RAJKOT MUNICIPAL CORPORATION
SOLID WASTE MANAGEMENT

CONSTRUCTION OF ELEVATED SEMICLOSED BODY REFUSE TRANSFER STATION AT KOTHARIYA RAJKOT
E- TENDER

TENDER NOTICE NO : RMC/SWM/2018-19/27

VOLUME: II

TECHNICAL BID

Part-2

DATE OF DOWNLOADING OF ONLINE TENDER	27/03/2019, 16:00 Hour
WEB SITE	www.rmc.nprocure.com
PRE BID MEETING	14/03/2019 up to 11:30 hrs. at Office of the environment engineer, Room No. 03, 3rd floor, Rajkot Municipal Corporation, Dhebar Road, Rajkot.
LAST DATE OF SUBMISSION OF ONLINE TENDER	27/03/2019, 18:00 Hour
DATE OF SUBMISSION OF TECHNICAL BID, TENDER FEES, EMD AND OTHER DOCUMENTS IN HARD COPY	02/04/2019, 18:00 Hour
Verification of submitted documents (EMD, e-tender fee, Etc.)	From 04/04/2019, 16:00 hours Onwards
Opening of online tender	From 04/04/2019, 16:30 hours Onwards
ESTIMATED AMOUNT	Rs. **9,30,39,438/-**
DOCUMENT FEES	Rs **.15000/-**

TO BE SUBMITTED TO:

Environment Engineer,
RAJKOT MUNICIPAL CORPORATION,
Dr. Ambedkar Bhavan, Dhebar Road
Rajkot-360001
GUJARAT

The Patti shall be made of M.S. sheet 0.8 mm thick & coated white and refelctabe. It shall be complete with 40 watts polyester heavy duty copper wound ballast. It shall have lock type tube holders with proper fittings. It shall have provide with starter, duly wired for use on 250 volt A.C. supply.
Erection should be made properly in level with necessary fittings & erectection shall be made on varnish P.W. Block/ P.V.C. block (if required) with lead wires and connection as directed by an engineer in charge.

Description no:-114

Four pole MCB type change over switch 415 V, 25A with poweder coated MS enclosure confirming to I.S.13947 erected on polished wooden block.

The double/ four pole 240 V MCB 240V/250V having breaking capacity of 10 KA and confirms to IS 13947.

The Double / Four Pole MCB should be of approved make and accessories as per list attached in tender booklet.

The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

Description no:-115

Providing and erecting Sheet Steel powder coated MCB distribution board

The MCB should be with ISI mark of Indian standard specification No. IS: 8828/1996.

MCB should be with overload and short circuit tripping elements. The breaking capacity of fault current of MCB should not be less than 10000 Amp. at an electric pressure of 230 volt.

Miniature circuit breaker single pole, double pole or four pole should be suitable to operate on 230/415 V A.C. system and having overload and short circuit tripping elements and breaking capacity 10KA to be erected in existing M.S. box confirming to IS 8828/1996 with ISI Mark.

MCB / ELCB distribution board should be metal clad having modular double doors with DIN rails, epoxy powder coated finish metal frame & door assembly with S.S. door spring & hinged pins complete with required PVC sleeved 63A copper Bus strips without MCB / ELCBs The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Description no:-116

Supply, Erection of Miniature circuit breaker single pole 6A to 32A type B curve suitable to operate on 230 V. A.C. system and having overload and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to

Miniature circuit breakers shall be quick make and break and break type conform with British standard BS : 3871 (Part-I) 1965 and IS :8825. The housing of MCBs shall be heat resistant and having a high impact strength. The fault current of MCBs shall not be less than 9000 amps, at 230 volts. The MCBs shall be flush mounted and shall be provided with trip free manual operating mechanism with mechanical "ON" and "OFF" indications.

The circuit breaker dollies shall be of trip free pattern to prevent closing the breaker on a faculty current.

The MCB contact shall be silver nickel and silver graphite alloy and tip coated with silver. Proper arc chutes shall be provided to quench the arc immediately. MCB's shall be provided with magnetic fluid plunger relay 3 as for over current and short circuit protection. The over load or short circuit devices shall have a common trip bar in the case of DP and TPN miniature circuit breakers. All the MCB's shall be tested and certified as per Indian Standard, prior to Installation.

Description no:-117

Copper plate type earthing as per IS 3043 and as per specification

The earthing of an installation shall confirm to I.E. Electricity Rules, IS-3043, latest edition and I.E.E. the copper earth plates should be tinned before installation. The earth plates of Cans iron, having size of 30 x 30 x 0.35 cms. In separate pit. Specially prepared 2.5 mtr deep with necessary to real moist earth surface. The earth pit should be provided with 38 mm dia GI pipe 2 mtr long. Alternative layers of salt and coke shall be provided surrounding the plate.

The pits shall be filled when the plates are in position and in presence of Engineer in charge. The earthing resistance of each earth plate should be measured by resistance megger in the presence of Engineer in charge. Three days after the completion of earthing work the value should conform to regulations.

The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specifications and shall be approved by the Electrical Engineer in charge before executing work.

Description no:-118

Providing & erecting Nominal Bore 16 gauge steel conduit painted black pipe with necessary saddles, screws, bends, junction boxes with 16 G GI fish wire etc.
50 mm

The Light class pipe shall be of galvanized iron “A” Grade pipe having 25/50 mm. to be erected on road crossing or on floor as directed for laying cable.

The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specifications and shall be approved by the Electrical Engineer in charge before executing work.

STREET LIGHT POLE

STREET LIGHT

Description No. : 119

(i) Steel Tubular Pole (Swaged), 7.5 Mtr Long

Steel tubular pole (Swaged) made of steel tubes of following dimensions swaged together
When hot, complete painted with one coat of Red oxide and two coats of aluminum paint
Erected with metallic base plate of 300mm x 300mm x 4mm thick
Overall length 7.5mtr. With approximate Weight of pole 67 kg.

Effective length of sections:
_ Bottom 4.5 mtr. Having outside dia. 114.3mm and wall thickness 4.50mm.
_ Middle 2 mtr. Having outside dia. 88.9 mm and wall thickness 3.65mm.
_ Top 2 mtr. Having outside dia. 76.9 mm and wall thickness 3.25mm.

The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

(ii) Cable clamp

Cable clamp shall be 25 mm X 3 mm M.S. flat suitable for fixing 2 Nos. of armored cable with nuts and bolts.

(iii) C.C. Foundation for Poles

The Cement concrete foundation shall be prepared in accordance with current specifications and as per instruction of in-charge-electrical engineer. The depth of pit shall very with planting depth of pole (length below ground) as per IS: 2713-1964. The planting depth shall be 1.25M for 7.5 M pole, 1.50M for 8.0M to 9.0M Pole, 1.8M for 9.5M to 11.0dM pole and 2.00M for 12.00M pole. The cross-section of pit shall be 450MM x 450MM. The C.C. foundation shall be started from the base plate of the pole and shall be filled up to depth of 100MM. below the ground level. Cement concrete mixture shall be prepared in the ratio of 1 part cement: 2 parts course sand: 4 parts gravel of 19MM. size. The cement concrete foundation shall be made in presence of representative of in-charge-electrical engineer. The C.C. shall be protected from premature drying by curing for at least 7 days after pouring it with regular interval of time as instructed.
The pole shall be covered above the ground level by plinth of 30cm. x 30cm. x 30cm. of bricks shall be prepared as specified. The plinth shall be prepared with cement mortar containing 1 part cement: 3 parts of fine cement. The smooth plaster shall be prepared with minimum thickness of 150MM. to outer side and top surface. Necessary white washing shall be made after proper curing of plinth.

(iv) Sintex Box for Cutout

The sintex box shall be approved make SMC press or painted molded composite FRP (Plastic) loop in loop out box approx 2.07 MM. thick complete with bakelite connector strip 4 way and hinged doors having locking arrangements with mounting clamp with nuts bolts and washers suitable for erection on pole with cable clamps and earth bolt of required size of box.
The box shall be erected on pole/wall with suitable M.S. clamp duly painted as described above and as per the instruction of Engineer-in-charge.
The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

(v) MCB

The MCB shall be with ISI mark of Indian standard specification No. IS:8828/1996.
MCB shall be with overload and short circuit tripping elements. The breaking capacity of fault current of MCB shall not be less than 10000 Amp at electric pressure of 230 volt.

Miniature circuit breaker single pole, double pole or four pole should be suitable to operate on 230/415 V A.C. system and having overload and short circuit tripping elements and breaking capacity 10KA to be erected in existing M.S. box. Confirming to IS 8828/1996 with ISI Mark.
MCB / ELCB distribution board should be thermo plastic "SHOKARE" /L & T - Hager or equivalent having modular double doors with DIN rails, epoxy powder coated finish metal frame & door assembly with S.S. door spring & hinged pins complete with required PVC sleeved 63A copper Bus strips without MCB / ELCBs The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work

(vi) Bracket for Pole

The Arm bracket shall be prepared from specified class of galvanized iron pipe of suitable diameter as specified in the Description. The bracket shall be complete with M.S. / G.I. sleeve tubing of required size and length suitable for pole to fitted with necessary fasteners to fix the bracket. The rise and angle shall be according to site condition and as per instruction of in-charge-electrical engineer. The length of spread shall be as specified in the Description with suitable welded stiffener. Bracket shall have 1 coat of anti-corrosion primer red-oxide coating before dispatching to site and 2 coats of approved make and shade of aluminum paint after erection on pole. The general specification given in tender booklet, specification as per schedule-B, drawing attached with tender shall also be considered as a part of agreement.
The arm bracket shall be single or double or triple as specified in the Description itself. The bracket shall be erected on the top of the pole with necessary bold fasts etc. with special reducer at the end to accommodate type of streetlight fitting to be fixed.
The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

(vii) G.I. Pipe

The galvanized iron pipe shall be of 'B' Class and 38/40 MM. diameter having smooth finished bore of the pipe on both ends erected on the face of the wall with wall clamps nuts and bolts and clamps for laying of cable along the pole / wall shaping the pipe as per site requirement to ease cable entry.
The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

(viii) Sodium Vapour Lamp, 70w to 400w

The sodium vapour lamp shall be high-pressure type with SON-E Elliptical lamps or SON-T tubular lamps as specified. The wattage of the lamps shall be specified. The lamp shall have a minimum approximate rated and guaranteed life of 15000 hours. The H.P.S.V. lamps shall confirm IS-9974 (Part 1 & 2): 1981. The Bi-pin cap of lamp for 70W shall be E-40 and shall have colour temperature of 2000 K. The lamps shall be rated for operating on 230 V/250 V as directed by in-charge electrical engineer. The voltage, current, nominal luminous flux and dimensions of lamps shall be as per Indian Standard.
The lamps shall be fixed in the fixtures hung on the pole/wall at a height not less than 3.0 meters for PTL and for 5.00 meters for street lighting purpose from ground level. The lams fused before/during the final testing of installation shall be replaced by the contractor at his own cost

and no extra payment shall be made for such replacement. Lamps for permanent installation shall not be placed in the fixtures until so directed by in-charge-electrical engineer.
The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

(ix) HPSV Lamp, 200v to 240v

HPSV public lighting luminaries should be as per Keselec'Z' range comprising an injection molded aluminum body with a single piece deep drawn reflector in high purity polished & anodized aluminum, with polystyrene acrylonitrite protective cover & a clear acrylic protector. The control gear mounted in the body on to removable mounting plate. Suitable for mounting on double or four-arm bracket as per above with prismatic or reinforced glass protector.
The street light luminaries suitable for HPSV lamp shall confirm IS: 10322 and part 5 section 1 & 3): 1987 for luminaries for road and street lighting. The luminaries shall be dust, vermin and weatherproof. The luminaries shall be of single die cast aluminum made out of LM6 canopy, anodized high purity aluminum reflector with reflection factor of not less than 80%. A single piece clear, UV treated protective acrylic cover shall be hinged to one end and stainless steel toggle shall be provided for claiming. Neoprene synthetic rubber felt gasket should be provided between acrylic cover and fixture. Control gear compartment shall have heavy-duty low loss copper wound ballast, porcelain lamp holder (E.40) power factor improvement capacitor igniter. All accessories are pre wired up to terminal block. Two Nos. M.S.U. clamps shall be provided for mounting on suitable sized pipe. A hole with a grommet shall be provided for cable entry. The luminaries shall be painted with stove enameled of gray/black outside and white inside as approved by in-charge-electrical engineer.
The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

(x) PVC Insulated Cable 2, 3, 3½ & 4 core

Scope: -The Scope of work shall cover supply, laying, connecting, testing and commissioning of low and medium voltage power cabling.
All Cables shall be as per relevant Indian Standard with ISI Mark.

Materials: - All cables shall be 1100-volt grade PVC insulated, PVC sheathed **aluminum or copper conductor** with or without armouring as specified and with an outer PVC protective sheath heavy duty. Cables shall have high conductivity stranded aluminum or copper conductors and cores colour coded to the Indian Standard. Type designation and core identification of cables shall be as per relevant Indian Standard.
All cables shall be new without any kind of visible damage. The manufacturers name, insulating materials, conductor size, voltage class and IS mark shall be marked on the surface of the cable at every 600MM length.

General: -The cable shall be supplied in single length i.e. without any intermediate joint. The cable ends shall be suitably sealed against entry of moisture, dust, water etc. with cable compound as per standard practice.

Installation: - Cable shall be laid in the routes as directed by in charge Electrical Engineer.
Cable running indoors shall be laid on walls or ceiling as per the site situation. Cables shall be fixed directly to wall or ceiling and supported with G.I. saddles / clamps at not more than 500 MM. interval with chrome plated screws.

In case of cables buried directly in ground, cables shall be laid in an excavated trench not less than 900 MM from G.L., over a sand or soft earth cushion to provide protection against abrasion.
In case cables entering the building or one room to another it would be done through porcelain/PVC pipes. After erection the pipes shall be sealed with M-seal.
The general and technical specification given in the tender booklet shall be considered as a part of agreement. The material shall be approved as per relevant IS specification and shall be approved by the Electrical Engineer in charge before executing the work.

Description No: 120

Metal Hailad Lamp
The wall light fitting should be decorative type pole mounted luminaries suitable for 150 W halogen tube. It should have die cast aluminum housing anodized aluminum reflector. It should have flame hardened Pyrex glass diffuser and silicon gasket.

The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge / Architect before executing the work.

Description No: 121

(i) MCB and MCB Distribution Boards

The MCB should be with ISI mark of Indian standard specification No. IS: 8828/1996.

MCB should be with overload and short circuit tripping elements. The breaking capacity of fault current of MCB should not be less than 10000 Amp. at an electric pressure of 230 volt.

Miniature circuit breaker single pole, double pole or four pole should be suitable to operate on 230/415 V A.C. system and having overload and short circuit tripping elements and breaking capacity 10KA to be erected in existing M.S. box confirming to IS 8828/1996 with ISI Mark.

MCB / ELCB distribution board should be metal clad having modular double doors with DIN rails, epoxy powder coated finish metal frame & door assembly with S.S. door spring & hinged pins complete with required PVC sleeved 63A copper Bus strips without MCB / ELCBs The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

(ii) ELCB

The ELCBs should be of approved make & should be conforming to IS:12640/1988 & BS:4293/1983 having sensitivity of 30 MA & breaking capacity of 10 KA & suitable for 240/415 V 40 Amp rating ELCB should have characteristics of quick acting & tripping with all advanced features & do not incorporate any electronic component. The wiring for connection should be used of PVC copper wires of adequate capacity with proper size of lugs.

The ELCBs should be erected on polished wooden board as per direction of Engineer in charge.

The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Description No: 122
Power Distribution Board
General Specification:

All the Main Co Panel's , PCC's / PDB's / MCC's shall be metal clad, totally enclosed, rigid, floor / wall mounted, air - insulation, cubical type suitable for operation on three phase / single phase, 415 / 230 volts, 50 Hz. neutral effectively / Non effectively grounded at transformer and short circuit level not less than 30 MVA at 415 volts.

The Main Co Panel's, PCC's / MCC's shall be designed the withstand and heaviest condition at site, with minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

Standard and Codes

The Main Changeover Panel, PCCs & MCCs shall comply with the at least edition of relevant Indian standards and Indian Electricity rules and regulations. The following Indian Standards shall be complied with:

IS: 4237 : General requirements for switch gear and control gear for voltage not exceeding 1000 v.

IS: 375 : Switchgear bus-bars, main connection and auxiliary wiring, marking and arrangement.

IS: 2147 : Degree of protection provided by enclosures for low voltage switch gear and control gear.

IS: 8197 : Terminal marking for electrical measuring instrument and their accessories.

IS: 2557 : Danger notice plates.

IS: 2516 : Specification for AC circuit breaker.

IS: 1818 : Specification for AC isolator and earthing switch.

IS: 3072 : Code of practice for installation and maintenance of switchgear.

IS : 8623 up to : Specification for factory built as symbolize of switch gear and control gear for voltage and including 1000v. A.C.& 1200 v. D.C.

IS: 8828 : Miniature Circuit Breaker.

IS: 2516 : Air circuit breaker.

IS: 4064 : Fuse switch and switch fuse unit.

IS: 9224 : HRC fuse unit.

IS: 2705 : Current transformer.

IS: 3155 : Voltage transformer.

IS: 3231 : Electrical relay for protection.

IS: 1248 : indicating instrument.

IS: 722 : Integrating instrument.

IS: 6875 : Control switches & push buttons.

IS: 2959 : Auxiliary contactor.

IS: 1822 : AC motor starters of voltage not exceeding 1000V.

Indian Electricity Act and rules. (as amended up to eight) & approval of FIA. of India.

The Main Changeover Panel, PCCs / MCCs / PDBs also require approval of the purchaser or his representative at various stage of their manufacture such as design, selection, construction, testing, shipping etc.

Shop Drawing

Prior to fabrication of the MAIN CHANGEOVER PANEL,PCCs / MCCs / PDBs, the supplier / contractor shall submit for consultant's approval the shop / vender drawing, and design calculations, indicating type, size, short circuiting rating of all the electrical components used, busbar size, internal wiring size, MAIN CHANGEOVER PANEL,PCCs / MCCs / PDBs dimension, colour, mounting detail etc. The contractor shall submit manufacture's catalogues of the electrical components installed in the MAIN CHANGEOVER PANEL,PCCs & MCCs.

Inspection

At all reasonable times during production and prior to transport of all the MAIN CHANGEOVER PANEL,PCCs & MCCs to site, the supplier / contractor shall arrange and provide all the facilities at their plant for inspection.

Test Certification

Testing of MAIN CHANGEOVER PANEL,PCCs & MCCs shall be carried out at factory or at site as specified in Indian Standards in the presence of Client. The test results shall be recorded on prescribed forms. The test certificates for the test carried out at factory or at site shall be submitted in duplicate for approval.

Construction

Cubical Type MAIN CHANGEOVER PANEL,PCCs, MCCs, PDBs.

STRUCTURE

The MAIN CHANGEOVER PANEL,PCCs, MCCs & PDBs shall be metal clad enclosed and be fabricated out of high quality CRCA sheet, suitable for indoor installation having dead front operated and floor mounting type.

All CRCA sheet steel used in the construction of MAIN CHANGEOVER PANEL,PCCs / MCCs / PDBs shall be 1.6 mm thick and shall be folded and braced as necessary to provided a rigid support for all components. Joints of any kind in sheet shall be seam welded, all welding slag grounded off and welding pits wiped smooth with plumber metal.

The MAIN CHANGEOVER PANEL,PCCs / MCCs / PDBs shall be totally enclosed, completely dust and vermin proof and degree of protection being no less than IP-51 to IS 2147. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. All doors and covers shall be fully gasket with foam rubber and / or rubber strips and shall be lockable.

All panels and covers shall be properly fitted and secured with the frame, and holes in the panel correctly positioned. Fixing screw shall enter into holes taped into an adequate thickness of metal or provided with bolts and nuts. Self threading screws shall not be used in the construction of MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs.

A base channel of 75 mm x 75 mm x 5 mm thick shall be provided at the bottom.

MAIN CHANGEOVER PANEL, PCCs / MCCs /PDBs shall arrange in multi-tier formation. The size of the MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs shall be designed in such a way that the internal space is sufficient for hot air movement, and the electrical component dose not attain temperature more than 40 degree Celsius. If necessary openings shall provided for natural ventilation, but they said openings shall be screened with fine weld mesh.

Knockout holes of appropriate size and number shall be provided in the MAIN CHANGEOVER PANEL, PCCs / MCCs/ PDBs in conformity with number, and size of incoming and outgoing conduits / cables.
Alternatively the MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs shall provided with removable sheet plates at top to drill holes for cable / conduit entry at site.

The MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs shall be designed to facilitate easy inspection, maintenance and repair.

The MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs shall be sufficiently rugged in design and shall support the equipment without distortion under normal and short circuit condition; they shall be suitable braced for short circuit duty.

Protection Class

All the indoor MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs shall have protection class of TP - 51.

Painting

All sheet steel work shall undergo a process of decreasing pickling in acid, cold rinsing, phosphate and pesivating and then sprayed with a high corrosion resistant primer. The finishing treatment shall be by application. We coats of synthetic enamel paint of approved colour shall be applied by spray.

Circuit Compartment

Each circuit breaker and switch fuse units shall be housed in separate compartments and shall be enclosed an all sides. Sheet steel hinged lockable door shall be duly inter locked with the breaker / switch fuse units in ON and OFF position. Safety interlocks shall be from being drawn out when the breaker is in ON position.

The door shall not form as integral part of the draw out position of the circuit breaker. All instruments and indicating lamp shall be mounted on the compartment door. Sheet steel barriers shall be provided between the tires in a vertical section.

Instrument Compartment

Separate and adequate compartment shall provided for accommodating instruments, indicating lamp, control contactors, relays and control fuses etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, switch fuse units, bus bars and connections.

Busbars

The bus bar shall be air insulated and made high quality, high conductivity, high strength aluminums and as per relevant IS code. The bus bar shall of three phases and neutral system with separate neutral and earth bar. The bus bar and interconnection between bus bar and various components shall be of high conductivity, hard drawn, aluminum. The bus bar shall be of rectangular cross section designed to withstand full load current for phase bus bar and half rated current for neutral bus bar and shall be extensible type on either side. The bus bar shall be rated for the frame size of the main incoming breaker but in any case not less than 125 amp capacities. The bus bar shall have uniform cross section throughout the length.

The bus bar and interconnection shall be insulated with heat shrinkable PVC sleeves and be colour coded in red, Yellow, Blue and Black to identify the three phases and neutral of the system. The bus bar shall be supported on unbreakable, non hygroscope DMC insulated supports at sufficiently close interval to prevent bus bar sag and shall effectively withstand electromagnetic stresses in the event of short circuit capacity of 50 KA RMS symmetrical for one second and a peak short circuit withstand of 105 KA minimum.

The busbar shall be housed in a separate compartment. The busbar shall be isolated with 3 mm thick Bakelite sheet to avoid any accidental contact. The busbar shall be arranged such that minimum clearance between the busbar are maintained as per below.

Between phases	:	27 mm min.
Between phases and neutral	:	25 mm min.
Between phases and earth	:	25 mm min.
Between neutral and earth	:	23 mm min.

All bus bar connection shall be done by drilling holes in bus bars and connecting by chromium plated brass bolt and nuts. Additional cross section of bus bar shall be provided in all MAIN CHANGEOVER PANEL, PCCs / MCCs / PDBs to cover-up the holes drilled in the bus bars. Spring and flat washers shall be used for tightening the bolts.

All connection between bus bar and circuit breaker / switches and between circuit breaker/ switches and cable terminals shall be through solid aluminum strips of proper size to carry full rated current. These strips shall be insulated with insulating strips.

Electrical Power & Control Wiring Connection

Terminal for both incoming and outgoing cable shall be suitable for 1100 volts grade, aluminum/copper conductor PVC insulated and sheathed, armoured cable and shall be suitable for

connections of solder less sockets for the cable size as indicated on the appended drawing for the MAIN CHANGEOVER PANEL, PCCs, MCCs, and PDBs.

Both control and power wiring shall be brought out in cable alley for ease of external connections, operation and maintenance.

Both control and power terminals shall properly be shrouded.

10% spare terminal shall be provided on each terminal block. Sufficient terminals shall be provided on each terminal block so that not more than one outgoing wire connected per terminal.

Terminal strip for power and control shall preferably be separated from each other by suitable barriers of enclosures.

Wiring inside the module for power, control protection and instrument etc. shall be done with use of 660/1100 confirming to IS 694 and IS 8130. Power wiring inside the starter module shall be rated for full current rating of contactor, but not less than 4 sq mm cross section area. For current transformer circuits, 2.5 sq mm copper conductor wire shall be used. Other control wiring shall be done with 1.5 sq mm copper conductor wires. Wires for connections to the door shall be flexible. All conductors shall be crimped with solder less sockets at the ends before connections are made to the terminals.

Control power for the motor starter module shall be taken from the respective module switchgear outgoing from R phase and Neutral. Control wiring shall have control fuse (HRC type).

Particular care shall be taken to ensure that the layout of wiring neat and orderly. Identification ferrules shall be filled to all the wire termination for ease of identification and to facilitate and testing.

"CUPAL" washers shall be used for all copper and aluminum connections.

Final wiring diagram of the PCC, MCC, PDB power and control circuit with ferrules number shall be submitted along with the PCC/MCC/PDB as one of the documents.

Terminals

The outgoing terminals and neural link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformer for instrument metering shall mounted on the disconnecting type terminal blocks. No direct connection of incoming and outgoing cables to internal components connection of the distribution board is permitted; only one conductor may be connected in one terminal.

Wire ways

A horizontal PVC wire way with screwed covers shall provided at the top to take interconnecting control wiring between different vertical sections.

Cable Compartment

Cable compartment of adequate size shall be provided in the MAIN CHANGEOVER PANEL,PCCs, MCCs, PDBS for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate support shall be provided in the cable compartment shall be brought out to terminal blocks in the cable compartment.

Earthing

Aluminum earth bus bar of 25 mm x 3 mm shall be provided in the MAIN CHANGEOVER PANEL,PCCs, MCCs, PDBS for the entire length if panel. The frame work of the MAIN CHANGEOVER PANEL, PCCs, MCCs, and PDBs shall be connected to this earth bus bar. Provisions shall be made for connection from earth bus bar to the main earthing bar coming from the earth pit on both sides of the MAIN CHANGEOVER PANEL, PCCs, MCCs, and PDBs.

The earth continuity conductor of each incoming and outgoing feeder shall be connected to this earth bar. The armour shall be properly connected with earthing clamp and the clamp shall be ultimately bounded with the earth bar.

Labels

Engraved PVC labels shall be provided on all incoming and outgoing feeders. Single line circuit diagram showing the arrangements of circuit inside the distribution board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet.

Name Plate

A name plate with panel designation in bold letter shall be fixed at top of the central in panel. A separate name plate giving feeder giving feeder details shall be provided for each feeder module door.

Inside the feeder compartment, the electrical component, equipments, accessories like switchgear, contactor, lamp, relays etc. shall suitably be identified by providing stickers.

Engraved name plates shall preferably be of 3 ply, (red-white-red or black-white-black) lamicold sheet. However black engraved perplex sheet name plates shall also be applicable. Engraving shall be done with square groove cutters.

Name plate shall be fastened by counter sunk screws and not by adhesives.

Danger Notice Plate

The danger plate shall be affixed in a permanent manner on operating side of the panel.

The danger notice plate shall indicate danger notice both in Hindi and English and with a sign of skull and bones.

The danger notice plate in general shall meet to requirements of local inspecting authorities.

Overall dimension of the danger notice plate shall be 200 mm wide and 150 mm high. The danger notice plate shall be made from minimum 1.6 mm thick mild steel sheet and after due pretreatment to the plate, the same shall be painted white with vitreous enamel paint on both front and rear surface of the plate.

The letter, the figure, the conventional skull and bones shall etc. shall be positioned on the plate as per recommendations of IS : 2551-1982.

The said letter, the figure and the sign of skull and bones be painted in single red colour as per IS : 5-1978.

The danger plate shall have rounded corners. Locations of fixing holes for the plate shall be decided to suit design of the panel.

The danger notice plate, if possible, be of ISI certification mark.

Internal Components

The PCC / MCC / PDB shall be equipped complete with all type of required number of air circuit breakers, switch fuse unit, contactor, relays, fuses, meters, instruments, indicating lamps, push buttons, equipment, fittings, busbar, etc. and all the necessary internal connections /wiring as required and as indicated on relevant drawings. Components necessary for proper complete functioning of the PCC / MCC / PDB but not indicated on the drawings shall be supplied and installed on the PCC / MCC / PDB.

All part of the PCC / MCC/ PDB carrying current including the components, connections, joints and instruments shall be capable of carrying their specified rated current continuously, without temperature rise exceeding the acceptable values of the relevant specifications at any part of the PCC / MCC / PDB.

All units of the same rating and specifications shall be fully interchangeable.

Inspections

Each equipment should inspect and witness by client.
The PCC / MCC / PDB shall be inspected and checked as per inspection manual of the PCC / MCC / PDB manufacturer.

Various electrical components and accessories of the PCC / MCC / PDB shall be checked as per drawing for the respective PCC / MCC / PDB.

The PCC / MCC / PDB shall be checked for rigid mounting, earthing connections, proper rating and size of components, internal wiring, etc.

All mechanical fasteners and electrical connections shall be checked and tightened before installation.

Routine test certificates for all ACB for similar rating shall be submitted.

Test

Prior to dispatch of the PCC / MCC / PDB following tests shall be carried out.

Mechanical endurance test shall carried out by closing and opening of all the ACB's, MCB's switches etc.

High voltage and Insulation resistance test shall be carried out between phases and between phase to earth bus, keeping the isolating switch in ON position. Similar test shall be carried out keeping the isolating switch in closed position.

All the interlocks, controls and tripping mechanism of the switch gears shall be tested for their proper functioning.

Components
General

The type, size, and rating of the components shall be as indicated on the relevant drawings.

While selection of the capacity of the components resulting from the prevailing conditions like room temperature shall be allowed for the Thermal and magnetic trip rating shall be compensated for the ambient temperature.
The rating indicated on the drawings are rating anticipated at prevailing site condition.

Fuse Switch Units

The fuse switches unit shall be 3 pole double break type suitable for load break duty (AC 23), quick make and break action. Separate neutral link shall be provided with hinged doors duly interlocked with operating mechanism so as to prevent opening of the door when the switch is in " ON " position and also prevent closing of the switch when the door is not properly secured. All contacts shall be silver plated and all live parts shall be shrouded. The incoming and outgoing terminals of switches shall be adequately sized to receive proper size of the cables. High Rupturing capacity (HRC) fuse links shall be provided with switch fuse units and shall be in accordance with IS : 2208-1962 and having rupturing capacity of not less than 35 MVA at 415 volts. HRC fuse links shall be provided with visible indicators to show that they have operated. The switch fuse unit shall be manufactured in accordance with IS : 4047 - 1967 as amended to date.

Miniature Circuit Breaker

Miniature circuit breakers shall be quick make and break and break type conform with British standard BS : 3871 (Part-I) 1965 and IS :8825. The housing of MCBs shall be heat resistant and having a high impact strength. The fault current of MCBs shall not be less than 9000 amps, at 230 volts. The MCBs shall be flush mounted and shall be provided with trip free manual operating mechanism with mechanical "ON" and "OFF" indications.

The circuit breaker dollies shall be of trip free pattern to prevent closing the breaker on a faculty current.

The MCB contact shall be silver nickel and silver graphite alloy and tip coated with silver. Proper arc chutes shall be provided to quench the arc immediately. MCB's shall be provided with magnetic fluid plunger relay 3 as for over current and short circuit protection. The over load or short circuit devices shall have a common trip bar in the case of DP and TPN miniature circuit breakers. All the MCB's shall be tested and certified as per Indian Standard, prior to Installation.

Fuse

Fuses shall be of high rupturing capacity (HRC) fuse links and shall be in accordance with IS : 2000-1962 and having rupturing capacity of not less than 35 MVA at 415 Volts. The backup fuse rating for each motor / equipment. HRC fuses shall be of English Electric make or approved equal.

Moulded Case Circuit Breaker

The MCCB shall be air break type and having quick make quick break with trip free operating mechanism.

Housing of the MCCB shall be of heat resistant and flame retardant insulating material.

Operating handle of the MCCB shall be in front and clearly indicate ON / OFF / TRIP positions.

The electrical contact of the circuit breaker shall be of high conducting non deteriorating silver alloy contacts.

The MCCB shall be provided with thermal / magnetic type BI-metal over load release and Electro-magnetic short circuit protection device. All the releases shall operate on common trip busbar so that in case of operation of any one of the releases in any of the three phases, it will cut off all the three phases and thereby single phasing of the system is avoided.

The MCCB whenever called for in the appended drawings shall provide an earth fault relay.

The MCCB shall provide two sets of extra auxiliary contacts with connections for additional controls at future date.
The electrical parameters of the MCCB shall be as per the descriptions given in the appended drawings.

Contactors

The contactor shall meet with the requirements of IS: 2959 and BS: 775.

The contactors shall have minimum making and breaking capacity in accordance with utilization category AC 3 and shall be suitable for minimum class II intermittent duty.

If the contactor forms part of a distribution board then a separate enclosure is not required, but the installation of the contactor shall be such that it is not possible to make an accidental contact with live parts.

Voltmeter
Voltmeter shall comply with BS-90. The dial of the meter shall be square in shape of 96 x 96 mm size. The voltmeter shall be moving iron type, flush pattern with dust and moisture proof enclosure.

The voltmeter selector switch shall be arranged to provide line to line voltage reading.

Ammeter

Ammeter shall comply with BS: 89. The dial of the ammeter shall be square in 96 x 96 mm in size. The ammeter shall be moving iron type, flush pattern with dust and moisture proof enclosure. The range of the ammeter shall be in accordance with 1 to 1.5 times the feeder full load current. Separate current transformer shall be provided for all Ammeters.

Current Transformer

Where ammeter is called for, CT's shall provide for current measuring. Each phase shall be provided with separate CT of class I accuracy and suitable VA burden for operation of associated metering and controls. Current transformer shall be in accordance with IS: 2705 - 1964 as amended up to date.

