NEW BOYS HOSTEL BLOCK B&C, IBA MAIN CAMPUS, KARACHI

VOLUME 5
SPECIFICATIONS
(ELECTRICAL WORKS)

1.0 GENERAL REQUIREMENTS:

1.1 GENERAL

All applicable provisions or drawings, General Requirement and General Specification and Bill of Quantities form part of the contract.

The item wise amount deems to have included all obligation set out in the contract.

1.2 DEFINITIONS

Where used in documents and drawings the following words shall be interpreted as listed.

1.2.1 "The Contract" shall cover all the works to be carried out under this trade.

1.2.2 "Equal", Equivalent", Acceptable" or "As Approved" applies to all material acceptable as thereinafter set forth in the text under the heading "Approval of the work".

1.2.3 "The Work" covers all works described or implied from Drawings, General Requirements, General Conditions, General Specifications and Bill of Quantities and the work described under the heading "Work include" described in Section 1.19 of General Requirements.

1.2.4 "The Project Architect", "The Consultant", "The Engineer", "The Owner", "The Owner Representative", "Project Manager". The party or parties jointly or severally responsible for interpreting, accepting and otherwise running the performance under this contract.

1.2.5 "The Specifications". These Specification", All specified work under various contract documents including the documents described under "The Work".

1.2.6 "British Standards", British Standards (B.S) prepared by British Standards Institution London.

1.2.7 "Items", include all material, equipment fittings and fixtures, accessories etc. to complete the work in all respect under this contract and in accordance with the best engineering standards / practice.

1.2.8 All the work carried out in this contract / scope of work shall be governed by the latest I.E.E Regulations / B.S Standard / Local Electricity Rules. Among the various standards applicable, the most stringent shall be applicable.

1.3 NOTICE TO BIDDERS

1.3.1 Drawings, General Requirements, General Specification, and Bill of Quantities are to be considered as supplementing each other and as such as intended to serve jointly on the basis upon which the Contractor shall establish his bid.

1.3.2 It is the intent of this contract to call for finished work, tested, completed and ready for operation in all respect.

1.3.3 Drawings, Specifications, and Bill of Quantities do not include assurance as to their complete accuracy and validity, in all details and which may depend for proper execution, upon interpretation by Owner's Representative and other authorities, during the course of construction.

1.3.4 The contractor shall under stand that:

- In the event that a disagreement with regard to item between contract documents occurs, he shall provide items of greater quantity and better quality.

- He shall provide any small items of work not specifically called for, but required to complete the intended installations.

- He shall coordinate his work or adjust same so that conflicts in space do not occur with other trades involved at the project.

- He shall coordinate his work or adjust the same to suit or any other existing conditions.

1.4 APPROVAL OF THE WORK

All workmanship and items supplied under this contract, shall be acceptable to the Owner's representative or Consultants, who have the power to reject any items which is in their judgment are not in full accordance with the plans and specifications.

1.5 GURANTEE AND CERTIFICATES

All work shall be guaranteed to be free from leaks or defects where required by the Owner's Representative the contractor shall give such guarantee in writing. Any defective material and workmanship shall be replaced or repaired by the Contractor as directed for in the duration of the maintenance period.

1.6 SAMPLES FOR APPROVALS

1.6.1 The contractor is required to submit on one or more wooden boards, one sample each of different sizes or capacities of conduits, conduit fittings, wires, junction boxes, switch boxes, switches, sockets, circuits breakers and distribution board, accessories and other items as required by the Consultants. No material of any kind be procured or installed without approval of such samples. All such samples will be returned to the Contractor at the end of the contract on satisfactory completion of the work.

1.6.2 Prior to procuring or installation work of any item, also furnish for the approval of Consultants, relevant literature, catalogues, cuts, factory / assembly drawings showing circuitry arrangements, and other necessary requirements of all items to be furnished or installed under this contract.

1.6.3 Approval of any item tests shall not relieve the contractor from the responsibility of furnishing proper items.

1.7 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

1.7.1 Except where modified by a specification notation to the contrary, it shall be understood that the indication and / or description of any item, in the drawings, Bill of Quantities, Specifications and / or General Requirement carried with it the instruction to furnish and install the item.

