

HEART OF AMMAN PROJECT
**RAS ALAIN SOCIAL
INCUBATION OFFICES**

VOLUME 3

METHOD OF MEASUREMENT
AND
BILLS OF QUANTITIES

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METHOD OF MEASUREMENTS

CONTENTS

GENERAL REQUIREMENTS

MASONRY

METALS

SPECIALIST WOOD WORKS

THERMAL & MOISTURE PROTECTION

DOORS AND WINDOWS

FINISHES

MECHANICAL WORKS

ELECTRICAL WORKS

GENERAL REQUIREMENTS

General Requirements

1. Principles of Measurement

- 1.1 The Works have been measured generally in accordance with the "Principles of Measurement (International) for Works of Construction" dated June 1979 published by The Royal Institution of Chartered Surveyors, U.K.
- 1.2 This method of measurement provides a uniform basis for measuring bills of quantities for works of construction. More detailed information than is required by this document may be given to define the precise nature of works or the circumstances under which it is to be carried out.
- 1.3 Amendments to this method of measurement for use in a particular locality or adopted for work not envisaged by this document shall be stated; an appendix is to be provided for such amendments.
- 1.4 This method of measurement may be applied equally to the measurement of proposed works and of complete works.
- 1.5 All measurements of the executed works called for in the Contract shall be based on the unit price stated in the Bills of Quantities and made according to the specifications. Any work done by the Contractor not requested in writing by the Engineer, shall not be included in the measurement.
- 1.6 In the case of discrepancy in quantities of works performed by the contractor and those shown on the drawings, and should such discrepancy be acceptable to the employer, then the quantities agreed by the Engineer shall be taken into account in the measurement of quantities.

2. Bills of Quantities

- 2.1 the objects of bills of quantities are:
 - a. To assist in the accurate preparation of tenders, by providing for measurement of quantities on a uniform basis.
 - b. To provide a basis for the financial control of a project, in accordance with the conditions of contract.
- 2.2 Bills of quantities shall describe and represent the works to be carried out; work which cannot be measured accurately shall be described as approximate or given in bills of approximate quantities.
- 2.3 Conditions of contract, drawings and specifications shall be provided with the bills of quantities.
- 2.4 The section headings and classifications do not impose restrictions upon the format and presentation of bills of quantities.

3. Measurement

- 3.1 Works shall be measured net as fixed in position and each measurement shall be taken to nearest 10 millimeters; this principle shall not apply to dimension stated in descriptions.
- 3.2 Unless otherwise stated, no deduction shall be made from items required to be measured by area voids of less than 0.25 m².
- 3.3 Minimum deductions of void shall refer only to voids within the edges of measured areas; voids which are at the edges of measured area shall always be deducted, irrespective of size.
- 3.4 These principles of measurement may be used with other units of measurement but the particular amendments shall be stated.
- 3.5 Notwithstanding these principles of measurement, a separate minor building or structure may be enumerated.

4. Items to be Fully Inclusive

- 4.1 Unless otherwise stated, all items shall be fully inclusive of all that is necessary to fulfill the liabilities and obligations arising out of contract and shall include:
 - a) Labor and all associated costs.
 - b) materials, goods and all associated costs
 - c) provision of plant
 - d) temporary works
 - e) establishment charges, overheads and profit

Description of Items

- 4.2 Items which are required to be enumerated, or for which an item is required, shall be fully described.
- 4.3 Items which are to be measured by length or depth shall state the cross-sectional size and shape, girth or ranges of girths or such other information as may be appropriate.
- 4.4 Items which are to be measured by weight shall state the thickness or such other information as may be appropriate.
- 4.5 Items which are to be measured by weight shall state the materials thickness or such other information as may be appropriate
- 4.6 Notwithstanding this method of measurement, proprietary items may be measured in a manner appropriate to the manufacturer's tariff or customary practice.
- 4.7 The description of items in bills of quantities may refer to other documents or drawings and any reference to such information shall be understood to fulfill any requirement of this method of measurement, alternatively, reference may be made to published information.

