PROPOSED RENOVATION AND CONVERSION WORKS OF PUSA OLD POWER STATION TO NEW OFFICE

INSTRUCTION TO TENDERERS

1.0 Tenders will be received from the UPK Registered Class D or above Head I or II or VIIA for the above tender.

2.0 Tender will be considered for acceptance only on the Form of Tender provided in the bound Tender Document and shall be filled in and signed in the space provided for the purpose.

3.0 Any printed conditions on the note-paper used for any letter accompanying the tender will not be deemed to be applicable to this Contract.

4.0 The Tenderer's attention is further directed to the fact that the Tender Price must include for all increases in the cost of labour and materials other than those subjected to fluctuation requirement.

The submission of a tender shall be deemed to be an undertaking that the tender price includes for the above.

5.0 The Tenderer is deemed to have visited the site to ascertain local conditions under which the works are expected to be executed and thus the Tender Price must include all incidental and contingent costs. No claims will be entertained on the ground of lack of knowledge of site conditions.

6.0 When the Employer had decided on a tender which it is willing to accept, a Letter of Acceptance will be sent to the Tenderer who submitted the tender, and it will state the terms on which the acceptance is given.

7.0 All recipients of the documents for the proposed contract for the purpose of submitting a Tender (whether they submit or not) shall treat the details of the documents as private and confidential.

8.0 The Employer will not be responsible for or pay for any expenses or losses which may be incurred by any tenderer in the preparation of his tender.

9.0 The official currency for this contract shall be in the Malaysian Ringgit and all rates and prices shall be quoted in this currency. Payment due under this contract will be made in Ringgit Malaysia.

10.0 The Contractor's attention is drawn to the contents of these instructions and he will be assumed to have carefully studied this implications contained herein in relation to and in conjunction with the contents of these Contract Documents and he is to provide any sum he considers necessary in complying with these instructions where indicated in the Summary of Tender.

11.0 The Contractor will be deemed to have carefully examined the Contract documents and he is to inform the Employer of any alleged discrepancy and/or ambiguity before submission of Tenders, as no claims deriving there from will be entertained after such submission.

12.0 Should any inconsistency between the Contract drawings be found during the progress of the works, it will be brought immediately to the notice of the Employer who reserves the right to give such instruction as he deems necessary. Such instructions given by the Employer shall be final and binding.

13.0 The Tenderer's attention is drawn to the limitations of storage area within the site and possible restrictions of access which may be enforced by the Company. Tenderer is to co-ordinate with the Company for any storage space he may require.

14.0 Every precaution is to be taken to protect the safety of workmen and also the existing structure and fitting on site.

15.0 Tenders are to be submitted in a sealed envelope marked:-

"CONFIDENTIAL – Tender for the **"PROPOSED RENOVATION AND CONVERSION WORKS OF PUSA OLD POWER STATION TO NEW OFFICE":-**

The Chief Executive Officer,
Sarawak Energy Berhad,
P.O Box 149,
93700 Kuching, Sarawak.

or hand delivered to :-

The Officer-in-charge,
Tender Box, 8th Floor,
Sarawak Energy Berhad,
Wisma SEB,
No.1 The Isthmus,
93050 Kuching, Sarawak.

on or before 3:00 pm on **20th June 2012.**

16.0 The Employer is not bound to accept the lowest or any Tender.

SUMMARY OF TENDER

(A) PREAMBLES TO TENDER

This is a Lump Sum Contract comprising the following items. This Summary of Tender must be read in conjunction with the Specification and Contract Drawings. The tenderer is to pay particular attention to the following notes before pricing the items.

(i) The Contract shall be for the following scope of works:-

1. **Preliminaries**
2. **Main Office Building**
3. **Gate and Chain Link Fencing**
4. **Miscellaneous Works**
5. **Any Other Works**

(ii) Tenderers are required to pay particular attention to the Project Specification.

(iii) The Company reserves the right to delete, add or substitute of works according to the rates tendered here in.

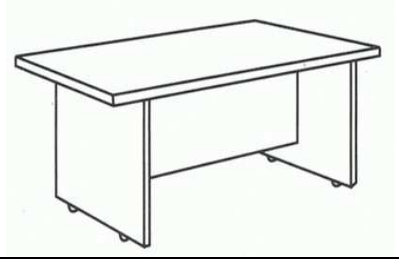
(iv) Tenderers are required to submit catalogues or brochures and literature of building materials specified or proposed as and when requested. Samples are also required to be submitted for approval. Upon approval are set of catalogue and samples of the approval materials when be kept at the site office.

(v) Tenderers shall allow for provision to the Engineer comprehensive installation details and shop drawings for all sections of works as deemed necessary. Three sets of shop drawings are to be submitted for approval are set to be duly marked by the Engineer as approved and the Tenderer shall then commence works within 14 days, of delivery of the corresponding approved shop drawings, unless directed otherwise by the Engineer or except return of the approved shop drawings.