1.7.2 It shall be understood that the specifications drawings, and Bill of Quantities are complimentary and are to be taken together for a complete interpretation of the work. Exceptions are that notes on the drawings, which refer to an individual element of work, take precedence over the Specifications.

1.7.3 No exclusion form or limitations, in the language used in drawings or specifications shall be interpreted as meaning that the appurtenance or accessories to complete any required system or item are to be omitted.

1.7.4 The drawings or necessity utilized symbols and schematic diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate every item required for the intended installation. The works shall be installed, in accordance with the diagrammatic intent expressed: on the drawings, and in conformity with the dimensions indicted on final architectural and structural working drawings and on equipment shop drawings / other trade drawings.

1.7.5 No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded.

1.7.6 Certain details appear on the drawings which are specific with regards to the dimensioning and positioning of the work. These details are intended only for

the purpose of established general feasibility. They do not obviate filed coordination for the indicated work.

1.7.7 The latest standards and codes of reputable institutes shall be applicable to all items and installation work. Wherever these specifications differ from contract specifications, the higher specifications shall prevail.

1.7.8 Submit the details and obtain prior approval for any deviation work from the Contract Drawings.

1.8 SHOP DRAWINGS

Contractor to prepare & submit Drawings / Sketches for coordination purpose of installation works.

1.9 RECORDS / AS INSTALLED DRAWINGS

1.9.1 As-Built / record drawings shall be initiated / prepared from the start of the work & be progressed towards completion.

1.9.2 Supply record drawings of reproducible types Sepias + 3 Prints along with electronic CD's at the completion of the work.

1.9.3 The drawings shall provide an accurate and complete records of the work as installed. Submit three copies of all records drawings.

1.10 CLEANING & PROTECTING

1.10.1 Store all material and items in al manner that will maintain an orderly clean appearance and cover and protect them.

1.10.2 Protect the completed work from damage throughout the contract period.

1.10.3 After completion of the project, clean the exterior surface of equipment and fixtures including concrete residue.

1.11 OPERATING AND MAINTANCNE INSTRUCTIONS

Furnish three copies of manuals to the owner in bound form containing data covering capacities, manufacturer's instructions and maintenance of operation of all equipment and apparatus.

1.12 PAINTING

Deliver all equipment with standard factory finish or as clean all equipment before acceptable by the Owner.

1.13 EQUIPMENT AND MATERIAL

1.13.1 All items required for installation under these specifications shall be new without blemish or defect, where no specific indications as to the type or quality of items in indicated a first class standard item shall be furnished in accordance with the latest applicable B.S Standards.

1.13.2 It is intent of these specifications that wherever a manufacturer of a product is specified, and the terms, "Other Approved", or "Approved Equivalent", or "Equal", are used, the substituted items must conform in all respect to the specified items.

1.13.3 All items of one type (such as in panel boards) shall be the products of one manufacturer.

1.13.4 Substitution of electrical equipment for that shown on the schedules or designated by model number in the specification will not be considered if the item in not a regular items shown on the current catalogue of the manufacturer and has been successfully used for a period of not less the five (5) years.

1.14 TEST, ACCEPTANCE AND CERTIFICATES

1.14.1 All test necessary to show proper execution of work shall have been performed before final acceptance of work, Carry out these test in the presence of the Owner's and / or Consultants representative, Provide any assistance required in this regard including necessary arrangements of labour and measuring instruments.

1.14.2 It is the Contractor's responsibility to ensure that all components of the system including the controls are operating satisfactorily before any of the work shall be considered completed.

Test the installation for proper ground, continuity and installation. If test indicate in-adequate insulation resistance, corrections shall be made accordingly, any defects or deficiencies discovered in any of the electrical works shall be promptly corrected.

Earth resistance measurement must indicate acceptable values.

1.15 LIMITING NOISE PRODUCED BY ELECTRICAL INSTALLATION

1.15.1 Perform the necessary work shown below to assure that minimum noise is produced by any of the electrical equipment supplied and installed under this contract.

1.15.2 Check and tighten the fastenings of sheet metal plates, covers, doors and trims used in the enclosure of electrical equipment.

1.15.3 Remove and replace any individual device containing one or more magnetic flux path metallic cores (e.g. discharge lamp ballast, transformer, dimmer, etc.) which is found to have a noise output exceeding that of other identical installed at the project.