5. Conditions of Contract

- 5.1 The Tenderer is deemed to have covered in his unit rates all the requirements of the Conditions of Contract.

6. Specification

- 6.1 The Tenderer is deemed to have covered in his unit rates all the requirements of the technical specifications.

7. Restrictions

- 7.1 The Contractor shall allow in his unit rates for Restrictions, which shall include:

- a) Access to a possession or use of the site.
- b) Limitations of working space.
- c) Limitations of working hours.
- d) The maintenance of existing services on, under or over the site.
- e) The execution of completion of the working in any specific order, sections or phases,
- f) Items of a like nature.

8. Contractor's Administrative Arrangements

- 8.1 The Contractor shall allow in his unit rates for contractor's administrative arrangements, which shall include:
- a. Site administration
 - b. Supervision.
 - c. Security.
 - d. Safety, health and welfare of work-people
 - e. Transport of work-people

9. Constructional Plant

- 9.1 The Contractor shall allow in his unit rates for constructional plant, which shall include:
- a) Small plant and tools.
 - b) Scaffolding.
 - c) Cranes and lifting plant.
 - d) Site transport.
 - e) Plant required for specific Trades.

10. Contractor's Facilities

10.1 The Contractor shall allow in his unit rates for facilities required by the contractor, which shall include:

- a) Water for the works; particulars shall be given if water will be supplied to the contractor.
- b) Lighting and power for the works, particulars shall be given if current will be applied to the contractor.
- c) Any other facilities (e.g. signboards, progress, photographs . . . etc.).

11.Sundry Items

11.1 The contractor shall allow in his unit rates for sundry items, which shall include:

- a) Testing of materials
- b) Testing of the works.
- c) Protecting the works from inclement weather.
- d) Removing rubbish, protective casings and coverings and cleaning the works at completion.
- e) Traffic regulations.

MASONARY

Masonry

BLOCK WORKS

Generally

- 1.1 Block works shall be measured net as indicated in the BOQ built in position for the various thickness specified, including mortar, metal lath, corner beads, lentils, reinforcement steel, measured by meter square.

The unit rate is deemed to include:

- Mortar for bedding and jointing.
- Fine sand to be filled in cavities
- Raking out joints or leaving rough joints to form key
- Battering work (i.e. sloping with parallel sides)
- Extra materials for curved work, tapering work and for work bonded at back to other work
- Temporary strutting to work used as Formwork
- Joint reinforcement in reinforced work
- Overhand building
- Forming cavities in hollow walls and between wall and other work, including providing wall ties, and closing cavities at ends, tops and around openings including extra materials
- Bonding ends of walls to other work including providing ties reinforcement and anchorage or other fixings and extra material in bonding
- Pinning up load bearing walls to structural soffits and filling voids with mortar
- Reveals, angles and intersections
- Rough and fair cutting
- Grooves, throats, mortices, chases, rebates, holes, stops, mitres and the like
- Labors in returns, ends and angles
- Building in or cutting and pinning ends of lintels, sills, bearing bars, steps, timbers, steel sections and the like
- Templates for forming openings and lift shafts, centering, and temporary supported protection to built-in frames
- Fixings in position
- Labors, tools, scaffolding, and overhead and profit

METALS

Metals

1. Stairs, balustrades, railings and the like

- 1.1 Each kind of work is given separately, stating the kind of material and finish as delivered. Staircases and the like which include integral balustrades are so described.
- 1.2 Each height of balustrade and the like is given separately. Raking and curved work are each so described.
- 1.3 Dimensions and details are stated in descriptions, where necessary, to identify the work.
- 1.4 Balustrades and the like are given in meters.

