall not contain harmful materials such as iron pyrites, iron oxide, mica, shale, or similar laminar materials, or flaky or elongated particles, in such a form or in sufficient quantity as to adversely affect the strength or durability of the concrete or any materials which might attach reinforcement where this is required.

The various sizes of particles of which an aggregate is composed shall be uniformly distributed throughout the mass. The quantities of clay, silt and fine dust shall not exceed:

- I. Sand or crushed gravel sand, 3% by weight when using the test given in BS 812 Clause 13
- II. Crushed stone sand, 5% by weight when using the test given in BS 812 Clause 12.
- III. Coarse aggregate, 1% by weight when using the test given in BS 812 Clause 13.
- IV. All in aggregate, 2% by weight when using the test given in BS 812 Clause 13.

#### **4.4. Sand**

All sands for making mortar shall be clean well graded siliceous sand of good, sharp, hard quality equal to samples which shall be deposited with and approved by the Project

Manager. Earth, loam, dust, salt, organic matter, and any other deleterious substances, sieved.

A guide to the silt and clay content of sand and crushed gravel sand can be obtained by the field settling test described in B.S. 812 Clause 14 when the silt and clay content should not exceed 65 by volume.

#### **5.1. Metal**

Metal for welding work shall be well treated, graded and free from defects/deformities/bends in accordance with the metal (Export and Grading Rules 1967) and obtained from an approved South Sudan standard.

All metals shall be free of other defaults, rot and decay, brittle heart, and compression failure and loose unsound or dead knots.

All metals shall be grade marked as specified in the Grading Rules and certificates of Grading shall be produced for verification by the Project Manager.

In as much as is practicable, metals/materials shall be purchased immediately after the contract is signed to enable it to be adequately seasoned before required for use.

#### **5.2 Metals for Special Structures**

Metals for designed structural work requiring metal of high strength and quality will be specified by name in the Particular Specification or the Bills of Quantities, and in accordance with the Regulations for Structural Design.

#### **5.3 Preventive Treatment for Timber**

All timber for metal work shall be vacuum pressure treated and other eroding and rust agents. All cut ends of metals shall be painted and/or cover with caps.

#### **5.4 Sawn Timber**

All timber, except as specified elsewhere, shall be die square clean sawn as left from the saw and shall hold the full dimensions specified.

#### **5.5 Wrot metal**

The term "wrot" shall mean finished to a perfectly smooth finish to receive paint or other surface treatment. Pieces which have been machine planed shall be finely smoothed by files or other applicable tools to remove all unwanted marks.

3 mm reduction of specified size will be allowed in respect of each wrought face except in members 25 mm thick or less or where described as finished size "finished" when the members shall hold the full size stated.

### **5.6. Iron Sheets**

The aluminum corrugated iron sheets shall be in accordance with BS 6100 - 1.3.2 having a minimum length of 3m width 0.9m and Gauge is 28.

The aluminum troughed iron sheets shall be in accordance with BS 6100 - 1.3.2 Type A or B as specified in the Contract Documents having a minimum thickness of 0.9 mm (20 S.W.G.) and 1.2 mm (19 S.W.G.) respectively.

Sheets shall be lapped to the full extent indicated on the contract drawings or documents.

Corrugated roof sheets shall be fixed to timber purlins and corrugated roof sheets and troughed roofs sheets shall be fixed to steel purlins all as before described for galvanized corrugated steel roof sheets unless otherwise specified.

Troughed roof sheets shall be fixed to timber purlins on the crown of the trough at not less than 300 mm centers with 6 mm galvanized embossed washer under to give not less than 50 mm penetration of the purlins to which they are attached.

Sheets shall be stitched all as before described for galvanized corrugated steel roof sheets.

All holes in sheets shall be neatly drilled or punched, of the required diameter and finished clean without rages.

### **5.7. Hooks and Bolts**

All hooks, bolts and metal fastenings shall be of mild steel, free of all rust and defects and of approved manufacture.

### **5.8 Sand**

Sand for mortars shall be as described in "Concrete Works" except that it shall be fine sand.

### **5.9 Mortars**

The cement mortar shall consist of one part of cement to four parts of sand by volume (1:4). The sand shall be measured in specifically prepared gauge boxes and thoroughly mixed in an approved mechanical mixer or mixed dry on clean and approved mixing platforms, with water added afterwards until all parts are completely incorporated and brought to a proper consistency. The use of retempering of wholly or partially set mortar will not be allowed.