Push Button

The push button unit shall comprise of the contact element, a fixing holder, and push button actuator. The push button shall be momentary contact type. The contacts shall be of silver alloy and

rated at 10 Amps. Continuous current rating. The actuator shall be of stranded type and colour as per its usage for ON, OFF and Trip.

Indicating Lamp

Indicating Lamp shall be LED type.

Colour shade for the indicating lamps shall be as below:

ON indicating lamp	:	Red
OFF indicating lamp	:	Green
TRIP indicating lamp	:	Amber
PHASE indicating lamp	:	Red, Yellow, Blue.

Description No: 123

PVC Insulated Cable 2, 3, 3½ & 4 core

Scope: - The Scope of work should cover supply, laying, connecting, testing and commissioning of low and medium voltage power cabling.

All Cables should be as per relevant Indian Standard with ISI Mark.

Materials: - All cables should be 1100 volt grade PVC insulated, PVC sheathed aluminum or copper conductor with or without armoring as specified and with an outer PVC protective sheath heavy duty. Cables should have high conductivity stranded aluminum or copper conductors and cores colour coded to the Indian Standard. Type designation and core identification of cables should be as per relevant Indian Standard.

All cables should be new without any kind of visible damage. The manufacturers name, insulating materials, conductor size, voltage class and IS mark should be marked on the surface of the cable at every 600MM length.

General: -The cable should be supplied in single length i.e. without any intermediate joint. The cable ends should be suitably sealed against entry of moisture, dust, water etc. with cable compound as per standard practice.

Installation: - Cable should be laid in the routes as directed by in charge Electrical Engineer.

Cable running indoors should be laid on walls or ceiling as per the site situation. Cables should be fixed directly to wall or ceiling and supported with G.I. saddles / clamps at not more than 500 MM. interval with chrome plated screws.

In case of cables buried directly in ground, cables should be laid in an excavated trench not less than 900 MM from G.L., over a sand or soft earth cushion to provide protection against abrasion.

In case cables entering the building or one room to another it would be done through porcelain/PVC pipes. After erection the pipes should be sealed with M-seal.

The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Cable Laying

Scope: - The Scope of work should cover supply, laying, connecting, testing and commissioning of low and medium voltage power cabling.
All Cables should be as per relevant Indian Standard with ISI Mark.
Materials: - All cables should be 1100 volt grade PVC insulated, PVC sheathed aluminum or copper conductor with or without armouring as specified and with an outer PVC protective sheath heavy duty. Cables should have high conductivity stranded aluminum or copper conductors and cores colour coded to the Indian Standard. Type designation and core identification of cables should be as per relevant Indian Standard.

All cables should be new without any kind of visible damage. The manufacturers name, insulating materials, conductor size, voltage class and IS mark should be marked on the surface of the cable at every 600MM length.

General: -The cable should be supplied in single length i.e. without any intermediate joint. The cable ends should be suitably sealed against entry of moisture, dust, water etc. with cable compound as per standard practice.

Installation: - Cable should be laid in the routes as directed by in charge Electrical Engineer.

Cable running indoors should be laid on walls or ceiling as per the site situation. Cables should be fixed directly to wall or ceiling and supported with G.I. saddles / clamps at not more than 500 MM. interval with chrome plated screws.

In case of cables buried directly in ground, cables should be laid in an excavated trench not less than 900 MM from G.L., over a sand or soft earth cushion to provide protection against abrasion.

In case cables entering the building or one room to another it would be done through porcelain/PVC pipes. After erection the pipes should be sealed with M-seal.

The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Brass Cable Gland & Lug

The cable gland should be of polished brass, double compression type and ends should be shrouded. The inner size of gland should be suitable to received suitable size of cables. The cable glands should be heavy duty and should be fixed with switch fuse unit with suitable brass washers with rubber ring/gasket.

Rigid PVC Pipes

The Rigid PVC Pipe should confirm IS: 2509 or ISI marked a specified Rigid PVC Pipe should be 1.5 MM to 1.6 MM thick manufactured from high grade virgin PVC. The diameter of PVC pipe should be as specified. Fittings for Rigid PVC Pipe such as bends, elbows, nipples, couplings, reducers, plugs etc. should be specifically designed and manufactured for their particular applications. All fittings should confirm to IS: 3415.

The Rigid PVC Pipe should be erected on wall / ceiling with properly screwed heavy duty Rigid PVC Saddles at the intervals not more than 500 MM. and pipes to pipes and pipes to fittings

should be fixed with adhesive solution. 16 SWG G.I. fish wire should be erected with erection of pipe as a drawer wire. The installation of pipes should be as per IS: 4648, IS: 732 and IS: 1646.

The general and technical specifications given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Description No: 124

Earthing

The Earthing of an installation should confirm to I.E. Electricity Rules, IS-3043, latest edition and I.E.E. The copper earth plates should be tinned before installation. The earth plates of **Cast iron, having size of 0.45 x 0.45 x 0.35 cm. in separate pit**. It should be specially prepared 2.5 mtr deep with necessary to real moist earth surface. The earth pit should be provided with 38 MM dia GI Pipe 2 mtr long. Alternative layers of salt and coke should be provided surrounding the plate.

The pits should be filled when the plates are in position and in presence of Engineer in Charge. The earthing resistance of each earth plate should be measured by resistance meggar in the presence of Engineer in Charge. Three days after the completion of earthing work the value should conform to regulations.

The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Copper Earth Wire

The copper wire of 8 to 16 SWG should be use for earthing of switchgear. The wire should be Annealed bare Copper Wire. The copper wire should be erected as per the requirement and instruction of Engineer in charge.

The general and technical specification given in the tender booklet should be considered as a part of agreement. The material should be approved as per relevant IS specification and should be approved by the Electrical Engineer in charge before executing the work.

Description No: 125

Supply and install/commission on finished foundation 01 No. UNIQUE, METRIX, EVERY, EAGLE, APPLE or equivalent make pit-less type fully Electronic weighbridge platform size 9 m x 3 meters for 50 MT capacity including applying oil paint, etc complete.
Capacity :-50 MT

Workmanship:

Weighbridge Platform
Weighing platform will be installed on 6 nos. shear beam load cells of 30 MT capacity each, weighbridge platform shall be heavily constructed with 2 nos. 400 mm RS Joists arranged longitudinally and 26 nos. 200 mm RS joists arranged horizontally rigid steel construction which shall adequate to take care of loading as well as the impact due to movement of the loaded trucks /trailers/ dumpers on the platform, entry of the vehicles on the platform will be from both the ends.

12 mm thickness Mild steel plate having area of 36 sq.m at the top of the platform will be detachable type which is welded with MS strips on it for antis, kidding, the top plates will be removable for maintenance purpose without dismantling the entire weighbridge. IRMC 200 of 12 mt in length will be fixed longitudinally on the both sides of M.S plate

Load-cells :

Load-cells will be strain gauge shear beam type, hermetically sealed and confirming to protection clause, the technical particulars of the load-cells are given below:

Load-cell characters:

Capacity Range	: 30, 0000 Kgs
Rated output	: 2m v/v
Calibration accuracy	: ± 0.1 %
Terminal Non-Linearity	: +0, -0.03 %
Hysteresis	: +0.02 %,-0 :
Combined effect on linearity &Hysteresis	: 0,-0.03 %
Creep, 20 Minutes	: Less than 0.03 %
Temperature effect on zero balance	: Less than ± 0.15% / 70C
Temperature effect on Output	: Less than ±0.08% / 70C
Environment Protection	: IP-67

Electronic Indicator:-

UWB-40 model micro processor based Digital Indicator. Automatic zeroing and taring, push button zeroing, 13mm red led digital display, RS. 232 output to interface with any branded Computer (To be supplied with the weighbridge Indicator) with required software to generate printout slip with all the data like Gross weight, Tare weight, Net weight along with the date and time of each weigh-ment , supplier code, material code, In the software you have the provision of getting daily report.

Description No:-126
Providing and fixing single phase pump motor for pumping of water at different floor level including all fixture and fasteners with all fitting of pipes etc complete.
0.5 H.P

Workmanship:

The single phase motor shall be used of standardcompany. The motor give the full head at different floor level. The fasteners and fixtures are used of standard quality. Motor can be fix after approved by Engg- in - charge

Mode of Measurement and Payment:

Rate shall be for a unit of one No.

Description no:-127
Providing and supplying ISI Standard R.C.C.pipes in standard lengths of following class and diameter suitable for collar joints or rubber ring joints including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS – 458 latest version)

Note: One collar should be supplied with each full length plain ended RCC pipe, cost included in rates below, One rubber ring should be supplied with each full length socketed pipe, cost included in rates below.
Class NP3/ NP2

Workmanship:

Materials:

The reinforced concrete non pressure pipes of specified diameter shall be confirm to relevant is: 458 . Material shall be of the 1st quality of the approved make or equivalent as approved by the Consultants.

Carting and Handling

The pipes and other materials required shall be transported from the factory to the work sites at places along the alignment of pipeline as directed by the engineer-in-charge. The contractor shall be responsible for the safety of pipes and fittings/specials in transit, loading / unloading. Every care shall be exercised in handling pipes to avoid damage. While unloading, the pipes and fittings/specials shall not be thrown down from the truck o the hard surfaces. They shall be unloaded on timber skids with steadying ropes or by any approve means. Padding shall be provided between coated pies, fittings/specials and timber skids to avoid damage to the coating. Suittable gaps between pipes should be left at intervals in order to permit access from one side to the other. In case of spigot socket pipes, care should be taken regarding orientation of pipes while unloading. As far as possible pipes shall be unloaded on one side of the trench only. The pipes shall be checked for any visible damage while unloading and shall be sorted out for5 reclamation. Any pipe which shows sufficient damage to preclude it from being used shall be discarded. Dragging of pipes and fittings/specials along concrete and similar pavement with hard surfaces shall be prohibited.
New pipes can be brought to site only after the mandatory tests (i.e cube tests, three edge bearing tests, hydrostatic tests, water absorption test etc.) are completed.

Storage :

Each stack of pipe shall contain only pipes of same class and size, with consignment or batch number marked on it with particulars of suppliers wherever possible. Storage shall be done on firm level and clean ground and wedges shall be provided at the bottom layer to keep the stack stable. The stack shall be in pyramid shape or the pipes laid lengthwise and crosswise in alternate

layers. The pyramid stack shall be made for smaller diameter pipes for conserving space in storing them. The height of the stock shall not exceed 1.5 m.

Mode of Measurement and Payment:

The rate shall be for a unit of one running meter (Including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS-458 latest embedment)

Description no:-128

Lowering, laying and jointing R.C.C. pipes in C. M. 1:1½ of following diameters in proper position, grade and alignment as directed by Engineer -in-charge including conveyance from stores to site of work, labour, giving hydraulic testing as per ISI code, etc complete including cost of jointing materials.
Class NP3/ NP2

Workmanship:
Excavation in trenches shall be carried out as per relevant specification of item which is measured & paid separately. Laying, jointing etc shall be carried out by following method.

Laying:

The pipes shall be lowered into the trenches carefully, Mechanical appliances may be used. Where necessary pipe shall be laid in straight lines or with easy curves and true to line and gradient as specified. The laying of pipe shall precede upgrade of a slope. In the pipe with loose collar, the collars shall be slipped on before the next pipe is laid.

In case where the foundation conditions are unusual such as the proximity of trees or holes, under existing or proposed around in 150 mm thick cement concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mmnominalsize) or compacted sand or gravel.

In case where the natural foundation is inadequate the pipe shall be laid either in concrete cradle, supported on proper foundation or on any other suitably designed structure. If concrete bedding issued, the depth of concrete below bottom of the pipe shall be at least $1/4^{th}$ of the internal diameter of the pipe subject to a minimum of 100 mm and maximum 300 mm. The concrete shall be extended up to the sides of the pipe at least a distance of $1/4^{th}$ of the out sided diameter for pipes 300mm and over in diameter.

The pipes shall be laid in the concrete bedding before the concrete has set. Pipes laid in trenches in earth shall be bedded evenly and firmly as far as up to the haunches of the pipe as to safely transit the load expected from the backfill through the pipe to the end. This shall be done either by excavating the bottom of the trenches to fit the curve of the pipe or by compacting the earth under round curve of the pipe to form an even bed. Necessary provision shall be made for joints wherever required.

Jointing:

The joints shall be done by slipping the collar over and clear of the end of the pipe. The recess of the end of the pipe shall be filled with jute threading dipped in hot bitumen. The new pipe shall then be brought forwarded until bitumen ring in recess of first pipe is set into the recess of the

second pipe. This process shall be repeated for two or three pipes which shall then be jacked up so as to thoroughly compress the bitumen. The quantity of jute and bitumen shall be just enough to fill the recess when pressed hard by jacking care being taken that no off set of the jute braiding shall be visible either enough to fill the recess when pressed hard by jacking care being taken that no offset of the jute braiding shall be visible either outside or inside of pipe. The collar shall then be set up over the joints covering equally both the pipe and leaving an even caulking space all around cement and sand mortar 1:1 ½ shall then be well punched or pressed home with a caulking tool within the caulking space. Care shall be taken that the underside of the joints is properly filled with mortar.

Curing:

Every joint shall be kept wet for about 10 days for maturing, the section of the pipe line laid and jointed shall be covered immediately to protect from weather effects, Minimum bore of 100 mm is considered adequate.
The joints shall be left exposed for observation.
Testing of joint:
The pipeline shall be tested as directed.
If any leakage is visible, the defective part of the work shall be made food at no extra cost.
A slight amount of sweating which is uniform may be overlooked, but excessive scatting forma particular pipe or joints shall be watched for and taken as indicating a defect to be made good.

Mode of measurements and payment:
Pounding or bottoming of the net without any allowance for cutting and waste. The length of bends, junctions and other connections shall be included in the total length of the drainpipes. Nothing extra shall be paid for the same.
The rate shall be for a unit of one running meter

ITEM NO WISE DETAILS TECHNICAL SPECIFICATIONS OF CIVIL WORK

GENERAL NOTE FOR ALL COMPONENTS:

ALL CONCRETING WORK OF GRADE M200 (CONTROLLED CONC.) OR HIGHER SHALL ONLY BE DONE AT SITE BY READY MIX CONCRETE WITHOUT FLY ASH CONTENT FOR MORE THAN 1 CUM QUANTITY, UNDER SUPERVISION OF RMC / PMC / TPI REPRESENTATIVE. MIX DESIGN OF CONCRETE SHALL BE GOT APPROVED WITH ENGINEER IN CHARGE / CONSULTANT / TPI.

ELEVATED SEMI-CLOSED TRANSFER STATION

TRANSFER STATION BUILDING

Item No: 1

Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.
(1) R.C.C. work

1.0 Workmanship:
The relevant specifications of description no. 1 shall be followed.

2.0 Mode of Measurement and Payment:s
The relevant specifications of description no. 1 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Demolition of brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead lift in cement mortar

1.0 Workmanship:
The relevant specifications of description no. 2 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 2 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 3

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area and as instructed.
(A) 0 to 1.50 m depth 1) Soil, Murrum, sand etc 2) Soft Rock 3) Hard Rock
(B) 1.50 to 3.0 m depth 1) Soil, Murrum, sand etc 2) Soft Rock 3) Hard Rock

1.0 Workmanship:
The relevant specifications of description no.4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.

Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 40 nominal size) and curing complete including cost of formwork in.
(A) Foundation and Plinth

1.0 Workmanship:
The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 5

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding cost of reinforcement for reinforced concrete work in (A) Foundation, footing, base of columns and Mass concrete.

1.0 Workmanship:
The relevant specifications of description no. 12 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 12 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 6

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in (A) Columns (B) Beam, etc.

1.0 Workmanship:
The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 7

Providing and laying rubble stone soling/pitching 230 mm thick including hand packing/ murrum backing and compacting etc. complete. For maneuvering area of work site

1.0 Workmanship:
The relevant specifications of description no. 17 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 17 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 8

Providing and laying cement concrete 1:3:6 (1 cement: 3 sand: 6 graded stone aggregates 20 nominal size) and curing complete including cost of formwork for foundation and plinth (A) For maneuvering area of work site

1.0 Workmanship:
The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.
.

Item No: 9

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement for reinforced concrete work in (A) SLAB AT GL

1.0 Workmanship:
The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 10

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending, binding, hooking& placing in position complete Up to floor two levels. More than 10T

1.0 Materials:
The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 11

Filling in trenches with available excavated earth (excluding rock in trenches plinth, sides of foundations etc. in layer not exceeding 20 cm in depth consolidating each desposalite layer by ramming and watering.)

1.0 Materials:
The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 7 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 12

Conveying carting and removing of surplus excavated stuff from the site to any place within municipal limited as directed by the engineer in charge including loading, unloading carting dumping and or spreading as directed etc. comp. For Lead 4.5 km to 5.00 km.

1.0 Workmanship:
The relevant specifications of description no. 6 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 6 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 13

Providing and filling in plinth with yellow soil or selected soil in layers of 20 cm in thickness including watering, ramming and consolidation etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 8 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 8 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 14

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work incolumn, beam, slab, elevation wall etc.

1.0 Workmanship:
The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 15

Providing TMT FE - 500 bar reinforcement for R.C.C. work including bending, binding, hooking & placing in position complete Up to floor two levels. More than 10T

1.0 Materials:
The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 16

Providing and constructing brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth and up to floor two level in cement mortar 1:6 (1 cement : 6 fine sand) (B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 17

Providing and constructing half brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth and up to floor two level in cement mortar 1:4 (1 cement : 4 fine sand) (B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 18

Providing up to floor two levels precast concrete Ventilation Block as per drawing. 1:2:4 mix (1 cement :2 coarse sand :4 graded stone aggregate) 6 mm nominal size reinforced with 1.6 mm dia mild steel wire including roughening cleaning, fixing and finishing in cement mortar 1:3 and curing complete.
100 mm thick

1.0 Workmanship:

The relevant specifications of description no. 19 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 19 shall be followed.

Rate shall be for a unit of one Square meter.

Item No: 19

Providing and applying 12 mm thick cement plaster in single coat on brick /concrete walls and similar surfaces for plastering and finishing even an smooth with floating coat of cement slurry mixed with admixture of lime or neeru in required proportion etc. complete in cement mortar 1:3 (1 cement:3 sand)

1.0 Workmanship:

The relevant specifications of description no. 20 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 20 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 20

20 mm thick Sand face Cement Plaster Work in which 1 plaster in proportion of 1:3 and 2nd plaster in proportion of 1:2 using Cement: Mortar with sponge finishing etc. complete (Note : Before carring out Plaster work on RCC, required tipping work should be carried out as instructed)

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 21

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete.
(A) For wall

1.0 Workmanship:

As per manufacturers specification and instruction of engineer incharge.The relevant specifications of description no. 40 shall also be followed

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 40 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 22

Providing and applying one coat Epoxy Phenolic primer of DFT 50 micron and two coats of Epoxy Phenolic coating of DFT 100 microns each or any other equivalent epoxy coating system to all concrete surfaces exposed to atmosphere including cost of material, labour, transportation, scaffolding and preparing the surfaces by cleaning, washing, brushing, sand/grit blasting etc. complete. (Paint shall be got approved from Engineer and tested from approved laboratory)

1.0 Workmanship:

The relevant specifications of description no. 43 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 43 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 23

Providing and Fixing of colour coated aluminium-zinc alloy sheets (Galvalume) of ASTM – A792 Grade D, Coating AZ-150 with 0.5 mm thickness, 0.90m to 1.20m width and length up to 12m with factory cut and fixing to the roof polymer coated galvanized hex head self drilling screws with integral washers and EPDM seals fasteners for support for sheet etc., complete as directed including cost of sheets For roofing, with necessary fixtures and accessories, hangers, skylights etc complete as per drawing and design.

1.0. Materials:

Roofing/ Clading Material:
Type of Roofing Material: Colour Coated Aluminium-Zinc Alloy Sheet (Galvalume) of
ASTM – A792, Grade D, Coating – AZ150
Outside Colour coating / Inside Colour coating: As per availability/Ivory

2.0. Laying of sheets:

The sheets shall be laid in to a true plane with the line of corrugations truly parallel or normal to the sides of area to be covered. The sheets shall not generally be built into gables and parapets. They shall be bent up along their side edges close to the wall, and the junction shall be protected by suitable flushing or by projecting drip course.
The laps at end shall be provided as per manufacture guideline.
The sheets shall be cut to the dimensions or the shape of the roof either along their lengths or their width or in slant across the line of corrugations at hips and valleys. The sheets shall be cut carefully with a straight edge and chisel to give straight finish. The sheets shall be laid such that the laps are turned away from the usual direction of local heavy rain.

2. Fixing of sheets:

Sheets shall be fixed to the other roof members such as hips or valley rafter etc. with necessary fitting, accessories.

1. Mode of measurements and payment

The measurements of the sheet roof shall be taken for finished work in superficial area in general plane (not girthed on the roof). The laps between the Sheets both at their ends and along the side edges shall not be measured. The overlaps of sheets over the valley piece and their under lap under the ridge, hip and flashing piece shall be included in the measurements.
No deductions in measurements shall be made for openings for chimney stacks, sky light, turbo vantilator etc., of area up to 0.40 sq. mt. nor extra be paid for labour in cutting and for wastage etc. in forming such openings.
The rate of roof shall include the cost of all materials and labour involved in all operations described above.The rate also includes the cost of provision, erection and removal of the .scaffolding, benching, ladders, templates and tools required for the proper execution and erection of the work. The rate includes the cost of accessories.

5.0 The rate shall be for a unit of one sq. meter

Accessories:
i) Hangers to be fixed based on area to support Cables & Light fixtures
ii) Skylights to be fixed based on area and as per design and drawing
iii) Turbo-ventilators to be fixed based on area & no. of air rotations as per design and drawing.

General notes.

1) Design of structure should strictly comply.

2) The end wall tie beams on one side of the building should be kept open for entry of equipments for errection for roofing. The final plan for errection should be dicussed with the engineer incharge.

3) Installation will be undertaken only after successful completion of Entire proposed Site at curing to the support structure. Installation will be done only after 15 days of curing to the last casted beam.

4) Roofing Installation shall not be carried out in the event of wind velocity above 20 Km/hr.

5) Minor colour pealing / chipping / scratching can happen due to Onsite Fabrication & Errection. The same will be rectified by applying Epoxy lacquer.

6) Proper storage of Coils on Plastic/Wooden Pellets under covered conditions with clean atmosphere away from dust & water. Unloading of coils to be strictly made by Hydra / Crane. Mishandling of coil can damage its shape and change the Inner Diameter. Any damage to coil during unloading will be sole responsibility of the Contractor.

Item No: 24

Providing & fixing welded in built up section for M.S. angle of size 75 X 75 X 6 mm at vertical portion of column for protection including fabrication and painting One coat of red oxide primer & 2 coats of approved enamel paint as directed etc with all material & labour, complete on Platform area Column corners Wt of M.S. Angle 75 X 75 X 6 is 6.8 Kg/m.

1.0 Workmanship:

The relevant specifications of description no. 22, 23 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 22, 23 shall be followed.
Rate shall be for a unit of one Kg.

Item No: 25

Providing & fixing structural M.S. Sections, Plates etc. for Platform, MS ladder, inserts including fabrication as shown in the drg. One coat of red oxide primer & 2 coats of approved enamel paint as directed etc with all material & labour, complete.

1.0 Workmanship:

The relevant specifications of description no. 22, 23 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 22, 23 shall be followed.
Rate shall be for a unit of one Kg.

Item No: 26

Providing and laying Controlled cement concrete M 250 pavement wearing coat 75 mm thick with M20 including floor finishing with a floating of neat cement complete. TREMIX VD SYSTEM including providing and fixing channels as per required levels and slope, leveling poured concrete between channels with Double Beam screed vibrators removing excess water using VD Pump finishing the surface with power trowel and power floater including cutting the groove of size 5mm x 10mm at required distance and providing and filling the same with bitumen as per practices etc. complete at all levels Excluding steel reinforcement.

1.0 Workmanship:

The relevant specifications of description no. 26 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 26 shall be followed.
Rate shall be for a unit of one Square meter.

(B) RCC RAMP

R.C.C. RAMP DETAILS

Item No: 27

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area and as instructed.
(A) 0 to 1.50 m depth 1) Soil, Murrum, sand etc 2) Soft Rock 3) Hard Rock
(B) 1.50 to 3.0 m depth 1) Soil, Murrum, sand etc 2) Soft Rock 3) Hard Rock

1.0 Workmanship:

The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 28

Providing and laying cement concrete 1:3:6: (1 cement 4 sand: 8 graded stone aggregates 40 mm nominal size) and curing complete including the cost of formwork in:
(A) Foundation and Plinth

1.0 Workmanship:

The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 29

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement reinforced concrete work in (A) Foundation, footing, base of columns and Mass concrete.

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 30

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement reinforced concrete work in (A) Columns(B) Beams

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 31

Providing and laying rubble stone soling/pitching 230 mm thick including hand packing and compacting etc. complete.

1.0 Workmanship:

The relevant specifications of description no.17 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 17 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 32

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 40 nominal size) and curing complete including cost of formwork for foundation and plinth

1.0 Workmanship:

The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 33

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in RCC Slab at the starting point of Ramp.

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 34

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending, binding, hooking& placing in position complete Up to floor two levels.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 35

Filling in trenches with available excavated earth (excluding rock in trenches plinth, sides of foundations etc. in layer not exceeding 20 cm in depth consolidating each desposalite layer by ramming and watering.) etc. complete.

1.0 Workmanship:

The relevant specifications of description no. 7 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 7 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 36

Conveying ,carting , removing and laying of surplus excavated stuff from the site to any place within municipal limit as directed by the engineer in charge including loading, unloading carting dumping and or spreading as directed etc. complete

1.0 Workmanship:

The relevant specifications of description no. 6 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 6 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 37

Providing and filling in plinth with murmur or selected soil in layers of 20 cm in thickness including watering, ramming and consolidation etc. complete.

1.0 Workmanship:

The relevant specifications of description no. 8 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 8 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 38

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in Column, Beam, Slab, Pardi

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 39

Providing TMT FE - 500 bar reinforcement for R.C.C. work including bending, binding, hooking & placing in position complete Up to floor two levels.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 40

Providing and casting in situ Controlled Cement concrete M 250 for curb/curb blocks including formwork curing and finishing complete.

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 41

Providing and applying 12 mm thick cement plaster in single coat on brick /concrete walls and similar surfaces for plastering and finishing even an smooth with floating coat of cement slurry mixed with admixture of lime or neeru in required proportion etc. complete in cement mortar 1:3 (1 cement:3 sand)

1.0 Workmanship:

The relevant specifications of description no. 20 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 20 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 42

(A) Providing an applying finishing wall and similar surfaces with exterior sand textured matt paint (three coats) of snowcem, indocem etc. manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete.
(A) For wall and similar surface

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 40 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 43

Providing and applying one coat Epoxy Phenolic primer of DFT 50 micron and two coats of Epoxy Phenolic coating of DFT 100 microns each or any other equivalent epoxy coating system to all concrete surfaces exposed to atmosphere including cost of material, labour, transportation, scaffolding and preparing the surfaces by cleaning, washing, brushing, sand/grit blasting etc. complete. (Paint shall be got approved from Engineer and tested from approved laboratory)

1.0 Workmanship:

The relevant specifications of description no. 43 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 43 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 44

Distempering two coats with oil bound washable distemper of approved brand and manufacture and of required shade on wall surface to give an even shade over and including a priming coat of alkali resistance primer of approved brand after throghly brushing the surface to give an even shade after thoroughly brushing the surface free from mortar dropping and other foreign matter and also including preparing the surface even and smooth.

1.0 Workmanship:

The relevant specifications of description no. 39 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 39 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 45

Providing and fixing gear operated rolling shutters of approved make made of 80 mm wide M.S. laths inter-locked together through their entire length and jointed together at the ends by end lokes mounted on specially designed pipe shaft with backed plates, geode channels and arrangements for inside and outside looking with push pull operation complete including the cost of hood cover and spring.
(B) shutter having width above 3.5 meters

1.0 Workmanship:
The relevant specifications of description no. 25 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 25 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 46

Wall Painting (two coats) with plastic emulsion paint of approved brand and manufacture on wall surfaces to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and other foreign matter and sand prepared smooth.

1.0 Workmanship:
The relevant specifications of description no. 42 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 42 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 47

Applying Priming coat over new steel and other metal surfaces after over and including preparing the surface by thoroughly cleaning oil grease dirt and other foreign matter and scoured with brushes fine steel wool scrapers and sand paper with ready mixed priming paint brushing red lead. Painting two coats (excluding priming coat) on new steel and other metal surfaces with Enamel paint brushing interior to give enamel paint brushing interior to give even shade including cleaning the surface of all dirt dust and other foreign matter.

1.0 Workmanship:
The relevant specifications of description no. 44 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 44 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 48

Providing and Fixing metal expansion joints as per standard drawing. Details of expansion joint 50 x50 x 6mm size tow IS and 100 x6mm MS plate with 6 x 20x 25mm long hold fast @ 50cm/cc on both sides of expansion joints.

1.0 Workmanship:
The relevant specifications of description no. 24 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 24 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 49

Providing and Fixing M.S post and pipe railing (medium duty of 63 mm dia) as per standard drawing including 3 coats of painting to steel work complete.

1.0 Workmanship:
The relevant specifications of description no. 73 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 73 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 50

Providing and Fixing 20 mm thick premoulded board for expansion joints as per drawing. Between Columns of Ramp as per Drg

1.0 Workmanship:
The relevant specifications of description no. 46 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 46 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 51

Providing and laying controlled cement concrete M 250 pavement wearing coat 75 mm thick with M20 including floor finishing with a floating of neat cement complete. TREMIX VD SYSTEM including providing and fixing channels as per required levels and slope, leveling poured concrete between channels with Double Beam screed vibrators removing excess water using VD Pump finishing the surface with power trowel and power floater including cutting the groove of size 5mm x 10mm at required distance and providing and filling the same with bitumen as per practices etc. complete at all levels Excluding steel reinforcement.

1.0 Workmanship:
The relevant specifications of description no. 26 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 26 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 52

Providing PVC 100 mm diameter water spouts including necessary iron grating as per drawings

Self explanatory and as instruction by Engineer – in – charge and as per Architect's details.

Item No: 53

Providing and fixing to wall,ceiling and floor 10.0 Kg/sq.cm working pressure polythene pipes of the 75mm/110mm outside dia low density complete with special flange compression type fittings, wall clips etc.

1.0 Workmanship:
The relevant specifications of description no. 52 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 52 shall be followed.
Rate shall be for a unit of one Square meter.

(C) ELECTRICAL WORK

Item No: 01

Point wiring for light / fan /bell / primary point with 2-1.0 sq.mm & earth wire of 1.0 sq.mm (green) both are of ISI marked FR PVC insulated multistand copper wires, in existing pipe duly erected, complete with 6A Tissino Type ISI marked flush type switch/bel push and accessories erected on polished wooden block/metal, PVC box cover with 3mm thick laminated sheet for concealed wiring.

1.0 Workmanship:
The relevant specifications of description no. 102 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 102 shall be followed.
Rate shall be for a unit of one No.

Item No: 02

Providing and erecting switch board One 5 pin 5A 250 Volt Socket out let point controlled by 6 A switch on board cat- ii.

1.0 Workmanship:
The relevant specifications of description no. 103 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 103 shall be followed.
Rate shall be for a unit of one No.

Item No: 03

Providing Electronic hum free five steps EME fan regulator of modular type accessories mounted with PVC/Metallic box covered with appropriate front plate modules erected with necessary connection. Cat - II

1.0 Workmanship:
The relevant specifications of description no. 104 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 104 shall be followed.
Rate shall be for a unit of one No.

Item No: 04

Shockproof Tissino type single pole switch 6/16A universal plug socket as per wiring specification.

1.0 Workmanship:
The relevant specifications of description no. 105 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 105 shall be followed.
Rate shall be for a unit of one No.

Item No: 05

Providing 6A/10A/16A/20A/25A/32A/ single pole Modular MCB Switch for A.C. cat-III modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 106 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 106 shall be followed.
Rate shall be for a unit of one No.

Item No: 06

Providing Two pin /RJ -11 Telephone socket with top (Cat III) modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 107 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 107 shall be followed.
Rate shall be for a unit of one No.

Item No: 07

Providing & laying Rigid PVC pipe confirming to I.S.S., erected with necessary fittings fixed with adhesive solution with 16 G. GI fish wire for concealed in wall / slab / Flooring with necessary cementation.
20 mm Size (3/4")
25 mm Size (1")

1.0 Workmanship:
The relevant specifications of description no. 108 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 108 shall be followed.
Rate shall be for a unit of one Running meter.

Item no: 08

Breaking slab/masonry walls for prov. holes to pass main line wiring & reinstating the same as per original condition etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 109 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 109 shall be followed.
Rate shall be for a unit of one No.

Item No: 09

Supply and laying of main lines with ISI marked Copper conductor FRLS / ZHFR PVC insulated copper wire in existing pipe erected with earth continuity wire as specified in specification for following size.
2 wire 1.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 2.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 4.0 mm^2 with 14 SWG / 3 mm^2 Cu. earth wire

1.0 Workmanship:
The relevant specifications of description no. 110 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 110 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 10

Supplying and erecting approved make Telephone Cable electrolytic grade annealed copper conductor insulated with PE insulation twisted in to pairs with colour combination bunched together in conecentric layers so as to minimles cross-talk & wrapped with FR PVC tape & sheathed with FR PVC or HFFR outer jacket suitable for indoor telephone wiring & conforming to C-DOT S/WS113/IEC 60189-2, UL1581 section 1080 VW-1 erected with necessary connections.2 Pair Telephone Cable

1.0 Workmanship:
The relevant specifications of description no. 111 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 111 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 11

Providing and erecting approved make Ceiling fan with double ball bearing ISI mark with condenser A.C 230V. 50 c/s. 1400 mm. sweep complete, canopy and 30 cms. Down rod erected on existing hook or clamp with 24/0.2 flat 3 core flexible copper wire with earthing(or R.C. Rate) make shall be approved by engineer in charge.

1.0 Workmanship:

The relevant specifications of description no. 112 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 112 shall be followed.
Rate shall be for a unit of one No.