2. Metal fabrications, decorative metal items, gratings and the like

- 1.1 Each kind of work is given separately, stating the kind of material and finish as delivered.
- 1.2 Each item is given separately. Dimensions and details are stated in descriptions, where necessary, to identify the work.
- 1.3 Curved work is so described.
- 1.4 Rates for measured work are deemed to include the costs of: surface treatments applied as part of the production process, finishes, where part of the item as delivered, rebates, grooves, splays, chamfers, mouldings and the like labours including ends, angles, fixings, fastenings and gaskets, cutting and fitting around obstructions, protection.

SPECIALIST WOOD WORKS

Specialist Wood Works

1. Generally

- 1.1 Each kind of work is given separately, stating the kind of material and finish as delivered.
- 1.2 Dimensions and details are stated in descriptions, where necessary, to identify the work. Dimensions stated for wood are deemed to be finished sizes unless stated as nominal.
- 1.3 Curved work is so described.
- 1.4 Rates for measured work are deemed to include the costs of:
 - surface treatments and preservative treatments applied as part of the production process,
 - finishes, where part of the item as delivered,
 - rebates, grooves, splays, chamfers, mouldings and the like labours on wood including ends, angles, fixings, fastenings and gaskets, cutting and fitting around obstructions, protection.

2. Wood Cabinets

- 1.1 Each kind and type of cabinet is given separately.
- 1.2 Dimensions, types and details are stated in descriptions, where necessary, to identify the work.
- 1.4 Cabinets are given in meters.
- 1.5 Rates for measured work are deemed to include the costs of:
 - all component parts, finishing including applied finishes, ironmongery and accessories,
 - providing everything necessary for jointing, sealant and pointing,
 - adjusting, easing and lubricating, cleaning on completion,
 - placing and fixing in final position, extra material and labour in secure anchorage,
 - product data, shop drawings and samples, protection.

THERMAL AND MOISTURE PROTECTION

Thermal and moisture protection

1. Thermal and moisture protection:

Each kind of thermal and moisture protection items are given separately stating the type of material.

The unit rate is deemed to include:

- Preparation of surfaces
- All necessary related works shown on the drawings and called for in the Specifications
- Repair waterproof membrane are given in item.
- Liquid waterproof insulation is given in meter square

DOORS AND WINDOWS

Doors and Windows

1. Doors and Windows:

- 1.1 Each kind of work is given separately, stating the kind of material and finish as delivered. Windows, doors, screens, and the like which include associated frames or linings and ironmongery are each so described.
- 1.2 Each type of unit is given separately. Dimensions and details are stated in descriptions, where necessary, to identify the work. Dimension stated for wood are deemed to be finished sizes unless stated as nominal.
- 1.3 Multi-leafed doors are counted as one door type.
- 1.4 Windows, doors, screens, , louvers and the like are enumerated or given in enumerated.
- 1.5 Door frames, architraves and linings are included in unit price.
- 1.6 Rates for measured work are deemed to include the costs of:
 - frames, sills, louvres, doors, opening portions and insect screens, where supplied with the unit,
 - glazing beads, gaskets, weather strips, flashings, architraves, trims and the like accessories, where supplied with the unit,
 - glass and glazing, where supplied with the unit,
 - ironmongery and operating equipment, where supplied with the unit, hardware sets and all sundry ironmongery, where supplied with the unit, fitting and hanging doors,
 - surface treatments and preservative treatments applied as part of the production process,
 - finishes, where part of the unit as delivered, priming backs of frames and the like,
 - rebates, grooves, splays, chamfers, mouldings and the like labours on wood including ends, angles,
 - sub-frames, packing's, bearers, grounds and the like,
 - fixing and fastening, bedding, jointing and pointing including providing materials,
 - cutting and fitting around obstructions, firestopping to door frames and doors.