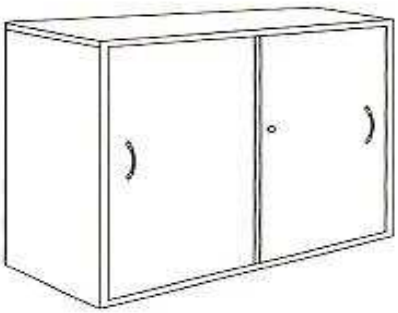
(vi) The Tenderer shall be responsible for carrying out the whole of the works, provisions and requirements of the contract or seeing to that they and carrying out by all concerned, in a thoroughly safe and satisfactory manner and in particular shall strictly confirm to the requirements of any by-laws, regulations, orders and advices relating to the safety of person, on or about site, made of public authority and government having jurisdiction in the matter.

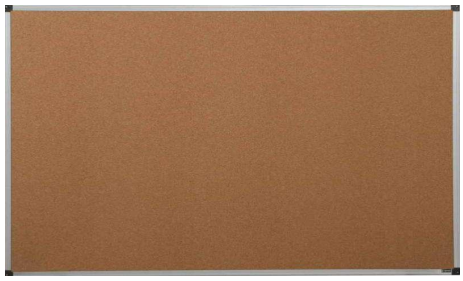
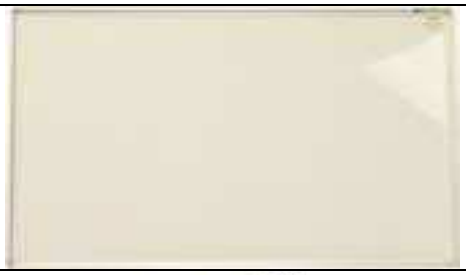
FURNITURE DETAILS & SAMPLE PICTURES

Item	Sample Pictures	Location	Description
Medium Back Chair		STA Room	-"EURO" brand - Min 5 years warranty - Approved Quality Fabric Upholstery - PU Arm Rest - Hydraulic Adjustable Shaft - 5-Pronged Hard PU Base with Twin Hooded Castors
Low Back Chair		Conference Room, General Office 1 & 2, Standby Room	- TP Arm Rest - Gas Lift Height Measurement - Prong TP Base With Double Roller Castos - Up Holstered With Approved Selected Fabric
Armless Plastic Chair		Pantry	407 x 405 807 mm
Waiting Chair		Customer Waiting Area	- 4 ready link in a row with soft cushion seat - L2120 x W560 x H820 mm
Writing Table (WR 1)		STA Room	L1800 x W800 x H762

Writing Table (WR 2)		Standby Room	L1200 x W700 x H750

Item	**Sample Pictures**	**Location**	**Description**
Conference Table		Conference Room	L3500 x W1500 x H750 mm
Foldable Plastic Table		Pantry	L800 x W600 x H700 mm
Workstation		General Office 1 & 2	-c/w Keyboard tray, Network & Telephone Point -Full Board with cushion (colour to be choose later) 1500mm Height
Kitchen Cabinet		Pantry	-L1800 x W450 x H750 c/w ceramic tiles on top

Low Sliding Cabinet		General Office 1 & 2, Standby Room, Conference Room	L800 x W400 x H800 mm

Item	**Sample Pictures**	**Location**	**Description**
3D Mobile Pedestal		General Office 1 & 2, STA Room	L430 x W500 x H540 mm
Notice Board		Lobby at General Office 1 & Customer Waiting Area	- L2400 x H1200 - 10mm thk foam laminated on top of 3mm plywood - Aluminium frame call edges are furnished with safety cap corner
White Board		Conference Room	L2400 x H1200 mm complete with aluminium frame and safety cap corner
Filing Cabinet		Filing Room	L2000 x W400 x H 1725mm
Heavy Duty Shelv		Open Storage Space	L3500 x W1000 x H2440mm

Note:
Pictures shown are for illustration only. Furniture supplied shall be equivalent/similar to picture and to be approved prior to delivery.

APPENDIX K - WORKS PROGRAM

The Tenderer shall enter below his detailed program, in the form of a Bar Chart, for the execution of the works.

Item	Description	Months																							
		1				2				3				4				5				6			
1.	Mobilisation and dismantling works																								
2.	Renovation works for the building																								
3.	M&E (Internal Wiring, Plumbing, Piping etc)																								
4.	External Works (Road, Car park, Gate, Drainage, Sewerage etc)																								
5.	Site Clearing and Demobilisation																								

A. ELECTRICAL SERVICES – INSTALLATION OF INTERNAL WIRING

The tenderer for the installation of internal wiring must be an electrical contractor registered with the Unit Pendaftaran Kontraktor (UPK) under head VIIA Sub-head 1 & CIDB Grade G3 & above and category ME. The tenderer must posses a valid Authorized To Test (ATT) certificate issued by Electrical Inspectorate Unit (EIU) and to submit registration certificates, license and any other written evidence to the effect.

SPECIFICATIONS

The Contract for the mechanical and electrical services shall include complete supply, delivery, installation, testing and commissioning, handing over in approved working order and maintenance for the period of the whole of the contract as detailed here after and as shown on the drawings.

The works to be carried out under this Contract shall include the whole of materials and all necessary labour for the complete installation strictly in accordance with the specification and the requirements of all relevant authorities having jurisdiction over this installation, together with all incidental work pertaining thereto even through not specifically mentioned herein or as shown on the drawings.

The works to be carried out is sub-divided into the following headings:-

A) Scope of Works

This Specification covers the supply and transportation of labour, tools and all materials to the specified Works sites for the installation of internal wiring inclusive of testing, commissioning and maintenance thereafter for twelve (12) months after official completion date of the Works.