The gauged mortar shall consist of one part of cement to two parts of lime to nine parts of sand by volume (1: 2: 9).

In the case of gauged mortar, the sand and lime shall first be mixed into a coarse mix before addition of cement. All mortar is to be thoroughly mixed to a uniform consistency with only sufficient water to obtain a plastic condition suitable for towelling. No mortar that has commenced to set is to be used or knocked up again for reuse.

### **5.10. Brick Walling of 3 courses**

Bricks shall be kiln burnt bricks from a local source, and samples shall be submitted for the Project Manager's approval. Bricks are to comply with BS EN 772 and BS 6750 as regards size and tolerances, and shall be of good shape, well burnt, of even colour, free from flaws, stones and unburnt lumps and are to emit a clear ringing sound when struck one another. Brittle or badly burnt bricks must not be used and broken bricks or bats may only be used where required for bond. No brick shall absorb more than 20% of its dry weight during 24 hours' immersion in water.

Load bearing brickwork shall be constructed in solid bricks and internal non-load bearing walls where specified may be built in bricks having perforations.

Bricks may also be used in non-load bearing construction as facing or in-fill walling. The various classes of bricks are: -

- (a) Non-facing plastered (NFP).
- (b) Facing brick standard (FBS).
- (c) Facing bricks aesthetic (FBA); and

### **5.11. Wire mesh and Mosquito Gauze**

Fix wire mesh and mosquito gauge were indicated on the drawings, wire mesh and mosquito gauze shall be metal and brass or copper gauze respectively. Wire mesh comes in pieces of 1.2m width and 2.4m length. The mosquito gauge comes in roll of 30metres.

## **6.0 ROOFING**

### **6.1. General**

Roofing sheets shall generally be fixed in accordance with BS EN 501 except where the contract drawings or documents expressly override or modify this specification.

### **6.2 Iron Sheet**

The galvanized corrugated steel roof sheets shall be generally in accordance with BS 3083 having a steel sheet not less than 0.559 mm (24 S.W.G) thick with a coating of zinc on both sides with a total weight of not less than 610 and not more than 763 grammas per square meter of steel surface area. Sheets shall be laid with 150 mm end laps and side laps of one and half corrugations on the side away from the prevailing wind otherwise lapping shall be to the full extent indicated on the contract drawings or documents. Laps shall be not less than 150 mm long.

When timber purlins are employed, sheets shall be securely fixed to same on the crown of the corrugations at not less than 300 mm centres with 6 mm diameter galvanized drive screws each not less than 62 mm long with head and galvanized embossed curved washer under.

Sheets shall be fixed to steel purlins with 8 mm diameter galvanized mild steel hook bolts of 50 mm longer in the shank than the depth of the steel purling to which they are fixed each with nut and galvanized embossed curved washer. The sheets shall be fixed at not less than 300 mm centres on the crown of the corrugations.

Where sheets are required to be stitched together, they shall be joined at not less than 300 mm centres with 6 mm diameter and finished clean without rags, burrs or damage to the surrounding zinc coating.

Ridges shall have a roll top and plain wings not less than 450 mm girth all in galvanized steel sheet not less than 0.559 mm (24 S.W.G) thick and fixed in similar manner to the sheeting.

At square abutments the last two corrugations of the corrugated iron sheets next to walls shall be flattened and turned up against the wall and covered with 24 S.W.G galvanized iron apron flashing. Holes for bolts or screws shall be punched from the inside of the sheet and shall be in the ridges of the corrugations as fixed and not in the holes.

Bat proofing shall consist of "Perspex" or similar approved translucent plastic corrugated sheeting.

## **7.0 WINDOWS, DOORS, AND BLACKBOARD**

### **7.1. Windows and Doors**

All metallic framed iron sheet windows and doors shall unless otherwise specifically described be of the domestic type. Doors and windows should be designed according to the drawing.

### **7.2. Blackboard**

Blackboard should be out of plywood of 6mm thickness, 2 metres long, 1 metre wide and should be painted with blackboard paints.

## **8.0 CLEANING**

### **8.1. Cleaning**

The Contractor shall remove and destroy all cut ends, shavings, and other wood waste from all parts of the building and the site generally both whilst the work is in progress and at its completion.