FINISHES

Finishes:

1. Gypsum board

- 1.1 Each kind of lining is given separately. Work which includes integral insulation, vapor barriers, fire barriers, isolating membranes, moisture resistant treatment and the like are each so described.
- 1.2 Lining to sides of openings, to projections, nibs, recesses and rebates, and to steps in surfaces is included with the measurement of work to the adjacent surface.
- 1.3 Lining to isolated columns is only measured as such when their length on plan is not exceeding four times their thickness.
- 1.4 Lining to isolated beams and isolated columns include attached beams and attached columns where the work is different from the abutting ceilings and walls.
- 1.5 Thickness and height of partitions are stated in descriptions. Partitions boarded one side and boarded both sides are each so described.
- 1.6 Dimensions, types, and details of features are stated in descriptions, where necessary, to identify the work.
- 1.7 Linings are given in square meters measured on the external face and over obstructions. No deduction is made for voids not exceeding 0.50 m². No allowance in the measurement is made for lapped joints.
- 1.8 Band courses, coves, mouldings, cornices, architraves and the like features are given in meters.
- 1.9 Rates for measured work are deemed to include the costs of:
 - fixings including head and sole plates, studs, stiffening sections, firings and channels, fixings for heavy fittings, and other fixing materials,
 - jointing including fair joints, jointing battens, fillets, beads and the like,
 - joint and reinforcing tape,
 - finishing including plaster for dabs, filling and finishing,
 - work at any height above floor level,
 - work of any width, height or girth,
 - working overhand,

2. Plaster and cement the unit rate is deemed to include:

- 2.1 Cement sand plaster materials as specifications section (plaster guides should be for walls and ceilings).
- 2.2 All mixes mentioned in specification section.
- 2.3 Metal accessories, expansion joints and anchorages as specified in the specifications.
- 2.4 Completion of the work as specified.
- 2.5 Angles beads, casing stops and wire mesh
- 2.6 All necessary related works and materials.

3. Floor and Wall Tiling – Generally

- 3.1 Each kind of tiling and slab is given separately. Patterned work and work in multi-colors are each so described stating the nature of the work.
- 3.2 Works to each of the following is given separately:
 - floors,
 - treads, risers,
 - channels,
 - skirtings,
 - saddles,
 - walls, including attached columns,
 - isolated columns,
 - isolated beams,
 - ceilings, including soffits, sides and soffits of attached beams, and soffits of staircases and landings.
- 3.3 Works to arches and other special features are each given separately.
- 3.4 Works to side of openings, to projections, nibs, recesses, and rebates and the like is included with the measurement of works to the adjacent surface.
- 3.5 Isolated columns are only measured as such when their respective length on plan is not exceeding four times their thickness.
- 3.6 Thickness, dimensions, types and details are stated in descriptions where necessary to identify the work.
- 3.7 Thickness stated for tiles and slabs is the thickness exclusive of keys, grooves and the like.
- 3.8 Work to floors, walls, ceilings, isolated columns, isolated beams and the like is given in square meters measured on the exposed face. No deduction is made for voids not exceeding 0.50m².

4. Floor and Wall Tiling – Generally / CONT'D

- 4.1 Work to skirtings, saddles, treads, risers, nosings and the like is given in meters.
- 4.2 Rates for measured work are deemed to include the costs of:
- work at any height above floor level, setting out,
 - extra work involved in patterned work and work in multi-colors, work of any width, height and girth,
 - special and non-standard tiles and slabs,
 - slabs and tiling laid to falls and cross falls
 - raking and vertical work to string, aprons and the like,
 - sand leveling bed, cement-sand screeds,
 - adhesive and fixing materials and/or devices,
 - bedding and fixing including bedding and backing mortars,
 - all cutting including circular cutting,
 - internal and external angles, intersections, joints,
 - division strips and anti-slip nosings,
 - jointing, grouting, cleaning, sealing,
 - grinding and polishing including working overhand and working over and around obstructions,
 - temporary support, supports for roof paving,
 - shop drawings, samples and test results, protection

5. **Painting – Generally**

- 1.1 Painting is measured in square meters for the net area covered. Work to narrow widths will be incorporated in the measurement.
- 1.2 Painting for all metal and wooden works shall not be measured included but shall be deemed included with the related measured works.
- 1.3 Rates for measured work are deemed to include the costs of
 - internal and external work,
 - preparatory work,
 - method of application,
 - rubbing down between coats, easing,
 - work required to be carried out before fixing, whether on or off site,
 - stopping, filling and priming,
 - priming backs of frames, edges of rebates and beads and bottoms of doors,
 - work in multi-colors, defined as the application of more than one colour on an individual surface or in one room,
 - removing ironmongery from surfaces to be decorated and re-fixing,
 - masking adjacent surfaces,
 - samples and product data, protection.