B) Materials and Workmanship

All works shall be carried out in accordance with the Specification and shall, where not specified, adhere to the current edition of the "IEE Wiring Regulation for the Electrical Equipment of Building".

The Company's Representative may reject any materials or workmanship, which in his opinion, are not up to the above standards.

The materials used must comply with the latest edition of relevant Malaysian Standard or other international standard such as IEC or BS.

C) Wiring

Concealed wiring shall be adopted throughout. Conductor of the correct current ratings and colour codes shall be used. Separate circuits shall be wired for power and lighting points. For lighting circuit, the conductor size of 1.5mm2 with maximum number of 10 should be adopted. As for power circuits, RING type with conductor size of 2.5mm2 with maximum point 8 should be adopted.

If PVC/PVC conductor or single layer PVC conductor is to be used, the PVC conduit pipe is compulsory for the concealed wiring.

D) Earthing

Each wiring installation shall be protected against earth leakage current and earth fault by the installation of an earthing rod. Earthing rods may be of galvanized iron pipes of 1.5” diameter and 8’ minimum length, or copper rods of 5/8” diameter and 6’ minimum length.

Connection of the earthing leads to the earthing rods or pipes shall be both mechanically and electrically sound. All clamps, lugs, bolts and nuts etc. used for such connection shall be of non-corrosive metals. Each earthing terminal at the earthing rod or pipe shall contain in a cement box having a removable cover for the purpose of inspection. The full length of the earthing leads from the main switch to the earthing rod or pipe shall be protected from mechanical damages by PVC conduits. The earthing shall be below 10 ohm. The maximum earth loop impedance shall be below 100ohm.

E) Protection Against Earth Fault

Residual Circuit Breakers (RCBs) shall be used for earth fault protection if the wiring system and shall be of 60A rating and 100mA sensitivity for all the single-phase wiring installation in accordance with SESCo regulation and circulars. They shall be of types approved for use by the Company.

F) Power Socket and Switches

All power socket outlets and switches shall be of types approved for use by the Company prior to installation.

G) Means of Control

The means of isolation and control for the wiring installation shall be by way of an approved switch-fuse incorporating a minimum of three (3) ways distribution board. The switches fuse shall be mounted on a wooden board of sufficient dimensions to accommodate, in addition, a residual circuit breaker where required, a 40A cut-out fuse and a neutral link.

H) Supply of Materials

The switch fuse, distribution board, wooden board, residual circuit breaker, small wiring and earthing are to be provided and installed by the internal wiring Contractor to SESCo standard. The 40A cut-out fuse, neutral link and meter box are to be provided by the Contractor.

I) Termination of Internal House Wiring

The internal house wiring Contractor is to terminate the internal wiring on a meter board which is generally positioned at the entrance preferably on the outside of the house facing the roadside. He may have to install a meter box to protect the meter from weather conditions where necessary.

The meter board and meter box where necessary, must be installed in such position so as not to obstruct the normal opening or closing of the house’s door or window.

J) Contractor's License

The tenderer or the tenderer;s wireman must posses a valid Authorized To Test (ATT) certificate from the Electrical Inspectorate Unit, Sarawak and registered with SESCO Kuching Regional Office. The tenderer is to submit registration certification, license and any other written evidence to the above effect. The tenderer is also required to submit respectively the necessary AC/O1 forms signed by the license holder before commencement and after completion of the internal house wiring installation.

K) Transportation and Mobilization

The Contractor shall provide his own transportation for the delivery of the materials and workmen to the work sites.

B. COLD WATER SERVICES

All pipes, fittings and appliances shall be of a type and brand approved by the relevant authorities.

Material for the pipes and fittings for cold water shall be of PN 12 material and shall have a minimum wall thickness and pressure rating for cold water system is PN 10.

Joint and Fittings Assembles

PP-R pipes and fittings joints shall be made with any of the suitable methods us recommended by the manufacturer of the pipes and fittings.

a) Socket Fusion Welding
b) Electric Coupling Fusion Welding (for REPAIR PURPOSES ONLY)
c) Backing Ring and Flange Assembly
d) BSP Thread Joints

Pipe Clamps and Supports

Cold Water Plumbing

All piping support shall be designed to take the combined loads of pipes, valves, fittings and fluids in the system.

All supports shall be capable of keeping the piping in proper alignment and shall conform with appropriate codes and the recommended support lengths for the cold water pipes works as stated below:

PIPE	MAXIMUM SPACING OF SUPPORT (meters)	
Ømm	HORIZONTAL	VERTICAL
20	0.70	2.00
25	0.75	2.50
32	0.90	2.50
40	1.00	3.00
50	1.15	3.00
63	1.30	4.00
90	1.85	4.00
110	1.95	4.00

All pipes works shall be laterally restrained to maintain alignment in the shaft and the distance between two anchor points should not exceed 3.0 meters.

All pipes shall be hydrostatically tested at not less than 10 bars/145 psi.

C. SANITARY SERVICES

1. INTERNAL PIPEWORK

All above ground waste pipes shall be of UPVC pipes to BS 5255 for 50mm and below and to BS 4514 for 65mm diameter and above.

All above ground soil and vent pipe shall be of UPVC pipe to BS4514. All underground soil pipes shall be of UPVC to BS 4660.