Item No: 12

Supplying & erecting approved make 1 x 40 watt white strove enameled Patti type fluorescent fitting made of M.S. Sheet 0.8 mm thick white or reflector side. Complete with 40 watts polyester heavy duty copper wound ballast, lock type tube holders, starter, duly wired for use on 250 volt A.C. supply and erected if required on varnish P.W. block with lead wires & connection. Cat iii

1.0 Workmanship:

The relevant specifications of description no. 113 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 113 shall be followed.
Rate shall be for a unit of one No.

Item No: 13

Four pole MCB type change over switch 415 V, 25A with powder coated MS enclosure confirming to I.S.13947 erected on polished wooden block. Cat iii

1.0 Workmanship:

The relevant specifications of description no. 114 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 114 shall be followed.

Rate shall be for a unit of one No.

Item No: 14

Providing and erecting Sheet Steel powder coated MCB distribution board- cat-III, flush/surface mounted fitted with bushbar, neutral link, earth bar and din rail conforming to IS 13032 and BS 5486- 1986 without MCB to house appropriate nos of MCBs (B) single phase 4 way SS double door.

1.0 Workmanship:
The relevant specifications of description no. 115 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 115 shall be followed.
Rate shall be for a unit of one No.

Item No: 15

Supply, Erection of Miniature circuit breaker single pole 6A to 32A type B curve suitable to operate on 230 V. A.C. system and having overload and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to cat iii

1.0 Workmanship:
The relevant specifications of description no. 116 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 116 shall be followed.
Rate shall be for a unit of one No.

Item No: 16

Supplying & erecting funnel type earthing having copper earth plate 60 x 60 x 0.315 cms, burred in specifically prepared earth pit 3 mt. below ground with 40 kg. charcoal and salt with alternate layers of charcoal & salt, 20 mm dia. G.I. pipe with Funnel with a wire mesh for watering & bricks masonry block, C.I. Cover complete as per Para 7.3 of IS 3043 with necessary length of double Galvanized Iron / copper earth wire No 6 SWG bolted with lug to the plate and covered in 12 mm dia. G.I. pipe 2.5 mt long complete connected to the nearest switch gear with end socket as per direction & duly tested by earth tester confirming to IS (As per drawing) with following specification.

Workmanship:
The relevant specifications of description no. 117 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 117 shall be followed.

Rate shall be for a unit of one No.

Item No: 17

Providing & erecting Nominal Bore 16 gauge steel conduit painted black pipe with necessary saddles, screws ,bends, junction boxes with 16 G GI fish wire etc. 50 mm dia pipe erecting concealed in wall/slab along fish wire to draw mains, laid in approved manner with plastering by cement mortar & finishing the surface to match the wall ceiling.

1.0 Workmanship:
The relevant specifications of description no. 118 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 118 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 18(i)

Providing and erecting Sheet Steel powder coated MCB Distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, confirming to IS 13032 and BS 5486-1986 without MCB to house appropriate No. of MCBs. (D) Single phase 6 way SS Double door

1.0 Workmanship:
The relevant specifications of description no. 115 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 115 shall be followed.
Rate shall be for a unit of one No.

Item No: 18(ii)

Miniature circuit breaker single pole 6A to 32A suitable to operate on 240 V A.C. system and having over load and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to IS 8828/1996 with ISI mark. Cat iii

1.0 Workmanship:
The relevant specifications of description no. 116 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 116 shall be followed.
Rate shall be for a unit of one No.

Item No: 18 (iii)

Approved make ELCBs / RCCBs conforming to IS : 12640 and having sensitivity of 30m A and Short Circuit with stand capacity of 6 KA and suitable for operation on single phase 240 V. having characteristic of quick acting & tripping with all advance feature &
(ii) 40 Amps. DP

1.0 Workmanship:
The relevant specifications of description no. 121(II) shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 121(II) shall be followed.
Rate shall be for a unit of one No.

Item No: 19(i)

Supply and installation of complete panel board as specified below.

Providing & erecting weather proof, dust & vermin proof, floor mounted front operated cubical panel board having IP 52 protection made from 2mm thick CRC M.S. sheet for outer body & doors, 1.5mm thick CRC M.S. sheet for internal partitions with necessary supporting angles, flats including cutting, bending, drilling, welding, riveting with internal partitions & cable alley as per requirements & instruction of engineer - in - charge with erection of required switchgears, bus bars with suitable size of interconnecting PVC copper wire / Copper - Aluminum strips, rubber grommets, reb, control wire, Bakelite control fuses measuring instruments, earth bus & earth bolts, foundation flange - bolts -base plates, sufficient nos, of hinged doors, handles with locking arrangement, rubber gasket complete. The Panel shall be painted with epoxy powder coating. (The rates excludes the cost of switchgears, bus bars, inter connecting mains, meters, fuses etc. The dimension shall be measured excluding base beams) The panel shall be supplied with following approved manufacturers with following size.
(i) With 350mm depth

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item No: 19(ii)

Supplying and erecting triple pole & neutral 440V / 500V panel mounting Aluminum Busbars with four equal Nos. of electrolyte bus duly warped with colour insulating rape for phase sequence of following current carrying capacity, erected with necessary busbar supports / insulators, main cable socket to each bar, erected in existing cubical panel with necessary incoming & outgoing connections with proper size of Aluminum wires or strip with lugs as directed.
(A) Suitable for 200 Amp. Capacity having cross section area not less than 250 sq.mm

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 19(iii)

Approved make Four Pole moulded case circuit breaker having breaking capacity ICU of 25 KA at 415 V, having normal current rating up to 25 A to 100 A, with Fixed thermal & magnetic release suitable to work on AC supply 50 cys. With all internal connections & complete erected in 16 G.M.S. housing on angle frame Cat. II, Minimum Rating of MCCB shall be 100 Amp.

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (iv)

Providing and erecting 240V MCB double pole switch for motor & lighting load (B Curve) having 10KA breaking capacity & confirms to IS : 8828 in existing box having following capacity (B) 40 Amp. Cat.II

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (v)

Providing and erecting 415V MCB four pole switch for motor & lighting load (B Curve) having 10KA breaking capacity & confirms to IS : 8828 in existing box having following capacity. (B) 40 Amp Cat.II

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (vi)

Providing and erecting AC - 3 duty 3 pole power contactor with 2 NO & 2 NC aux. Contacts complete with 415V / 220V operating coil suitable for (L & T, Cutler Hammer, T.C., Siemens, make). (d)For 80 / 95 A Rating

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (vii)

Supplying and erecting approved make Analog type voltmeter moving iron with square / Round Dial, flush / pedestal mounting pattern for AC voltage 0 to 500 Volt range, Erected on panel board with all connection, wiring etc.

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (viii)

Supplying and erecting approved make Analog type moving iron Ammeter direct reading type 0-30A AC current, 500 V square / Round dial, flush or projection type complete erected with connection and wiring.

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19(ix)

Supplying and erecting Ammeter / Voltmeter selector switch for 3 phase AC supply 50 V on existing panel board with necessary connections.

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (x)

Providing & erecting L.T. Current Transformer with bar primary 50/5 to 2000/5 ratio 10 VA burden erected in existing ECA box duly secured with insulating materials connected to the meter.

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (xi)

Supplying and erecting approved make set of indicator lamps LED. Type with neon lamp, lense cover, Bakelite holder complete erected with necessary connections.

1.0 Workmanship:
The relevant specifications of description no. 122 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 122 shall be followed.
Rate shall be for a unit of one No.

Item no:-19 (xii)

Supplying & erecting approved make Four Pole 415V change over switch interior for panel mounting with operating mechanism A.C.23 duty confirming to IS for (D)200A , Cat-lll

Item no:-19 (xiii)

Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 35 KA. at 415 V. having Normal current rating up to 200A.with variable Thermal & magnetic release suitable to work on A.C.supply 50 c/s. with all internal connections & complete erected in existing 16 G.M.S.housing, ICS=100% of ICU only Cat III

Note:
All electrical items shall be executed as per details specification given for electrical part and relevant latest IS code.

Item no:-20 (i)

Providing and erecting XLPE (IS : 7098)(I)-88 ISI marked armored cable multistoried Aluminum conductor for 1.1 KV to be laid on wall with necessary clamps or in existing cable trench / pipe at road crossing or floor of following size of cables.

(d) 4 core 16 Sq.m.m

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.

Rate shall be for a unit of one Running meter.

Item no:-20 (ii)

Providing and erecting XLPE (IS : 7098)(I)-88 ISI marked armored cable multistrand Aluminum conductor for 1.1 KV to be laid on wall with necessary clamps or in existing cable trench / pipe at road crossing or floor of following size of cables.

(C) 3 core 6 Sq.m.m

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one Running meter.

Item no:-20 (iii)

Supplying & erecting XLPE (IS : 7098)(I)-88 ISI marked unarmoured Copper cable 1.1 KV. Grade with necessary clamps on wall of following size.

(b) 3 core 2.5 Sq.m.m

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one Running meter.

Item no:-20 (iv)

Making Trench in soft soil of suitable width of 90 cms. Deep for laying cable or locating the fault all over the run and backfilling the same and making the surface proper.

(A) Up to 25 Sq.mm cable.

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one Running meter.

Item no:-20 (v)

Covering of cable with second class bricks laid over the cable crosswise & also on both sides with cushioning of 7.5 cms. Layer of sand above & below cable (cable shall be laid in 0.9 mt Deep & 0.4 mt wide trench). Where there are more than one cable

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one Running meter.

Item no:-20 (vi)

Providing and erecting 1.5 mm thick FIA approved ISI mark (embossed) RIGID PVC PIPES of following size complete erected with necessary PVC fitting & Junction boxes with adhesive solution & Clamps with following type of erection.

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one Running meter.

Item no:-20 (vii)

For erecting concealed in wall / slab along with continuous fish wire to draw mains, laid in approved manner with plastering by cement mortar & finishing the surface to match the wall / ceiling.

(b) 25 mm

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one No.

Item no:-20 (viii)

Providing and fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armored cable complete with outgoing rails, insulating tape etc for following size of cables.

(c) 2 to 4 core 6Sq.m.m
(e) 2 to 4 core 16Sq.m.m

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one No.

Item no:-20 (ix)

Soldieries crimping type Aluminum a lug conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner.

(A) 2.5/4/6 Sq. mm
(C) 16 Sq. mm

Workmanship:
The relevant specifications of description no. 123 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 123 shall be followed.
Rate shall be for a unit of one No.

(2) COMPOUND DEVELOPMENT

2 (A) Compound Wall

Item: 1

Demolation of brick work and stone masonary including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift in cement mortar

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item: 2

Demolation including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift in R.C.C. work

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item: 3

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area and as instructed.
(A) up to 1.50 m depth (1) Dense or Hard Soil (2) Soft Rock not required blasting
(B) 1.50 m to 3.0 m depth Soft Rock not required blasting

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 20 nominal size) and curing complete including cost of form work in:

1.0 Workmanship:
The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of Cubic meter.

Item: 5

Providing & laying controlled cement concrete M250 and curing complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in (A) Foundation, footing, base of columns and Mass concrete.

1.0 Materials:

The Relevant Specification of Description No. 11 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 11 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item: 6

Providing & laying controlled cement concrete M250 and curing complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in COLUMN,BEAM,COPING

1.0 Materials:

The Relevant Specification of Description No. 11 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 11 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 7

Providing and constructing brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth in cement mortar 1:6 (1 cement : 6 fine sand) (B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one cubic meter.

Item No: 8

Providing TMT bar FE-500/500D reinforcement work including bending, binding & placing in position complete up to floor two level.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.

The Rate shall be for a unit of one kg.

Item No: 9

20 mm thick Sand face Cement Plaster Work in which 1 coat of plaster 12 mm thick in proportion of 1:3 and 2nd coat of plaster 8 mm thick in proportion of 1:1 using Cement: Mortar with sponge finishing etc. complete (Note : Before carring out Plaster work on RCC, required tipping work should be carried out as instructed)

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21 shall be followed.

Rate shall be for a unit of Square meter.

Item No: 10

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete. (A) For wall

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

Rate shall be for a unit of Square meter.

Item No: 11

Providing and filling in plinth or road way with yellow soil or selected soil in layers of 20 cm in thickness including watering, ramming, compaction and consolidation etc. complete.

1.0 Materials:

The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 7 shall be followed.

The Rate shall be for a unit of one Cubic meter.

2 (B) –MAIN GATE

Item: 1

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area and as instructed.
(A) up to 1.50 m depth (1) Dense or Hard Soil (2) Soft Rock not required blasting
(B) 1.50 m to 3.0 m depth Soft Rock not required blasting

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 20 nominal size) and curing complete including cost of form work in:

1.0 Workmanship:
The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of Cubic meter.

Item: 3

Providing & laying controlled cement concrete M250 and curing complete including the cost of formwork but excluding thecost of reinforcement for reinforced concrete work in column, footing, beam and slab

1.0 Materials:
The Relevant Specification of Description No. 11 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 11 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing TMT bar FE-500/500D reinforcement work including bending, binding & placing in position complete up to floor two level.

1.0 Materials:
The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 14 shall be followed.

The Rate shall be for a unit of one kg.

Item: 5

Providing and fixing 35 mm finished thick Indian teakwood shutters, for doors, windows and clear storey windows including the salwood frames of finished size 10 cm x 7 cm including medium quality anodised aluminum fixtures and fastenings including primer coat of approved quality and two coats of oil painting etc. complete.

1.0 Materials:

The Relevant Specification of Description No. 34shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 34 shall be followed.

The Rate shall be for a unit of one sqm.

Item No: 6

Providing and constructing brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth in cement mortar 1:6 (1 cement : 6 fine sand) (B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.

The Rate shall be for a unit of one cubic meter.

Item No: 7

20 mm thick Sand face Cement Plaster Work in which 1 coat of plaster 12 mm thick in proportion of 1:3 and 2nd coat of plaster 8 mm thick in proportion of 1:1 using Cement: Mortar with sponge finishing etc. complete (Note : Before carring out Plaster work on RCC, required tipping work should be carried out as instructed)

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21 shall be followed.

Rate shall be for a unit of Square meter.

Item No: 8

Providing anf applying 12 mm thick cement plaster in single coat on brick / concrete walls and similar surfaces for plastering and finishing even in smooth and finishing with a floating coat of cement slurry in CM 1:3 (1 cement : 3 sand) etc complete

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 9

Providing, fixing and Lettering Stainless steel Font " RAJKOT MUNICIPAL CORPORATION - REFUSE TRANSFER STATION" (height 12") on FRONT TOP beam as per drawing. at elevation portion as directed by Engineer in charge.

Item shall be exeuted as per instruction of engineer in charge.
Rate shall be for a unit of one number.

Item No: 10

Providing & fixing steel work welded in built up structural M.S. Sections, Plates etc. for Platform, MS ladder, inserts including fabrication as shown in the drg. all steel work to have primer coat of red oxide zink chromate paint to relavant IS followed by final coat as per specification / 2 coats of approved enamel paint as directed by engineer in charge etc with all material & labour, complete.

1.0 Workmanship:

The relevant specifications of Item no. 25 of transfer station building shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item no. 25 of transfer station building shall be followed.

Rate shall be for a unit of one kg.

Item No: 11

Alucomat Ti - Zink aluminium composite Panel 4 mm thick cladding as per drawing, approved color, specification and as directed by engineer in charge.

Item shall be exeuted as per instruction of engineer in charge.
Rate shall be for a unit of one square meter.

Item No: 12

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete.

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

Rate shall be for a unit of Square meter.

Item No: 13

Providing and erecting approved make LED compound wall light 200 mm dia, 300 mm high, aluminium base, white color, LED E27 8 W bulb, luminous flux 750 lm, luminous efficiency >= 90 lm/w with fixures and lamp etc. complete and as directed by engineer in charge.

Item shall be exeuted as per instruction of engineer in charge.
Rate shall be for a unit of one square meter.
The Rate shall be for a unit of one number

Item No: 14

Point wiring for light / fan /bell / primary point with 2-1.0 sq.mm & earth wire of 1.0 sq.mm (green) both are of ISI marked FR PVC insulated multistand copper wires, in existing pipe duly erected, complete with 6A Tissino Type ISI marked flush type switch/bel push and accessories erected on polished wooden block/metal, PVC box cover with 3mm thick laminated sheet for concealed wiring.

1.0 Workmanship:
The relevant specifications of description no. 102 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 102 shall be followed.
Rate shall be for a unit of one No.

Item No: 15

Providing and erecting switch board One 5 pin 5A 250 Volt Socket out let point controlled by 6 A switch on board cat- ii.

1.0 Workmanship:
The relevant specifications of description no. 103 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 103 shall be followed.
Rate shall be for a unit of one No.

Item No: 16

Providing Electronic hum free five steps EME fan regulator of modular type accessories mounted with PVC/Metallic box covered with appropriate front plate modules erected with necessary connection. Cat - II

1.0 Workmanship:
The relevant specifications of description no. 104 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 104 shall be followed.
Rate shall be for a unit of one No.

Item No: 17

Shockproof Tissino type single pole switch 6/16A universal plug socket as per wiring specification.

1.0 Workmanship:
The relevant specifications of description no. 105 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 105 shall be followed.
Rate shall be for a unit of one No.

Item No: 18

Providing Two pin /RJ -11 Telephone socket with top (Cat III) modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 107 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 107 shall be followed.
Rate shall be for a unit of one No.

Item No: 19

Providing & laying Rigid PVC pipe confirming to I.S.S., erected with necessary fittings fixed with adhesive solution with 16 G. GI fish wire for concealed in wall / slab / Flooring with necessary cementation.
20 mm Size (3/4")
25 mm Size (1")

1.0 Workmanship:
The relevant specifications of description no. 108 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 108 shall be followed.
Rate shall be for a unit of one Running meter.

Item no: 20

Breaking slab/masonry walls for prov. holes to pass main line wiring & reinstating the same as per original condition etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 109 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 109 shall be followed.
Rate shall be for a unit of one No.

Item No: 21

Supply and laying of main lines with ISI marked Copper conductor FRLS / ZHFR PVC insulated copper wire in existing pipe erected with earth continuity wire as specified in specification for following size.
2 wire 1.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 2.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 4.0 mm^2 with 14 SWG / 3 mm^2 Cu. earth wire

1.0 Workmanship:
The relevant specifications of description no. 110 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 110 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 22

Supplying and erecting approved make Telephone Cable electrolytic grade annealed copper conductor insulated with PE insulation twisted in to pairs with colour combination bunched together in conecentric layers so as to minimles cross-talk & wrapped with FR PVC tape & sheathed with FR PVC or HFFR outer jacket suitable for indoor telephone wiring & conforming to C-DOT S/WS113/IEC 60189-2, UL1581 section 1080 VW-1 erected with necessary connections.2 Pair Telephone Cable

1.0 Workmanship:
The relevant specifications of description no. 111 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 111 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 23

Providing and erecting approved make Ceiling fan with double ball bearing ISI mark with condenser A.C 230V. 50 c/s. 1400 mm. sweep complete, canopy and 30 cms. Down rod erected on existing hook or clamp with 24/0.2 flat 3 core flexible copper wire with earthing(or R.C. Rate) make shall be approved by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 112 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 112 shall be followed.
Rate shall be for a unit of one No.

Item No: 24

Supplying & erecting approved make 1 x 40 watt white strove enameled Patti type fluorescent fitting made of M.S. Sheet 0.8 mm thick white or reflector side. Complete with 40 watts polyester heavy duty copper wound ballast, lock type tube holders, starter, duly wired for use

on 250 volt A.C. supply and erected if required on varnish P.W. block with lead wires & connection. Cat iii

1.0 Workmanship:
The relevant specifications of description no. 113 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 113 shall be followed.
Rate shall be for a unit of one No.

2 (C) - KERBING

Item No: 1

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area instructed. (A) Loose or soft soil
(1) Up to 1.5 Mt. Depth

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Providing & laying cement concrete 1:1.5:3 finishing smooth curing etc. completed including cost of form work excluding cost of reinforcement for reinforced concrete work in:
(b) Vertical pardi & partion-, Kerb, Horizontal Fins

1.0 Workmanship:
The relevant specifications of description no. 11 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 11 shall be followed.
Rate shall be for a unit of Cubic meter.

Item No: 3

Providing and filling in plinth with yellow soil or selected soil in layers of 23 cm in thickness including watering, ramming and consolidation etc. complete.

1.0 Materials:
The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 7 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing and fixing to wall,ceilling and floor 10.0 Kg/sq.cm working pressure polythene pipes (PVC) of the110mm outside dia low density complete with special flange compression type fittings, wall clips etc.

1.0 Workmanship:
The relevant specifications of description no. 52 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 52 shall be followed.
Rate shall be for a unit of Rmt

2-(D) STORM DRAIN / SEWERAGE / WATER SUPPLY

Item No: 5

Providing and supplying ISI Standard R.C.C. pipes in standard lengths of following class and diameter suitable for rubber ring joints including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS - 458/1989) Note:- One rubber ring should be supplied with each full length pipe, cost included in rates below.
300 mm dia NP3 pipe for Storm Drain
200 mm dia NP2 pipe for Sewerage

1.0 Workmanship:
The relevant specifications of description no. 127 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 127 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 6

Lowering, laying and jointing R.C.C. pipes in C. M. 1:1.5 of following diameters in proper position, grade and alignment as directed by Engineer -in-charge including conveyance from stores to site of work, labour, giving hydraulic testing as per ISI code, etc complete including cost of jointing materials.

1.0 Workmanship:
The relevant specifications of description no. 128 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 128 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 7

Providing, supplying and fixing ISI mark G.I. pipes with couplings of following class and diameter including laying, fixing, backfilling with all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.
50 mm dia Heavy Duty

1.0 Workmanship:

The relevant specifications of description no. 54 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 54 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 8

Excavation for foundation in any types of soil including sorting out and stacking off useful materials and disposing of the excavated stuff up to 50 mt. Lead.

1.0 Workmanship:

The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 9

Providing and laying cement concrete 1:3:6 (1 cement: 3 sand: 6 graded stone aggregates 20 nominal size) and curing complete including cost of form work in:

1.0 Workmanship:

The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of Cubic meter.

Item No: 10

Brick work using common Burnt clay building brick having crushing strength not less than 35 kg/sq.cm above foundation and plinth in cement mortar 1:6 (1 Cement : 6 fine sand) (B)Conventional

1.0 Workmanship:

The relevant specifications of item no.5 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of item no. 5 shall be followed.
Rate shall be for a unit of Cubic meter.

Item No: 11

CC work 1:1.5:3 for RCC footing using aggregate of size 10-20 mm centring, curing, finishing etc. complete (without reinforcement)

1.0 Materials:

The Relevant Specification of Description No. 11 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 11 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 12

Providing & laying cement concrete 1:1.5:3 & curing completed including cost of form work excluding cost of reinforcement for reinforced concrete work in: Vertical .

1.0 Workmanship:

The relevant specifications of description no. 11 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 11 shall be followed.

Rate shall be for a unit of Cubic meter.

Item No: 13

Supplying, cutting, bending, binding and placing in position steel as per plan and design and as per ISS 2502 including cost of steel and binding wire for all structures only including lift up to 6 m height of depth below G.L. Thermo mechanically treated (TMT) Fe415 graProviding TMT bar FE 500/500D reinforcement for R.C.C. work including bending, binding and placing in position complete upto floor two level (more than 10 T)

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.

The Rate shall be for a unit of one kg.

Item No: 14

Filling with available excavated earth or good soil (excluding rock) in trenches in layers not exceeding in layers not exceeding 20 cm in depth consolidating each deposited layer by ramming and watering.

1.0 Materials:

The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 7 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 15

Providing precast MH frame and cover manufacture, supply and delivery at store or at site of work precast RCC in 1:1.5:3 frame and cover suitable for storm water drain MH and as per type

design and drawing including cost of reinforcement MS angles or flate. The rate also includes fixing RCC precast MH frame and cover in CC (1:2:4) coping Size 600 X 600 mm.Catch Chamber (frame & cover Heavy Duty for 50cm opening),Inspection Chamber (frame & cover Light duty)

1.0 Materials:

The Relevant Specification of Description No. 71A shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 71A shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 16

Providing 12 mm thick cement plaster in single coat on brick/ concrete wall for interior plastering, finished even and smooth in (1) cement mortar 1:3 (1 cement : 3 sand) (inside).

1.0 Materials:

The Relevant Specification of Description No. 20 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 20 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 17

Providing and laying Cement Concrete 1:1.5:3 and curing complete including the cost of formwork and excluding the cost of reinforcement for reinforced concrete work in etc. For slab of inspection chamber, benching etc.

1.0 Materials:

The Relevant Specification of Description No.11 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 11 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 17A

Providing and constructing Sewer manholes, scraper manholes and unit house connection chamber, as per the type design in brick masonary in C. M. 1:5 and inside and outsice 20 mm thick plastering in C.M. 1:3 necessary 100 mm coping with reinforcement in RCC M- 200 providing & fixing C. I. steps and fixing manhole frame and covers (But excluding supply of manhole frame and covers) over manholes and house connection chambers and fixing Manhole covers (but excluding supplying of manhole covers) over scraper manhole etc. complete, providing and fixing safety chain wherever necessary as per the stipulations in the type desing complete as per latest CPHEEO manual (excl. excavation).
a) Manhole type 'A' Circular type having inside diameter of 1200 mm for depth up to 1.5 mt depth (for 150 mm to 500 mm dia sewer).
i) Manhole type 'A' as above but up to 1.0 M depth.ii) Extra Depth beyond 1.0 M but upto 1.5 m depth for type "A" manhole above.

- **Scope**

  This specification covers the requirements for providing and constructing ancillary works such as manholes and vent shafts.

- **Standards**

  The following standards/codes, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the standards/codes shall be referred to.
  Codes of Practice

IS : 210	Specification for grey iron castings
IS : 269	Specification for ordinary and low heat Portland cement
IS : 383	Specification for coarse and fine aggregates from natural sources for concrete
IS : 432	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
IS : 516	Methods of tests for strength of concrete
IS : 651	Specification for salt-glazed stoneware pipes and fittings
IS : 1077	Specification for common burnt clay building bricks
IS : 1726	Specification for cast iron manhole covers and frames
IS : 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS : 2116	Specification for sand for masonry mortars
IS : 3495	Methods of tests of burnt clay building bricks
IS : 5455	Specification for cast iron steps for manholes

IS : 456	Code of practice for plain and reinforced concrete
IS : 2212	Code of practice for brickwork
IS : 2250	Code of practice for preparation and use of masonry mortars
IS : 4111	Code of practice for ancillary structures in sewerage system part 1manholes
IS : 4127	Code of practice for laying of glazed stoneware pipes

- **Materials**

  Water shall conform to M-1, sand shall conform to M-6, graded aggregated 40 mm, nominal size shall conform to M-12, and Bricks shall conform to M-15.

Cement of proportion shall conform to M-11 T.M.T bar shall be confirmed to M-23 Mild steel binding wire shall conform to M-21.Manholes

- **Location**

  Manholes shall be constructed in accordance with the drawings at the locations indicated thereon.

- **Excavation**

  Relevant Specification Shall be followed as per Description no:-4

- **Bed Concrete**
- **Materials**

  The proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-100, M-150, M-200, M-250, M-300, M-350, M-400 with prefix controlled added to it The letter 'M' refers to mix and numbers specify 28 days work cube compressive strength of 150 mm. cubes of the mix expressed in Kg/Cmt.The proportion of cement, sand and coarse aggregates shall be determined by weight. The weight batch mahine shall be used for maintaining proper control over the porportion of aggregates as per mix design.

  The strength requirements of different grades of concrete shall be as per IS456:2000:

  In all case, the 28 days compressive strength specifed in IS456:2000 shall be the criteria for acceptance or rejection of the concrete. Where the, strength of a concrete mix as indicated by tests, lies in between the strength of any two grades specifed in IS456:2000, such concrete shall be classified in for all purposes as concrete belonging to the lower of the two grades between which its strength lies.

- **Workmanship**
- **General**

  Before starting concreting the bed of foundation trenches shall be cleared of all loose materials, leveled, Watered and rammed as directed.

- **Proportion of Mix**

  The proportion of cement, sand coarse aggregate shall be one part of cement, 4 parts of sand 8 parts of stone aggregate shall be measured by volume.

- **Mixing**

  The concrete shall be mixed in a mechanical mixer is the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of break down of machineries and in the interest of the work, it shall be carried out a water tight platform and care shall be taken to ensure that mixing is

continued until the mass is uniform in colour and consistency. However in such case 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period 1 ½ to 2 minutes. The quantity of water shall be just sufficient to produce dense concrete of required workability for the purpose.

- **Transporting and placing the concrete**

  The concrete shall be handed from the place of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences

  The concrete shall be laid in layers of 15 cms to 20 cms.

- **Compacting**

  The concrete shall be rammed with heavy iron rammer and rapidly to get the required compaction and to allow the interstices to be filed with mortar.

- **Curing**

  After the final set, the concrete shall be kept continuously wet, if required by pending for a period of not less than 7 days from the date of placement.

- **Brick Masonry**

  All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work of manholes shall be in the proportion 1:3 (1 cement: 3 sand)

  Brick work 230 mm thick and over shall be laid in English Bond unless otherwise specified. 115mm thick brickwork shall be laid with stretchers. For laying bricks, a layer of mortar shall be spread over the full width of suitable length of the lower course. Each brick shall be pressed into the mortar and into its final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.

  All brickwork shall be plumb and square unless otherwise shown on drawing and true to dimensions shown. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be leveled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes unless otherwise specified. All interconnected brickwork shall be carried out at nearly one level (so that there is uniform distribution of pressure on the supporting structure) and no portion of the work shall be left more than one course lower than the adjacent work. Where this is not possible, the work shall be raked back according to bond (and not saw toothed) at an angle not exceeding 45 degrees. But in no case the level difference between adjoining walls shall exceed 1.25 m. Workmanship shall conform to IS: 2212.

  Brick shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6 mm and not more than 10 mm. The face joints shall be raked to a minimum depth of 12 mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for

the plastering to be done. When plastering is not required to be done, the joints shall be uniform in thickness and be struck flush and finished at the time of laying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If mortar in the lower courses has begun to set, the joints shall be raked out to a depth of 12 mm before another course is laid.

- **Cement Plaster**

  All joints in masonry shall be raked to a depth of 12 mm with hooked tool made for the purpose when the mortar is still green and in any case within 48 hours of its laying. The surface to be rendered shall be washed with fresh clean water free from all dirt, loose material, grease etc. and thoroughly wetted for 6 hours before plastering work is commenced. The wall should not be too wet but only damp at the time of plastering. The damping shall be uniform to get uniform bond between the plaster and the wall.

  Cement shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water, sand and cement shall be as per relevant I.S. The mortar thus mixed shall be used immediately and in no case shall the mortar be allowed to remain for more than 25 minutes after mixing with water.Curing of plaster shall be started as soon as the applied plaster has hardened enough so as not to be damaged. The decision as to when the plaster has hardened, will be given by Engineer. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days.

  Plastering shall be done on both faces of brick masonry in cement mortar (1:3) and 20 mm thick unless otherwise specified.

  Plastering work shall be carried out in two layers, the first layer being 14 mm thick and the second layer being 6 mm thick. The first layer shall be dashed against the prepared surface with a trowel to obtain an even surface. The second layer shall then be applied and finished leaving an even and uniform surface, trowel finished unless otherwise directed by Engineer.

- **Cement Concrete Channel**

  The channel for the manhole shall be constructed in cement concrete of M15 grade. Both sides of the channel shall be taken up to the level of the crown of the outgoing sewer. They shall be benched up in concrete and rendered in cement mortar (1:3) of 20 mm thickness and formed to a slope of 1 in 12 towards the channel.

- **Pipe Entering or Leaving Manhole**

  Whenever a pipe enters or leaves a manhole, bricks on edge must be cut to a proper form and laid around the upper end of the pipe so as to form an arch. All around the pipes, there shall be a joint of cement mortar (1:3) 13 mm thick between it and the bricks.

- **Cast Iron Steps**

Cast iron steps shall be as per IS: 5455. The steps shall be of grey cast iron of grade 15 as per IS : 210. The steps shall be clean, well cast and they shall be free from air and sand holes, cold shuts and wrappings. The portion of the step which projects from the wall of the manhole shall be 30 cms X 15 cms. And 2.5 cm thick. The same shall be fixed in masonry walls as per drawing or I.S standard. The sample of C.I steps to be used shall be got approved from the Engineer before use. These steps shall be coated with a black bituminous composition. The coating shall be smooth and tenacious. It shall not flow when exposed to a temperature of 63 degrees C and shall not be brittle as to chip of at temperature of 0 degree C.

Where the depth of invert of manhole exceeds 800 mm, cast iron steps of approved pattern shall be fixed in the brick work at the interval of 300 mm vertically and staggered at 380 mm horizontally center to center. In case of pipe diameter greater than 600 mm, box type C.I. steps weighing 19 kg each shall be provided at 300 mm vertically in channel of manhole as per drawing.

- **Drop Manhole**

When a branch sewer connects to a main sewer, and where the difference in level between water line (peak flow levels) of main line and the invert level of branch lines is more than 600 mm or a drop of more than 600 mm is required to be given in the same sewer line and it is uneconomical or impractical to arrange the connection within 600 mm, a drop connection shall be provided for which a manhole shall be constructed as per relevant drawing, incorporating a vertical drop pipe from the higher sewer to the lower one. This pipe shall be provided outside the shaft and encased in concrete. A continuation of the branch sewer should be built through the shaft wall to form a rodding and inspection eye, which should be provided with a half blank flange. The diameter of the back drop should be the same as that of the incoming pipe. The drop pipe should terminate at its lower end with a plain bend turned so as to discharge its flow at 45 degrees or less to the direction of the flow in the main sewer. The drop pipe should be surrounded with 150 mm thick concrete.

In the case of sewers over 450 mm in diameter the drop in level may be accomplished by one of the following methods as shown on relevant drawings:

A cascade

A ramp

By drops in previous manholes.

- ***Vent Shafts***
- General

Vent shafts shall be erected at such places as shown on relevant drawings. The detailed drawing will be furnished during execution of the work by the Engineer.

- **Vent Shaft**

Providing and erecting at site of work steel ventilating column of 9.0 mt high from ground level to bottom of top grill including C.I. grill and base plate bolts

and nuts etc. & excavation in foundation of size 1.20 m X1.20 m X100 cm and three coats of silver oil paint etc. complete.