MECHANICAL WORKS

A. PREAMBLES:

- 1.0 The Scope of works includes the supply, delivery to site, installation, commissioning and testing of the various complete systems outlined in contract, and as described elsewhere in the specification documents.

The contractor shall be responsible to visit the site to familiarize himself with the scope of work.

- 2.0 The work shall comprise the whole of the labor and, unless otherwise indicated, all the materials necessary to form a complete installation and such tests, adjustments and commissioning as are prescribed in subsequent clauses and as may otherwise be required to give an effective working installation to the satisfaction of the Engineer.
- 3.0 This specification is for the Mechanical works. However, the Instructions to Tenders, Form of Tender, Conditions of contract, Preliminaries Section and any Supplementary Conditions of Contract applicable to Main Contract shall be applicable to this contract also.
- 4.0 The term Contractor used in the Mechanical documents and drawings is to be considered to mean the Contractor for Mechanical works.
- 5.0 Contractor shall be responsible for proper performance of all Mechanical systems in accordance with relevant standards and codes and design parameters listed hereinafter.
- 6.0 Provide all items, articles, materials, operations, sundries, labor, supervision, guarantees, allowances for overhead and profit, etc., to achieve a fully functional and acceptable system.
- 7.0 The precedence of documents and drawings shall be as determined in the Main Contract. However, consider the specifications as an integral part of the work together with the drawings. Consider any item or subject omitted from one, but mentioned or reasonably implied on the other as properly and sufficiently indicated.
- 8.0 The Contractor is responsible for developing his own take off of materials and is to make this available as requested to the Consultant.

B. EXAMINATION OF SITE AND DRAWINGS

- 1.0 Visit the site of the proposed works and obtain all information as to existing conditions and limitation.
- 2.0 Examine the documents including the Specifications and Drawings of all other Divisions before bidding and again before commencing any portion of the works.
- 3.0 Neither the Owner nor the Consultant will be responsible for any claim for extra work or expense resulting from the failure of the Contractor to be fully aware of Site Conditions.

C. CONTRACT DRAWINGS

- 1.0 The drawings for services works are design drawings, diagrammatic, and intended to convey the scope of work and indicate general arrangement and approximate locations of apparatus, fixtures, pipe, etc. The drawings do not intend to indicate architectural or structural details.

These cannot be used as shop drawings. Contractor must develop own detailed shop drawings for work at site.
- 2.0 Do not scale drawings. Obtain accurate dimensions to structure and architectural items from drawings of those trades. Confirm by site measurement. Verify location and elevation of all services (, Mechanical, Telephone, etc.,) before proceeding with the work.
- 3.0 Make at no extra cost, any changes or additions to materials, and/ or equipment necessary to accommodate structural conditions (pipes or ducts around beams, columns, etc.)
- 4.0 Alter, at no additional cost, the location of materials and/ or equipment as directed, provided that the changes are made before installation and do not necessitate additional material.
- 5.0 Install all ceiling mounted components (Diffusers, grilles, detectors, light fixtures, emergency lights, fire detectors, loudspeakers, camera points, etc.) in accordance with the reflected ceiling drawings which are to be prepared by the Contractor and coordinated with all trades. These must be submitted for approval and be approved before any work commences on site.
- 6.0 Leave space clear and install all work to accommodate future materials and/or equipment as indicated and/or supplied by other divisions of work of the contract. Install all pipe runs, conduit runs, cable trays, etc., to maintain maximum headroom and clearances, and to conserve space in shafts and ceiling spaces and under floors, and to provide adequate space for service and maintenance.
- 7.0 Confirm on the site the exact location of outlets and fixtures.
- 8.0 Obtain Manufacturers' installation directions to aid in the proper execution of the work. Submit two copies of such directions to the Consultant prior to installation, for use in inspecting the work.
- 9.0 Confer with all trades installing equipment which may affect the work of this division, and arrange equipment in proper relation with that equipment installed under all Divisions of the Contract.
- 10.0 The Unit Price of the materials and equipment in Bills of Quantities shall be comprehensive and shall include for complying in all respects with the requirements of the Technical Specifications, covering the obligations under the contract and all matters and things necessary for the proper construction, completion of and remedy of defects in the works. No claims for additional payment will be allowed for any error, or misunderstanding of the work involved by the contractor.