1.16 SYSTEMS DATA

1.16.1 Unless specifically mentioned elsewhere all equipment and items shall be designed to operate satisfactory without any derating for following tolerance levels.

- Voltage rating of H.T. Equipment – 11 KV.
- Voltage rating of L.T. Equipment
- Three phase: 400 Volts ± 10% at 50 Hz
- Single phase: 230 Volts ± 10% at 50 Hz

1.16.2 All equipment and items shall be suitable for smooth operation between temperature range 0 to 50^{o} Celsius and at relative humidity up to 90 %.

1.17 IDENTIFICATION

1.17.1 Following items or material need identifications.
Identify Individually:-

i) Each primary and secondary switch board.

ii) Each panel board.

iii) Each primary and secondary distribution switch and circuit breaker regardless of whether separately mounted or grouped with others in a single housing.

iv) Each wire of or cable in each primary & secondary feeders.

1.17.2 The identifications of all above items shall be as explained under this section.

1.17.3 The nomenclature used to identify power centres, networks, units, switchboards panel-board shall confirm to the nomenclature used on the drawings.

1.17.4 The nomenclature used to identify switches or circuit breakers shall:

i) Where they disconnect mains or service, designate this services or main involved.

ii) Where they control feeders, designate the feeder number and the name of the space and the load supplied.

iii) Where they control lighting and appliance branch circuitry, designate the name of the space and the load supplied.

1.17.5 The nomenclature used to identify feeder wires and cables shall designate the feeder number. Identification for power centres, Switch boards and panel boards shall be by means of engraved lamcoid nameplates showing ¼" high white lettering on a black background fastened to the outside face of the front.

1.17.6 Identification for distribution switches or circuits breakers Panel / DB's by name of the following.

i) Where individually enclosed use engraved lamcoid nameplates showing 1/8" high white lettering on black background fastened on the outside front face of the enclosure.
ii) Where is power centres and switch, use directories mounted behind transparent plastic covers, in metal frames fastened on the inside face of the doors.

1.17.7 Identification for the wires and cables of feeders shall be by means of wrap around labels except that fiber or non-ferrous metal tags fastened with non ferrous metal wires shall be used for secondary feeders in manholes.

1.17.8 Phase identifications letters shall be stamped into the metal of the bus-bars of each phase of the main busses of each switch-board (distribution board) and panel board. The letters shall be visible without having to disassemble any current carrying or supporting elements.

1.17.9 Provide type written directories for panel boards.

1.17.10 All electric switch boards rooms, electric closets shall be equipped with enameled sheet metal "red on white sign" reading "Electrical Equipment Room – No Storage permitted". Signs shall be mounted at clearly visible locations within the rooms.

1.17.11 Identify each junction box, pull box, and empty conduit system for wires of future system.

1.17.12 Prior to installation of identifying tags and name plates submit their nomenclature for acceptance by the Consultant.

1.18 RULES REGULATIONS & CODES

The entire electrical installation works shall be carried out by licensed contractor authorized to undertake such work under the provisions of the Electricity Rules 1973 as adopted and modified to date by the Government of Pakistan. Contractor must follow all local / international electrical codes as per requirement of different manufacturers.

1.19 WORK INCLUDED

The works shall broadly include but not be limited to the supply, installation, testing & commissioning of the following.

- Preparation of Shop Drawings / Installation, Fabrication details and As-Built Drawings.

- Submission of magger test reports for L.V. works / cables & earth resistance tests sheet. The above are to be witnessed by Client / Consultants representative.
- Testing & commissioning procedures Performa to be adopted / submitted shall be given in advance for approval.

- On completion of satisfactory testing / commissioning all reports / documents shall be submitted to the Client.

SECTION – A
CONDUITS PIPES & ACCESSORIES

0.1 All conduits, accessories such as junction boxes, sockets, tees bends elbow shall be of similar quality and properly sized to perfectly match with, the sizes of conduits to which they are installed.