Cleaning eyes shall be provided at all bends, and branches of soil and waste pipes. "Long bend" shall be used for all bends. Pipe gradients other than that stated in the drawings shall be as follows:-

50mm pipe	-	1:20
80mm pipe	-	1:30
100mm pipe	-	1:40
150mm pipe	-	1:60

All pipe dimension indicated shall be of clear internal dimension.

2. UPVC PIPING

All joints for UPVC piping shall be by solvent cement. All solvent joint pipes have one end to be socketed before joining.

3. PIPES INSTALLATION

All pipes shall be installed at least 40mm clear of walls with hinged holder bats or other approved fixings. Where pipes run horizontally shall be suspended from the underside of the floor slabs with approved hangers.

4. PIPE SUPPORTS

The spacing of pipe supports should not exceed as shown below:-

Max. Intervals between Pipes Supports (m)

Material of pipe	Dia. Of Pipe (mm)	Vertical Run	Horizontal Run
UPVC	25	3.0	2.4
	32	3.0	2.7
	40 to 50	3.7	3.0
	Above 65	4.6	3.7

Pipes shall be fixed in straight runs and all horizontal runs shall be laid to gradients in accordance with British Standard 5572 : 1978 code of Practice for sanitary pipe work.

The Contractor shall supply and install all necessary pipe support, hangers, anchors, guides and expansion and anchorage.

Where piping is supported from structural steel beam, clamps or welded bracket attachments shall be used. Where piping is supported from concrete, approved galvanised steel concrete insert fittings, cast-in bolts or expansion tube fasteners shall be used. Steel brackets shall be used for wall attachments, adequately reinforced and braced.

The work shall be inspected and tested during installation at agreed stages. All work which will be concealed shall be tested before it is finally enclosed.

MAINTENANCE AND WARRANTY

The system shall be warranted for parts and labour for not less than a period of one year (12 months) from the date of installation.

The Contractor shall specify the maintenance to be performed during the warranty period to maintain warranty condition.

The contractor shall provide an original letter with affirmation to the originality of clean agent supplied from the original manufacturer.

D. SWITCHBOARDS, DISTRIBUTION BOARDS AND CONTROL PANELS

1. GENERAL

The switchboards, distribution boards and control panels shall be of modular design and as specified in the drawings.

2. PANEL WORK & FINISH

Panel work shall be de-rusted, de-greased, anti rust treated, sprayed with one coat of red oxide primer, finished smooth and sprayed with two finishing coats of colour 631 light grey synthetic enamel paint to B.S. 381C. (As an alternative, powder painting shall be accepted).

3. CONSTRUCTION

Panel work shall be constructed of 2mm high quality sheet steel stiffened and reinforced by sturdy angle-iron frame-work. The rigid construction shall be designed to withstand without any sag, deformation or warping, the loads likely to be experienced during normal operation, maintenance or maximum fault conditions.

All units shall be fitted so that a clear outline is obtained. Operating handle shall not be installed at a height exceeding 1.95m from finished floor level. Hinged steel cover plates shall be fitted to give access to all parts for maintenance and easy removal. The cover shall be able to be hinged either on the left or right side and can be opened 180º. The free end of the cover shall be secured by a catch and a key operated lock, and at the same time the enclosure made drip and vermin proof. Precautions shall be taken to prevent overheating through hysteresis and eddy current losses.

The enclosure shall be designed to prevent accidental, touching of ‘live’ parts when a switchgear is isolated and the panel cover is removed for maintenance. All ‘live’ parts shall be protected by cover plates and approved warning labels provided in appropriate positions. (i.e. a fully shrouded construction)

Each panel shall be equipped with wiring channels and cable zones of ample dimensions and access to accommodate both internal and external wiring, including provisions for all future cabling to space and/ or circuits and be fitted with approved means of fitted with approved means of supporting all wiring. Bushed holes shall be provided for cabling between compartments.

Cable entry to the panels shall be through cutouts of suitable sizes which are lined with insulating material to ensure that cables are not pulled over sharp edges.

4. INSTALLATION OF WALL MOUNTED PANELS

Panel shall be installed on walls at the locations indicated on the layout drawings. The locations shown thereon are approximate only; therefore the Contractor shall liaise with the Supervising Engineer with respect to the exact positions and heights of the panels, prior to commencing wiring installation works.

The panels shall be held in position on walls by means of expansion bolts of sufficient length and gauge to withstand the weights of the boards and cable connected to the boards. The fixing holes for the panels shall be internal of the board.

Where the panel are to be installed on steel columns or framework, purpose made m.s. clamps of robust construction shall be used for holding the boards in positions. Drilling of holes in steel the columns or steel structured work for the installation of boards shall not be permitted, except with the prior approval of the Engineer.

If it is not possible for a panel to be installed in either manner stipulated above, then such panels shall be installed on a floor mounted m.s. pedestal and placed against the wall or column as the case may be.

E. LIGHTING FITTINGS

1. GENERAL

The Electric Contractor shall supply, deliver install and connect the light fittings in the location shown on the drawings. All trimming supports, etc. necessary for recessed, surface and suspended mounting of the light fittings shall be supplied by the Electrical Contractor. The types of light fittings are as shown and specified in the drawings.