D. CONTRACTORS RESPONSIBILITY

- 1.0 The appointed Contractor shall accept full functional responsibility for all Mechanical services to meet the requirements of the Client/Engineer and generally in accordance with this specification.
- 2.0 Supply materials and equipment
- 3.0 Off loading and handling from trucks on site to place of installation (including carnage, putting in place, and unpacking)
- 4.0 Installation of materials and equipment.
- 5.0 All civil work required and connected with the Mechanical installations, such as: equipment concrete bases and supports, cutting through walls and slabs for passage of piping and ducting to structure, excavation and back fillings, riggings, hoisting, water proofing, cleaning protection and painting.
- 6.0 All testing commissioning and operation by independent company (if applicable), they shall include for expenses of tests ordered by the engineer, and all costs of repairs to damage caused by the Contractor's work.
- 7.0 All labor, materials, tools and instruments required for installation, testing, operation, and commissioning.
- 8.0 Shop-drawings and record drawings.
- 9.0 Samples as required by the Engineer.

E. RULES OF MEASUREMENTS MECHANICAL SERVICES

- 1.0 The unit rate for any material or equipment mentioned in this contract as described in tender documents complete.

F. SCHEDULE OF MANUFACTURERS – ELECTRICAL WORKS

All materials supplied under this contract have to be approved and accepted by Engineer.

ELECTRICAL WORKS

A. PREAMBLES:

- 1.0 The Scope of works includes the supply, delivery to site, installation, commissioning and testing of the various complete systems outlined in contract, and as described elsewhere in the specification documents.

The contractor shall be responsible to visit the site to familiarize himself with the scope of work.

- 2.0 The work shall comprise the whole of the labour and, unless otherwise indicated, all the materials necessary to form a complete installation and such tests, adjustments and commissioning as are prescribed in subsequent clauses and as may otherwise be required to give an effective working installation to the satisfaction of the Engineer.
- 3.0 This specification is for the Electrical works. However, the Instructions to Tenderers, Form of Tender, Conditions of contract, Preliminaries Section and any Supplementary Conditions of Contract applicable to Main Contract shall be applicable to this contract also.
- 4.0 The term Contractor used in the Electrical documents and drawings is to be considered to mean the Contractor for Electrical works.
- 5.0 Contractor shall be responsible for proper performance of all Electrical systems in accordance with relevant standards and codes and design parameters listed hereinafter.
- 6.0 Provide all items, articles, materials, operations, sundries, labour, supervision, guarantees, allowances for overhead and profit, etc., to achieve a fully functional and acceptable system.
- 7.0 The precedence of documents and drawings shall be as determined in the Main Contract. However, consider the specifications as an integral part of the work together with the drawings. Consider any item or subject omitted from one, but mentioned or reasonably implied on the other as properly and sufficiently indicated.
- 8.0 The Contractor is responsible for developing his own take off of materials and is to make this available as requested to the Consultant.