The work shall be carried out as per detailed drawing and detailed specification as under shall be followed.

The pipe shall be of best quality ERW pipe 150 mm dia up to 3.0m from G.L., 100 mm dia. for in between 3.0 m. and balance length of top 3.0 m shall be of 80 mm dia. Barrel thickness shall be 5 mm for all sizes. The pipe for column shall be got approved before using. The base plate shall be of best quality M.S. plate, of 0.30 mt X 0.30 mt. size and 8 mm thick. The gusset plate used for diagonal joint of column shall be of 6mm thick and triangle size of 150 mm. For preparing column welding of two pipe shall be done with proper care. A sleeve of same pipe 30 cm long shall be first inserted in pipe and welded inside, then second pipe inserted on sleeve in such a way that both the pipe shall touch each other. After checking straightness of column welding work on joint shall be carried out. Similarly joint of column with base plate also shall be done with care and four gusset plate also welded to pipe and plate. The branch pipes 90 cm long of same dia. And quality also be provided and welded with of a slop of 1 in 30. The length of column shall be 8.00 m from G.L. to bottom of C.I. top cap.

For foundation work four holes of 25mm dia shall be drilled on four corners of plate. Four foundation anchor bolts of 20 mm dia as per standard design or as directed by Engineer to be supplied and fixed in foundation concrete.

The top cap of cast iron as per standard design or as instructed by Engineer shall be provided. The cap shall be fixed on top of column by means of four bolts.

For erecting the column necessary excavation pit of size 120cm X 120cm X 100cm shall be dug in which 120cm X 120cm X90cm foundation concrete shall be done with C.C. 1:3:6: mix (one part of cement, three part sand : six part Black Trap metal of 20 mm size) to embed four anchor bolt for preparing foundation for column. The concrete work shall be cured for at least seven days. The column then shall be brought on site properly erected by means of tripod and chain pulley blocks in proper plumb. The bolts nuts shall be carefully fixed. The column shall be checked for its verticality after column erected and silver paint of two coats is completed. Remaining pit (75cm) shall be filled with BBCC 1:3:6 mix fillet in conc. 1:2:4 is provided in pyramid shape in such a way that top square portion shall be 30cm X 30 cm. The fillet shall be properly finished to smooth after the fillet is completed. The remaining one coat of silver oil paint shall be applied evenly.

The whole work of column preparation and erection shall be done with good care and without damage to other structure.

The column so erected shall be paid per No. The rate of item includes the cost of material, labour, bolts nuts caps and silver oil paint, excavation and concrete work etc. to complete the work.

- **Testing**

The interior of manholes shall be cleared of all debris after construction and before testing the same for water tightness by Contractor.

Water for testing of manholes along with pipeline shall be arranged by Contractor at his own cost.

- **R.C.C PRE CAST M.H.F.C.**

  Manufacture, supply delivery at Contractor's store at site of work and fixing on top of manhole precast RCC M.20 Frame & cover suitable to drainage M.H. and as per type design including cost of reinforcement M.S. Angles or Flat, curing, mold work etc.

- **General Specification**

  R.C.C Precast manhole frame & cover shall be manufacture as per standard type design. Frame shall confirm to IS : 12592 part – II – 1991. Cover shall confirm to IS : 12592 part – I – 1988.

- **Inspection**

  Inspection of materials will be carried out at work site by the Engineer. Who shall carry out inspection as soon as material is brought on work site. Inspection will be carried out normally within one week time. The supplier has to take care of the following points.

1. The manufacturer has to go in for one line stenciling for identifying size and class for proper separation.
2. The unloaded material has to be stacked in manageable batches with adequate inspection space like spreading the pieces etc. to permit proper inspection.

- **Transit Risk**

  The contractor shall bring goods at his own risk or it should be covered against the transit risk at its own cost.

- **TEST CERTIFICATE**

  The contractor shall always provide manufacturer's test certificate in accordance with every batch/lot of goods so manufactured and supplied.

  The supplier shall also produce in addition to manufacturer's test certificate as mentioned in above, the inspection certificate issued by Engineer for the same purpose.

- **Mode of measurements & payment:**

  The depth of manhole shall be distance between the top of the manhole cover and the invert level of the main drain.

  The rate includes all labours-, materials, tools and plant etc. required for satisfactory completion of this item as directed above.

  The rate shall be paid for a unit of one no of constructed and extra depth shall be paid on running meter basis.

2 (E)RCC PAVEMENT

Item No: 18

Excavation in cutting in all sorts of soil and soft murum including conveying and spreading the stuff, embankment as and where directed within 200 meters from the end of the cutting with all required lead and lift

1.0 Workmanship:

The relevant specifications of description no. 74 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 74 shall be followed.

Rate shall be for a unit of Cubic meter.

Item No: 19

Construction of granular sub base by providing close graded material mixing in a mechanical plant at OMC, spreading in uniform layers with mortar grader on prepared surface and compaction with vibratory roller to achive the desire density complete
Parking/ road area 1st layer- Grade iii

Scope

This work shall consist of laying and compacting well-graded material on prepared sub grade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base or lower sub-base and (termed as sub-base hereinafter) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer.

Providing & laying of specified compacted thickness Granular sub base (GSB) in specified grading in table 400-1 of the specification MORT&H and compactor to the required density with 8 - 10 tonne vibratory roller with plain drum or heavy pneumatic tyred roller of minimum 200 to 300 KN weight in all seasons as per MORT&H , maintaining the required slope & grade during the operation as approved by the engineer in charge & watering to the proper moisture content and sprinkled with the help of truck mounted water tank fitted with suitable arrangement .(fully saturated having CBR value greater or equal to 30)

Materials

The material to be used for the work shall be crushed gravel, crushed stone or combination thereof depending upon the grading required. The material shall be free from organic or other deleterious constituents and shall conform to the grading given in Table 400-1 and physical requirements given in Table 400-2. The grading to be adopted for a project shall be as specified in the Contract. Where the sub–base is laid in two layers as upper sub-base and lower sub-base, the thickness of each layer shall not be less than 150mm.

If the water absorption of the aggregates determined as per IS: 2386(Part 3) is greater than 2 percent, the aggregates shall be tested for Wet Aggregate Impact Value (AIV) (IS:5640).Soft aggregates like Kankar, brick ballast and laterite shall also be tested for Wet AIV (IS:5640).

Table 400-1: Grading for Granular Sub-base Materials

IS Sieve Designation	Percent by Weight Passing the IS Sieve					
	Grading I	**Grading II**	Grading III	Grading IV	Grading V	Grading VI
75.0 mm	**100**	**-**	-	-	100	-
53.0 mm	**80-100**	**100**	100	100	80-100	100
26.5 mm	**55-90**	**70-100**	55-75	50-80	55-90	75-100
9.50 mm	**35-65**	**50-80**	-	-	35-65	55-75
4.75 mm	**25-55**	**40-65**	10-30	15-35	25-50	30-55
2.36 mm	**20-40**	**30-50**	-	-	10-20	10-25
0.85 mm	**-**	**-**	-	-	2-10	-
0.425 mm	**10-15**	**10-15**	-	-	0-5	0-8
0.075 mm	**< 5**	**< 5**	< 5	< 5	-	0-3

Table 400-2 : Physical Requirements for Material for Granular Sub-base

Aggregate Impact Value (AIV)	**IS:2386 (Part 4) or IS:5640**	**40 maximum**
Liquid Limit	**IS:2720 (Part 5)**	**Maximum 25**
Plasticity Index	**IS:2720 (Part 5)**	**Maximum 6**
CBR at 98% dry density (at IS:2720-Part 8)	**IS:2720 (Part 5)**	**Minimum 30 unless otherwise specified in the Contract**

Construction Operations

Preparation of Sub-grade

Immediately prior to the laying of sub-base, the sub grade already finished to Clause 301 or 305 of MoRT & H Fifth Revision as applicable shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water, if necessary and rolled with two passes of 80-100 kN smooth wheeled roller.

Spreading and Compacting

The sub-base material of the grading specified in the Contract and water shall be mixed mechanically by a suitable mixer equipped with provision for controlled addition of water and mechanical mixing. So as to ensure homogenous sand uniform mix. The required water content shall be determined in accordance with IS: 2720 (Part 8).The mix shall be spread on the prepared sub grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation, or other means as approved by the Engineer.

Moisture content of the mix shall be checked in accordance with IS: 2720 (Part 2) and suitably adjusted so that, at the time of compaction, it is from 1 to 2 percent below the optimum moisture content.

Immediately after spreading the mix, rolling shall be done by an approved roller. If the thickness of the compacted layer does not exceed 100mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer up to 200mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 KN static weight capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional cross fall or on super-elevation. For carriageway having cross fall on both sides, rolling shall commence at the edges and progress towards the crown.

Each pass of the roller shall uniformly overlap not less than one-third of the track made the preceding pass. During rolling, the grade and the cross fall (camber) shall be checked and any high spots or depressions which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km per hour.

Rolling shall be continued till the density achieved is at least 98 percent of the maximum dry density for the material determined as per IS:2720 (Part 8). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made to the full thickness of layer and re-compacted.

Surface Finish and Quality Control of Work

The surface finish of construction shall conform to the requirement of Clause 902 of MoRT & H Fifth Revision. Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900 of MoRT & H Fifth Revision.

Table 900-3 Control Tests and their Minimum Frequency for Sub-Bases and Bases (Excluding Bitumen Bound Bases)

Sr. No & Type of Construction	Test	Frequency (min.)
1) Granular	Gradation	One test per 400 cum
	Alterberg Limits	One test per 400 cum
	Moisture content prior to compaction	One test per 400 cum

	Density of compacted layer	One test per 1000sqm
	Deleterious constituents	As required
	CBR	As required

Control of alignment, level and surface regularity:-

For checking GSB top surface levels shall be taken on a grid of points placed at 6.25 Mt. longitudinally and 3.5 Mt. transversely. For any 10 consecutive measurements taken longitudinally or transversely, not more than one measurement shall be permitted to exceed the tolerance given in table 900.1 of dense bituminous macadam item in this document. This one measurement being not in excess of 5 mm above the permitted tolerance.

Arrangement for Traffic

During the period of construction, arrangements for the traffic shall be provided and maintained in accordance with Clause 112 of MoRT & H Fifth Revision.

Mode of Measurements for Payment

Granular sub-base shall be measured as finished work in position in cubic meters. The protection of edges of granular sub-base extended over the full formation as shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

GSB construction shall be measured separately by taking cross sections at suitable intervals in the original position before the work starts and after its completion and computing the volumes in **cubic meters**

Rate

The Contract unit rate for granular sub-base shall be payment in full for carrying out the required operation including full compensation for:

i) Making arrangements for traffic to Clause 112 of MoRT & H Fifth Revision except for initial treatment to verges, shoulders and construction of diversion;
ii) Supplying all materials to be incorporated in the work including all royalties, fess rents where applicable with all leads and lifts;
iii) All labour, tools, equipment and incidentals to complete the work to the Specification;
iv) Carrying out the work in part widths of road where directed; and
v) Carrying out the required tests for quality control.

Item- 20

Providing, Laying, Spreading and compaction graded stone aggregate to (WMM) wet mix macadam specification including premixing the material by tipper to site, laying in uniform layer with paver inn sub base/ base course on well compacted surface and compacting with vibratory roller to achive desired density as per MoRT specification.

Scope

This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub grade/sub-base/ base or existing pavement as the case may be in accordance with the requirements of these specifications. The material shall be laid in one or more layers as necessary to lines, grades and cross-sections shown on the approved drawings or as directed by the Engineer.

Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam as per specification and drawing including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density as per MORT&H fifth revision clause- 406.

The thickness of a single compacted Wet Mix Macadam layer shall not be less than 75mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the sub-base course may be increased to 200 mm upon approval of the Engineer.

Materials

Aggregates

Physical requirements:

Coarse aggregates shall be crushed stone. If crushed gravel/shingle is used, not less than 90 per cent by weight of the gravel/shingle pieces retained on 4, 75 mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements set forth in Table 400-12 below.

If water absorption value of these coarse aggregate is greater than 2 percent, the soundness test shall be carried out on the material to site as per IS :2386 Part-5)

TABLE 400.12

PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR WET MIX MACADAM FOR SUB.BASE/BASE COURSES

Test	Test Method	Requirements
1. Los Angeles Abrasion value	IS: 2386 (Part-4)	40 per cent (Maximum)
Or Aggregate Impact value	IS: 2386 (Part-4) or IS; 5640	30 per cent (Maximum)
2. Combined Flakiness and Elongation indices (Total)	IS: 2386 (Pan-1)	35 per cent (Maximum)*

*To determine this combined proportion, the flaky stone from a representative sample should first be separated out; Flakiness Index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles are separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total nor flaky particles. The value of flakiness index and elongation index so found are added up.

Grading requirements:

The aggregates shall conform to the grading given in Table 400-13,

TABLE 400-13 GRADING REQUIREMENTS OF AGGREGATES FOR WET MIX MACADAM

IS Sieve Designation	Per cent by weight passing the IS sieve
53.00 mm	100
45.00 mm	95-100
26.50 mm	-----
22.40 mm	60-80
11.20 mm	40-60
4.75 mm	25-40
2.36 mm	15-30
600.00 micron	8-22
75.00 micron	0-5

Materials finer than 425 micron shall have Plasticity Index (PI) not exceeding 6.
The final gradation approved within these limits shall be well graded from coarse to fine and shall not vary from the low limit en one sieve to the high limit on the adjacent sieve or vice versa.

Construction Operations

Preparation of base:

The surface of sub-grade/sub-base/base to receive the water bound macadam course shall be prepared to the specified grade and cleaned of dust, dirt and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained.

Where the WMM is to be laid on an existing metalled road, damaged area including depression and potholes shall be repaired and made good with the suitable material. The existing surface shall be scarified and re-shaped to the required grade and camber before spreading the coarse aggregate for WMM.

As far as possible, laying WMM course over existing bituminous layer may be avoided since it will cause problems of internal drainage of the pavement at the interface of two courses. It is desirable to completely pick out the existing thin bituminous wearing course where water bound macadam is proposed to be laid over it.

Provision of lateral confinement of aggregates:

While constructing wet mix macadam, arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of wet mix macadam layer and following the sequence of operations described below:

For construction of WMM, arrangement shall be made for the lateral confinement of aggregates. This shall be done by building adjoining shoulders along with WBM layers. The practice of constructing WMM in a trench section excavated in the finished formation must be completely avoided.

Where the WMM course is to be constructed in narrow widths for widening of an existing pavement, the existing shoulders should be excavated to their full depth and width up to the sub-grade level except where widening specifications envisages laying of a stabilized sub –base using in-situ operation in which case the same should be removed only up to the sub-base level.

Preparation of mix:

Wet Mix Macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and Forced/positive mixing arrangement like pug mill or pan type mixer of concrete batching plant. The Plant shall have following features:

i) For Feeding aggregates – three/ four bin feeders with variable speed motor.

ii) Vibrating screen for removal of oversize aggregates.

iii) Conveyor Belt.

iv) Controlled system for addition of water.

v) Forced/positive mixing arrangement like pug-mill or pan type mixer

vi) Centralized control panel for sequential operation of various devices and precise process control.

vii) Safety devise

Optimum moisture for mixing shall be determined in accordance with IS: 2720 (Pari-8) after replacing the aggregate fraction retained on 22.4 mm sieve with material of 4.75 mm to 22.4 mm size. While adding water, due allowance should be made for evaporation losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and no segregation should be permitted.

Spreading of mix:

Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub grade/sub- base/base in required quantities in no case should these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed stretch be permitted.

The mix may be spread by a paver finisher. The paver finisher shall be self-propelled of adequate capacity with following features:

(i) Loading hoppers and suitable distribution mechanism system, so as to provide a smooth uninterrupted material flow for different layer thickness from the tipper to the screed.

(ii) Hydraulically operated telescopic screed for paving width up to 7.30m and fixed screed beyond this. The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface profile.

(iii) Automatic leveling control system with electronic sensing device to maintain mat thickness and cross slope of mat during laying procedure. The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

In Exceptional cases where it is not possible for the paver to be utilized, mechanical means like mortor grader may be used with the prior approval of the Engineer. The motor grader shall be capable of spreading the material uniformly all over the surface. Its blade shall have hydraulic control suitable for initial adjustments and maintaining the same so as to achieve the specified slope and grade.

The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregate as may be required. The layer may be tested by depth blocks during construction. No segregation of larger and fine particles should be allowed. The aggregates as spread should be of uniform gradation with no pockets of fine materials.

The Engineer may permit manual mixing and/or laying of wet mix macadam where small quantity of wet mix macadam is to be executed. Manual mixing/laying in inaccessible/remote locations and inaccessible/remote locations and in situations where use of machinery is not feasible can also be permitted. Where manual mixing/laying is intended to be used, the same shall be done with the approval of the Engineer.

Compaction:

After the mix has been laid to the required thickness, grade and cross fall /camber the same shall be uniformly compacted, to the full depth with suitable roller. If the thickness of single compacted layer does not exceed 100 mm, a smooth wheel roller of 80 to 100 kN weight may be used. For a compacted single layer up to 200 mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100 kN or equivalent capacity roller. The speed of the roller shall not exceed 5 km/h.

In portions having unidirectional cross fall/super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter, roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least one third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1 m away from any preceding slope.

In portions in camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the centre parallel to the centre line of the road uniformly overlapping each of the preceding tracks by at least one-third width until the entire surface has been rolled.

Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and/or removed and made good.

Along forms, kerbs, walls or other places not accessible to the roller, the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor. Skin patching of an area without scarifying the surface to permit proper bonding of the added material shall not be permitted.

Rolling should not be done when the sub grade is soft or yielding or when it causes a wave-like motion in the sub-base/base course or sub grade. If irregularities develop during rolling which exceed 12 mm when tested with a 3 meter straight edge, the surface should be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform surface conforming to the desired grade and cross fall. In no case should the use of unmixed material be permitted to make up the depressions.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material as determined by the method outlined in IS: 2720 (Part-8)

After completion, the surface of any finished layer shall be well-closed, free from movement under compaction equipment or any compaction planes, ridges, cracks and loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of the layer and recomputed.

Setting and drying:

After final compaction of wet mix macadam course, the road shall be allowed to dry for 24 hours.

Opening to Traffic

Preferably no vehicular traffic of any kind should be allowed on the finished wet mix macadam surface till it has dried and the wearing

Surface Finish and Quality Control of Work

The surface finish of construction shall conform to the requirement of Clause 902 of MoRT & H Fifth Revision. Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900 of MoRT & H Fifth Revision.

Table Control Tests and their Minimum Frequency for Wet Mix Macadam

Wet Mix Macadam	Aggregate Impact Value	One test per 1000 cum of aggregate
	Grading of aggregate	One test per 200 cum of aggregate
	Combined Flakiness and Elongation Indices	One test per 500 cum of aggregate
	Atterberg limits of portion of aggregate passing 425 micron sieve	One test per 200 cum of aggregate
	Density of compacted layer	One set of three tests per 1000 sqm

Control of alignment, level and surface regularity:-

For checking WMM top surface levels shall be taken on a grid of points placed at 6.25 Mt. longitudinally and 3.5 Mt. transversely. For any 10 consecutive measurements taken longitudinally or transversely, not more than one measurement shall be permitted to exceed the tolerance given in table 900.1 of dense bituminous macadam item in this document. This one measurement being not in excess of 5 mm above the permitted tolerance.

Rectification of Surface Irregularity

Where the surface irregularity of the wet mix macadam course exceeds the permissible tolerances or where inc course is otherwise defective due to sub grade soil getting mixed with the aggregates, the full thickness of the layer shall be scarified over the affected area, re-shaped with added premixed material or removed and replaced with fresh premixed material as applicable and recomputed in accordance with Clause 406.3. The area treated in the aforesaid manner shall not be less than 5 m long and 2 m wide. In no case shall depressions be filled up with unmixed and ungraded material or fines.

Arrangement for Traffic

During the period of construction, arrangement of traffic shall be done as per Clause 112 of MoRT & H Fifth Revision.

Measurements for Payment

Wet mix macadam shall be measured as finished work in position in **cubic meters**.

WMM construction shall be measured separately by taking cross sections at suitable intervals in the original position before the work starts and after its completion and computing the volumes in **cubic meters**

Rates

The Contract unit rate for wet mix macadam shall be payment in full for carrying out the required operations including full compensation for all components listed in below

i) Making arrangements for traffic to Clause 112 of MoRT & H Fifth Revision except for initial treatment to verges, shoulders and construction of diversion;

ii) Supplying all materials to be incorporated in the work including all royalties, fess rents where applicable with all leads and lifts;

iii) All labour, tools, equipment and incidentals to complete the work to the Specification;

iv) Carrying out the work in part widths of road where directed; and

Carrying out the required tests for quality control.

ITEM – 21

Construction of dry lean cement concrete Sub base over a prepared sub grade with coarse and fine aggregate conforming to IS 383 the size of coarse aggregate not exceeding 25mm aggregate cement ration no to exceed 15:1, aggravate grading after blending to be as per table no 600-1, cement content not less than 150kg/cum, optimum mosture content to be determined during trial length conctruction , concrete strength not be less than 10 Mpa at 7 days mixed in batching plant, transported to site, laid with a paver with electronic sensor, compacting with 8-10 tonnes vibratory roller, finishing and curing etc complete as per MoRT specification.

601. DRY LEAN CEMENT CONCRETE (SUB-BASE)

601.1. Scope

601.1.1. The work shall consist of construction of dry lean concrete sub base for cement concrete pavement in accordance with the requirements of these specifications and in conformity with the lines, grades and cross-sections shown on the drawings or as directed by the Engineer. The work shall include furnishing of all plant and equipment, materials and labour and performing all operations, in connection with the work, as approved by the Engineer.

601.1.2. The design parameters of dry lean concrete sub-base, viz., width, thickness, grade of concrete, details of joints, if any, etc. shall be as stipulated in the Contract drawings.

601.2. Materials

601.2.1. Source of Materials: The Contractor shall indicate to the Engineer the source of all materials with relevant test data to be used in the lean concrete work sufficiently in advance and the approval of the Engineer for the same shall be obtained at least 45 days before the scheduled commencement of the work. If the Contractor later proposes to obtain the materials from a different source, he shall notify the Engineer for his approval at least 45 days before such materials are to be used.

601.2.2. Cement: Following types of cement may be used with prior approval of the Engineer :(i) Ordinary Portland Cement IS : 269 If the sub grade is found to consist of soluble sulphates in a concentration more than 0.5 percent, cement used shall be sulphate resistant and shall conform to IS: 6909. Cement to be used may preferably be obtained in bulk form. It shall be stored in accordance with stipulations contained in Clause 1014 and shall be subjected to acceptance test prior to its immediate use.

601.2.3 Aggregates:

601.2.3.1. Aggregates for lean concrete shall be natural material complying with IS: 383.
The aggregates shall not be alkali reactive. The limits of deleterious materials shall not exceed the equirements set out in IS: 383. In case the Engineer considers that the aggregates are not free from dust, the same may be washed and drained for at least 72 hours before batching, as directed by the Engineer.

601.2.3.2. Coarse aggregate:

Coarse aggregate shall consist of clean, hard, strong, dense, non-porous and durable pieces of crushed stone or crushed gravel and shall be divided of pieces of disintegrated stone, soft, flaky, elongated, very angular or splintery pieces. The maximum size of the coarse aggregate shall be 25 mm. The coarse aggregate shall comply with Clause 602.2.4.2

601.2.3.3. Fine aggregate:
The fine aggregate shall consist of clean, natural sand or crushed stone sand or a combination of the two and shall conform to IS : 383. Fine aggregate shall be free from soft particles, clay, shale, loam, cemented particles, mica, organic and other foreign matter. The fine aggregate shall comply with Clause 602.2.4.3

601.2.3.4. The coarse and fine aggregates may be obtained in either of the following manner: (i) In separate nominal sizes of coarse and fine aggregates and mixed together intimately before use. (ii) Separately as 25 mm nominal single size, 12.5 mm nominal size graded aggregates and fine aggregate of crushed stone dust or sand or 3 combination of these two. The material after blending shall conform to the grading as indicated in Table 600-1.

TABLE 600-1 AGGREGATE GRADATION FOR DRY LEAN CONCRETE

Sieve Designation	Percentage passing the sieve by weight
26.50 mm	100
19.00 mm	80-100
9.50 mm	55-75
4.75 mm	35-60
600.00 micron	10-35
75.00 micron	0-3

601.2.4. Water:

Water used for mixing and curing of concrete shall be clean and free from injurious amounts of oil, salt, acid, vegetable matter or other substances harmful to the finished concrete. It shall meet the requirements stipulated in IS: 456.

601.2.5. Storage of materials:

All materials shall be stored in accordance with the provisions of Clause 1014 of these specifications and other relevant IS Specifications. All efforts must be made to store the materials in proper places so as to prevent their deterioration or contamination by foreign matter and to ensure their satisfactory quality and fitness for use in the work. The storage place must also permit easy inspection, removal and storage of materials. All such materials even though stored in approved godown must be subjected to acceptance test immediately prior to their use. The requirement of storage yard specified in Clause 602.2.9 shall also be applicable.

601.3. Proportioning of Materials for the Mix

601.3.1. The mix shall be proportioned with a maximum aggregate cement ratio of 15: 1. The water content shall be adjusted to the optimum as per Clause 601.3.2 for facilitating compaction by rolling. The strength and density requirements of concrete shall be determined in accordance with Clause 601.6 by making trial mixes.

601.3.2. Moisture content:

The right amount of water for the lean concrete in the main work shall be decided so as to ensure full compaction under rolling and shall be assessed at the time of rolling the trial length. Too much water will cause the lean concrete to be heaving up before the wheels and picked up on the wheels of the roller and too little will lead to inadequate compaction, a low in-situ strength and an open-textured surface. The optimum, water content shall be determined and demonstrated by rolling during trial length construction and the optimum moisture content and degree of compaction shall be got approved from the Engineer. While laying in the main work, the lean concrete shall have a moisture content between the optimum and optimum +2 per cent, keeping in view the effectiveness of compaction achieved and to compensate for evaporation losses.

601.3.3. Cement content:

The minimum cement content in the lean concrete shall not be less than **150 kg/cu.m.** If this minimum cement content is not sufficient to produce concrete of the specified strength, it shall be increased as necessary without additional cost compensation to the Contractor.

601.3.4. Concrete strength:

The average compressive strength of each consecutive group of 5 cubes made in accordance with Clause 903.5.1.1 shall not be less than 10 MPa at 7 days. In addition, the minimum compressive strength of any individual cube shall not be less than 7.5 MPa at 7 days. The design mix complying with the above shall be got approved from the Engineer and demonstrated in the trial length construction.

601.4 Sub grade

The sub grade shall conform to the grades and cross sections shown on the drawings and shall be uniformly compacted to the design strength in accordance with these specifications and Specification stipulated in the Contract. The lean concrete sub base shall not be laid on a sub grade softened by rain after its final preparation; surface trenches and soft spots,if any, must be properly back-filled and compacted to avoid any weak or soft spot. As far as possible, the construction traffic shall be avoided on the prepared sub grade. A day before placing of the sub-base, the sub grade surface shall be given a fine spray of water and rolled with one or two passes of a smooth wheeled roller after a lapse of 2-3 hours in order to stabilize loose surface. If Engineer feels it necessary, another fine spray of water may be applied just before placing sub-base.

601.5. Construction

601.5.1. General:

The pace and program of the lean concrete sub-base construction shall be matching suitably with the program of construction of the cement concrete pavement over it. The sub-base shall be overlaid with cement concrete pavement only after 7 days after sub-base construction.

601.5.2. Batching and mixing:

The batching plant shall be capable of proportioning the materials by weight, each type of material being weighed separately in accordance with Clause 602.9.3.2. The cement from the bulk stock shall be weighed separately from the aggregates. The capacity of batching and mixing plant shall be at least 25 per cent higher than the proposed capacity for the laying arrangements.

The batching and mixing shall be carried out preferably in a forced action central batching and mixing plant having necessary automatic controls to ensure
accurate proportioning and mixing. Other types of mixers shall be permitted subject to demonstration of their satisfactory performance during the trial length. The type and capacity of the plant shall be got approved by the Engineer before commencement of the trial length. The weighing balances shall be calibrated by weighing the aggregates, cement, water and admixtures physically either by weighing with large weighing machine or in a
weigh bridge. The accuracy of weighing scales of the batching plant shall be within ± 2 percent in the case of aggregates and ±1 per cent in the case of cement and water. The design features of Batching Plant should be such that the shifting operations of the plant will not take very long time when they are to be shifted from place to place with the progress of the work.

601.5.3. Transporting:

Plant mix lean concrete shall be discharged immediately from the mixer, transported directly to the point where it is to be laid and protected from the weather by covering the tippers/ dumpers with tarpaulin during transit. The concrete shall be transported by tipping trucks, sufficient in number to ensure a continuous supply of material to feed the laying equipment to work at a uniform speed and in an uninterrupted manner. The lead of the batching plant to paving site shall be such that the travel time available from mixing to paving
as specified in Clause 601.5.5.2 will be adhered to.

601.5.4. Placing:

Lean concrete shall be laid / placed by a paver. The equipment shall be capable of laying the material in one layer in an even manner without segregation, so that after compaction the total thickness is as specified. The paving machine shall have high amplitude tamping bars to give good initial compaction to the sub-base.
The laying of the two-lane road sub base may be done either in full width or lane by lane. Preferably the lean concrete shall be placed and compacted across the full width of the road, by constructing it in one go or in two lanes running forward simultaneously. Transverse and longitudinal construction joints shall be staggered by 500-1000 mm and 200-400 mm respectively from the corresponding joints in the overlaying concrete slabs.

601.5.5. Compaction
601.5.5.1. The compaction shall be carried out immediately after the material is laid and leveled. In order to ensure thorough compaction which is essential, rolling shall be continued on the full width till there is no further visible movement under the roller and the surface is closed. The minimum dry density obtained shall be 97 per cent of that achieved during the trial length construction vide Clause 601.7. The densities achieved at the edges i.e 0.5 m from the edge shall not be less than 95 per cent of that achieved during the trial construction vide Clause 601.7

601.5.5.2. The spreading, compacting and finishing of the lean concrete shall be carried out as rapidly as possible and the operation shall be so arranged as to ensure that the time between the mixing of the first batch of concrete in any transverse section of the layer and the final finishing of the same shall not exceed 90 minutes when the concrete temperature is above 25 and below 30 degree Celsius and 120 minutes if less than 25 degree Celsius. This period may be reviewed by the Engineer in the light of the results of the trial run but in no case shall it exceed 2 hours. Work shall not proceed when the temperature of the concrete exceeds 30 degree Celsius. If necessary, chilled water or addition of ice may be resorted to for bringing down the temperature. It is desirable to stop concreting when the ambient temperature is above 35°C. After compaction has been completed, roller shall not stand on the compacted surface for the duration of the curing

period except during commencement of next day's work near the location where work was terminated the previous day.

601.5.5.3. Double drum smooth-wheeled vibratory rollers of minimum 80 to 100 KN static weights are considered to be suitable for rolling dry lean concrete. In case any other roller is proposed, the same shall be got approved from the Engineer, after demonstrating its performance. The number of passes required to obtain maximum compaction depends on the thickness of the lean concrete, the compatibility of the mix, and the weight and type of the roller etc. and the same as well as the total requirement of rollers for the job shall be determined during trial run by measuring the in-situ density and the scale of the work to be undertaken.

601.5.5.4. In addition to the number of passes required for compaction there shall be a preliminary pass without vibration to bed the lean concrete down and again a final pass without vibration to remove roller marks and to smoothen the surface. Special care and attention shall be exercised during compaction near joints, kerbs, channels, side forms and around gullies and manholes. In case adequate compaction is not achieved by the roller at these points, use of plate vibrator shall be made, if so directed by the Engineer.

601.5.5.5. The final lean concrete surface on completion of compaction and immediately before overlaying shall be well closed, free from movement under roller and free from ridges, low spots, cracks, loose material, pot holes, ruts or other defects. The final surface shall be inspected immediately on completion and all loose, segregated or defective areas shall be corrected by using fresh lean concrete material laid and compacted as per Specification. For repairing honeycombed surface, concrete with aggregates of size 10 mm and below shall be spread and compacted. It is necessary to check the level of the rolled surface for compliance. Any level/thickness deficiency should be corrected after applying concrete with aggregates of size 10 mm and below after roughening the surface. Similarly the surface regularity also should be checked with 3m straight edge. The deficiency should be made up with concrete with aggregates of size 10 mm and below.

601.5.5.6. Segregation of concrete in the dumpers shall be controlled by premixing each fraction of the aggregates before loading in the bin of the batching plant, by moving the dumper back and forth while discharging the mix on it and other means. Even paving operation shall be such that the mix does not segregate.

601.5.6. Joints: Contraction and longitudinal joints shall be provided as per the drawing. At longitudinal or transverse construction joints, unless vertical forms are used, the edge of compacted material shall be cut back to a vertical face where the correct thickness of the properly compacted material has been obtained.

601.5.7. Curing: As soon as the lean concrete surface is compacted, curing shall commence. One of the following two methods shall be adopted: (a) The initial curing shall be done by spraying with liquid curing compound. The curing compound shall be white pigmented or transparent type with water retention index of 90
per cent when tested in accordance with BS 7542. Curing compound shall be sprayed immediately after rolling is complete. As soon as the curing compound has lost its tackiness, the surface shall be covered with wet hessian for three days. (b) Curing shall be done by covering the surface by gunny bags/hessian, which shall be
kept continuously moist for 7 days by sprinkling water.

601.6. Trial Mixes

The Contractor shall make trial mixes of dry lean concrete with moisture contents like 5.0, 5.5, 6.0, 6.5 and 7.0 per cent using cement content specified and the specified aggregate grading but without violating the requirement of aggregate-cement ratio specified in Clause 601.3.1. Optimum moisture and density shall be established by preparing cubes with varying moisture contents. Compaction of the mix shall be done in three layers with vibratory hammer fitted with a square or rectangular foot as described in Clause 903.5.1.1. After establishing the optimum moisture, a set of six cubes shall be cast at that moisture for the determination of compressive strength on the 3rd and the seventh day. Trial mixes shall be repeated if the strength is not satisfactory either by increasing cement content or using higher grade of cement. After the mix design is approved, the Contractor shall construct a trial section in accordance with Clause 601.7. If during the construction of the trial length, the optimum moisture content determined as above is found to be unsatisfactory, the Contractor may make suitable changes in the moisture content to achieve a satisfactory mix. The cube specimens prepared with the changed moisture content should satisfy the strength requirement. Before production of the mix, natural moisture content of the aggregate should be determined on a day-to-day basis so that the moisture content could be adjusted. The mix finally designed should neither stick to the rollers nor become too dry resulting in ravelling of surface.