2. STANDARDS

The light fittings, together with lamps, lamp holders, auxiliary and other necessary equipment shall conform to latest British Standard Specifications in all respect with regard to design, construction, performance and test as a minimum requirement.

3. LUMINARIES

Luminaries shall

- comply with B.S. 4533 unless otherwise specified or scheduled;
- luminaries shall be arranged such that control gear and auxiliary wiring is separated from the lamp compartment by means of removable covers which prevent inadvertent contact during re-lamping operations; access between compartments for wiring shall be through holes fitted with grommets. Each luminary shall be fitted with a fused terminal block and be suitable for 20mm conduit entry.

4. FABRICATED EQUIPMENT

Fabricated equipment shall be of robust, symmetrical and unwrapped construction and all such equipment shall be approved by the Consultant Engineers before being installed. Metalwork shall be neatly and accurately cut and free from undulations or any other distortions.

Bends and folds in sheet metalwork shall be made in suitable bending machines. Welding shall be neatly executed and any ragged spots filed smooth.

The minimum thickness of steel shall be 0.8mm for luminaries' up to 100mm wide and 1.0mm minimum thickness for those wider than 100mm. The fittings shall have removable reflector plates of matching material and finish which shall conceal all auxiliaries and wiring.

5. FINISHES

All equipment shall be protected to minimize the effects of corrosion and galvanic action. All fixing onto painted surface shall have washers, felt or nylon washers and be of the captive type.

For proprietary equipment, the manufacturer's standard finishes may be accepted provided they are, in the opinion of the Engineer, equal or superior to the standards of finishes described.

All internal light reflecting surfaces shall be gloss white unless denoted otherwise by the Catalogue No. or description (i.e., silver reflector downlight).

All external surfaces shall be finished anodized, plated or enamel to colors selected by the Consulting Engineers or as denoted by Catalogue No. or description.

LAMP AND TUBES

Fluorescent tubes shall comply with B.S. 1853 and generally be of the switch start type, similar to Philips TLD 36W and Philips TLD 18W, cool white type, 26mm diameter 86 lumen/w, colour rendering index 66, colour temperature (approx.) 4100K or other equal manufacture. Lamps shall have a guaranteed life of 7500 hours.

Rapid start tubes aged for 100 hours shall be used where fitted to circuits which are dimmed. Discharge lamps shall be of the colour corrected type in compliance with B.S. 3677 and 3767.

Incandescent lamps shall be in compliance with B.S.161 and 555 and be of the type and ratings indicated. Lamps shall be of the bayonet cap, frosted glass, coiled coil filament type with a nominal life of 1000 burning hours.

LAMP HOLDER

Lamp holders shall be constructed of non flammable high impact resistant material which does not deteriorate under the temperatures encountered during service (porcelain or brass type). Lamp holders shall be secured to the body of the luminaries such that they maintain their position and plane during lamp replacement.

Lamp holders for fluorescent tubes shall comply with the requirements of B.S. 1875 & B.S. 5042 Part 4 and be of the two pin retractable or counter twist type with metal strip spring type contacts, designed to positively retain the lamps.

Lamp holders for incandescent lamps shall comply with the requirements of B.S. 52 and B.S. 5042 for B22 bayonet cap for lamps up to 100 watts and Edison screw types for lamping up to 300 watts.

Discharge lamps shall be of the Edison Screw type up to 300 watts and of the G.E.S. type above 300 watts in compliance with the requirements of B.S/ 5042 Part 2.

6. FIXINGS

Luminaries shall:

- be provided with standard means of achieveing satisfactory fixings;

- in the case of pendant types, have 85 deg C suspension cords, and where the suspension is metal or other arrangement with the cable inside, the cable shall be glass or PTFE insulation;

- in the case of recessed or semi-recessed type, in addition, be provided with concealed holes for side screw fixings into the ceiling aperture trimming;

- In the case of surface mounted type, be furnished with minimum of two fixing holes at the ends of the fitting. Fittings wider than 150mm shall be provided with 4 fixing holes.

All ceiling recessed fluorescent fittings wider than 150mm shall be individually secured

with 2mm diameter galvanized steel wire to the building structure.

Where chain suspensions are required they shall be of welded, twisted link pattern, minimum 18 gauge (1.20mm) diameter.

7. ‘KELUAR’ SIGN LIGHTS

‘KELUAR’ sign lights of the type approved by the Fire Brigade Department shall be supplied and installed as shown on the drawings. Acceptance certificate from the Fire Brigade Department has to be submitted.

The ‘KELUAR’ sign light fitting shall be a maintained unit i.e. the lamp is continuously lit form normal mains supply and upon mains failure powered by a sealed nickel cadmium battery. The illumination level shall be uniform throughout the sing fixture with sufficient downward illumination.

The word ‘KELUAR’ shall be in letters 150mm high, 75mm wide and 19mm wide strokes. The lettering shall be illuminated red against a black background. The ‘KELUAR’ signs shall consist of the following types:

a) Single sided signs with the lettering ‘KELUAR’ with or without directional arrows.

b) Double sided signs with the lettering ‘KELUAR’ with or without directional arrows.

The ‘KELUAR’ sign light units shall be provided with nickel cadmium batteries having a minimum capacity capable of maintaining the units in full illumination for a period of at least 3 hours when the mains supply is interrupted. An automatic charger unit which maintains the battery in a fully charged condition shall also be incorporated within each unit.