B. EXAMINATION OF SITE AND DRAWINGS

- 1.0 Visit the site of the proposed works and obtain all information as to existing conditions and limitation.
- 2.0 Examine the documents including the Specifications and Drawings of all other Divisions before bidding and again before commencing any portion of the works.
- 3.0 Neither the Owner nor the Consultant will be responsible for any claim for extra work or expense resulting from the failure of the Contractor to be fully aware of Site Conditions.

C. CONTRACT DRAWINGS

- 1.0 The drawings for services works are design drawings, diagrammatic, and intended to convey the scope of work and indicate general arrangement and approximate locations of apparatus, fixtures, pipe and duct runs, etc. The drawings do not intend to indicate architectural or structural details.

These cannot be used as shop drawings. Contractor must develop own detailed shop drawings for work at site.

- 2.0 Do not scale drawings. Obtain accurate dimensions to structure and architectural items from drawings of those trades. Confirm by site measurement. Verify location and elevation of all services (, Electrical, Telephone, etc.,) before proceeding with the work.
- 3.0 Make at no extra cost, any changes or additions to materials, and/ or equipment necessary to accommodate structural conditions (pipes or ducts around beams, columns, etc.)
- 4.0 Alter, at no additional cost, the location of materials and/ or equipment as directed, provided that the changes are made before installation and do not necessitate additional material.
- 5.0 Install all ceiling mounted components (Diffusers, grilles, detectors, light fixtures, emergency lights, fire detectors, loudspeakers, camera points, etc.) in accordance with the reflected ceiling drawings which are to be prepared by the Contractor and coordinated with all trades. These must be submitted for approval and be approved before any work commences on site.
- 6.0 Leave space clear and install all work to accommodate future materials and/or equipment as indicated and/or supplied by other divisions of work of the contract. Install all pipe runs, conduit runs, cable trays, etc., to maintain maximum headroom and clearances, and to conserve space in shafts and ceiling spaces and under floors, and to provide adequate space for service and maintenance.
- 7.0 Confirm on the site the exact location of outlets and fixtures.
- 8.0 Obtain Manufacturers' installation directions to aid in the proper execution of the work. Submit two copies of such directions to the Consultant prior to installation, for use in inspecting the work.
- 9.0 Confer with all trades installing equipment which may affect the work of this division, and arrange equipment in proper relation with that equipment installed under all Divisions of the Contract.
- 10.0 The Unit Price of the materials and equipment in Bills of Quantities shall be comprehensive and shall include for complying in all respects with the requirements of the Technical Specifications, covering the obligations under the contract and all matters and things necessary for the proper construction, completion of and remedy of defects in the works. No claims for additional payment will be allowed for any error, or misunderstanding of the work involved by the contractor.

D. CONTRACTORS RESPONSIBILITY

- 1.0 The appointed Contractor shall accept full functional responsibility for all electrical services to meet the requirements of the Client/Engineer and generally in accordance with this specification.
- 2.0 Supply materials and equipment
- 3.0 Off loading and handling from trucks on site to place of installation (including carnage, putting in place, and unpacking)
- 4.0 Installation of materials and equipment.
- 5.0 All civil work required and connected with the electrical installations, such as: equipment concrete bases and supports, cutting through walls and slabs for passage of conduits, trunking and cable trays/ladders support s to structure, excavation and back fillings, riggings, hoisting, water proofing, cleaning protection and painting.
- 6.0 All testing commissioning and operation by independent company (if applicable), they shall include for expenses of tests ordered by the engineer, and all costs of repairs to damage caused by the Contractor's work.
- 7.0 All labor, materials, tools and instruments required for installation, testing, operation, and commissioning.
- 8.0 Shop-drawings and record drawings.
- 9.0 Samples as required by the Engineer.

E. Materials, Equipment and Installations

- 1.0 The unit rate for any material or equipment mentioned in this contract as described in tender documents complete.

F. SCHEDULE OF MANUFACTURERS – ELECTRICAL WORKS

All materials supplied under this contract have to be approved and accepted by Engineer.