601.7. Trial Length

601.7.1. The trial length shall be constructed at least 14 days in advance of the proposed date of commencement of work. At least 30 days prior to the construction of the trial length, the Contractor shall submit for the Engineer's approval a "Method Statement" giving detailed description of the proposed materials, plant, equipment, mix proportion, and procedure for batching, mixing, laying, compaction and other construction procedures. The Engineer shall also approve the location and length of trial construction which shall be a minimum of 60m length and for full width of the pavement. The trial length shall contain die construction of at
least one transverse construction joint involving hardened concrete and freshly laid sub base. The construction of trial length will be repeated till the Contractor proves his ability to satisfactorily construct the sub base.

601.7.2. In order to determine and demonstrate the optimum moisture content which results in the maximum dry density of the mix compacted by the rolling equipment and the minimum cement content that is necessary to achieve the strength stipulated in the drawing, trial mixes shall be prepared as per Clause 601.6.

601.7.3. After the construction of the trial length, the in-situ density of the freshly laid material shall be determined by sand replacement method with 20 cm dia density cone. Three density holes shall be made at locations equally spaced along a diagonal that bisects the trial length; average of these densities shall be determined. These main density holes shall not be made in the strip 50 cm from the edges. The average density obtained from the three samples collected shall be the reference density and is considered as 100 per cent. The field density of regular work will be compared with this reference density in accordance with Clauses 601.5.5.1 and 903.5.1.2. A few cores may be cut as per the instructions of the Engineer to check segregation or any other deficiency.

601.7.4. The hardened concrete shall be cut over 3 m width and reversed to inspect the bottom surface for any segregation taking place. The trial length shall be constructed after making necessary changes in the gradation of the mix to eliminate segregation of the mix. The lower surface shall not have honey-combing and the aggregates shall not be held loosely at the edges.

601.7.5. The trial length shall be outside the main works. The main work shall not start until the trial length has been approved by the Engineer. After approval has been given, the materials, mix

proportions, moisture content, mixing, laying, compaction plant and construction procedures shall not be changed without the approval of the Engineer.

601.8. Tolerances for Surface Regularity, Level, Thickness, Density and Strength

The tolerances for surface regularity, level, thickness, density and strength shall conform to the requirements given in Clause 903.5. Control of quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

601.9. Traffic

No heavy commercial vehicles like trucks and buses shall be permitted on the lean concrete sub-base after its construction. Light vehicles if unavoidable may, however, be allowed after 7 days of its construction with prior approval of the Engineer.

601.10. Measurements for Payment

The unit of measurement for dry lean concrete pavement shall be the cubic metre of concrete placed, based on the net plan areas for the specified thickness shown on the drawings or as directed by the Engineer.

601.11. Rate

The Contract unit rate payable for dry lean concrete sub-base shall be payment in full for carrying out the required operations including full compensation for all labour, materials and equipment, mixing, transport, placing, compacting, finishing, curing, testing and incidentals to complete the work as per Specifications, all royalties, fees, storage and rents where necessary and all leads and lifts.

ITEM – 22

M35 grade Pavement Quality Cocrete-Construction of un- reinforced, dowel jointed plain cement concrete pavement over a prepared sub base with minimum cement @ 380 Kg/ cum, coarse and fine aggregate conforming to IS 383, Maximum size of coarse aggregate not exceeding 25mm, mixed in a batching plant as per approved mix design, transported to site, laid with fixed/ slip form paver, spreaded , compacted and finish in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, selant primer, joint sealant, deboning strip, 32mm dia dowel bar, 12mm dia tie road, admixture as approved curing compound, finishing to lines and grade as per drawing and specification.

602. CEMENT CONCRETE PAVEMENT

602.1. Scope

Providing and laying Pavement Quality Concrete of M 35 grade - **250 mm thickness** (a) providing 125 micron thick impermeable plastic sheet membrane (b) Coarse and fine aggregates of specified gradation, OPC 53 grade cement, approved admixture and adding Recron 3S or equivalent fibers @ 0.25% by weight of cementecious material mixing in fully automatic concrete batching plant & with
computerized controls (c) Design mix to the specified workability, transporting the mix with transit mixers (d) Laying with fixed side steel form work having required size channels spreading of placed concrete, leveling, compacting with double beam screed vibrator finishing with power floater to desire surface texture curing with ponding for a minimum period of 21 days (e) Contraction joints - Joints shall be at every 4.5 m interval. 32 mm dia x 500 mm MS dowel bars

placed at 250 mm c/c with PVC sheathing on one side. Mechanical sawn Groove, 8 mm x 30 mm top groove filled with compressible debonding strips and joint filler and 3 mm x 65 mm bottom groove (f) Construction Joints/Expansion joints - Joints shall be at every 27 m interval. 32 mm dia x 500 mm MS dowel bars placed at 250 mm c/c with PVC sheathing on one side. Joint fillar board of 20 mm x 250 mm. 40 mm x 30 mm top groove filled with compressible debonding strips and joint filler (g) Longitudinal Joints- Longitudinal joints shall be between two lanes. 12 mm dia x 700 mm Tie bars @ 550 mm c/c with center 150 mm bituminous painted. 8 mm x 30 mm debonding strip with sealant (h) Longitudinal Joints on edge- Joints on edge shall be between CC lane and flexible pavement/kerb block. 8 mm x 20 mm groove with 5 mm thick debonding strip with rubberised bituminous sealant (i) Job including all materials, labour, equipments, curing, chemical etc complete

602.1.1. The work shall consist of construction of unreinforced, dowel jointed, plain cement concrete pavement in accordance with the requirements of these Specifications and in conformity with the lines, grades and cross sections shown on the drawings. The work shall include furnishing of all plant and equipment, materials and labour and performing all operations in connection with the work, as approved by the Engineer.

602.1.2. The design parameters, viz., thickness of pavement slab, grade of concrete, joint details etc. shall be as stipulated in the drawings.

602.2. Materials

602.2.1. Source of materials: The Contractor shall indicate to the Engineer the source of all materials to be used in the concrete work with relevant test data sufficiently in advance, and the approval of the Engineer for the same shall be obtained at least 45 days before the scheduled commencement of the work. If the Contractor later proposes to obtain materials from a different source, he shall notify the Engineer for his approval, at least 45 days before such materials are to be used with relevant test data.

602.2.2. Cement:

Following type of cement capable of achieving the design strength may be used with prior approval of the Engineer. (i) Ordinary Portland Cement, 43 Grade IS: 269 : 8112 If the soil around has soluble salts like sulphates in excess of 0.5 per cent, the cement used shall be sulphate resistant and shall conform to IS: 12330.
Guidance may be taken from IS: SP: 23, Handbook for Concrete Mixes for ascertaining the minimum 7 days strength of cement required to match with the design concrete strength. Cement to be used may preferably be obtained in bulk form. If cement in paper bags are proposed to be used, there shall be bag-splitters with the facility to separate pieces of paper bags and dispose them of suitably. No paper pieces shall enter the concrete mix. Bulk cement shall be stored in accordance with Clause 1014. The cement shall be subjected to acceptance test just prior to its use.

602.2.3. Admixtures:

Admixtures conforming to IS:6925 and IS: 9103 shall be permitted to improve workability of the concrete or extension of setting time, on satisfactory evidence that they will not have any adverse effect on the properties of concrete with respect to strength, volume change, durability and have no deleterious effect on steel bars. The particulars of the admixture and the quantity to be used, must be furnished to the Engineer in advance to obtain his approval before use. Satisfactory performance of the admixtures should be proved both on the laboratory concrete trial mixes and in trial paving works. If air entraining admixture is used, the total quantity of air in

air-entrained concrete as a percentage of the volume of the mix shall be 5 ± 1.5 per cent for 25 mm nominal size aggregate.

602.2.4. Aggregates

602.2.4.1. Aggregates for pavement concrete shall be natural material complying with IS : 383 but with a Los Angeles Abrasion Test result not more than 35 per cent The limits of deleterious materials shall not exceed the requirements set out in IS : 383.

The aggregates shall be free from chert, flint, chalcedony or other silica in a form that can react with the alkalies in the cement. In addition, the total chlorides content expressed as chloride ion content shall not exceed 0.06 per cent by weight and the total sulphate content expressed as sulphuric anhydride (S03) shall not exceed 0.25 per cent by weight.

602.2.4.2. Coarse aggregate: Coarse aggregate shall consist of clean, hard, strong, dense, nonporous and durable pieces of crushed stone or crushed gravel and shall be devoid of pieces of disintegrated stone, soft, flaky, elongated, very angular or splintery pieces. The maximum size of coarse aggregate shall not exceed 25 mm for pavement concrete Continuously graded or gap graded aggregates may be used, depending on the grading of the fine aggregate. No aggregate which has water absorption more than 2 per cent shall be used in the concrete mix. The aggregates shall be tested for soundness in accordance with IS : 2386 (Part-5). After 5 cycles of testing the loss shall not be more than 12 per cent if sodium sulphate solution is used or 18 per cent if magnesium sulphate solution is used. Dumping and stacking of aggregates shall be done in an approved manner. In case the Engineer considers that the aggregates are not free from dirt, the same may be washed and drained for at least 72 hours before batching as directed by the Engineer.

602.2.4.3. Fine aggregate: The fine aggregate shall consist of clean., natural sand or crushed stone sand or a combination of the two and shall conform to IS : 383. Fine aggregate shall be free from soft particles, clay, shale, loam, cemented particles, mica and organic and other foreign matter. The fine aggregate shall not contain deleterious substances more than the following:

Clay lumps 4.0 per cent
Coal and lignite 1.0 per cent
Material passing IS Sieve No. 75 micron 4.0 per cent

602.2.5. Water: Water used for mixing and curing of concrete shall be clean and free from injurious amount of oil, salt, acid, vegetable matter or other substances harmful to the finished concrete. It shall meet the requirements stipulated in IS: 456

602.2.6. Mild steel bars for dowels and tie bars :
These shall conform to the requirements of IS : 432, IS : 1139 and IS : 1786 as relevant. The dowel bars shall conform to - Grade S 240 and tie bars to Grade S 415 of I.S.

602.2.7. Pre-moulded joint filler:

Joint filler board for expansion joints which are proposed for use only at some abutting structures like bridges and culverts shall be of 20-25 mm thickness within a tolerance of ± 1.5 mm and of a firm compressible material and complying with the requirements of IS: 1838, or BS Specification Clause No. 2630 or Specification for Highway Works, Vol. I Clause 1015. It shall be 25 mm less in depth than the thickness of the slab within a tolerance of ± 3 mm and provided to the full width between the side forms. It shall be in suitable lengths which shall not be less than one lane width.

Holes to accommodate dowel bars shall be accurately bored or punched out to give a sliding fit on the dowel bars.

602.2.8. Joint sealing compound:

The joint sealing compound shall be of hot poured, elastomeric type or cold polysulphide type having flexibility, resistance to age hardening and durability. If the sealant is of hot poured type it shall conform to AASHTO M282 and cold applied sealant shall be in accordance with BS 5212 (Part 2).

602.2.9. Storage of materials:

All materials shall be stored in accordance with the provisions of Clause 1014 of the Specifications and other relevant IS Specifications. All efforts must be made to store the materials in proper places so as to prevent their deterioration or contamination by foreign matter and to ensure their satisfactory quality and fitness for the work. The platform where aggregates are stock piled shall be leveled with 15 cm of watered, mixed and compacted granular sub-base material. The area shall have slope and drain to drain off rain water. The storage space must also permit easy inspection, removal and storage of the materials. Aggregates of different sizes shall be stored in partitioned stack-yards. All such materials even though stored in approved go down must be subjected to acceptance test as per Clause 903 of these Specifications immediately prior to their use.

602.3. Proportioning of Concrete

602.3.1. After approval by the Engineer of all the materials to be used in the concrete, the Contractor shall submit the mix design based on weighed proportions of all ingredients for the approval of the Engineer. The mix design shall be submitted at least 30 days prior to the paving of trial length and the design shall be based on laboratory trial mixes using the approved materials and methods as per 15:10262 (Recommended Guidelines for Mix Design) or on the basis of any other rational method agreed to by the Engineer. Guidance in this regard can also be obtained from IS:SP:23 Handbook on Concrete Mixes. The target mean strength for the design mix shall be determined as indicated in Clause 903.5.2. The mix design shall be based on the flexural strength of concrete.

602.3.2. Cement content:

The cement content **shall not be less than 380 kg per cu.m**. If this minimum cement content is not sufficient to produce in the field, concrete of the strength specified in the drawings/design, it shall be increased as necessary without additional compensation under the Contract. The cement content shall, however, **not exceed 425 kg per cu.m. of concrete.** Mix design shall be prepared from approved laboratory without fly ash content. Fly ash content shall be only be used for workability aspect only.

602.3.3. Concrete strength

602.3.3.1. While designing the mix in the laboratory, correlation between flexural and compressive strengths of concrete shall be established on the basis of at least thirty tests on samples. However, quality control in the field shall be exercised on the basis of flexural strength. It may, however, be ensured that the materials and mix proportions remain substantially unaltered during the daily concrete production. The water content shall be the minimum required to provide the agreed workability for full compaction of the concrete to the required

density as determined by the trial mixes or other means approved by the Engineer and the maximum free water cement ratio shall be 0.50

602.3.3.2. The ratio between the 7 and 2 day strengths shall be established for the mix to be used in the slab in advance, by testing pairs of beams and cubes at each stage on at least six batches of trial mix. The average strength of the 7 day cured specimens shall be divided by the average strength of the 28 day specimens for each batch, and the ratio 'R' shall be determined. The ratio 'R' shall be expressed to three decimal places. If during the construction of the trial length or during normal working, the average value of any four consecutive 7 day test results falls below the required 7 day strength as derived from the value of 'R', then the cement content of the concrete shall, without extra payment, be increased by 5 per cent by weight or by an amount agreed by the Engineer. The increased cement content shall be maintained at least until the four corresponding 28 day
strengths have been assessed for its conformity with the requirements as per Clause 602.3.1. Whenever the cement content is increased, the concrete mix shall be adjusted to maintain the required workability.

602.3.4. Workability

602.3.4.1. The workability of the concrete at the point of placing shall be adequate for the concrete to be fully compacted and finished without undue flow. The optimum workability for the mix to suit the paving plant being used shall be determined by the Contractor and approved by the Engineer. The control of workability in the field shall be exercised by the slump test as per IS : 1199.

602.3.4.2. The workability requirement at the Batching Plant and paving site shall be established by slump tests carried during trial paving. These requirements shall be established from season to season and also when the lead from Batching plant site to the paving site changes. The workability shall be established for the type of paving equipment available. A slump value in the range of 30 ± 15 mm is reasonable for paving works but this may be modified depending upon the site requirement and got approved by the Engineer. These tests shall be carried out on every truck/dumper at Plant site and paving site initially when the work commences but subsequently the frequency can be reduced to alternate trucks or as per the instructions of the Engineer.

602.3.5. Design mix

602.3.5.1. The Contractor shall carry out laboratory trials of design mixes with the materials from the approved sources to be used. Trial mixes shall be made in presence of the Engineer or his representative and the design mix shall be subject to the approval of the Engineer. They shall be repeated if necessary until the proportions that will produce a concrete which complies in all respects with this Specification, and conforms to the requirement of the design/drawings have been determined.

602.3.5.2. The proportions determined as a result of the laboratory trial mixes may be adjusted if necessary during the construction of the trial length. Thereafter, neither the materials nor the mix proportions shall be varied in any way except with the written approval of the Engineer.

602.3.5.3. Any change in the source of materials or mix proportions proposed by the Contractor during the course of work shall be assessed by making laboratory trial mixes and the construction of a further trial length unless approval is given by the Engineer for minor adjustments like compensation for moisture content in aggregates or minor fluctuations in the grading of aggregate.

602.4. Sub-base

The cement concrete pavement shall be laid over the sub-base constructed in accordance with the relevant drawings and Specifications contained in Clause 601. If the sub-base is found damaged at some places or it has cracks wider than 10 mm, it shall be repaired with fine cement concrete or bituminous concrete before laying separation layer. Prior to laying of concrete it shall be ensured that the separation membrane as per Clause 602.5 is placed in position and the same is clean of din or other extraneous materials and free from any damage.

602.5. Separation Membrane

A separation membrane shall be used between the concrete slab and the subbase. Separation membrane shall be impermeable plastic sheeting 125 microns thick laid flat without creases. Before placing the separation membrane, the sub-base shall be swept clean of all the extraneous materials using air compressor. Wherever overlap of plastic sheets is necessary, the same shall be at least 300 mm and any damaged sheeting shall be replaced at the Contractor's expense. The separation membrane may be nailed to the lower layer with concrete nails.

602.6. Joints

602.6.1. The location and type of joints shall be as shown in the drawing. Joints shall be constructed depending upon their functional requirement as detailed in the following paragraphs. The location of the joints should be transferred accurately at the site and mechanical saw cutting of joints done as per stipulated dimensions. It should be ensured that the full required depth of cut is made from edge to edge of the pavement. Transverse and longitudinal joints in the pavement and sub-base shall be staggered so that they are not coincident vertically and are at least 1m and 0.3 m apart respectively. Sawing of joints shall be carried out with diamond studded blades soon after the concrete has hardened to take the load of the sawing machine and personnel without damaging the texture of the pavement. Sawing operation could start as early as 6-8 hours depending upon the season.

602.6.2. Transverse joints

602.6.2.1. Transverse joints shall be contraction and expansion joints constructed at the spacing described in the Drawings. Transverse joints shall be straight within the following tolerances along the intended line of joints which is the straight line transverse to the longitudinal axis of the carriageway at the position proposed by the Contractor and agreed to by the Engineer, except at road junctions or roundabouts where the position shall be as described in the drawings:

(i) Deviations of the filler board in the case of expansion joints from the intended line of-the joint shall not be greater than ± 10 mm.
(ii) The best fit straight line through the joint grooves as constructed shall be not more than 25 mm from the intended tine of the joint.
(iii) Deviations of the joint groove from the best fit straight line of the joint shall not be greater than 10 mm.
(iv) Transverse joints on each side of the longitudinal joint shall be in line with each other and of the same type and width. Transverse joints shall have a sealing groove which shall be sealed in compliance with Clause 602.11.

602.6.2.2. Contraction joints: Contraction joints shall consist of a mechanical sawn joint groove, 3 to 5 mm wide and 1/4 to 1/3 depth of the slab ± 5 mm or as stipulated in the drawings and dowel bars complying with Clause 602.6.5 and as detailed in the drawings. The contraction joints shall be cut as soon as the concrete has undergone initial hardening and is hard enough to take the load of joint sawing machine without causing
damage to the slab.

602.6.2.3. Expansion joints: The expansion joints shall consist of a joint filler board complying with Clause 602.2.7 and dowel bars complying with Clause 602.6.5 and as detailed in the drawings. The filler board shall be positioned vertically with the prefabricated joint assemblies along the line of the joint within the tolerances given in Clause 602.6.2.1. and at such depth below the surface as will not impede the passage of the finishing straight edges or oscillating beams of the paving machines. The adjacent slabs shall be completely separated from each other by providing joint filler board. Space around the dowel bars, between the sub-base and the filler board shall be packed with a suitable compressible material to block the flow of cement slurry.

602.6.3. Transverse construction joint: Transverse construction joints shall be placed whenever concreting is completed after a day's work or is suspended for more than 30 minutes. These joints shall be provided at the regular location of contraction joints using dowel bars. The joint shall be made butt type. At all construction joints, steel bulk heads shall be used to retain the concrete while the surface is finished. The surface of the concrete laid subsequently shall conform to the grade and cross sections of the previously laid pavement. When positioning of bulk head/ stop-end is not possible, concreting to an additional 1 or 2 m length may be carried out to enable the movement of joint cutting machine so that joint grooves may be formed and the extra 1 or 2 m length is cut out and removed subsequently after concrete has hardened.

602.6.4. Longitudinal joint

602.6.4.1. The longitudinal joints shall be saw cut as per details of the joints shown in the drawing. The groove may be cut after the final set of the concrete. Joints should be sawn to at least 1/3 the depth of the slab ± 5 mm as indicated in the drawing.

602.6.4.2. Tie bars shall be provided at the longitudinal joints as per dimensions and spacing shown in the drawing and in accordance with Clause 602.6.6.

602.6.5. Dowel bars

602.6.5.1. Dowel bars shall be mild steel rounds in accordance with Clause 602.2.6 with details/dimensions as indicated in the drawing and free from oil, dirt, loose rust or scale. They shall be straight, free of irregularities and burring restricting slippage in the concrete. The sliding ends shall be sawn or cropped cleanly with no protrusions outside the normal diameter of the bar. The dowel bar shall be supported on cradles/dowel chairs
in pre-fabricated joint assemblies positioned prior to the construction of the slabs or mechanically inserted with vibration into the plastic concrete by a method which ensures correct placement of the bars besides full re-compaction of the concrete around the dowel bars.

602.6.5.2. Unless shown otherwise on the drawings, dowel bars shall be positioned at mid depth of the slab within a tolerance of ± 20 mm, and centered equally about intended lines of the joint within a tolerance of ± 25 mm. They shall be aligned parallel to the finished surface of the slab and to the centre line of the carriageway and to each other within tolerances given hereunder, the compliance of which shall be checked as per Clause 602.10.7.
(i) For bars supported on cradles prior to the laying of the slab:

(a) All bars in a joint shall be within ± 3 mm per 300 mm length of bar
(b) 2/3rd of the bars shall be within ± 2 mm per 300 mm length of bar
(c) No bar shall differ in alignment from an adjoining bar by more than 3 mm per 300 mm length of bar in either the horizontal or vertical plane
(d) Cradles supporting dowel bar shall not extend across the line of joint i.e. no steel bar of the cradle assembly shall be continuous across the joint.

(ii) For all bars inserted after laying of the slab:
(a)Twice the tolerance for alignment as indicated in (i) above

602.6.5.3- Dowel bars, supported on cradles in assemblies, when subject to a load of 110 N applied at either end and in either the vertical or horizontal direction (upwards and downwards and both directions horizontally) shall conform to be within the following limits: (i) Two-thirds of the number of bars of any assembly tested shall not deflect more than 2 mm per 300 mm length of bar
(ii) The remainder of the bars in that assembly shall not deflect more than 3 mm per 300 mm length of bar.

602.6.5.4. The assembly of dowel bars and supporting. cradles, including the joint filler board in the case of expansion joints, shall have the following degree of rigidity when fixed in position:- (i) For expansion joints, the deflection of the top edge of the filler board shall be not greater than 13 mm, when a load of 1.3 kN is applied perpendicular to the vertical face of the joint filler board and distributed over a length of 600 mm by means of a bar or timber packing, at mid depth and midway between individual fixings, or 300 mm from either end of any length of filler board, if a continuous fixing is used. The residual deflection after removal of the load shall be not more than 3 mm. (ii) The joint assembly fixings to sub-base shall not fail under the 1.3kN load applied for testing the rigidity of the assembly but shall fail before the load reaches 2.6 kN**.** (iii) The fixings for contraction joint shall not fail under 1.3 kN load and shall fail before the load reaches 2.6 kN when applied over a length of 600 mm by means of a bar or timber packing placed as near to the level of the line of fixings as practicable.

(iv) Fixings shall be deemed to fail when there is displacement of the assemblies by more than 3 mm with any form of fixing, under the test load. The displacement shall be measured at the nearest part of the assembly to the centre of the bar or timber packing.

602.6.5.5. Dowel bars shall be covered by a thin plastic sheath for at least two-thirds of the length from one end for dowel bars in contraction joints or half the length plus 50 mm for expansion joints. The sheath shall be tough, durable and of an average thickness not greater than 1.25 mm. The sheathed bar shall comply with the following pull-out tests: Four bars shall be taken at random from stock and without any special preparation shall be covered by sheaths as required in this Clause. The ends of the dowel bars which have been sheathed shall be cast centrally into concrete specimens ISO x 150 x 600 mm, made of the same mix proportions to be used in the pavement, but with a maximum nominal aggregate size of 20 mm and cured in accordance with IS: 516. At 7 days a tensile load shall be applied to achieve a movement of the bar of at least 0.25 mm. The average bond stress to achieve this movement shall not be greater than 0.14 MPa.

602.6.5.6. For expansion joints, a closely fitting cap 100 mm long consisting of waterproofed cardboard or an approved synthetic material like PVC or GI pipe shall be placed over the sheathed end of each dowel bar. An expansion space at least equal in length to the thickness of the joint filler board shall be formed between the end of the cap and the end of the dowel bar by using compressible sponge. To block the entry of cement slurry
between dowel and cap it may be taped.

602.6.6. Tie bars

602.6.6.1. Tie bars in longitudinal joints shall be deformed steel bars of strength 415 MPa complying with IS:1786 and in accordance with the requirements given below. The bars shall be free from oil, dirt, loose rust and scale.

602.6.6.2. Tie bars projecting across the longitudinal joint shall be protected from corrosion for 75mm on each side of the joint by a protective coating of bituminous paint with the approval of the Engineer. The coating shall be dry when the tie bars are used.

602.6.6.3. Tie bars in longitudinal joints shall be made up into rigid assemblies with adequate supports and fixings to remain firmly in position during the construction of the slab. Alternatively, tie bars at longitudinal joints may be mechanically or manually inserted into the plastic concrete from above by vibration using a method which ensures correct placement of the bars and re-compaction of the concrete around the tie bars.

602.6.6.4. Tie bars shall be positioned to remain within the middle third of the slab depth as indicated in the drawings and approximately parallel to the surface and approximately perpendicular to the line of the joint, with the centre of each bar on the intended line of the joints within a tolerance of ± 50mm, and with a minimum cover of 30 mm below the joint groove.

602.7. Weather and Seasonal Limitations

602.7.1. Concreting during monsoon months: When concrete is being placed during monsoon months and when it may be expected to rain, sufficient supply of tarpaulin or other water proof cloth shall be provided along the line of the work. Any time when it rains, all freshly laid concrete which had not been covered for curing purposes shall be adequately protected. Any concrete damaged by rain shall be removed and replaced. If the damage is limited to texture, it shall be retextured in accordance with the directives of the Engineer.

602.7.2. Concreting in hot weather:
No concreting shall be done when the concrete temperature is above 30 degree Centigrade. Besides, in adverse conditions like high temperature, low relative humidity, excessive wind velocity, imminence of rains etc., if so desired by the Engineer, tents on mobile trusses may be provided over the freshly laid concrete for a minimum period of 3 hours as directed by the Engineer. The temperature of the concrete mix on reaching the paving site shall not be more than 30° C. To bring down the temperature, if necessary, chilled water or ice flakes should be made use of No concreting shall be done when the concrete temperature is below 5 degree Centigrade and the temperature is descending.

602,8. Side Forms, Rails and Guidewires

602.8.1. Side forms and rails: All side forms shall be of mild steel of depth equal to the thickness of pavement or slightly less to accommodate the surface regularity of the sub-base. The forms can be placed on series of steel packing plates or shims to take care of irregularity of sub-base. They shall be sufficiently robust and rigid to support the weight and pressure caused by paving equipment. Side forms for use with wheeled paving machines shall incorporate metal rails firmly fixed at a constant height below the top of the forms. The forms and rails shall be firmly secured in position by not less than 3 stakes/pins per each 3 m length so as to prevent movement in any direction. Forms and rails shall be straight within a tolerance of 3 mm in 3 m and when in place shall not settle in excess of 1.5 mm in 3 m while paving is being done. Forms shall be cleaned and oiled immediately before each use. The forms shall be bedded on a continuous bed of low moisture content lean cement mortar or concrete and set to the line and levels shown on the drawings within tolerances ± 10 mm and ± 3 mm respectively. The bedding shall not extend under the slab and there shall be no vertical step between adjacent forms of more than 3 mm. The forms shall be got inspected from the Engineer for his approval before 12 hours on the day before the construction of the slab and shall not be removed until at least 12 hours afterwards.

602.8.2. At all times sufficient forms shall be used and set to the required alignment for at least 200 m length of pavement immediately in advance of the paving operations, or the anticipated length of pavement to be laid within the next 24 hrs whichever is more.

602.8.3. Use of guide wires

602.8.3.1. Where slip form paving is proposed, a guide wire shall be provided along both sides of the slab. Each guide wire shall be at a constant height above and parallel to the required edges of the slab as described in the contract/drawing within a vertical tolerance of ± 3mm. Additionally, one of the wires shall be kept at a constant horizontal distance from the required edge of the pavement as indicated in the contract/drawing within a lateral tolerance of ± 10 mm.

602.8.3.2. The guide wire shall be supported on stakes not more than 8 m apart by connectors capable of fine horizontal and vertical adjustment. The guide wire shall be tensioned on the stakes so that a 500 gram weight shall produce a deflection of not more than 20 mm when suspended at the midpoint between any pair of stakes. The ends of the guide wire shall be anchored to fixing point or winch and not on the stakes.

602.8.3.3. The stakes shall be positioned and the connectors maintained at their correct height and alignment from 12 hours on the day before concreting takes place until 12 hours after finishing of the concrete. The guide wire shall be erected and tensioned on the connectors at any section for at least 2 hours before concreting that section.

602.8.3.4. The Contractor shall submit to the Engineer for his approval of line and level, the stakes and connectors which are ready for use in the length of road to be constructed by 12 hours on the working day before the day of construction of slab. Any deficiencies noted by the Engineer shall be rectified by the Contractor who shall then re-apply for approval of the affected stakes. Work shall not proceed until the Engineer has given his approval. It shall be ensured that the stakes and guide wires are not affected by the construction equipment when concreting is in progress.

602.9. Construction

602.9.1. General: A systems approach may be adopted for construction of the pavement, and the Method Statement for carrying out the work, detailing all the activities including indication of time-cycle, equipment, personnel etc., shall be got approved from the Engineer before the commencement of the work. The above shall include the type, capacity and make of the batching and mixing plant besides the hauling arrangement and paving equipment. The capacity of paving equipment, batching plant as well as all the ancillary equipment shall be adequate for a paving rate of atleast 300 m in one day.

602.9.2. Batching and mixing: Batching and mixing of the concrete shall be done at a central batching and mixing plant with automatic controls, located at a suitable place which takes into account sufficient space for stockpiling of cement, aggregates and stationary water tanks. This shall be, however, situated at an approved distance, duly considering the properties of the mix and the transporting arrangements available with the Contractor.

602.9.3. Equipment for proportioning of materials and paving

602.9.3.1. Proportioning of materials shall be done in the batching plant by weight, each type of material being weighed separately. The cement from the bulk stock may be weighed separately from the aggregates and water shall be measured by volume. Wherever properly graded aggregate of uniform quality cannot be maintained as envisaged in the mix design, the grading of aggregates shall be controlled by appropriate blending techniques. The capacity of batching and

mixing plant shall be at least 25 per cent higher than the proposed capacity of the laying/paving equipment.

602.9.3.2. Batching plant and equipment:

(1) **General-** The batching plant shall include minimum four bins, weighing hoppers, and scales for the fine aggregate and for each size of coarse aggregate. If cement is used in bulk, a separate scale for cement shall be included. The weighing hoppers shall be properly sealed and vented to preclude dust during operation. Approved safety devices shall be provided and maintained for the protection of all personnel engaged in plant operation, inspection and testing. The batch plant shall be equipped with a suitable non-resettable batch counter which will correctly indicate the number of batches proportioned.
(2) Bins and hoppers-Bins with minimum number of four adequate separate compartments shall be provided in the batching plant.

(3) Automatic weighing devices-Batching plant shall be equipped to proportion aggregates and bulk cement by means of automatic weighing devices using load cells.

(4) Mixers- Mixers shall be pan type, reversible type or any other mixer capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specific mixing period, and of discharging the mixture, without segregation. Each stationary mixer shall be equipped with an approved timing device which will automatically lock the discharge lever when the drum has been charged and release it at the end of the mixing period. The device shall be equipped with a bell or other suitable warning device adjusted to give a clearly audible signal each time the lock is released. In case of failure of the timing device, the mixer may be used for the balance of the day while it is being repaired, provided that each batch is mixed 90 seconds or as per the manufacturer's recommendation. The mixer shall be equipped with a suitable non-resettable batch counter which shall correctly indicate the number of batches mixed. The mixers shall be cleaned at suitable intervals. The pickup and throw-over blades in the drum or drums shall be repaired or replaced when they are worn down 20 mm or more. The Contractor shall (1) have available at the job site a copy of the manufacturer's design, showing dimensions and arrangements of blades in reference to original height and depth, or (2) provide permanent marks on blade to show points of 20 mm wear from new conditions. Drilled holes of 5 mm diameter near each end and at midpoint of each blade are recommended. Batching Plant shall be calibrated in the beginning and thereafter at suitable interval not exceeding 1 month.

(5) Control cabin - An air-conditioned centralised control cabin shall be provided for automatic operation of the equipment.

602.9.3.3. Paving equipment: The concrete shall be placed with an approved fixed form or slip from paver with independent units designed to (i) spread,(ii) consolidate, screed and float-finish, (iii) texture and cure the freshly placed concrete in one complete pass of the machine in such a manner that a minimum of hand finishing will be necessary and so as to provide a dense and homogeneous pavement in conformity with the plans and Specifications. The paver shall be equipped with electronic controls to control/sensor line and grade from either or both sides of the machine. Vibrators shall operate at a frequency of 8300 to 9600 impulses per minute under load at a maximum spacing of 60 cm. The variable vibration setting shall be provided in the machine.

602.9.3.4. Concrete saw: The Contractor shall provide adequate number of concrete saws with sufficient number of diamond-edge saw blades. The saw machine shall be either electric or petrol/diesel driven type. A water tank with flexible hoses and pump shall be made available in

this activity on priority basis. The Contractor shall have at least one standby saw in good working condition. The concreting work shall not commence if the saws are not in working condition.