0.2 Do not use conduit less then 20 mm diameter.

0.3 Do not use defective conduits, pipes or accessories.

0.4 Maximum allowable percent of conduit fill shall conform to the following.

- 2 Conductors 30 Percent
- 3 or more conductors 40 Percent

0.5 Get approval of samples of all sizes and type of conduits and pipes.

0.2 METERIAL

2.1 PVC Conduit & Accessories.

0.1 Use PVC rigid conduits of class " D " type. Use PVC bends with enough enlarged ends to receive conduit without reduction in the internal diameter at joints.

0.2 Use only manufactured smooth bends where conduits change directions.

0.3 Do not use direct heating method for making bends in conduit. Use hot air and fill the conduit with sand for forming bends in the conduit. The minimum bending curve curvature shall not be less then 8 times the conduit diameter.

0.4 Use solvent cement or proper glue at all joints so as to make joint water tight.

0.5 The contractor shall furnish all conduit fittings, bushings, elbows, coupling, bends inspection boxes, pull boxes, solid plugs, check nuts, supports, etc. as required for a complete conduit installation and the same shall be of quality equal to that specified for conduit. Smooth bushes shall be used at conduit ends in order to save wire insulation from damage due to sharp conduit edges in cable pulling operation.

2.2 Inspection and Pull Boxes.

0.1 Use pull boxes / inspection boxes along the conduit runs to facilitate pulling operation of wires. These pull boxes / inspection boxes are not necessarily shown on drawings.

0.2 Use pull boxes made from 16 SWG gauge sheet steel.

0.3 Providing pull boxes in accessible locations but avoid aesthetic area. Shown location of pull boxes on as built drawings.

0.4 The maximum distance of conduit rum without the use of pull boxes shall be :-

- Straight conduit 100 Feet.
- Conduit run with one 90^0 Bend 65 Feet.
- Conduit run with two 90^0 Bends. 50 Feet.

3.0 INSTALLATION

3.1 General

0.1 At all termination points of PVC conduits and pipes, smooth out the rough edges and make conduits free from burrs and sharps edges.

0.2 All conduit and pipes shall be installed empty and all conducting / piping works must be complete prior to carrying out of wiring operation.

0.3 Fasten all conduits rigidly into all outlets boxes, L.T. Switchboard, Distribution Boards, cable boxes, pull boxes, junction boxes, safety switches and other devices in the conduit system.

0.4 Plug or cap open ends of conduits in course of construction and keep them until the wires are pulled in.

0.5 Use 18 SWG G.I Wire or nylon fish tape in all empty conduits to facilitate wiring operation.

0.6 Run all conduits carefully to avoid piping, valves ducts and other mechanical and plumbing equipment's in the building.

0.7 Do not use more than (4) four bends in any conduit run from outlet to outlet.

0.8 Do not use sharp 90^0 bends and tees.

0.9 Take care to adequately protect conduits from mechanical damage.

0.10 use flexible conduit terminations (from 2 feet minimum to 6 feet maximum, in length) for connection to all motors and vibrating equipment.

3.2 Concealed Conducting Work

0.1 Where conduit is to be concealed, maintain a minimum of 32 mm cover of concrete measured from the top of conduit to finished surface.

0.2 In RCC work, lay all conduit works prior to pouring. In slab, support all conduit on top of bottom reinforcement. Firmly support all outlet boxes and install them in a way that the finish flush with the soft of slab or beam.

0.3 Do not make any chases in RCC structure for concealing conduit work.

0.4 When conduits have to be concealed in cement concrete (CC) do not make chase deeper and wider than required and use appropriate tools to make such chases. Do not make unnecessary chases or cutting.

0.5 Normally run all branch lighting and receptacle circuit conduits concealed in concrete slabs or in hung ceiling.

0.6 Minimize crossovers of conduits.

0.7 Adequately support conduits in hung ceiling by means of approved clamps or heavy iron wire tied to structural members supporting the ceiling. Paint these clamps and Ross with one coat of prime paint supporting of conduits by wire shall not be allowed.

3.3 Surface Conduiting Work:

0.1 Install conduit either, Parallel and / or perpendicular to the surface of wall and structural members.

0.2 Use Saddles not less then 6 mm thickness and clamps made of 16 SWG sheet steel to fix the conduit surface.

0.3 Use other accessories, necessary to install conduits properly.

0.4 Provide proper support (saddles and clamps) to surface conduits. The maximum spacing between centre to centre of these supports shall be as follows.