The units shall also be provided with a main indication lamp and a mains failure simulation press button test switch. An internal switch shall be provided to disconnect the lamps when required.

8. SELF CONTAINED EMERGENCY LIGHTS

Emergency light units of the type approved by the Fire Brigade Department shall be supplied and installed as shown on the drawings. Acceptance certificate from the Fire Brigade Department has to be submitted.

The Emergency Light shall be a ‘non-maintained’ unit i.e. The lamp is off as long as there is mains supply and the same lamp is illuminated from a nickel cadmium battery when the mains are interrupted.

The Emergency Light units shall be of the 8 watts bi-pin fluorescent lamp, acrylic diffuser type. Nickel cadmium batteries shall have a minimum capacity capable of maintaining the units in full illumination for a period of at least 3 hours when the mains supply is interrupted. An automatic charger unit which maintains the battery in a fully charged condition shall also be incorporated within each unit.

The units shall also be provided with a main indication lamp and a mains failure simulation press button test switch. An internal shall be provided to disconnect the lamps when required.

9. COMPOUND LIGHTING

Lighting Columns

The Column shall be of octagonal steel made up of interchangeable section where necessary and hot-dip galvanized internally and externally in accordance to BS 729: 1971 complete with the necessary bearing plate for direct planting or mounting onto concrete bases and bracket arms where specified.

The interchangeable sections where used shall be of steel to BS 4360: 1972 (GRADE 43C or Grade 50C) and fit over each section to form a complete column. The overlap shall be a minimum of 1.5 times the diameter of the immediate lower section or as indicated by the manufacturer's marking. The straightness of the column when assembled shall not deviate more than 2.1 mm per meter length.

A weatherproof door with an anti-vandalism locking device shall be provided over the control gear compartment opening of each column.

The control gear compartment shall be provided with a metal or fiber base board suitable for mounting of the lamp control gear and cable cut-out boxes. An earthing terminal shall be provided secured to the column and within the control gear compartment.

A service slot shall be provided at the lower portion of the column for underground cable entry.

The service cut-out box shall be of three phase type with protective fusing incorporated for lighting overload protection.

Wiring

All cables between the service compartment and the lantern shall be 2.5 sq. mm. PVC insulated and PVC sheathed and free from all joints except at the terminal block and fuse base. If the distance exceeds a certain distance recommended by the manufacturer a purpose recommended cable shall be use especially for HID lamps using ignitors. A HRC fuse terminal block c/w HRC fuse link and neutral link shall be provided inside each lighting column.

All metallic parts not carrying current shall be effectively earthed.

F. ACCESSORIES

1. SWITCHES

Lighting Switches shall be 5A for circuits rated up to and including 5A, and 15A for circuits rated above 5A but not exceeding 15A ratings. All switches for internal wiring of lighting points shall be rocker operated type,grid pattern, single pole, one way or two ways or intermediate as required on the layout drawings. The lighting switches shall also be of the quick make and slow break, silent switches action type with solid silver alloy contacts. Switches shall be in accordance to B.S. 3676.

All switches at switch centers indicated in the drawings shall be arranged in an orderly sequence to the satisfaction of the Consulting Engineers. A grid switch system of modular design shall be used.

Switches shall be suitable for flush or surface mounting, as required, and be complete with pressed steel box, adjustable grid plate, switch interior and cover plate. A minimum clearance of 9mm shall be provided between the back of the switch and the back of the conduit box.

Pull cord operated switches shall be fixed to white molded plastic mounting blocks which in turn shall be fixed o a circular conduit box. Pull cords shall be white or natural colour and the lower end shall terminate in a molding of rubber or plastic material.

The switches of each phase shall be grouped in row(s) and adequate insulation shall be provided between the phases. A warning sign “DANGER 415 VOLTS” shall be placed near switch centre where different phases are grouped together.

2. SWITCH SOCKET OUTLETS

Switch socket outlets shall be of the three rectangular pins (i.e. 2 poles and earth), shuttered type conforming to B.S. 1363. The switch shall be of the quick make, slow break, type with silent, totally enclosed, switch action.

In cases where the socket outlets cannot be flush mounted, switch socket outlets of the metal clad type shall be used. Knock outs for conduits entry shall also be provided on the steel boxes. The cover plate shall also be of steel.

3. TIME SWITCHES

Time switches shall be of the self-starting, self-winding, synchronous-driven type, rated at a voltage of not less than 230 volts.

Time switch shall incorporate the following:-

- a 24-hours spring reserve to drive the mechanism during electricity supply interruptions:

- an easily replaceable cartridge fuse-link complying with BS 646 pr BS 2950, inserted in the motor circuit, a day-omitting device to render the switch inoperative; an ON-OFF manual switch to enable the circuit to be controlled at will without affecting normal dial operation; a 24-hours dial with ON and OFF level and a single pole, single throw, switch.

G. TELEPHONE SERVICES

1. GENERAL

The telephone services shall comprises of all the trunkings, cable trays, junction boxes, distribution point boxes, Main Distribution Frame, underground ducting and manholes, wiring and earthing as indicated in the drawings. It shall also include any incidental work to form a complete system to the satisfaction and the requirements of the local Jabatan Telekom Malaysia.