602.9.4. Hauling and placing of concrete

602.9.4.1. Freshly mixed concrete from the central batching and mixing plant shall be transported to the paver site by means of trucks/tippers of sufficient capacity and approved design in sufficient numbers to ensure a constant supply of concrete. Covers shall be used for protection of concrete against the weather. The trucks/tippers shall be capable of maintaining the mixed concrete in a homogeneous state and discharging the same without segregation and loss of cement slurry. The feeding to the paver is to be regulated in such a way that the paving is done in an uninterrupted manner with a uniform speed throughout the day's work.

602.9.4.2. Placing of concrete

Concrete mixed in central mixing plant shall be transported to the site without delay and the concrete which, in the opinion of the Engineer, has been mixed too long before laying will be rejected and shall be removed from the site. The total time taken from the addition of the water to the mix, until the completion of the surface finishing and texturing shall not exceed 120 minutes when concrete temperature is less than 25°C and 90 minutes when the concrete temperature is between 25°C to 30°C. Trucks/tippers delivering concrete shall not run on plastic sheeting nor shall they run on completed slabs until after 28 days of placing the concrete. The Paver shall be capable of paving the carriageway as shown in the drawings, in a single pass and lift.

602.9.4.3. Where fixed form pavers are to be used, forms shall be fixed in advance as per Clause 602.8. of the Specifications. Before any paving is done, the site shall be shown to the Engineer, in order to verify the arrangement for paving besides placing of dowels, tie-bars etc., as per the relevant Clauses of this Specification. The mixing and placing of concrete shall progress only at such a rate as to permit proper finishing, protecting and curing of the pavement.

602.9.4.4. In all cases, the temperature of the concrete shall be measured at the point of discharge from the delivery vehicle.

602.9.4.5. The addition of water to the surface of the concrete to facilitate the finishing operations will not be permitted except with the approval of the Engineer when it shall be applied as a mist by means of approved equipment.

602.9.4.6. If considered necessary by the Engineer, the paving machines shall be provided with approved covers to protect the surface of the slab under construction from direct sunlight and rain or hot wind.

602.9.4.7. While the concrete is still plastic, its surface shall be brush textured in compliance with Clause 602.9.8 and the surface and edges of the slab cured by the application of a sprayed liquid curing membrane in compliance with Clause 602.9.9. After the surface texturing, but before the curing compound is applied, the concrete slab shall be marked with the chainage at every 100 m interval.

602.9.4.8. As soon as the side forms are removed, edges of the slabs shall be corrected wherever irregularities have occurred by using fine concrete composed of one part of cement to 3 pans of fine chips and fine aggregate under the supervision of the Engineer.

602.9.4.9- If the requirement of Clause 902.4. for surface regularity fails to be achieved on two consecutive working days, then normal working shall cease until the cause of the excessive irregularity has been identified and remedied.

602.9.5. Construction by fixed form paver

602.9.5.1. The fixed form paving train shall consist of separate powered machines which spread, compact and finish the concrete in a continuous operation.

602.9.5.2. The concrete shall be discharged without segregation into a hopper spreader which is equipped with means for controlling its rate of deposition on to the sub base. The spreader shall be operated to strike off concrete up to a level requiring a small amount of cutting down by the distributor of the spreader. The distributor of spreader shall strike off the concrete to the surcharge adequate to ensure that the vibratory compactor thoroughly compacts the layer. If necessary, poker vibrators shall be used adjacent to the side forms and edges of the previously constructed slab. The vibratory compactor shall be set to strike off the surface slightly high so that it is cut down to the required level by the oscillating beam. The machine shall be capable of being rapidly adjusted for changes in average and differential surcharge necessitated by changes in slab thickness or cross fall. The final finisher shall be able to finish the surface to the required level and smoothness as specified, care being taken to avoid bringing up of excessive mortar to the surface by over working.

602.9.6. Construction by slip form paver

602.9.6.1. The slip form paving train shall consist of power machine which spreads, compacts and finishes the concrete in a continuous operation. The slip form paving machine shall compact the concrete by internal vibration and shape it between the side forms with either a conforming plate or by vibrating and oscillating finishing beams. The concrete shall be deposited without segregation in front of slip form paver across the whole width and to a height which at all times is in excess of the required surcharge. The deposited concrete shall be struck off to the necessary average and differential surcharge by means of the strike off plate or a screw auger device extending across the whole width of the slab. The equipment for striking-off the concrete shall be capable of being rapidly adjusted for changes of the average and differential surcharge necessitated by change in slab thickness or cross fall.

602.9.6.2. The level of the conforming plate and finishing beams shall be controlled automatically from the guide wires installed as per Clause 602.8 by sensors attached at the four comers of the slip form paving machine. The alignment of the paver shall be controlled automatically from the guide wire by at least one set of sensors attached to the paver. The alignment and level of ancillary machines for finishing, texturing and curing of the concrete shall be automatically controlled relative to the guide wire or to the surface and edge of the slab.

602.9.6.3. Slip-form paving machines shall have vibrators of variable output, with a maximum energy output of not less than 2.5 KW per metre width of slab per 300 mm depth of slab for a laying speed upto 1.5 m per minute or pro-rata for higher speeds. The machines shall be of sufficient mass to provide adequate reaction during spreading and paving operations on the traction units to maintain forward movements during the placing of concrete in all situations.

602.9.6.4. If the edges of the slip formed slab slump to the extent that the surface of the top edge of the slab does not comply with the requirements of Clause 602.14, then special measures approved by the Engineer shall be taken to support the edges to the required levels and work shall be stopped until such time as the Contractor can demonstrate his ability to slip form the edges to the required levels.

602.9.7. Construction by hand-guided method:

Areas in which hand-guided methods of construction become indispensable shall be got approved by the Engineer in writing in advance. Such work may be permitted only in restricted areas in small lengths. Work shall be carried out by skilled personnel as per methods approved by the Engineer. The acceptance criteria regarding level, thickness, surface regularity, texture, finish, strength of concrete and all other quality control measures shall be the same as in the case of machine laid work.

602.9.8. Surface texture

602.9.8.1. After the final regulation of the slab and before the application of the curing membrane, the surface of concrete slab shall be brush-textured in a direction at right angles to the longitudinal axis of the carriageway.

602.9.8.2. The brushed surface texture shall be applied evenly across the" slab in one direction by the use of a wire brush not less than 450 mm wide but longer brushes are preferred. The brush shall be made of 32 gauge tape wires grouped together in tufts spaced at 10 mm centres. The tufts shall contain an average of 14 wires and initially be 100 mm long. The brush shall have two rows of tufts. The rows shall be 20 mm apart and the tufts in one row shall be opposite the centre of the gap between tufts in the other row. The brush shall be
replaced when the shortest tuft wears down to 90 mm long.

602.9.8.3. The texture depth shall be determined by the Sand Patch Test as described in Clause 602.12.This test shall be performed at least once for each day's paving and wherever the Engineer considers it necessary at times after construction as under: Five individual measurements of the texture depth shall be taken at least 2 m apart anywhere along a diagonal line across a lane width between points 50 m apart along the pavement. No measurement shall be taken within 300 mm of the longitudinal edges of a concrete slab constructed in one pass.

602.9.8.4. Texture depths shall not be less than the minimum required when measurements are taken as given in Table 600-2 iior greater than a maximum average of 1.25 mm.

TABLE: 600-2. Texture Depth

Time of Test	Number of Measurements	Required Texture Depth (mm)	
		Specified Value	Tolerance
1 Between 24 hours and 7 days after the construction of the slab or until the- slab is first used by vehicles.	An average of 5 measurements	1.00	±0.25
2. Not later than 6 weeks before the road is opened to public traffic.	An average of 5 measurements	1.00	+0.25 -0.35

602.9.8.5. After the application of the brushed texture, the surface of the slab shall have a uniform appearance.

602.9.8.6. Where the texture depth requirements are found to be deficient, the Contractor shall make good the texture across the full lane width over length directed by the Engineer, by retexturing the hardened concrete surface in an approved manner.

602.9.9. Curing

602.9.9.1. Immediately after the surface texturing, the surface and sides of the slab shall be cured by the application of approved resin- based aluminised reflective curing compound which hardens into an impervious film or membrane with the help of a mechanical sprayer. Curing compounds shall contain sufficient flake aluminium in finely divided dispersion to produce a complete coverage of the sprayed surface with a metallic finish. The compound shall become stable and impervious to evaporation of water from the surface of the concrete within 60 minutes of application and shall be of approved type. The curing compounds shall have a water retention efficiency index of 90 per cent in accordance with BS Specification No. 7542.

602.9.9.2. The curing compound shall not react chemically with the concrete and the film or membrane shall not crack, peel or disintegrate within three weeks after application. Immediately prior to use, the curing compound shall be thoroughly agitated in its containers. The rate of spread shall be in accordance with the manufacturer's instructions checked during the construction of the trial length and subsequently whenever required by the Engineer. The mechanical sprayer shall incorporate an efficient mechanical device for
continuous agitation and mixing of the compound during spraying.

602.9.9.3. In addition to spraying of curing compound, the fresh concrete surface shall be protected for at least 3 hours by covering the finished concrete pavement with tents as described in Clause 602.7.2, during adverse weather conditions as directed by the Engineer. After three hours, the pavement shall be covered by moist hessian and the same shall then be kept damp for a minimum period of 14 days after which time the hessian may be removed. The hessian shall be kept continuously moist. All damaged/torn hessian shall be removed
and replaced by new hessian on a regular basis.

602.9.9.4. The Contractor shall be liable at his expense to replace any concrete damaged as a result of incomplete curing or cracked on a line other than that of a joint.

602.10. Trial Length

602.10.1. The trial length shall be constructed at least one month in advance of the proposed start of concrete paving work. At least one month prior to the construction of the trial length, the Contractor shall submit for the Engineer's approval a detailed method statement giving description of the proposed materials, plant, equipment and construction methods. All the major equipments like paving train, batching plant, 'tippers etc., proposed in the construction are to be approved by the Engineer before their procurement. No trials of new materials, plant, equipment or construction methods, nor any development of them shall be permitted either during the construction of trial length or in any subsequent paving work, unless they form part of further, approved trials. These trial lengths shall be constructed away from the carriageway but with at least a sub base layer below it.

602.10.2. The Contractor shall demonstrate the materials, plant, equipment and methods of construction that are proposed for concrete paving, by first constructing a trial length of slab, at least 60 m but not more than 300 m long for mechanised construction and at least 30 m long for hand **guided** methods. If the first trial is unsatisfactory, the Contractor shall have to demonstrate his capability to satisfactorily construct the pavement in subsequent trials.

602.10.3. The trial length shall be constructed in two parts over a period comprising at least part of two separate working days, with a minimum of 30 m constructed each day for mechanized construction and a minimum of 15 m on each day for hand guided construction. The trial length shall be constructed at a similar rate (speed, around 1 m/hr) to that which is proposed for the main work.

602.10.4. Transverse joints and longitudinal joints of each type that are proposed for dowel-jointed unreinforced concrete slabs in the main work shall be constructed and assessed in the trial length. If in the trial length the construction of expansion joint and longitudinal joint is not demonstrated, the first 2 expansion joints and at least the first 150 m of longitudinal construction joint for mechanised paving in the main work, shall be considered as the trial length for these joints.

602.10.5. The trial length shall comply with the Specification in all respects, with the following additions and exceptions:

602.10.5.1. Surface levels and regularity

(i) In checking for compliance with Clause 903.5 the levels shall be taken at intervals at the locations specified in this Clause along any line or lines parallel to the longitudinal centre line of the trial length. (ii) The maximum number of permitted irregularities of pavement surface shall comply with the requirements of Clause 902.4. Shorter trial lengths shall be assessed pro-rata based on values for a 300 m length.

602.10.5.2. Joints

(iii) Alignment of dowel bars shall be inspected as described in Clause 602.10.7 in any two consecutive transverse joints. If the position or alignment of the dowel bars at one of these joints does not comply with Clause 602.6.5, if that joint remains the only one that does not comply after the next 3 consecutive joints of the same type have been inspected, then the method of placing dowels shall be deemed to be satisfactory. In order to check sufficient joints for dowel bar alignment without extending the trial length unduly, the Contractor may, by agreement with the Engineer, construct joints at more frequent joint intervals than the normal spacing required in the Contract. (iv) If there are deficiencies in the first expansion joint that is constructed as a trial, the next expansion joint shall be a trial joint. Should this also be deficient, further trial expansion joints shall be made as pan of the trial length which shall not form part of the permanent works, unless agreed by the Engineer.

602.10.5.3. Density

(v) Density shall be assessed as described in Clause 602.3.3. from at least 3 cores drilled from each part of the trial length.

602.10.5.4. Position of tie bars

(vi) Compliance with Clause 602.6.6 for the pos-tion and alignment of tie bars shall be checked by drilling additional cores from the slab unless they can be determined from cores taken for density.

602.10.6. **Approval and acceptance**

602.10.6.1. Approval of the materials, plant, equipment and construction methods shall be given when a trial length complies with the Specification. The Contractor shall not proceed with normal

working until the trial length has been approved and any earlier defective trial lengths have been removed, unless that can be remedied to the satisfaction of the Engineer. If the Engineer does not notify the Contractor of any deficiencies in any trial length within 10 days after the completion of that trial length, the Contractor may assume that the trial length, and the materials, plant, equipment and construction methods adopted are acceptable.

602.10.6.2. When approval has been given, the materials, plant, equipment and construction methods shall not thereafter be changed, except for normal adjustments and maintenance of plant, without the approval of the Engineer. Any changes in materials, plant, equipment, and construction methods shall entitle the Engineer to require, the Contractor to lay a further trial length as described in this Clause to demonstrate that the changes will not adversely affect the permanent works. 602.10.6.3. Trial lengths which do not comply with the Specification, with the exception of areas which are deficient only in surface texture and which can be remedied in accordance with Clause 602.9.8.6 shall be removed immediately upon notification of deficiencies by the Engineer, and the Contractor shall construct a further trial length.

602.10.7. Inspection of dowel bars

602.10.7.1. Compliance with Clause 602.6.5. for the position and alignment, of dowel bars at construction and expansion joints shall be checked by measurements relative to the side forms or guide wires.

602.10.7.2. When the slab has been constructed, the position and alignment of dowel bars and any filler board shall be measured after carefully exposing them in the plastic concrete across the whole width of the slab. When the joint is an expansion joint, the top of the filler board shall first be exposed sufficiently in the plastic concrete to permit measurement of any lateral or vertical displacement of the board. During the course of normal working, these measurements shall be carried out in the pavement section at the end of day's work by extending slab length by 2 m. After sawing the transverse joint groove, the extended 2 m slab shall be removed carefully soon after concrete has set to expose dowels over half the length. These dowels can be tested for tolerances.

602.10.7.3. If the position and alignment of the bars in a single joint in the slab is unsatisfactory then the next two joints shall be inspected. If only one joint of the three is defective, the rate of checking shall be increased to one joint per day until the Engineer is satisfied that compliance is being achieved. In the event of non-compliance in two or more successive joints, the Contractor shall revert to the construction of fresh trial lengths and make any necessary alteration to concrete mix, paving plant or methods until the dowel bar position and alignment are satisfactory.

602.10.7.4. After the dowel bars have been examined, the remainder of the concrete shall be removed over a width of 500 mm on each 'side of the line of the joint and reinstated to the satisfaction of the Engineer. The dowels shall be inserted on both sides of the 1 m wide slab by drilling holes and grouting with epoxy mortar. Plastic sheath as per Clause

602.6.5.5'shall be provided on dowels on one of the joints. The joint groove shall be widened and sealed as per Clause 602.11.

602.11. Preparation and Sealing of Joint Grooves

602.11.1. General

AH transverse joints in surface slabs shall be sealed using sealants described in Clause 602.2.8. Joints shall not be sealed before 14 days after construction.

602.11.2. Preparation of joint grooves for sealing

602.11.2.1. Joint grooves usually are not constructed to provide the minimum width specified in the drawings when saw cut joints are adopted. They shall be widened subsequently by sawing before sealing. Depth/width gauges shall be used to control the dimension of the groove.

602.11.2.2. If rough arrises develop when grooves are made, they shall be ground to provide a chamfer approximately 5 mm wide. If the groove is at an angle up to 10 degree from the

perpendicular to the surface, the overhanging edge of the sealing groove shall be sawn or ground perpendicular. If sapling occurs or the angle of the former is greater than 10 degrees, the joint sealing groove shall be sawn wider and perpendicular to the surface to encompass the defects up to a maximum width, including any chamfer, of 35 mm for transverse joints and 20 mm for longitudinal joints. If the spalling cannot be so eliminated then the arrises shall be repaired by an approved thin bonded arris repair using cementious materials.

602.11.2.3. All grooves shall be cleaned of any dirt or loose material by air blasting with filtered, oil free compressed air. If need arises the Engineer may instruct cleaning by pressurized water jets. Depending upon the requirement of the sealant manufacturer, the sides of the grooves may have to be sand blasted to increase the bondage between sealant and concrete.

602.11.2.4. The groove shall be cleaned and dried at the time of priming and sealing.

602.11.2.5. Before sealing the temporary seal provided for blocking the ingress of dirt, soil etc., shall be removed. A highly compressible heat resistant paper-backed de-bonding strip as per drawing shall be inserted in the groove to serve the purpose of breaking the bond between sealant and the bottom of the groove and to plug the joint groove so that the sealant may not leak through the cracks. The width of de-bonding strip shall be more than the joint groove width so that it is held tightly in the groove. In the case of longitudinal joints, heat resistant tapes may be inserted to block the leakage through bottom of the joint.

602.11.3. Sealing with sealants

602.11.3.1. When sealants are applied, an appropriate primer shall also be used if recommended by the manufacturer and it shall be applied in accordance with their recommendation. The sealant shall be applied within the minimum and maximum drying times of the primer recommended by the manufacturer. Priming and sealing with applied sealants shall not be carried out when the naturally occurring temperature in the joint groove to be sealed is below 7° C.

602.11.3.2. If hot applied sealant is used it shall be heated and applied from a thermostatically controlled, indirectly heated preferably with oil jacketed melter and pourer having reticulating pump and extruder. For large road projects, sealant shall be applied with extruder having flexible hose and nozzle. The sealant shall not be heated to a temperature higher than the safe heating temperature and not for a period longer than the safe heating period, as specified by the manufacturer. The dispenser shall be cleaned out at the end of each day in accordance with the manufacturer's recommendations and reheated material shall not be used.

602.11.3.3. Cold applied sealants with chemical formulation like polysulphide may be used. These shall be mixed and applied within the time limit specified by the manufacturer. If primers are recommended they shall be applied neatly with an appropriate brush. The Movement Accommodation Factor (MAP) shall be more than 10 per cent.

602.11.3.4. The sealants applied at contraction phase of the slabs would result in bulging of the sealant over and above the slab. Therefore, the Contractor in consultation with the Engineer shall establish the right temperature and time for applying the sealant. Thermometer shall be hung on a pole in the site for facilitating control during the sealing operation.

602.11.3.5. Sealant shall be applied, slightly to a lower level than slab with a tolerance of 5 ± 2 mm.

602.11.3.6. During sealing operation, it shall be seen that no air bubbles are introduced in the sealant either by vapours or by the sealing process.

602.11.4. Testing of applied sealants: Manufacturer's certificate shall be produced by the Contractor for establishing that the sealant is not more than six months old and stating that the sealant complies with the relevant standard as in Clause 602.2.8. The samples shall meet the requirement of AASHTO M 282 for hot applied sealant or BS 5212: (Part-2) for cold applied sealant.

602.12. Measurement of Texture Depth - Sand Patch Method 602.12.1. The following apparatus shall be used: (i) A cylindrical **container of** 25 **ml** internal **capacity** (ii) A flat **wooden disc** 64 mm

diameter with a hard rubber **disc, 1.5 nun thick,** stuck **to one** face, the reverse face being provided with a handle (iii) **Dry** natural sand with a rounded particle **shape** passing **a 300 micron** IS sieve **and retained on** a 150 micron IS sieve.

602.12.2. Method: The surface to be measured shall be dried, any extraneous mortar and loose material removed and the surface swept clean using a wire brush both 'at right angles and parallel to the carriageway. The cylindrical container shall be filled with the sand, tapping the base 3 times on the surface to ensure compaction, and striking off the sand level with the top of the cylinder. The sand shall be poured into a heap on the surface to be treated. The sand shall be spread over the surface, working the disc with its face kept flat in a
circular motion so that the sand is spread into a circular patch with the surface depressions filled with sand to the level of peaks.

602.12.3. The diameter of the patch shall be measured to the nearest 5 mm. The texture depth of concrete surface shall be calculated from 31000/(DxD) mm where D is the diameter of the patch in mm.

602.13. Opening to Traffic

No vehicular traffic shall be allowed to run on the finished surface of a concrete pavement within a period of 28 days of its construction and until the joints are permanently sealed. The road may be opened to regular traffic after completion of the curing period of 28 days and after sealing of joints is completed including the construction of shoulder, with the written permission of the Engineer.

602.14. Tolerances for Surface **Regularity, Level, Thickness and Strength**

The tolerances for surface regularity, level, thickness and strength shall conform to the requirements given in Clause 903.5. Control of quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

602.15. Measurements for Payment

602.15.1. Cement Concrete pavement shall be measured as a finished work in square meters with specified thickness. The volume to be paid for will be calculated on the basis of thickness and plans shown on the project drawings and adjusted for the deficiency in thickness. No additional payment shall be made for extra thickness of the slab. The full payment will be made to this item after 28 days strength of the concrete is found to be satisfactory. The unit for measurement for concrete pavement shall be the cubic meters of concrete placed, based on the net plan areas for the specified thickness shown on the Drawings or directed by the Engineer. The rate shall include all provisions of this Specification and shall include the provision of all materials including polythene film, concrete, stock piling, mixing, transport, placing, compacting, finishing, curing together with all formwork, and including testing and submission of test certificates and records. No deduction shall be made in measurement for openings provided that the area of each is less than 0.5 sq. m. The unit rate as entered in the Bill of Quantities shall also include the full costs of contraction, expansion, construction, and longitudinal joints. It shall also include joint filler, keys, caulking rod, debonding strip, sealant primer, joint sealant, dowel bar and tie rod.

602.15.2. Pavement thickness

All precautions and care shall be taken to construct pavement having uniform thickness as called for on the plans. Thickness of the cement concrete pavement shall be calculated on the basis of level data of the cement concrete pavement and the underlying sub-base taken on a grid of 5 m x 3.5 m or 6.25 m x 3.5 m, the former measurement being in longitudinal direction. A day's work is considered as a 'lot' for calculating the average thickness of the slab. In calculating the average thickness, individual measurements which are in excess of the
specified thickness by more than 10 mm shall be considered as the specified thickness plus 10 mm. Individual areas deficient by more than 25 mm shall be verified by the Engineer by ordering core cutting and if in his opinion the deficient areas warrant removal, they shall be removed and replaced with concrete of the thickness shown on the plans. When the average thickness for the lot is deficient by the extent shown in Table 600-3, the
Contract unit price will be adjusted as per this Table.

TABLE 600-3. PAYMENT ADJUSTMENT FOR DEFICIENCY IN THICKNESS

Deficiency in the average thickness of day's work	Per cent of Contract unit price payable
Up to 5 mm	100
6-10 mm	87
11-15 mm	81
16-20 mm	75
21-25 mm	70

In the stretch where deficiency of average thickness is more than 25 mm, the section whose thickness is deficient by 26 mm or more is identified with the help of cores. Such slabs shall be removed and reconstructed at the cost of the Contractor. During such rectification work, care shah be taken to replace full slab and to the full depth.

602.16. Rate

The Contract unit rate for the construction of the cement concrete shall be payment in full for carrying out the operations required for the different items of the work as per these Specifications including full compensation for all labour, tools, plant, equipments, testing and incidentals to complete the work as per Specifications, providing all materials to be incorporated in the work including all royalties, fees, storage, rents where necessary and all leads and lifts.

(3) OFFICE BUILDING

Item No: 1

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area instructed.
(A) Loose or soft soil, soft rock and Hard rock
(1) Up to 1.5 Mt. Depth
(2) 1.50 to 3.0 Mt. Depth

1.0 Workmanship:
The relevant specifications of description no.4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 40 nominal size) and curing complete including cost of formwork in.
(A) Foundation and Plinth

1.0 Workmanship:
The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 3

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding cost of reinforcement for reinforced concrete work in (A) Foundation, footing, base of columns and Mass concrete.

1.0 Workmanship:
The relevant specifications of description no. 12 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 12 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement for reinforced concrete work in

(A) Columns (B) Beam, etc.

1.0 Workmanship:
The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 5

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:
The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 6

Filling in trenches with available excavated earth (excluding rock in trenches plinth, sides of foundations etc. in layer not exceeding 20 cm in depth consolidating each desposalite layer by ramming and watering.)

1.0 Materials:
The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 7 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 7

Conveying carting and removing of surplus excavated stuff from the site to any place within municipal limited as directed by the engineer in charge including loading, unloading carting dumping and or spreading as directed etc. comp. For Lead 4.5 km to 5.00 km.

1.0 Workmanship:
The relevant specifications of description no. 6 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 6 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 8

Providing and filling in plinth with yellow soil or selected soil in layers of 23 cm in thickness including watering, ramming and consolidation etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 8 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 8 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 9

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement reinforced concrete work in column, beam, slab, wall etc.

1.0 Workmanship:
The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 10

Providing and constructing brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth in cement mortar 1:6 (1 cement : 6 fine sand)
(B) Conventional

1.0 Materials:
The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 11

Providing and constructing Half brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth and up to floor two level in cement mortar 1:4 (1 cement : 4fine sand)
(B) Conventional

1.0 Materials:
The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one Square meter.

Item No: 12

Providing TMT FE- 500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:
The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 13

Providing and applying 12 mm thick cement plaster in single coat on brick / concrete walls and similar surfaces for plastering and finishing even in smooth and finishing with a floating coat of cement slurry in CM 1:3 (1 cement : 3 sand) etc complete.
(a) Walls
(b) For ceiling and soffits of stair

1.0 Workmanship:
The relevant specifications of description no. 20 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 20 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 14

Providing and applying 20 mm thick sand faced cement plaster on walls or similar surfaces consisting of 12 cm thick backing cost of CM 1:3 (1 cement : 3 sand) and 8 cm thick finishing cost of CM 1:1 (1 cement :1 sand) etc complete.

1.0 Workmanship:
The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 21 shall be followed. Rate shall be for a unit of Square meter.

Item No: 15

Proving 35 mm wide throating or plaster drip and moulding it to R.C.C. chajja etc. complete.

Materials
Water shall conform to M-1. Cement shall conform to M-3 sand conform to M-6. Cement mortar shall conform to M-11.

Workmanship
The work shall be carried out as directed. Te proportion of mix for finishing, touching shall be in C.M. 1:2 by volume. Curing shall be done for not less than 7 days. The wok shall be carried out in best workman like manner. The throating or plaster drip and molding shall be one centimeter in thickness.

Mode of measurement
The rate includes cost of all materials and labour required completes the Description.

The rate shall be for a unit of one **Running Meter.**

Item No: 16

Providing 20 mm deep finished groove in plaster in line and level etc. complete

Self explanatory and as directed by Engineer-in-charge and Architect.
The rate shall be for a unit of one **Running Meter.**

Item No: 17

Providing and laying Vitrified tiles 8 to 10 mm thick of Orient, Kajariam Johnson, Nitco, Somani, Bell, Asian or Euro make in in flooring laid on a bed of 20 mm thick average base of cement mortar 1:6 (1 cement : 6coarse sane) and finished with flush pointing in white or colour cement complete. Size 24' x 24'.

The tiles shall be of approved make and shall generally conform to IS 15622. They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance. The tiles shall be tested as per IS 13630. Classification and Characteristics of pressed ceramic tiles shall be as per IS 13712.The tiles shall be square or rectangular of nominal size. Table 1,3,5, and 7 of IS 15622 give the modular preferred sizes and table 2,4,6 and 8 give the most common non modular sizes. Thickness shall be specified by the manufacturer. It includes the profiles on the visible face and on the rear side. Manufacturer/supplier and party shall choose the work size of tiles in order to allow a nominal joint width up to 2mm for unrectified floor tiles and up to 1mm for rectified floor tiles. The joint in case of spacer lug tile shall be as per spacer. The tiles shall conform to table10 of IS 15622 with water absorption 3 to 6%(Group BII). The top surface of the tiles shall be glazed. Glaze shall be either glossy or matt as specified. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze. However, any glaze if unavoidable, shall be permissible on only up to 50 per cent of the surface area of the edges.

Preparation of Surface and Laying
Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement: 4 coarse sand) or as specified. The average thickness of the bedding shall be 20 mm or as specified while the thickness under any portion of the tiles shall not be less than 8 mm.Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it. Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square meter over an area up to one square meter. Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining

tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.
The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap.
Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints.
Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado.
After tiles have been laid surplus cement slurry shall be cleaned off.

Pointing and Finishing

The joints shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the colour of tiles. Where spacer lug tiles are provided, the half the depth of joint shall be filled with polysulphide or as specified on top with under filling with cement grout without the lugs remaining exposed. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.

Measurements

Length and breadth shall be measured correct to a cm before laying skirting, dado or wall plaster and the area calculated in square meter correct to two places of decimal. Where coves are used at the junctions, the length and breadth shall be measured between the lower edges of the coves. No deduction shall be made nor extra paid for voids not exceeding 0.20 square meter. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square meter. Areas, where glazed tiles or different types of decorative tiles are used will be measured separately.

Rate The rate for flooring shall include the cost of all materials and labour involved in all the operations described above, For tiles of sizes up to 0.16 sqm. Unless otherwise specified in the description of the item. Nothing extra shall be paid for the use of cut (sawn) tiles in the work. Extra over and above the normal rate for white tiles shall be paid where coloured or any other type of decorative tiles have been used.
The tiles shall conform to Table 12 of IS 15622 (Tiles with water absorption E ≤ 0.08 per cent Group BIa) and the joint thickness in flooring shall not be more than 1mm.

Item No: 18

Providing and laying green polished kota stone slab flooring over 20 mm (average) thick base of cement mortar 1:6 (1cement: 6 sand) laid over and joined with grey cement slurry including and polishing etc. complete. (A) 25 mm thick

1.0 Workmanship:

The relevant specifications of description no. 28shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no.28 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 19

Providing and laying white glazed tiles 6mm. thick of Orient, Kajaria, Johnson, Nitco, Somani, Bell make at all floor levels, in flooring on 12 mm thick (average) cement plaster 1:3(1 cement : 3 coarse sand) including necessary cement paste for fixing and jointed with white cement slurry etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 31 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no.31 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 20

Providing and laying white glazed tiles 6mm. thick of Orient, Kajaria, Johnson, Nitco, Somani, Bell make at all floor levels, in skirting, and dado on 10 mm thick (average) cement plaster 1:3(1 cement : 3 coarse sand) including necessary cement paste for fixing and jointed with white cement slurry etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 32 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no.32 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 21

Providing and fixing 35 mm finished thick Indian teakwood shutters, for doors, windows and clear storey windows including the salwood frames of finished size 12 cm x 7 cm including medium quality anodised aluminum fixtures and fastenings including primer coat of approved quality and two coats of oil painting etc. complete.(1) Fully paneled

1.0 Workmanship:
The relevant specifications of description no. 34 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 34 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 22

Providing and fixing window having extruded aluminum Colour anodized section frame main outer size 95mm x 24mm x 1.17mm (of Jindal Section no:2459 @ wt.of 0.738 Kg/mt), horizontal Three track member size 92mm x 31.75mm x 1.30mm (of Jindal Section no:8688,@ Wt.1.07 Kg/mt), vertical member of size 92mm x 31.75mm x 1.50mm (of Jindal Section no:8933,@ Wt. 1.06 Kg/mt) with sliding shutters of horizontal member size 40 mmx18mm x1.29mm (of Jindal Section no:8947@ wt.of 0.456 Kg/mt), vertical member of size 40mm x 18mm x 1.29 mm (of Jindal Section no:8949 @ wt.of 0.456Kg/mt/ with 5 mm thick transparent bronze colour tinted float glass with powder coated aluminum fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc all completed

1.0 Workmanship:

The relevant specifications of M 31 shall be followed

Preparing the surface for the fixing of aluminum frame. Providing and fixing aluminum door frame as per the details of instruction given by the site in charge with proper alignment and precautions. Providing and fixing sheet glass with acid frosting as per architects detail and as per the details or instruction give by the Engineer in charge with necessary precautions. Aluminum doors, frame, glass etc. shall be cleaned after the completion of work as per instruction of Engineer in charge.

2.0 Mode of Measurement and Payment:

Rates include all materials, labour and tools including providing and fixing aluminum sheet, nails etc. complete. The measurement shall be taken for the finished product.

Rate shall be for a unit of one Square meter.

Item No: 23

Providing and fixing glazed louvered glass ventilators with teak wood frame 10cm x 7 cm size including 3 coats of oil painting to wood work etc.complete.

1.0 Workmanship:

The relevant specifications of description no. 35 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 35 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 24

Wall Painting (two coats) of acrylic emulsion plastic paint of approved brand and manufacture on wall surfaces to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and other foreign matter and sand prepared smooth.
(A) For wall
(B) For Ceilings and soffits of stairs

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

Item No: 25

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete. (A) For wall

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

Item no:- 26

Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc. consisting of following operations.(a) Applying and grouting slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with proprietary water proofing compound confirming to IS 2645 over the R.C.C. slab including cleaning the surface before treatment (b) Laying cement concrete using broken brick bats 25mm to 100mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) proprietary water proofing compound confirming to IS 2645 over 20 mm thick layer of cement mortar 1:5 (1 cement: 5 coarse sand) admixed with admixed with proprietary water proofing compound confirming to IS 2645 to required slope and treating similar surface to adjoined walls up to 300 mm. height including rounding of junctions of walls and slabs.(c) After two days of proper curing, applying a second coat of cement slurry admixed with proprietory water proofing compound conforming to IS:2645.(d) Finishing the surface with 20 mm thick joint less cement mortar of mix 1:4 (1 Cement: 4 Coarse sand) admixed with proprietary water proofing compound conforming to IS:2645 and finally finishing the surface with trowel with neat cement slurry and making of (300x300)mm Square.
(1) The Whole work is to be executed through specialized agency with a guarantee of 10 (ten) years given on a prescribed perform duly stamped. (2) The rate shall include for work at all floors and conducting water proof test as directed.