¾” to 1 dia	----------	3 Feet
1 – ½” dia	----------	5 Feet
2” dia	----------	6 Feet
3” to 4” dia	----------	7 Feet

3.4 CABLE TRAY

GENERAL

Wherever mentioned in the drawings cables shall be run into cable trunking size 9" x 3" under Raised Floor. The cable trunking shall be fabricated in 16 SWG Galvanized Sheet Steel in Section not exceeding 8'-0". The section shall be connected together using G.I nuts/bolts. Laying of cable trunking and cable as per specified drawings.

- Follow BOQ, Specification & drawings for specific locations.

- Sample of cable tray shall be got approved by Consultant's / Client's Engineer before total fabrication.

3.5 PAINTING / COLOUR IDENTIFICATION

All M.S surface conduits / trays, hangers, supports etc. shall be applied with one finish coat after installation.

All surface conduits (PVC / Steel) shall be applied with colour identification marks at (one) meter interval and at all bends, junction boxes etc as follows:

- Electrical (Light / Power) ---------- Blue
- Computer ---------- Green
- Other Systems ---------- Yellow
- Security System ---------- Red

For other system (if any) get colour code approval from Consultant.

SECTION – B

WIRING ACCESSORIES

(SWITCHES / SOCKETS – OWNER FURNISHED)

1.0 GENERAL

0.1 Co-ordinate with architectural and other services drawings and site conditions for exact locations of switch, socket, etc.

0.2 Use single pole switches rated for 10 Amp. / 20 Amp. At 250 volts AC, unless specially noted on drawings / BOQ.

0.3 The covering plate for switches shall have specified colour.

0.4 All switches shall be grid types.

2.0 ACCESSORIES.

2.1 One Way Switches:-

0.1 Each switch shall make and break contact between the "live" wire only.

0.2 Use owner furnished switches unless specifically indicated otherwise.

0.3 Submit appropriate sample an obtain colour approval prior to ordering.

2.2 Switch Socket Outlet.

0.1 For indoor type, use 3 pin, 13 Amp, 250 V AC type switches socket outlet mount this outlet on sheet steel outlet box or as per BOQ /Drawing.

2.3 Steel Sheet Boxes for Switches and Outlets.

0.1 Use all steel boxes made from 16 SWG galvanized steel. The boxes shall have necessary arrangements to receive exact sizes of conduits and for connecting earthing wire / cables.

0.2 Earth each steel boxes with proper earth wire / cable.

0.3 Get approval of samples of their quality and thickness.

0.4 Use boxes of sufficient depths to accommodate all connecting cable.

2.4 Junction Boxes and Pull Boxes.

0.1 Use junction boxes and pull boxes made out from 16 SWG galvanized steel only. Use proper sized boxes to facilitate pulling of cables. Cover of these boxes shall be accessible and designated for quick removal.

0.2 Do not install these boxes at finished locations. If necessary, reroute these conduits.

0.3 Supports these boxes independently to building structure with no weight bearing on conduit.

0.4 Except those shown on drawing, use junction box & pull boxes wherever it is necessary to pull the cable / wire conveniently.

SECTION – C

DISTRIBUTION BOARDS

1.0 DISTRIBUTION BOARDS GENERAL

The distribution boards shall be of sheet steel fabricated suitable for flush / surface mounting on wall, totally enclosed dust tight an damp proof protection **class IP-54.** The shall be complete in all respect, with accessories, factory assembled, tested and finished all according to the specification and painted with moisture proof powder paint.

The distribution board shall be front operation type and shall.

be rated for 400/230 volts. 3 phase, 4 wire, 50 Hz system.

be designed for flush mounting of all instruments of the front side.

Have all fixing brackets, plates for mounting & components Electro galvanized (CD coated).

Have incoming and outgoing cable termination in bottom, and top respectively with terminal black / line up terminals etc.

The DB shall have minimum of 20% extra physical space (minimum space of two breakers) including bus bar extensions knock outs covered with black plates for installation of additional breaker of medium frame size used in the panels.

All hardware shall be of metric sizes.

All dimensions shall be in multiple of 10 mm and not in fractions there of.

All doors shall be effectively double earthed.