2. UNDER FLOOR/ SKIRTING TRUNKING

The underfloor trunking shall be of PVC type unless otherwise specified installed below the finished floor level with a minimum of 13 mm cement screed covering over the top of the trunking. The trunking shall be cut and cleaned of rough edges prior to installation. The trunking system shall be watertight and all open ends at junction boxes location shall be property plugged prior to concreting and screeding.

Skirting type telephone trunking shall be of UPVC material. Wherever possible the manufacturers complete range of fittings shall be used throughout joints shall be cut and smoothened prior to jointing with a recommended jointing adhesive recommended by the manufacturer.

All skirting trunking shall have demountable clipped on lid for access to the telephone wiring.

Telephone trunking shall be laid complete and vacuum cleared of all debris and other foreign matter prior to installation of cables. Underfloor trunking shall include a draw wire linking the junction boxes for ease in installation of telephone cables.

Junction boxes of dimensions mentioned in the drawings shall be casted from aluminum alloy. The boxes shall be installed below the finished floor material with its adjustable frame to flush. The hinged aluminum alloy lid shall have a recessed pit to accept the specified floor finishing material in order to harmonize with its surroundings.

A gasket shall be provided around the edge of the junction box to prevent water from getting into the box. The screws used shall be non-corrosive type and a galvanized iron draw wire shall be provided between every two junction boxes.

3. PROVISION OF FLOOR CHASES

The provision of floor chases during the concreting of the floor for the future installation of the telephone trunking shall be deemed to be part of this works. All position and dimensions of the chases required for the trunking runs and junction boxes shall be prepared in advance. All materials required for the provision of these floor chases shall be part of the works.

4. DISTRIBUTION POINT BOX

Distribution points boxes including sub-distribution boxes shall be constructed from galvanized mild steel sheets of thickness 1.58 mm and with 12.7 mm thick plywood backing for terminal tag mounting to suit Telecom’s requirement.

They shall be suitable for wall mounting. Other JIM approved distribution point boxes may be accepted with the Superintending Officer's approval.

Distribution point boxes shall have the same number of ways as that shown on the drawing and shall be completed with the necessary number of jumper rings to Telekom's requirement. Each way shall be either of the sliding link terminal type or of the unit terminal type to allow conductors to be easily isolated without disconnecting or unsoldering wires and shall be completed with a chart board for recording the circuit connections. Each terminal block shall be engraved with the name of the building and to be completed with screws on both faces. Soldering tag will not be acceptable.

Particular attention shall be paid to the design of the doors and hinges to ensure that sagging or misalignment cannot occur. Doors shall be insect and vermin proof when closed and are to open through 180 degrees to permit unobstructed access to the inside of the box and complete with a rubber gasket. In addition simple but strong fasteners are to be fitted to the door.

The cables shall be suitable for operation on a 50 volt D.C. service and approved by the Telekom Department for use in the telephone installation system. The cables shall comprise the necessary number of wires each PE insulated, laid up in pairs and served with an extruded PVC sheath.

The conductor shall comprise tinned anneal copper wires, smooth drawn, pliable, uniform in quantity and frees from all defects, having a diameter of 0.5 mm or 0.63 mm as specified in the drawings.

Two insulated conductors shall be uniformly twisted together with right hand lay to form a pair. The length of lay shall not exceed 100 mm and the lays for adjacent pairs are to differ from one another in length. The cable cores shall be laid up to form a compact and symmetrical cable and if fillers are needed for this purpose they shall be PVC.

The direction of lay is to alternate for successive layers, the first layer being preferably right hand.

The cable sheath shall be of extruded PVC having a radial thickness of not less than 1.25 mm and containing a suitable quantity of approved termite repellant e.g. Lead naphthalene which shall be evenly dispersed.

For cables used underground it shall be fully filled with a high temperature petroleum jelly.

For directly buried cable it shall be armored and in accordance to MESC Specification 68.68.61.350.1. with G.I. Pipe protection at all road crossings.

5. JOINTING OF CONDUCTOR

Joints in individual conductors during the course of manufacture are to be avoided if possible and any such joints, if carry out, are to satisfy the following conditions:-

a) The tensile strength of a 250 mm length of conductor containing a joint shall be not less than 95% of similar un-jointed sample of the conductor.

b) The electrical resistance of a 150 mm length of conductor should not be increased

by 5% due to the inclusion of a joint.

6. INSTALLATION OF CABLES

The Sub-Contractor shall install all cables and be responsible for the supply of all clamps, trays, supporting brackets etc.

All single runs of cables shall utilize clamps fixed to the structure of the building and all multiple runs of cable shall utilize cable trays or trunkings. The design of all clamps shall be such that no pressure is applied to the cable and that the cable is in no way deformed.

Cable trays shall be of the perforated and galvanized pattern and shall be supported rigidly to the building structure at maximum 1000mm intervals by purpose made galvanized steel bracket. The tray shall have a straight run and any change indirection shall have a minimum radius of 600mm. It shall be painted dark green in accordance to JIM requirements after the rust-inhibiting treatment process.

7. BATTERY CABLES

A pair of Telekoms 24 volt D.C. battery cable in galvanized iron conduit from the Main Distribution Frame (MDF) to each distribution box shall be supplied . Cable shall be 6 sq.mm. PVC and coloured black red. One length of 2.5 sq.mm. PVC green colour cable as Telecoms earth wire shall also be supplied.