1.0 Workmanship:

The relevant specifications of description no. 37 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 37 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 27

Providing and fixing wash down water closet European type W.C. pan with integral "P" or "S" trap including jointing the trap with soil pipe in cement mortar 1:1 (1 cement :1 fine sand) (seat and cover to be measured and paid for separately) (A) Vitreous China pattern - 1 in approved colour

1.0 Workmanship:

The relevant specifications of description no. 55 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 55 shall be followed.
Rate shall be for a unit of one No.

Item No: 28

Providing and fixing plastic seat and cover for wash down water closet with CP brass hinges and rubber buffers

The relevant specifications for Material M60 shall be followed.
Rate shall be for a unit of one No.

Item No: 29

Prove & fixing wash basin with single hole for pillar tap at all floor levels, with C.I. or M.S. Brackets painted white including cutting holes & making good the same excluding fittings (A) vitreous china flat wash basin 550 mm x 400 mm size of approved colour.

1.0 Workmanship:
The relevant specifications of description no. 56 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 56 shall be followed.
Rate shall be for a unit of one No.

Item No: 30

Providing & fixing C.P. Brass waste for washbasin. 32 mm Dia

1.0 Workmanship:
The relevant specifications of description no. 66 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 66 shall be followed.
Rate shall be for a unit of one No.

Item No: 31

Providing & fixing pillar tap, capstan head, screw down high pressure with screws shanks and back nuts. (A) 15mm dia.

1.0 Workmanship:
The relevant specifications of description no. 65 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 65 shall be followed.
Rate shall be for a unit of one No.

Item No: 32

Providing & fixing screw down stop tap
(A) 15 mm dia.

1.0 Workmanship:
The relevant specifications of description no. 64 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 64 shall be followed.
Rate shall be for a unit of one No.

Item No: 33

Providing and fixing chromium plate bottle trap with necessary coupling of approved quality for wash-basin.

1.0 Workmanship:
The relevant specifications of description no. 56 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 56 shall be followed.
Rate shall be for a unit of one No.

Item No: 34

Providing and fixing flat back urinal having size 430 mm x 260 mm x 350 mm of approved quality including connecting the Urinal with waste pipe etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 57 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 57 shall be followed.
Rate shall be for a unit of one No.

Item No: 35

Providing& fixing 600 mm x 450mm Beveled edge mirror of superior glass at all floor levels, mounted on 6mm .thick A.C. sheet or plywood sheet in P.V.C. box type frame & fixed to wooden plugs with C.P. brass screws and washers etc.

1.0 Workmanship:
The relevant specifications of description no. 58 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 58 shall be followed.
Rate shall be for a unit of one No.

Item No: 36

Providing and fixing PVC SWR Nahni trap IS 14375 for drain - 100 mm diameter with jali of the following nominal diameter of self cleansing deign with C.I. scread down or hinged grating including the cost of cutting and making good of the wall.outlet.

1.0 Workmanship:
The relevant specifications of description no. 59 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 59 shall be followed.
Rate shall be for a unit of one No.

Item No: 37

Providing and fixing to wall, ceiling and floor 6.0 KG/sq.cm working pressure SWR polythene pipes of the following outside dia low density complete with special flange compression type fittings, wall clips etc. including making good wall ceiling and floor for 75mm dia and 110mm dia.

1.0 Workmanship:
The relevant specifications of description no. 52 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 52 shall be followed.
Rate shall be for a unit of one Rm.

Item No: 38

Providing and fixing S.W. Gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300 x 300 mm size (inside)with standard weight Square mouth Traps. (A) 75 mm Dia.(B) 110 mm Dia

1.0 Workmanship:
The relevant specifications of description no. 60 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 60 shall be followed.
Rate shall be for a unit of one No.

Item No: 39

Providing and constructing simple chamber of 23 cm. thick B.B. masonry wall in C.M.1:5 including 15 mm. thick cement plaster in C.M.1:3 inside and outside to exposed faces, including excavation for chamber bedding concrete in proportion 1:5:10 and fixing C.I cover with frame to be not less than 38 KG. on top etc. complete. Inside dimension 455 mm. X 610 mm and 450 mm deep for single pipe.

1.0 Workmanship:
The relevant specifications of description no. 61 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 61 shall be followed.
Rate shall be for a unit of one No.

Item No: 40

Providing, Lowering and laying R.C.C. NP2 CLASS pipe of the following internal diameter with collars and butt ends prepared for collar joints including testing of pipes and joints etc. complete. 150 mm.dia.

1.0 Workmanship:
The relevant specifications of description no. 63 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 63 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 41

Providing and laying in trenches galvanized mild steel tubes (medium grade) TATA / ZENITH / ASIAN / JINDAL make of the following nominal bore, and tube fittings etc. complete. 25 mm.dia.

1.0 Workmanship:
The relevant specifications of description no. 54 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 54 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 42

Providing laying and jointing in true line and level 25mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be concelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials. (A) 15 mm.dia.,(B) 25 mm.dia.

1.0 Workmanship:

The relevant specifications of description no. 53 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 53 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 43

Providing and fixing C.P brass screw down bib tap at all floor levels, polished bright etc. complete as directed by the Engineer-in -charge. 15 mm dia.

1.0 Workmanship:
The relevant specifications of description no. 64 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 64 shall be followed.
Rate shall be for a unit of one No.

Item No: 44

Providing and fixing M.I. fisher union for wash basin or sink. (A) 32 mm dia

1.0 Workmanship:
The relevant specifications of description no. 67 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 67 shall be followed.
Rate shall be for a unit of one No.

Item No: 45

Providing and fixing gun metal check or non return full way wheel valve at all floor levels, etc. complete.
(A) 15 mm Dia.
(B) 25 mm Dia.

1.0 Workmanship:
The relevant specifications of description no. 68 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 68 shall be followed.
Rate shall be for a unit of one No.

Item No: 46

Providing and fixing chromium plated brass half turn flush cock at all floor levels, of approved quality including fixing in pipe line etc. complete.25 mm dia

1.0 Workmanship:

The relevant specifications of description no. 69 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 69 shall be followed.
Rate shall be for a unit of one No.

Item No: 47

Providing and fixing abonite Ball valve of approved Quality as directed etc. complete.
25 mm dia

1.0 Workmanship:
The relevant specifications of description no. 70 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 70 shall be followed.
Rate shall be for a unit of one No.

Item No: 48

Providing and fixing C.I. manhole cover 0.60 mt. X 0.45 mt. size having weight not less than 35 KG etc complete.

1.0 Workmanship:
The relevant specifications of description no. 71 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 71 shall be followed.
Rate shall be for a unit of one No.

Item No: 49

Providing erecting and fixing double coated SYNTEX or equivalent PVC (ISI) mark water tank of required capacity each with all necessary fittings & connection etc. complete on terrace. 1000 Lit Capacity.

1.0 Workmanship:
The relevant specifications of description no. 51 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 51shall be followed.
Rate shall be for a unit of one Liter.

Item No: 50

Providing and fixing single phase pump motor for pumping of water at different floor level including all fixture and fasteners with all fitting of pipes etc complete.1.0 HP

1.0 Workmanship:
The relevant specifications of description no. 126 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 126 shall be followed.
Rate shall be for a unit of No.

Item No: 51

Providing and fixing M.S. Grills of required pattern to wooden frames of windows etc. at all floor levels with MS flats at required spacing and frame around square or round bars with round headed bolts and nuts or by screw including Priming coat of Read lead paint etc. complete (A) plain grill for all floors. In windows.

1.0 Workmanship:
The relevant specifications of description no. 22 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 22 shall be followed.
Rate shall be for a unit of one Kg.

Item No: 52

Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners , stainless steel bolts etc., of

required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge,(for payment purpose only weight of stainless steel members shall be considered including fixing accessories such as nuts, bolts, fasteners etc.).

Materials:
Stainless Steelrailing shall conform to M.81.

S.S. Pipe:
Stainless Steel pipe of 50 mm dia. of 16 gauge (1.62 mm) thickness of steel grade 312.
S.S. Plate:
Stainless Steel plate of 04 mm thickness of steel grade AISI 316/312.
S.S. Rod:
Stainless Steel rod of 16 mm dia. of steel grade AISI 316/312 plain or twisted as per drawing.

Fixing of railing:
50 mm dia. S.S. hollow pipe and 16 mm S.S. rod of required size shall be fixed on the top of floor/wall or the side of waist slab by welded on S.S. plate of size 100 mm x 100 mm x 4 mm size grouted in floor or side minimum 50 mm depth in rich cement mortar or slurry.

Mode of measurements and payment:
The rate includes cost of all labour, materials tools and plant and other equipment required for satisfactory completion of this item as described in above.
The rate shall be for a unit of one Kg.

ELECTRICAL WORK FOR OFFICE BUILDING

Item No: 53

Point wiring for light / fan /bell / primary point with 2-1.0 sq.mm &earth wire of 1.0 sq.mm (green) both are of ISI marked FR PVC insulated multistand copper wires, in existing pipe duly erected, complete with 6A Tissino Type ISI marked flush type switch.
Light Point (One Light Point controlled with one single way 6 A Switch)
Light Point (One Light Point controlled with two single way 6 A Switch- Two way Light Point)
Fan Point(One Fan Point controlled with one single way 6 A Switch)

1.0 Workmanship:
The relevant specifications of description no. 102 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 102 shall be followed.
Rate shall be for a unit of one No.

Item No: 54

One 5 pin 5A 250 Volt Socket out let point controlled by 6 A switch on board.

1.0 Workmanship:
The relevant specifications of description no. 103 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 103 shall be followed.
Rate shall be for a unit of one No.

Item No: 55

Providing Electronic hum free five steps EME fan regulator of modular type accessories mounted with PVC/Metallic box covered with appropriate front plate modules erected with necessary connection. Cat - II

1.0 Workmanship:
The relevant specifications of description no. 104 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 104 shall be followed.
Rate shall be for a unit of one No.

Item No: 56

Shockproof Tissino type single pole switch 6/16A universal plug socket as per wiring specification.

1.0 Workmanship:
The relevant specifications of description no. 105 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 105 shall be followed.
Rate shall be for a unit of one No.

Item No: 57

Providing 6A/10A/16A/20A/25A/32A/ single pole Modular MCB Switch for A.C. cat-III modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 106 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 106 shall be followed.
Rate shall be for a unit of one No.

Item No: 58

Providing Two pin /RJ -11 Telephone socket with top (Cat III) modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 107 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 107 shall be followed.
Rate shall be for a unit of one No.

Item No: 59

Providing & laying Rigid PVC pipe confirming to I.S.S., erected with necessary fittings fixed with adhesive solution with 16 G. GI fish wire for concealed in wall / slab / Flooring with necessary cementation.
20 mm Size (3/4")
25 mm Size (1")

1.0 Workmanship:
The relevant specifications of description no. 108 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 108 shall be followed.
Rate shall be for a unit of one Running meter.

Item no: 60

Breaking slab/masonry walls for prov. holes to pass main line wiring & reinstating the same as per original condition etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 109 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 109 shall be followed.
Rate shall be for a unit of one No.

Item No: 61

Supply and laying of main lines with ISI marked Copper conductor FRLS / ZHFR PVC insulated copper wire in existing pipe erected with earth continuity wire as specified in specification for following size.
2 wire 1.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 2.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 4.0 mm^2 with 14 SWG / 3 mm^2 Cu. earth wire

1.0 Workmanship:
The relevant specifications of description no. 110 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 110 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 62

Supplying and erecting approved make Telephone Cable electrolytic grade annealed copper conductor insulated with PE insulation twisted in to pairs with colour combination bunched together in concentric layers so as to minimles cross-talk & wrapped with FR PVC tape & sheathed with FR PVC or HFFR outer jacket suitable for indoor telephone wiring & conforming to C-DOT S/WS113/IEC 60189-2, UL1581 section 1080 VW-1 erected with necessary connections.
2 Pair Telephone Cable

1.0 Workmanship:
The relevant specifications of description no. 111 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 111 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 63

Providing and erecting approved make Ceiling fan with double ball bearing ISI mark with condenser A.C 230V. 50 c/s. 1400 mm. sweep complete, canopy and 30 cms. Down rod erected on existing hook or clamp with 24/0.2 flat 3 core flexible copper wire with earthing(or R.C. Rate) make shall be approved by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 112 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 112 shall be followed.
Rate shall be for a unit of one No.

Item No: 64

Supplying & erecting approved make 1 x 40 watt white stiove enameled patti type flouresent fitting made of M.S. Sheet 0.8 mm thick white or reflector side. Complete with 40 watts polyester heavy duty copper wound ballast, lock type tube holders, starter, duly wired for use on 250 volt A.C. supply and erected if required on varnish P.W. block/PVC block with lead wires& connection.
Cat.II

1.0 Workmanship:
The relevant specifications of description no. 113 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 113 shall be followed.
Rate shall be for a unit of one No.

Item No: 65

Four pole MCB type change over switch 415 V, 25A with powder coated MS enclosure confirming to I.S.13947 erected on polished wooden block.

1.0 Workmanship:
The relevant specifications of description no. 114 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 114 shall be followed.

Rate shall be for a unit of one No.

Item No: 66

Providing and erecting Sheet Steel powder coated MCB distribution board- cat-III, flush/surface mounted fitted with bushbar, neutral link, earth bar and din rail conforming to IS 13032 and BS 5486- 1986 without MCB to house appropriate nos of MCBs (B) single phase 4 way SS double door.

1.0 Workmanship:
The relevant specifications of description no. 115 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 115 shall be followed.
Rate shall be for a unit of one No.

Item No: 67

Supply, Erection of Miniature circuit breaker single pole 6A to 32A type B curve suitable to operate on 230 V. A.C. system and having overload and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to

1.0 Workmanship:
The relevant specifications of description no. 116 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 116 shall be followed.
Rate shall be for a unit of one No.

Item No: 68

Supplying & erecting funnel type earthing having earth plate of 60 x 60 x 0.315 cms, copper earth plate burred in specifically prepared earth pit 3 mt. below ground with 40 kg. charcoal and salt with alternate layers of charcoal & salt, 20 mm dia. G.I. pipe with Funnel with a wire mesh for watering & bricks masonry block, C.I. Cover complete as per Para 7.3 of IS 3043 with necessary length of double Galvanized Iron / copper earth wire No 6 SWG bolted with lug to the plate and covered in 12 mm dia. G.I. pipe 2.5 mt long complete connected to the nearest switch gear with end socket as per direction & duly tested by earth tester confirming to IS (As per drawing) with following specification.

1.0 Workmanship:
The relevant specifications of description no. 117 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 117 shall be followed.
Rate shall be for a unit of one No.

Item No: 69

Providing & erecting Nominal Bore 16 gauge steel conduit painted black pipe with necessary saddles, screws ,bends, junction boxes with 16 G GI fish wire etc. 50 mm dia pipe erecting concealed in wall/slab along fish wire to draw mains, laid in approved manner with plastering by cement mortar & finishing the surface to match the wall ceiling.

1.0 Workmanship:
The relevant specifications of description no. 118 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 118 shall be followed.
Rate shall be for a unit of one Running meter.

(4) TUBE WELL

The relevant specifications of description No - 5 & No 92 to No 101 shall be followed as per price bid item and unit also same as per price bid.

(5) Underground Water Tank

Item No: 1

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area instructed.
(A) Loose or soft soil, soft rock and Hard rock
(1) Up to 1.5 Mt. Depth
(2) 1.50 to 3.0 Mt. Depth

1.0 Workmanship:
The relevant specifications of description no.4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 40 nominal size) and curing complete including cost of formwork in.
(A) Foundation and Plinth

1.0 Workmanship:
The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 3

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding cost of reinforcement for reinforced concrete work in (A) Base slab (B) wall (C) top slab

1.0 Workmanship:
The relevant specifications of description no. 12 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 12 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing and laying 50 Thick IPS Flooring in proportion 1:2:4 with a floating coat of neat cement, finishing, curing etc. complete

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 5

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 6

Providing and applying 20 mm thick Water proof cement plaster using water proofing compounbd as per specification to the concrete walls and similar surfaces for plastering a in CM 1:3 (1 cement : 3 sand) etc complete.

1.0 Materials:

The Relevant Specification of Description No. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 21 shall be followed.
The Rate shall be for a unit of one square meter.

Item No: 7

RCC Precast M.H. Frame & Cover Manufacture, supply & Delivery at store or at site of work precast RCC M.200 Frame & cover suitable to drainage M.H. and as per type design & Drawing including cost of reinforcement M.S. Angles or plate, curing mold work etc. Frame & cover suitable for 50 cm opening. (Light Duty- 10 MT)

1.0 Materials:

The Relevant Specification of Description No. 71A shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 71A shall be followed.
The Rate shall be for a unit of one number.

Item No: 8

Providing & installing testing and commissioning of pumping Machinery with penal board wiring etc. comp. (Submersible pump set)
2.5 HP (Horizontal) & 1.5 HP (Horizontal)

1.0 Materials:

The Relevant Specification of Description No. 101 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 101 shall be followed.
The Rate shall be for a unit of one number.

(6) TOILET BLOCK

Item No: 1

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area instructed.
(A) Loose or soft soil, soft rock and Hard rock
(1) Up to 1.5 Mt. Depth
(2) 1.50 to 3.0 Mt. Depth

1.0 Workmanship:

The relevant specifications of description no.4 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Providing and laying cement concrete 1:3:6 (1cement: 3 sand: 6 graded stone aggregates 40 nominal size) and curing complete including cost of formwork in.
(A) Foundation and Plinth

1.0 Workmanship:

The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 3

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding cost of reinforcement for reinforced concrete work in (A) Foundation, footing, base of columns and Mass concrete.

1.0 Workmanship:

The relevant specifications of description no. 12 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 12 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 4

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement for reinforced concrete work in
(A) Columns (B) Beam, etc.

1.0 Workmanship:

The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 5

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 6

Providing and constructing brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth in cement mortar 1:6 (1 cement : 6 fine sand)
(B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 7

Filling in trenches with available excavated earth (excluding rock in trenches plinth, sides of foundations etc. in layer not exceeding 20 cm in depth consolidating each desposalite layer by ramming and watering.)

1.0 Materials:

The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 7 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 8

Providing and filling in plinth with yellow soil or selected soil in layers of 23 cm in thickness including watering, ramming and consolidation etc. complete.

1.0 Workmanship:

The relevant specifications of description no. 8 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 8 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 9

Providing and applying 20 mm thick sand faced cement plaster on walls or similar surfaces consisting of 12 cm thick backing cost of CM 1:3 (1 cement : 3 sand) and 8 cm thick finishing cost of CM 1:1 (1 cement :1 sand) etc complete.

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21 shall be followed. Rate shall be for a unit of Square meter.

Item No: 10

Providing and applying finishing wall and surfaces with water proofing cement paint (three coats) of approved brand and manufacture and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powdered material.
(A) For wall

Workmanship:
The relevant specifications of description no. 41 shall be followed.

Mode of Measurement and Payment:
The relevant specifications of description no. 41 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 11

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but excluding cost of reinforcement reinforced concrete work in column, beam, slab, wall etc.

1.0 Workmanship:
The relevant specifications of description no. 13 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 13 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 12

Providing TMT FE - 500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:
The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 13

Providing and constructing brick work using common burnt clay build bricks having crushing strength not less than 35 KG/SQ CM in foundation and plinth and up to floor two level in cement mortar 1:6 (1 cement : 6 fine sand)
(B) Conventional

1.0 Materials:
The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:
The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one Square meter.

Item No: 14

Providing and applying 12 mm thick cement plaster in single coat on brick / concrete walls and similar surfaces for plastering and finishing even in smooth and finishing with a floating coat of cement slurry in CM 1:3 (1 cement : 3 sand) etc complete.
(a) Walls
(b) For ceiling and soffits of stair

1.0 Workmanship:
The relevant specifications of description no. 20 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 20 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 15

Providing and applying 20 mm thick sand faced cement plaster on walls or similar surfaces consisting of 12 cm thick backing cost of CM 1:3 (1 cement : 3 sand) and 8 cm thick finishing cost of CM 1:1 (1 cement :1 sand) etc complete.

1.0 Workmanship:
The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 21 shall be followed. Rate shall be for a unit of Square meter.

Item No: 16

Providing and laying green polished kota stone slab flooring over 20 mm (average) thick base of cement mortar 1:6 (1cement: 6 sand) laid over and joined with grey cement slurry including and polishing etc. complete. (A) 25 mm thick

1.0 Workmanship:
The relevant specifications of description no. 28shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no.28 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 17

Providing and laying white glazed tiles 6mm. thick of Orient, Kajaria, Johnson, Nitco, Somani, Bell make at all floor levels, in flooring on 12 mm thick (average) cement plaster 1:3(1 cement : 3 coarse sand) including necessary cement paste for fixing and jointed with white cement slurry etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 31 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no.31 shall be followed.

Rate shall be for a unit of one Square meter.

Item No: 18

Providing and laying white glazed tiles 6mm. thick of Orient, Kajaria, Johnson, Nitco, Somani, Bell make at all floor levels, in skirting, and dado on 10 mm thick (average) cement plaster 1:3(1 cement : 3 coarse sand) including necessary cement paste for fixing and jointed with white cement slurry etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 32 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no.32 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 19

Providing and fixing 35 mm finished thick Indian teakwood shutters, for doors, windows and clear storey windows including the salwood frames of finished size 12 cm x 7 cm including medium quality anodised aluminum fixtures and fastenings including primer coat of approved quality and two coats of oil painting etc. complete.(1) Fully paneled

1.0 Workmanship:
The relevant specifications of description no. 34 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 34 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 20

Providing and fixing glazed louvered glass ventilators with teak wood frame 10cm x 7 cm size including 3 coats of oil painting to wood work etc.complete.

Materials

Indian Teak wood shall conform to M-29. Glass shall conform to M-38.

Workmanship:
The relevant specified Description No.34 shall be followed for frame work except that the frame works of 10 x 7 cms. Size of required size ventilators shall be provided with glazed glass louvers. The glass louvers shall be provided as directed. In the groove of 1.25 cms. depth made in frames the thickness of glass shall be 5 mm. and glass shall be glass of best quality The ventilation blades shall slope down towards the outside at an angle 45 0

Mode of measurements & payment:
The area of opening within the frame in which louvers are fixed shall be measured in sq.metres. The rate includes painting 3 coats of wood work with ready mix paint.

The rate shall be for a unit of one square meter.

Item No: 21

Providing and fixing glazed louvered glass ventilators with teak wood frame 10cm x 7 cm size including 3 coats of oil painting to wood work etc.cProviding and applying acrylic emulsion plastic paint (Two Coats) of approved brand and manufacture to give an even shade including thoroughly brushing the surface free from mortar dropings and other foreign matter and sand papered smooth etc complete. for Wall

1.0 Workmanship:
The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

Item No: 22

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete. (A) For wall

1.0 Workmanship:
The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

Item No: 23

Providing and fixing wash down water closet European type W.C. pan with integral "P" or "S" trap including jointing the trap with soil pipe in cement mortar 1:1 (1 cement :1 fine sand)

1.0 Workmanship:
The relevant specifications of description no. 55 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 55 shall be followed.
Rate shall be for a unit of one No.

Item No: 24

Providing and fixing plastic seat and cover for wash down water closet with CP brass hinges and rubber buffers

The relevant specifications for Material M60 shall be followed.
Rate shall be for a unit of one No.

Item No: 25

Prove & fixing wash basin with single hole for pillar tap at all floor levels, with C.I. or M.S. Brackets painted white including cutting holes & making good the same excluding fittings (A) vitreous china flat wash basin 550 mm x 400 mm size of approved colour.

1.0 Workmanship:
The relevant specifications of description no. 56 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 56 shall be followed.
Rate shall be for a unit of one No.

Item No: 26

Providing & fixing C.P. Brass waste for washbasin. 32 mm Dia

1.0 Workmanship:
The relevant specifications of description no. 66 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 66 shall be followed.
Rate shall be for a unit of one No.

Item No: 27

Providing & fixing pillar tap, capstan head, screw down high pressure with screws shanks and back nuts. (A) 15mm dia.

1.0 Workmanship:
The relevant specifications of description no. 65 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 65 shall be followed.
Rate shall be for a unit of one No.

Item No: 28

Providing & fixing screw down stop tap
(A) 15 mm dia.

1.0 Workmanship:
The relevant specifications of description no. 64 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 64 shall be followed.
Rate shall be for a unit of one No.

Item No: 29

Providing and fixing chromium plate bottle trap with necessary coupling of approved quality for wash-basin.

1.0 Workmanship:
The relevant specifications of description no. 56 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 56 shall be followed.
Rate shall be for a unit of one No.

Item No: 30

Providing and fixing flat back urinal having size 430 mm x 260 mm x 350 mm of approved quality including connecting the Urinal with waste pipe etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 57 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 57 shall be followed.
Rate shall be for a unit of one No.

Item No: 31

Providing & fixing 600 mm x 450mm Beveled edge mirror of superior glass at all floor levels, mounted on 6mm .thick A.C. sheet or plywood sheet in P.V.C. box type frame & fixed to wooden plugs with C.P. brass screws and washers etc.

1.0 Workmanship:
The relevant specifications of description no. 58 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 58 shall be followed.
Rate shall be for a unit of one No.

Item No: 32

Providing and fixing PVC SWR Nahni trap IS 14375 for drain - 100 mm diameter with jali of the following nominal diameter of self cleansing deign with C.I. scread down or hinged grating including the cost of cutting and making good of the wall.outlet.

1.0 Workmanship:
The relevant specifications of description no. 59 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 59 shall be followed.
Rate shall be for a unit of one No.

Item No: 33

Providing and fixing to wall, ceiling and floor 6.0 KG/sq.cm working pressure SWR polythene pipes of the following outside dia low density complete with special flange compression type fittings, wall clips etc. including making good wall ceiling and floor for 75mm dia and 110mm dia.

1.0 Workmanship:
The relevant specifications of description no. 52 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 52 shall be followed.
Rate shall be for a unit of one Rm.

Item No: 34

Providing and fixing S.W. Gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300 x 300 mm size (inside)with standard weight

Square mouth Traps (A) 100 X 300 mm Size – P type

1.0 Workmanship:
The relevant specifications of description no. 60 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 60 shall be followed.
Rate shall be for a unit of one No.

Item No: 35

Providing and constructing chamber of 23 cm. thick B.B. masonry wall in C.M.1:5 including 15 mm. thick cement plaster in C.M.1:3 inside and outside to exposed faces, including excavation for chamber bedding concrete in proportion 1:5:10 and fixing C.I cover with frame to be not less than 38 KG. RCC top slab 1:2:4 Mix, finish smooth with floating coat of neat cement etc. complete. Inside dimension 500 mm. X 700 mm and 450 mm deep for single pipe.

1.0 Workmanship:
The relevant specifications of description no. 61 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 61 shall be followed.
Rate shall be for a unit of one No.

Item No: 36

Providing, Lowering and laying R.C.C. NP2 CLASS pipe of the following internal diameter with collars and butt ends prepared for collar joints including testing of pipes and joints etc. complete. 150 mm.dia.

2.0 Workmanship:
The relevant specifications of description no. 63 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 63 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 37

Providing and laying in trenches galvanized mild steel tubes (medium grade) TATA / ZENITH / ASIAN / JINDAL make of the following nominal bore, and tube fittings etc. complete. 25 mm.dia.

1.0 Workmanship:
The relevant specifications of description no. 54 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 54 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 38

Providing laying and jointing in true line and level 25mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be concelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials. (A) 15 mm.dia.,(B) 25 mm.dia.

1.0 Workmanship:

The relevant specifications of description no. 53 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 53 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 39

Providing and fixing C.P brass screw down bib tap at all floor levels, polished bright etc. complete as directed by the Engineer-in -charge. 15 mm dia.

1.0 Workmanship:
The relevant specifications of description no. 64 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 64 shall be followed.
Rate shall be for a unit of one No.

Item No: 40

Providing and fixing M.I. fisher union for wash basin or sink. (A) 32 mm dia

1.0 Workmanship:
The relevant specifications of description no. 67 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 67 shall be followed.

Rate shall be for a unit of one No.

Item No: 41

Providing and fixing gun metal check or non return full way wheel valve at all floor levels, etc. complete.
(A) 15 mm Dia.
(B) 25 mm Dia.

1.0 Workmanship:
The relevant specifications of description no. 68 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 68 shall be followed.
Rate shall be for a unit of one No.

Item No: 42

Providing and fixing chromium plated brass half turn flush cock at all floor levels, of approved quality including fixing in pipe line etc. complete.25 mm dia

1.0 Workmanship:

The relevant specifications of description no. 69 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 69 shall be followed.
Rate shall be for a unit of one No.

Item No: 43

Providing and fixing abonite Ball valve of approved Quality as directed etc. complete.
25 mm dia

1.0 Workmanship:
The relevant specifications of description no. 70 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 70 shall be followed.
Rate shall be for a unit of one No.

Item No: 44

Providing and fixing C.I. manhole cover 0.60 mt. X 0.45 mt. size having weight not less than 35 KG etc complete.

1.0 Workmanship:
The relevant specifications of description no. 71 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 71 shall be followed.
Rate shall be for a unit of one No.

Item No: 45

Providing erecting and fixing double coated SYNTEX or equivalent PVC (ISI) mark water tank of required capacity each with all necessary fittings & connection etc. complete on terrace. 2000 Lit Capacity.

1.0 Workmanship:
The relevant specifications of description no. 51 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 51shall be followed.
Rate shall be for a unit of one Liter.

Item No: 46

Providing and fixing single phase pump motor for pumping of water at different floor level including all fixture and fasteners with all fitting of pipes etc complete.1.0 HP

1.0 Workmanship:
The relevant specifications of description no. 126 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 126 shall be followed.
Rate shall be for a unit of No.

ELECTRICAL WORK

Item No: 47

Point wiring for light / fan /bell / primary point with 2-1.0 sq.mm & earth wire of 1.0 sq.mm (green) both are of ISI marked FR PVC insulated multistand copper wires, in existing pipe duly erected, complete with 6A Tissino Type ISI marked flush type switch.
Light Point (One Light Point controlled with one single way 6 A Switch)
Light Point (One Light Point controlled with two single way 6 A Switch- Two way Light Point)
Fan Point(One Fan Point controlled with one single way 6 A Switch)

1.0 Workmanship:
The relevant specifications of description no. 102 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 102 shall be followed.
Rate shall be for a unit of one No.

Item No: 48

One 5 pin 5A 250 Volt Socket out let point controlled by 6 A switch on board.

1.0 Workmanship:
The relevant specifications of description no. 103 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 103 shall be followed.
Rate shall be for a unit of one No.

Item No: 49

Shockproof Tissino type single pole switch 6/16A universal plug socket as per wiring specification.

1.0 Workmanship:
The relevant specifications of description no. 105 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 105 shall be followed.
Rate shall be for a unit of one No.

Item No: 50

Providing & laying Rigid PVC pipe confirming to I.S.S., erected with necessary fittings fixed with adhesive solution with 16 G. GI fish wire for concealed in wall / slab / Flooring with necessary cementation.
20 mm Size (3/4")
25 mm Size (1")

1.0 Workmanship:
The relevant specifications of description no. 108 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 108 shall be followed.
Rate shall be for a unit of one Running meter.

Item no: 51

Breaking slab/masonry walls for prov. holes to pass main line wiring & reinstating the same as per original condition etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 109 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 109 shall be followed.
Rate shall be for a unit of one No.

Item No: 52

Supply and laying of main lines with ISI marked Copper conductor FRLS / ZHFR PVC insulated copper wire in existing pipe erected with earth continuity wire as specified in specification for following size.
2 wire 1.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 2.5 mm^2 with 1.5 mm^2 Cu. earth wire
2 wire 4.0 mm^2 with 14 SWG / 3 mm^2 Cu. earth wire

1.0 Workmanship:

The relevant specifications of description no. 110 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 110 shall be followed.
Rate shall be for a unit of one Rmt.

Item No: 53

Supplying & erecting approved make 1 x 40 watt white stiove enameled patti type flouresent fitting made of M.S. Sheet 0.8 mm thick white or reflector side. Complete with 40 watts polyester heavy duty copper wound ballast, lock type tube holders, starter, duly wired for use on 250 volt A.C. supply and erected if required on varnish P.W. block/PVC block with lead wires & connection.
Cat.II

1.0 Workmanship:

The relevant specifications of description no. 113 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 113 shall be followed.
Rate shall be for a unit of one No.

Item No: 54

Four pole MCB type change over switch 415 V, 25A with powder coated MS enclosure confirming to I.S.13947 erected on polished wooden block.

1.0 Workmanship:

The relevant specifications of description no. 114 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 114 shall be followed.

Rate shall be for a unit of one No.

Item No: 55

Providing and erecting Sheet Steel powder coated MCB distribution board- cat-III, flush/surface mounted fitted with bushbar, neutral link, earth bar and din rail conforming to IS 13032 and BS 5486- 1986 without MCB to house appropriate nos of MCBs (B) single phase 4 way SS double door.

1.0 Workmanship:

The relevant specifications of description no. 115 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 115 shall be followed.
Rate shall be for a unit of one No.

Item No: 56

Supply, Erection of Miniature circuit breaker single pole 6A to 32A type B curve suitable to operate on 230 V. A.C. system and having overload and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to

1.0 Workmanship:
The relevant specifications of description no. 116 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 116 shall be followed.
Rate shall be for a unit of one No.

Item No: 57

Supplying & erecting funnel type earthing having earth plate of 60 x 60 x 0.315 cms, copper earth plate burred in specifically prepared earth pit 3 mt. below ground with 40 kg. charcoal and salt with alternate layers of charcoal & salt, 20 mm dia. G.I. pipe with Funnel with a wire mesh for watering & bricks masonry block, C.I. Cover complete as per Para 7.3 of IS 3043 with necessary length of double Galvanized Iron / copper earth wire No 6 SWG bolted with lug to the plate and covered in 12 mm dia. G.I. pipe 2.5 mt long complete connected to the nearest switch gear with end socket as per direction & duly tested by earth tester confirming to IS (As per drawing) with following specification.