The Distribution board shall be fabricated with 14 SWG or thick sheet steel. All the components shall be mounted on a common component mounting plate, fixed inside the enclosure and DB shall be provided with. Screwed sheet steel front plate. The enclosure shall be provided with rubber gasketting having lockable hinged door with cam fastener.

The distribution board shall be supplied complete with all installation material as recommended by the manufacturers. The short circuit level shall be as shown on drawing. Use of back up fuses for meeting the short circuit level is not permitted.

1.1 COMPONENTS

Circuit Breakers.

The C.B shall be triple pole / single manual reset type, with temperature compensated overload release and instantaneous magnetic short circuit release.

Ammeter and Voltmeters.

All meters shall be flush mounting, moving, iron, spring controlled. The front dimensions shall be 96 x 96 mm. The meters shall have accuracy class 1.5. The ammeter shall be suitable for connection to 5 Amp secondary of current transformers. The ammeters and voltmeter shall have measuring range as indicated on the drawings.

Current Transformer.

Air cooled, ring type current transformers (CT) shall be provided having transformation ratio as indicated on the drawings. CT's shall be of accuracy class 1.0.

Selector Switches

Ammeter and voltmeter selector switches shall be complete with front plate grip and R-Y-B and OFF positions for ammeters and RY-YB-BR-RN and OFF position for voltmeter.

Indication Lamps.

Indicating lamps and selector switches shall be suitable for flush mounting complete with bases, 230 volt incandescent lamps and shall have rosettes of red colour for on condition.

2.0 INSPECTION & TESTS.

All equipment shall be subject to inspection and witness testes by Consultants at supplier's work. This shall include. Inspection of compliance specification.

- Over voltage and insulation test.
- Operational test.
- Any other test necessary for the purpose.

3.0 DRAWINGS

Four copies of general arrangement drawing and circuit diagrams shall be supplied to Consultants for approval before manufacturer commences work.

4.0 MANUFACTURER

M/S. R.A Engineering
M/S. Zellon Engineering
M/S. Engineers & Engineering
M/S. Karimi Elecromech Systems

SECTION - D

LOW TENSION CABLE

1.0 GENERAL

Generally except for the voltage rating & insulation, the specs for H.T. Cables shall be complied with.

Use type and size of cables as shown on drawing / mentioned in cable schedule.

Where single core sheathed cables are indicated on drawings, use 450 / 750 V grade cables.

For main and sub main use 600 / 1000 V PVC/PVC single core cables / stranded cables as indicated on drawings.

Use cables having high conductivity, soft annealed standard or solid conductors.

Take actual measurement and site condition into consideration prior to ordering any cables. Do not rely on drawing or BOQ for actual quantities of cables.

Prior to and after installation, ensure that the entire length of each cable is undamaged.

Where necessary, use cable accessories such as saddles, clamps, fixing channels, cables joints, clips, lugs, tape solder, identification tags, bushes, glands, etc. where shown on drawing use proper size of cable tray.

Identify each phase by colour code: Red, Yellow, Blue for phases and black for neutral and green of yellow green for earth conductor.

For single Phase circuit, use red colour for phase / line, black for neutral and green yellow for earth conductor.

Tag each circuit with designation exactly as indicated on the drawings.

2.0 INSTALLATION

General

Carry out pulling of cables terminations and connection in a neat and clean manner.

All termination shall be mechanically and electrically sound.

Install cables in such as way that no appreciable mechanical strains are imposed on the terminals.

At every cable termination, do not remove the sheath and insulation farther than in necessary.

2.1 Cables in Conduit

where cables to be drawn in conduit use only single core, cables unless specifically indicated otherwise on drawings.

Pull cables in conduit with care. Where lubricant is necessary for puling cables, use lubricant recommended by cable manufacturer.

Do not make joints in cables. Cables connectors may be allowed only where looping in of cables is rendered very difficult. Use only suitable rated connectors.

Leave a minimum 150 mm of loose wire at each termination point.

Leave a minimum 300 mm of loose cable at each termination point.

2.2 Cables run on Surface

Where cables are to be run on cable tray, directly on walls or ceiling, get the method of installation approved prior to actual start of installation work.

2.3 MANUFACTURER

M/S. Pakistan Cables
M/S. Pioneer Cables

SECTION - E

LIGHT FIXTURES

1.0 GENERAL

All light fixtures shall be owner furnished unless mentioned otherwise contractor to install and connect only.