A pair of 13A fuse holders and protector shall be fixed at the tap-off point of the battery cables to distribution box.

8. DUCTWORKS & MANHOLES

a) Excavation

No excavation work shall commence without providing proper warning notices, barricades, barrier ropes, red warning lamps, etc. As may be considered necessary by the relevant authorities or the Superintending Officer. The delay so caused shall not affect the date of completion of the works. A “PERMIT TO DIG” shall be obtained from SSB.

All roads and footways for cable ductworks and manholes shall be kept open to minimize interference to traffic and pedestrians. Not more than half a road may be closed to traffic at any one time and must comply with the requirements of the Police Department, Public Work Department or the Municipality or any local Authority having jurisdiction. On no account shall any material be placed beyond 600 mm of the edge of any excavation.

Excavation shall only be along sections of roads or footways as directed by the Superintending Officer. In no case shall the width of trench excavated be greater than is necessary for satisfactory execution of the work. The line of the excavated trench shall be as straight as possible and any bends or curves must be of the maximum radios possible. The lines enclosing the width of the trench will have to be marked out. In unstable ground and where ducts have to be encased in concrete, timbering may be necessary to support the trench and can also act as formwork for the concrete.

The depth of the trenches shall be in accordance to the Telecom's requirements for underground ductworks installation. The bottom of every trench shall be leveled with 50 mm of sand and rammed.

All pumps and appliances necessary for the pumping and baling of water from trenches shall be considered as part of works.

No mechanical power equipment or hoe are to be used in the excavation works except for breaking up hard surfaces, digging must be carried out with hand tools such as spades etc.

b) <u>PVC DUCTS</u>

These ducts shall be supplied in 6 meter lengths and should be stored away from the direct rays of the sun. Solvent cement shall be used for all joints.

The trench shall be scooped out at all points where the sockets rest, so that the body of the duct lies upon rammed sand. Where one line of ducts is laid over another in the same trench, sand shall be filled in over the lower line of ducts and carefully rammed to form a bedding 50 mm in thickness for the top ducts. Sand shall also be rammed between the ducts laid side by side. Where there is a road crossing, Class 'C' G.I. pipes shall be used, otherwise a concrete layer of minimum thickness 150 mm all round shall be constructed.

Ducts shall be cut when necessary, at right angles to the bore only, preferably with a saw in a simple cutting guide, the inside edge being afterwards so trimmed that there can be no possibility of damages to cables from the edges.

The spigot and coupling linings of the ducts shall be wiped clean and the vee-shaped rubber ring fitted pointing outwards. The lubricant shall be applied to the spigot back to the positioning groove. The lubricated end of the conduit shall be positioned to the coupling and pressure applied by hand to the new piece to be jointed and pushed home. The coupling should be checked to ensure that it lines up with the witness groove on the end of the conduit. In no circumstances shall dirt or grit be allowed to enter the joints.

To ensure the alignment of the ducts, a working mandrel 450 mm in length and 95 mm in diameter shall be drawn through as the ducts are laid.

When the building of a jointing chamber is deferred until after the completion of a section of duct included in the work, the last joint of each duct shall be tested on completion of the jointing chamber by means of the working mandrel mentioned above.

The test mandrel used for testing shall be 450 mm in length and 95 mm in diameter, the cylindrical brush shall be 108 mm in diameter.

Where telephone cables are directly buried a cable marker of concrete slab impressed with "SSB TEL. U/G CABLE "at 50 m intervals shall be placed over prior to backfilling.

9. EARTHING

An earthing system consisting of earthing termination points, inspection chambers & covers and interconnection 25 mm X 3 mm copper tape between termination points shall be provided to meet the requirement of the Telecoms Department. The earthing termination points shall consist of 16 mm dia. copper bonded steel rods driven into the ground. The resultant earthing resistance of the complete earthing system shall not exceed 5 ohms or as specified by the Telecom Department.

10. MAIN DISTRIBUTION FRAME

The MDF shall comprise of the quantity of pairs as specified in the drawings and approved by Jabatan Telekoms Malaysia.

The system should be on a expandable modular design and build up to form a complete MDF with the necessary wire guides and sturdy mounting frame.

Connection of cables shall be solderless utilizing a special insertion tool. The spring loaded contacts creating permanent contact with the spliced cable shall be protected from distortion due to multiple cable splicing.

All incoming circuit shall be protected by an over voltage arrestor complying to Telecom's Specification. The arrestors shall be housed in a module which fits over the terminal block module and connected to the MDF earth via an inbuilt shorting lead.

11. TELEPHONE WALL JACKS

Telephone wall jacks where specified shall be of JIM approved type and fitted according to the drawings.

12. DATA COMMUNICATION CABLES

The data cable shall be of coaxial type having impedance of 93 ohm and of data communication grade. The single care conductor shall be polythene insulated thereafter an overall layer of annealed copper wire braid followed by a layer of Black PVC sheath.

The coaxial cable shall be type RG62A/U or as specified and where used outdoor or in cable ducts shall be of the type specified for such an application. Where several cores are running to and from a similar location the multicore variety should be used. The cable should be run in a continuous length throughout and joints are strictly prohibited.