2.0 INSTALLATION

2.1 Fixture location shown on drawing are diagrammatical, verify exact locations from architectural, ceiling and elevation plans, coordinate space conditions for fixing with other trades.

2.2 Refer electrical & Architectural drawings for mounting heights of various fixtures.

2.3 Use 3 core, 2.5 sq. mm flexible PVC insulated PVC sheathed cables respectively between outlet box and fixtures, for circuits sretected by 10 Amp. And 15 Amp. MCB's.

2.4 Screws for fixing Puroose shall be chromium plated.

2.5 Get approval of suseension / hanging rods prior to its manufacture for installation of light fixtures where shown on drawing.

SECTION – F

TELEPHONE SYSTEMS

1.0 GENERAL

0.1 Supply, install, test and commission all material and services of complete telephone system as per specifications. Except telephone jack socket face plate will be OFM.

Telephone System comprises of :

- Conduits and pipes
- Telephone Junction boxes (or telephone terminal cabinet)
- Telephone cables and
- Telephone outlets

0.2 Install, complete telephone system in accordance with the rules and regulation laid down by the Pakistan Telecommunication Corporation.

0.3 Obtain, where required, clearances certificate etc. from local T & T corporation.

0.4 For exact route location and position of the system, coordinate at site with other service.

0.5 Comply with other relevant sections of the specifications.

0.6 Carry out the work in accordance with applicable rules and regulations of T & T Corporation.

2.0 MATERIAL

2.1 Conduits / Pipes & Accessories

Follow specification for the conduits pipes and accessories as per specification under section " Conduits and Pipes".

2.2 Telephone Junction Box (Telephone Cabinet)

2.2.1 Use Telephone junction box made of 16 SWG (1.63 mm) sheet steel having required dimension to accommodate the terminal strip with adequate space available for wiring, as stated in the BOQ.

2.2.2 Use solder less (punch block type) strips approved by the Owner with suitable capacity for terminating all incoming and outdoing cables.

2.2.3 Provide atleast 25% sets of terminals as spares for outgoing connections. Install the strip of insulated material sheet inside the sheet steel boxes.

2.2.4 Provide a lockable hinged door to the junction box. Make the box suitable for recess mounting, unless specifically indicated otherwise on drawings.

2.2.5 Telephone connection to be Siemens punch type or approved equal. Install minimum two rows of 20 pair connectors side by side for 20 pair telephone cable meaning there will be two set of connectors for each pair.

2.3 Telephone Cables.

0.1 Use PVC insulated, PVC sheeted multi pair 0.6 mm tinned solid conductor made from soft concealed high conductivity comer.

0.2 Insulation of conductors: Colour coded as per standards and codes.

0.3 Install approved cable of Pakistan Telecommunications Corp. for cable upto 10 pairs and above.

0.4 Install 2 pair standard SIEMENS / PAK Cable make for individual telephone line.

0.5 Where cable are to be run within existing duct bank and within the trench, use only armoured cables or as specified.

2.4 Telephone Socket / Outlet Boxes.

2.4.1 Install owner supplied telephone sockets with appropriate size terminals for connecting the telephone cables.

2.4.2 Provide telephone outlet boxes (for wall mounted outlets) made of 16 SWG sheet steel and of appropriate dimension having suitable arrangement for termination of conduit.

3.0 INSTALLATION

3.1 Conduits and pipes: Follow instructions and details given in section of "Conduits and Pipes". Identify each telephone conduit by attaching and approved brass tag using brass or bronze tie wire. Each tag shall be clearly stamped with "T" for Telephone conduit.

3.2 Telephone junction box: Use only recessed junction box or as specified surface boxes are permitted only where such junction boxes are installed above false ceiling. Use galvanized screws, nuts and bolts for fixing the box and soft metal bushes for conduit entries in the box.

3.3 Telephone Cable: Provided Plastic identification tags to cable. Show these identification on As Built Drawing. Check all the wiring for continuity and insulation resistance before final connections are made.

3.4 Telephone Sockets: Install telephone outlet boxes on wall / column or in floor as shown on drawings and install telephone socket on them. Steel boxes for telephone sockets shall be installed as specified in section of " Wiring Accessories".