1.0 Workmanship:
The relevant specifications of description no. 117 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 117 shall be followed.
Rate shall be for a unit of one No.

(7) Weigh_Bridge

Item No: 1

Excavation for foundation including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 mt. lead and all lift and watering etc. Complete.
(A) Loose or soft soil, soft rock and hard rock
(1) Up to 1.5 Mt. Depth
(2) 1.5 to 3.0 Mt. Depth
(3) 3.0 to 4.5 Mt. Depth

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Providing and laying rubble stone soling 230 mm thick including hand picking and compacting complete

1.0 Materials:

The Relevant Specification of Description No. 17 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 17 shall be followed.
The Rate shall be for a unit of one Square meter.

Item No: 3

Providing and laying cement concrete 1:3:6 (1 cement : 3 sand : 6 graded stone aggregates 40 nominal size) and curing complete excluding cost of form work in:

1.0 Workmanship:

The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of Cubic meter.

Item No: 4

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but including cost of reinforcement in reinforced concrete work in (A) Foundation, footing, base of columns and Mass concrete.

1.0 Materials:

The Relevant Specification of Description No. 12 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 12 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 5

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but including cost of reinforcement in reinforced concrete work in
A) Columns, (B) Beam, (C) Slab, (D) Pardi, etc.

1.0 Materials:

The Relevant Specification of Description No. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 13 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 6

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two level.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 7

Providing and constructing brick masonry work using common burnt clay build bricks confirming to IS: 13757, IS: 5454, IS: 3495, IS: 3812 having crushing strength not less than 35 kg./ Sq. Cm. in foundation and plinth in cement mortar 1:6 (1cement :6 fine sand)
(B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 8

Filling in trenches with available excavated earth (excluding rock in trenches plinth, sides of foundations etc. in layer not exceeding 20 cm in depth consolidating each desposalite layer by ramming and watering.)

1.0 Materials:

The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 7 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 9

Providing and applying 20 mm. thick sand faced cement plaster on walls or similar surfaces at all floor levels consisting of 12 mm. average thick backing coat of Cu.m.1:3 (1cement: 3 sand) and 8 mm. Thick finishing coat of Cu.m. 1:1 (1 cement: 1 sand)

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 10

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete. (A) For wall

1.0 Workmanship:
The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

Item No: 11

Steel work welded, in built up section, framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint. MS angle of size 100 x 100 x 6 mm at vertical portion of column for protection.

1.0 Workmanship:
The relevant specifications of description no. 22 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 22 shall be followed.
Rate shall be for a unit of one Kg.

Item No: 12

Applying priming coat over new steel and other metal surface after over and including preparing the surface by thoroughly cleaning oil, grease dirt and other foreign matter and scoured with brushes fine steel wool, scrapers and sand paper with ready mixed priming paint brushing red lead etc complete.

1.0 Workmanship:
The relevant specifications of description no. 44 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 44 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 13

Painting two coats (excluding priming coat) on new steel and other metal surfaces with enamel paint brushing, interior to give enamel paint brushing, interior to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.

1.0 Workmanship:

The relevant specifications of description no. 45 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 45 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 14

Supply and install/commission on finished foundation 01 No. UNIQUE, METRIX, EVERY, EAGLE, APPLE or equivalent make pit-less type fully Electronic weighbridge platform size 9 m x 3 meters for 50 MT capacity including applying oil paint, etc complete.

1.0 Workmanship:

The relevant specifications of description no. 125 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 125 shall be followed.
Rate shall be for a unit of No.

Office Building for weigh bridge up to Ground level

Item No: 15

Excavation for foundation including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 mt. lead and all lift and watering etc. Complete.
(A) Loose or soft soil, soft rock and hard rock
(1) Up to 1.5 Mt. Depth
(2) 1.5 to 3.0 Mt. Depth
(3) 3.0 to 4.5 Mt. Depth

1.0 Workmanship:

The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 16

Providing and laying cement concrete 1:3:6 (1 cement : 3 sand : 6 graded stone aggregates 40 nominal size) and curing complete excluding cost of form work in:

1.0 Workmanship:

The relevant specifications of description no. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 10 shall be followed.
Rate shall be for a unit of Cubic meter.

Item No: 17

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but including cost of reinforcement in reinforced concrete work in
(A) Foundation, footing, base of columns and Mass concrete.

1.0 Materials:

The Relevant Specification of Description No. 12 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 12 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Rate shall be for a unit of one Square meter.

Item No: 18

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of form work but including cost of reinforcement in reinforced concrete work in
A) Columns, (B) Beam, (C) Slab, (D) Pardi, etc.

1.0 Materials:

The Relevant Specification of Description No. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 13 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 19

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 20

Providing and constructing brick masonry work using common burnt clay build bricks confirming to IS: 13757, IS: 5454, IS: 3495, IS: 3812 having crushing strength not less than 35 kg./ Sq. Cm. in foundation and plinth in cement mortar 1:6 (1cement :6 fine sand)
(B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 21

Filling in trenches with available excavated earth (excluding rock in trenches plinth, sides of foundations etc. in layer not exceeding 20 cm in depth consolidating each desposalite layer by ramming and watering.)

1.0 Materials:

The Relevant Specification of Description No. 7 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 7 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 22

Providing and filling in plinth with murrum or selected soil in layers of 20 cm in thickness including watering, ramming and consolidation etc. complete.

1.0 Materials:

The Relevant Specification of Description No. 8 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 8 shall be followed.

The Rate shall be for a unit of one Cubic meter.

Item No: 23

Providing and applying 20 mm. thick sand faced cement plaster on walls or similar surfaces at all floor levels consisting of 12 mm. average thick backing coat of Cu.m.1:3 (1cement: 3 sand) and 8 mm. Thick finishing coat of Cu.m. 1:1 (1 cement: 1 sand)

1.0 Workmanship:

The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 21shall be followed.

Rate shall be for a unit of Square meter.

Item No: 24

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete. (A) For wall

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

WORK ABOVE PLINTH

Item No: 25

Providing & laying controlled cement concrete M250 proportions of ingredients as per mix design by weigh batching using and curing complete including the cost of form work but excluding cost of reinforcement in reinforced concrete work in
A) Columns, (B) Beam, (C) Slab, (D) Lintel,(E) Chhajja etc.

1.0 Materials:

The Relevant Specification of Description No. 13 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 13 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 26

Providing TMT FE-500 bar reinforcement for R.C.C. work including bending & placing in position complete Up to floor two levels.

1.0 Materials:

The Relevant Specification of Description No. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 14 shall be followed.
The Rate shall be for a unit of one kg.

Item No: 27

Providing and constructing brick masonry work using common burnt clay build bricks confirming to IS: 13757, IS: 5454, IS: 3495, IS: 3812 having crushing strength not less than 35 kg./ Sq. Cm. in foundation and plinth in cement mortar 1:6 (1cement :6fine sand)
(B) Conventional

1.0 Materials:

The Relevant Specification of Description No. 18 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 18 shall be followed.
The Rate shall be for a unit of one Cubic meter.

Item No: 28

Providing and applying 12 mm thick cement plaster in single coat on brick / concrete walls and similar surfaces for plastering and finishing even in smooth and finishing with a floating coat of cement slurry in CM 1:3 (1 cement : 3 sand) etc complete.
(a) Walls
(b) For ceiling and soffits of stair

1.0 Workmanship:
The relevant specifications of description no. 20 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 20 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 29

Providing and applying 12 mm thick cement plaster in single coat on brick / concrete walls and similar surfaces for plastering and finishing even in smooth and finishing with a floating coat of cement slurry in CM 1:3 (1 cement : 3 sand) etc complete

1.0 Workmanship:
The relevant specifications of description no. 20 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 20 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 30

Providing and applying 20 mm. thick sand faced cement plaster on walls or similar surfaces at all floor levels consisting of 12 mm. average thick backing coat of Cu.m.1:3(1cement: 3 sand) and 8 mm. Thick finishing coat of Cu.m. 1:1 (1cement: 1 sand)

1.0 Workmanship:
The relevant specifications of description no. 21 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 21 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 31

Proving 35 mm wide trotting or plaster drip and moulding it to R.C.C. chajja etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 15shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 15 shall be followed.
Rate shall be for a unit of Running meter.

Item No: 32

Providing 20 mm deep finished groove in plaster in line and level etc. complete

1.0 Workmanship:
The relevant specifications of description no. 16 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 16 shall be followed.
Rate shall be for a unit of running meter.

Item No: 33

Providing and laying green polished kota stone slab flooring over 20 mm (average) thick base of cement mortar 1:6 (1cement: 6 sand) laid over and joined with grey cement slurry including and polishing etc. complete. (A) 25 mm thick

1.0 Workmanship:
The relevant specifications of description no. 28 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no.28 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 34

Providing and laying polished marble stone slab 25 mm in risers of steps, dado and pillars laid on 10 mm thick cement mortar 1:3 (1cement: 3 sand) and jointed with grey cement slurry including and polishing etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 29 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 29 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 35

Providing & Fixing Marble stone 20 mm thick 1000 mm X 450 mm size including fixing in cement mortar 1:3 (1 cement : 3 sand)

1.0 Workmanship:
The relevant specifications of description no. 28 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 28 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 36

Providing and fixing 30 mm thick factory made PVC rigid foam paneled door shutters manufactured by M/s. Rajshri or equivalent made from M.S. tube of 19 gauge thickness, size 19 x 19 mm for styles and 15 x 15 mm for top and bottom rails, covered with heat moulded PVC "C" channel of 5 mm thick sheet and 30 x 50 mm wide to from styles and 5 mm thick and 75 mm wide PVC sheet for top rail, lock rail and bottom rail on either side and 5 mm thick, 20 mm wide cross PVC sheet as gap insert for top rail and bottom rail, panelling of 5 mm thick PVC sheet fitted in the M.S. frame welded/ sealed to the style and rails with 5 x 30 mm PVC sheet beading on either side and joined together with solvent cement adhesive etc., completed as per manufacturers specification and direction of Engineer-in-charge fixed to frames with 4 Nos. 125MM Stainless Steel butt hinges with necessary screws. (cupboard shutters)

1.0 Workmanship:
The relevant specifications of description no. 36 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 36 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 37

Constructing a platform 60 cm width and 70 cm height resting on B.B. masonry walls 23 cm thick in CM 1:6 with
(ii) Fixing kota stone laid on precast R.C.C. 1:2:4 slab with plastering on exposed faces of wall in CM (1:4) etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 33 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 33 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 38

Providing and fixing 35 mm. finished thick Indian teakwood shutters, for doors, windows and clear storey windows including the salwood frames of finished size 12 cm x 7 cm. including medium quality anodized aluminum fixtures and fastenings including primer coat of approved quality and two coats of oil painting etc. complete.
(1) Fully paneled for doors

1.0 Workmanship:
The relevant specifications of description no. 34 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 34 shall be followed.

Rate shall be for a unit of one Square meter.

Item No: 39

Providing and fixing window having extruded aluminum Colour anodized section frame main outer size 95mm x 24mm x 1.17mm (of Jindal Section no:2459 @ wt.of 0.738 Kg/mt), horizontal Three track member size 92mm x 31.75mm x 1.30mm (of Jindal Section no:8688,@ Wt.1.07 Kg/mt), vertical member of size 92mm x 31.75mm x 1.50mm (of Jindal Section no:8933,@ Wt. 1.06 Kg/mt) with sliding shutters of horizontal member size 40 mmx18mm x1.29mm (of Jindal Section no:8947@ wt.of 0.456 Kg/mt), vertical member of size 40mm x 18mm x 1.29 mm (of Jindal Section no:8949 @ wt.of 0.456Kg/mt/ with 5 mm thick transparent bronze colour tinted float glass with powder coated aluminum fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc all completed

1.0 Workmanship:

The relevant specifications of M 31 shall be followed

Preparing the surface for the fixing of aluminum frame. Providing and fixing aluminum door frame as per the details of instruction given by the site in charge with proper alignment and precautions. Providing and fixing sheet glass with acid frosting as per architects detail and as per the details or instruction give by the Engineer in charge with necessary precautions. Aluminum doors, frame, glass etc. shall be cleaned after the completion of work as per instruction of Engineer in charge.

2.0 Mode of Measurement and Payment:

Rates include all materials, labour and tools including providing and fixing aluminum sheet, nails etc. complete. The measurement shall be taken for the finished product.

Rate shall be for a unit of one Square meter.

Item No: 40

Providing and fixing glazed louvered glass ventilators with teak wood frame 10cm x 7 cm size including 3 coats of oil painting to wood work etc. complete.

1.0 Workmanship:

The relevant specifications of description no. 35 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 35 shall be followed.
Rate shall be for a unit of one Square meter.

Item No: 41

Wall Painting (two coats) of acrylic emulsion plastic paint of approved brand and manufacture on wall surfaces to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and other foreign matter and sand prepared smooth.
(A)For wall
(B) For Ceilings and soffits of stairs

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

Rate shall be for a unit of Square meter.

Item No: 42

Providing an applying finishing wall and similar surfaces two coats with base coat apex superior quality of weather shield max paint on outer side manufacture approved by Engineer in charge and in required shape, even shade after thoroughly brushing and watering the surface to remove all dust, dirt and remains of loose powered materials and curing etc. complete. (A) For wall

1.0 Workmanship:

The relevant specifications of Item description no. 21 of transfer station shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of Item description no. 21 of transfer station shall be followed.
Rate shall be for a unit of Square meter.

Item No: 43

Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc. consisting of following operations.(a) Applying and grouting slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with proprietary water proofing compound confirming to IS 2645 over the R.C.C. slab including cleaning the surface before treatment

(b) Laying cement concrete using broken brick bats 25mm to 100mm size with 50% of cement mortar 1:5 (1 cement: 5 coarse sand) proprietary water proofing compound confirming to IS 2645 over 20 mm thick layer of cement mortars 1:5 (1 cement: 5 coarse sand) admixed with admixed with proprietary water proofing compound confirming to IS 2645 to required slope and treating similar surface to adjoined walls up to 300 mm. height including rounding of junctions of walls and slabs.

(c) After two days of proper curing, applying a second coat of cement slurry admixed with proprietory water proofing compound conforming to IS: 2645.

(d) Finishing the surface with 20 mm thick joint less cement mortar of mix 1:4 (1 Cement: 4 Coarse sand) admixed with proprietary water proofing compound conforming to IS:2645 and finally finishing the surface with trowel with neat cement slurry and making of (300 x 300) mm square.

(e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All active operations to be down in order and as directed and specified by the engineer-in-charge. With average thickness of 120 mm and minimum thickness at khurra as 65 mm. (Cement consumption 0.642 Bags/S.M.)

NOTE;- (1) The Whole work is to be executed through specialised agency with a guarantee of 10 (ten) years given on a prescribed proforma duly stamped. (2) The rate shall include for work at all floors and conducting water proof test as directed.

1.0 Workmanship:

The relevant specifications of description no. 37 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 37 shall be followed.
Rate shall be for a unit of Square meter.

Item No: 44

Providing and fixing U-PVC pipes (SWR) confirming to IS no. 13592 (Type "B") of Prince/Supreme/Jain make for soil and waste discharge system at all floor level including. All fixtures like bends, tees, shoes etc.jointed with resin of approved brand & manufacture etc.complete. (A) 75 mm dia

1.0 Workmanship:
The relevant specifications of description no. 52 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 52 shall be followed.
Rate shall be for a unit of Running meter.

Item No: 45

Supplying approved make window type Air Conditioning machine comprising of hermetically sealed compressor, condensing & evaporating unit, fan/blower motor, thermo set, relay etc. suitable for,
(B) 1.5 Ton Capacity with remote and conveyance charges & installation charges.

1.0 Workmanship:
The relevant specifications of description no. 47 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 47 shall be followed.
Rate shall be for a unit of one No.

Item No: 46

Providing & erecting water cooler having storage capacity 150 ltr. & cooling capacity 150 ltr. Per hour @ an ambient temp. of 35 C.. The outlet temp. of the water should drop by 15O C. within a hour, If the water is fed @ 32o.The water cooler should be comprising of hermetically sealed compressor, fan motor, condensing unit, water tank surrounded by evaporating, coil, therinostate, relay etc. complete with necessary inlet & outlet connection.
WATER COOLER-80 TO 150 LITRES CAPACITY:

1.0 Workmanship:
The relevant specifications of description no. 48 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 48 shall be followed.
Rate shall be for a unit of one No.

Item No: 47

Providing and supplying ISI mark G.I pipes with couplings of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges,

loading, unloading, conveyance to departmental stores, stacking etc. complete. Medium Duty
15 mm dia (0.5" dia)

1.0 Workmanship:
The relevant specifications of description no. 53 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 53 shall be followed.
Rate shall be for a unit of Running meter.

Item No: 48

Providing erecting and fixing double coated Syntex or equivalent PVC(ISI) mark water tank of required capacity each with all necessary fittings and connection etc complete. (2) 2000 lit. Capacity

1.0 Workmanship:
The relevant specifications of description no. 51 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 51 shall be followed.
Rate shall be for a unit of liter.

Item No: 49

Providing and fixing M.S. Grills of required pattern to wooden frames of windows etc. at all floor levels with MS flats at required spacing and frame around square or round bars with round headed bolts and nuts or by screw including Priming coat of Read lead paint etc. complete (A) plain grill for all floors. In windows.

1.0 Workmanship:
The relevant specifications of description no. 22 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 22 shall be followed.
Rate shall be for a unit of one Kg.

Item No: 50

Providing and fixing of Urinal of approved quality including connection with trap and with integral longitudinal flush pipe.
(A) Squatting plate pattern white earthen ware 550 mm x 300 mm

1.0 Workmanship:
The relevant specifications of description no. 57 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 57 shall be followed.
Rate shall be for a unit of one No.

Electrical Work

Item No: 51

Point wiring for light / fan /bell / primary point with 2-1.0 sq.mm & earthwire of 1.0 sq.mm (green) both are of ISI marked FR PVC insulated multistand copper wires, in existing pipe duly erected, complete with 6A Tissino Type ISI marked flush type switch.
Light Point (One Light Point controlled with one single way 6 A Switch)
Light Point (One Light Point controlled with two single way 6 A Switch- Two way Light Point)
Fan Point(One Fan Point controlled with one single way 6 A Switch)

1.0 Workmanship:
The relevant specifications of description no. 102 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 102 shall be followed.

Item No: 52

One 5 pin 5A 250 Volt Socket out let point controlled by 6 A switch on board.
In Two Rooms 4.0 Nos .each

1.0 Workmanship:
The relevant specifications of description no. 103 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 103 shall be followed.
Rate shall be for a unit of one No.

Item No: 53

Providing Electronic hum free five steps EME fan regulator of modular type accessories mounted with PVC/Metallic box covered with appropriate front plate modules erected with necessary connection. Cat - II

1.0 Workmanship:
The relevant specifications of description no. 104 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 104 shall be followed.
Rate shall be for a unit of one No.

Item No: 54

Shockproof tissino type single pole switch 6/16A universal plug socket as per wiring specification.

1.0 Workmanship:
The relevant specifications of description no. 105 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 105 shall be followed.
Rate shall be for a unit of one No.

Item No: 55

Providing 6A/10A/16A/20A/25A/32A/ single pole Modular MCB Switch for A.C. cat-III modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 106 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 106 shall be followed.
Rate shall be for a unit of one No.

Item No: 56

Providing Two pin /RJ -11 Telephone socket with top (Cat III) modular type accessories mounted with pvc/metallic box , single mounting base frame covered with textured/metallic front plate, modules erected with necessary connection as desired by engineer in charge.

1.0 Workmanship:
The relevant specifications of description no. 107 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 107 shall be followed.
Rate shall be for a unit of one No.

Item No: 57

Providing & laying Rigid PVC pipe confirming to I.S.S., erected with necessary fittings fixed with adhesive solution with 16 G. GI fish wire for concealed in wall / slab / Flooring with necessary cementation.
20 mm Size (3/4")
25 mm Size (1")

1.0 Workmanship:
The relevant specifications of description no. 108 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 108 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 58

Breaking slab/masonry walls for prov. holes to pass main line wiring & reinstating the same as per original condition etc. complete.

1.0 Workmanship:
The relevant specifications of description no. 109 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 109 shall be followed.
Rate shall be for a unit of one No.

Item No: 59

Supply and lying of main lines with ISI marked Copper conductor FRLS / ZHFR PVC insulated copper wire in existing pipe erected with earth continuity wire as specified in specification for following size.
2 wire 1.5 mm2 with 1.5 mm2 Cu. earth wire
2 wire 2.5 mm2 with 1.5 mm2 Cu. earth wire
2 wire 4.0 mm2 with 14 SWG / 3 mm2 Cu. earth wire

1.0 Workmanship:
The relevant specifications of description no. 110 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 110 shall be followed.

Rate shall be for a unit of one Running meter.

Item No: 60

Supplying and erecting approved make Telephone Cable electrolytic grade annealed copper conductor insulated with PE insulation twisted in to pairs with colour combination bunched together in concentric layers so as to minimles cross-talk & wrapped with FR PVC tape & sheathed with FR PVC or HFFR outer jacket suitable for indoor telephone wiring & conforming to C-DOT S/WS113/IEC 60189-2, UL1581 section 1080 VW-1 erected with necessary connections. 2 Pair Telephone Cable

1.0 Workmanship:
The relevant specifications of description no. 111 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 111 shall be followed.
Rate shall be for a unit of one Running meter.

Item No: 61

Approved make Ceiling fan with condenser A.C. 50 Cys. 1400 mm. sweep complete, canopy and 30 cms. Down rod erected on existing hook or clamp with 24/0.2 flat 3 core flexible wires with earthing (or R.C. Rate)

1.0 Workmanship:
The relevant specifications of description no. 112 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 112 shall be followed.
Rate shall be for a unit of one No.

Item No: 62

Supplying & erecting approved make 1 x 40 watt white stiove enameled Patti type fluorescent fitting made of M.S. Sheet 0.8 mm thick white or reflector side. Complete with 40 watts polyester heavy duty copper wound ballast, lock type tube holders, starter, duly wired for use on 250 volt A.C. supply and erected if required on varnish P.W. block with lead wires & connection.

1.0 Workmanship:

The relevant specifications of description no. 113 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 113 shall be followed.
Rate shall be for a unit of one No.

Item No: 63

Supply & erecting wooden plank 12 mm thick on Angle iron frame or wooden patti.

Item No: 64

Providing Approved make Four pole MCB type change over switch 415 V, 25A with poweder coated MS enclosure confirming to I.S.13947 erected on polished wooden block. Cat III

1.0 Workmanship:

The relevant specifications of description no. 114 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 114 shall be followed.
Rate shall be for a unit of one No.

Item No: 65

Providing and erecting Sheet Steel powder coated MCB distribution board- cat-III, flush/surface mounted fitted with bushbar, neutral link, earth bar and din rail conforming to IS 13032 and BS 5486- 1986 without MCB to house appropriate nos of MCBs (B) single phase 4 way SS double door.

1.0 Workmanship:

The relevant specifications of description no. 115 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 115 shall be followed.
Rate shall be for a unit of one No.

Item No: 66

Supply, Erection of Miniature circuit breaker single pole 6A to 32A type B curve suitable to operate on 230 V. A.C. system and having overload and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to

1.0 Workmanship:

The relevant specifications of description no. 116 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 116 shall be followed.
Rate shall be for a unit of one No.

Item No: 67

Supplying & erecting funnel type earthing having earth plate of 60 x 60 x 0.315 cms, copper earth plate burred in specifically prepared earth pit 3 mt. below ground with 40 kg. charcoal and salt with alternate layers of charcoal & salt, 20 mm dia. G.I. pipe with Funnel with a wire mesh for watering & bricks masonry block, C.I. Cover complete as per Para 7.3 of IS 3043 with necessary length of double Galvanized Iron / copper earth wire No 6 SWG bolted with lug to the plate and covered in 12 mm dia. G.I. pipe 2.5 mt long complete connected to the nearest switch gear with end socket as per direction & duly tested by earth tester confirming to IS (As per drawing) with following specification.

1.0 Workmanship:

The relevant specifications of description no. 117 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 117 shall be followed.
Rate shall be for a unit of one No.

Item No: 68

Providing & erecting Nominal Bore 16 gauge steel conduit painted black pipe with necessary saddles, screws ,bends, junction boxes with 16 G GI fish wire etc. 50 mm dia pipe erecting concealed in wall/slab along fish wire to draw mains, laid in approved manner with plastering by cement mortar & finishing the surface to match the wall ceiling.

1.0 Workmanship:

The relevant specifications of description no. 118 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 118 shall be followed.
Rate shall be for a unit of one Running Meter.

(8) STREET LIGHT POLE

Item no:-1
Solar Street Light

Supplying, Instalation, Testing and comissioning Solar Street light on site. Inluding all local central taxes, transportation, freable charges, octroi, inspection charges, loading, unloading, conveyance to the site and fixing in ground using cement concrete,pedestral etc.complete as directed by Engineer in charge. Technical Specification of street light are described here and also get approved from concern Authority before procurement of Solar Street light. Solar Street Lighting System (Non- Customized OEM) withinbuilt Lithium Ion Battery pack and LED Plug and Play Type 9W DIMMER AND LITHIUM ION BASED+WITH SEPARATE- 26W SOLAR PANEL, 9W Dimmer and Lithium iron base, 9 watt / 26 watt PV, 2 year warranty, 4.5mtr MS Pole Set -medium class. The necessary cabeling for the solar circuit to be provided (4 core 10 sqmm) as per IS standard.

Workmanship:
Shall be executed as per item description, manufacturers instruction and as per instruction of engineer in charge.

Mode of Measurement and Payment:
Rate include as per complete job including all cost.

Rate shall be for a unit of one No.

(9) R.C.C. PLATFORM

Item: 1

Excavation of foundation up to required depth including lifting and laying in 90 mtr. lead area instructed for soil, murrum and sand etc.

1.0 Workmanship:
The relevant specifications of description no. 4 shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of description no. 4 shall be followed.
Rate shall be for a unit of one Cubic meter.

Item No: 2

Construction of granular sub base by providing close graded material mixing in a mechanical plant at OMC, spreading in uniform layers with mortar grader on prepared surface and compaction with vibratory roller to achive the desire density complete 150 mm thick 2 layer

1.0 Workmanship:
The relevant specifications of item description no. 19 of RCC Pavement shall be followed.

2.0 Mode of Measurement and Payment:
The relevant specifications of item description no. 19 of RCC Pavement shall be followed.
Rate shall be for a unit of one cubic meter

Item: 3

Providing and laying Cement Concrete 1:3:6 (1Cement : 3 Coarse sand : 6 stone aggregates 40 mm normal size) and curing including cost of form work in foundation

1.0 Materials:

The Relevant Specification of Description No. 10 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 10 shall be followed.

The Rate shall be for a unit of one cubic meter

Item: 4

Providing and laying Control cement Concrete M 250 proportions of ingredients as per mix design by weigh batching and curing complete including the cost of formwork but excluding cost of reinforcement for reinforced concrete work in slab, beam, wall

1.0 Materials:

The Relevant Specification of Description No. 12 shall be followed.

2.0 Mode of Measurement and Payment:

The Relevant Specification of Description No. 12 shall be followed.

The Rate shall be for a unit of Cubic meter.

Item No: 5

Providing TMT FE-500 bar reinforcement for RCC work including bending & placing in position complete

1.0 Workmanship:

The relevant specifications of description no. 14 shall be followed.

2.0 Mode of Measurement and Payment:

The relevant specifications of description no. 14 shall be followed.

Rate shall be for a unit of one Kg.

(10) GENERATOR AND ELECTRICAL ROOM

(11) WASH AND SERVICE AREA

NOTE:

The specification of items for generator & electrical room, wash and service area shall be as per relevant specification of other sub estimate be followed and the rate as per price bid.

(12) FIRE HYDRANT SYSTEM

Motor driven fire pumps:

End suction type, horizontally mounted centrifugal pump (as per IS 1520), TAC approved each capable to deliver 10.80 cum/hour (180 lpm) of clear water at minimum 70 M TDH, coupled to a suitably electric motor mounted on a common base frame and ant vibration pads coupling, coupling guard and fixing bolts etc. Motor HP to be suitably selected to suit minimum discharge and residual head at the top most hydrants. The characteristic curve should have a large range of discharge points for different heads.
C I Sluice Valve
C I components of the sluice valve shall be of Grey cast iron conforming to IS 210. The valves shall be flanged having solid wedge gate valve, inside screw, hand wheel with open-close indications etc all conforming to IS 780 but of nominal pressure rating of PN 1.6 as per TAC norms.
Test Pressure at manufacturers works
Flange drillings shall normally be as per IS 1538. However, if the manufacturer drills the flanges to other standard specifications, the valves shall be supplied with a pair of matching flanges, nuts, bolts, washers; rubber insertion etc and such flanges shall have inside threads to suit pipes of same nominal size as that of the valve.
G M Valves
Gun metal components of the peets valves i.e. Gate Valves, Check Valves i.e. non-return valves, and Globe valves etc shall be of Gun Metal conforming to Grade 2 of IS 318. The valves shall be having flanged or screwed ends, hand wheel with open-close indications etc all conforming to Class-2 Valves of IS 778 (ISI marked) or imported as per ASTM.
C I non return valves
C I reflux valves, i.e. swing check type non-return valves, shall be conforming to IS 5312. Test pressures shall be same as per CI sluice valves.
M S Pipes and Fittings
All M S pipes shall be as per IS 1239 (heavy/medium quality as mentioned in the schedule of items upto 150 mm N B, as per IS 3589 (minimum 6 mm thick) above 150 mm N B, and the fittings shall be of all welded construction, butt weld type flanges shall conform to IS 6392 and gaskets of synthetic moulded rubber approved by Fire Standard. All pipes outside the building shall be laid underground at a depth of 1 mtr (approx) and laying shall be as per layout drawing, excavation, back filling of earth, cutting holes in existing structure where necessary, providing puddle collars/pipes as required & making good the damages including making the concerned portion of the structure water tight. Erection of over ground piping shall be complete with necessary pipe supports hangers with MS angles/plate/nut bolts/clamps etc with fabrication as required including providing MS puddle pipes/collars as required for punctures through walls/slabs etc. Erection of pipe lines shall also include chipping of wall; making holes inside RCC or brick walls, slabs and necessary civil works for restoration of the surface after completion of erection. The quoted tender rate shall include all the above works, as well as the cost of route markers for under ground pipe lines as per following specifications. Route marker with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) of size 60 cm x 60 cm at bottoms and 50 cm x 50 cm at the top with a thickness of 10 cm including inscription duly engraved as required (spacing approx 15 mtrs or as directed at site). No extra payment will be made on this account.
Pressure Gauges
Pressure gauges with controlling cocks etc shall be of approved make having pressure range, bourdon material and dial size as specified in schedule of items.
Pressure Switches
Pressure switches with accessories shall be of approved make and design and shall actuate (`cut-off' and/or `make contact' as required) at pre-set pressures.
Landing Valves (Hydrant Valve)
Gun metal landing valve (internal/external Fire-Hydrants) with oblique type single outlet as per schedule of quantities complete with hose coupling adaptor of 63 mm size, instantaneous spring lock arrangement and blank cap with chain conforming to IS 5290. External Fire-Hydrants to be

provided with stand posts as specified in schedule of quantities. Orifice plates may be provided where inlet pressure is required to be reduced as per WBFS requirement.
Branch Pipe
Gun metal, short type, instantaneous pattern branch pipe to suit fire hose delivery coupling of 63 mm size complete with G M nozzle of 20 mm nominal size conforming to IS 903.
Hose with Coupling
63 mm nominal internal dia hose, rubber lined woven - jacketed coupling with Type-II (Reinforced Rubber lined type) of IS 636, fire fighting delivery hose 15 M long each, fitted with gun metal coupling of 63 mm size with multi serrated tail and double instantaneous spring lock arrangement comprising of male half at one end and female half at other end complete with rubber cup washer and conforming to IS 903.
Hose Reel
Swinging hose reel conforming to IS 884 & comprising of 3 ply rubber hose of length specified in schedule of items, 20 mm (3/4") nominal bore (25 kg/cm2/350 psi bursting pressure), mild steel pressed reel with 170 degree swinging, nozzle of G M chromium plated, with non-jamming controlling handle which shall stay at the `ON' `OFF' position as set, wall brackets with `U' shaped reel carrier made of C I complete with 25 mm NB G M valve at the inlet, and orifice plates (if necessary for reducing pressure).
Air Vessel
Mild steel air vessel adequate size to take care of pressure surges during operation of the system and venting of entrapped air in the system shall be complete with air relief valve, pressure gauge, drain valve and shutt off valve at the inlet.
Valve Chamber
Valve chamber of adequate size to accommodate external valves shall be constructed as directed per site condition.
Fire-Brigade Connections
Fire-Brigade connections (inlets) to Riser and Under Ground Reservoir shall be with two numbers of 63 mm instantaneous inlets for each connection as per TAC norms. Other aspects of the connection shall be as per IS 904.
Painting
All external steel surfaces shall be thoroughly cleaned to remove rust, scale etc before applying the primer.
All underground piping shall be provided protective wrappings as per TAC norms.
All over ground piping/hose boxes/landing valves/hose reel, M S frames etc shall be painted with two (2) coats of RED LEAD primer or equivalent followed by two coats of Post Office Red coloured Synthetic enamel finish paint.
All other equipment shall be given a red oxide/zinc chromate primer and two (2) coats of synthetic enamel.

GENERAL SPECIFICATION FOR ELECTRICAL INSTALLATION WORK

Below list of items arelikely to be used in the project . However, final capacity/size/rating etc shall be decided during detailed engineering and they should be got approved from EIC.

This list should be considered as technical specifications .For any query or discrepancy follow the detail tender specifications or IS Rules decision of EIC shall be final and binding.

The list below are indicative, not exhaustive. Necessary items required to be added for satisfactory completion of the project should be considered as part of the scope of work.

1.0 INTERNAL WIRING

This section covers, definition of point wiring, system of wiring and supply, installation, connection, testing and commissioning of point wiring for light points, ceiling fan points, exhaust fan points, convenience socket outlet points, power socket outlet points etc. including fixing of light fixtures, ceiling fan, exhaust fan, wall fan etc.

1.1 STANDARDS

The following standards and rules shall be applicable:

STANDARD NO.	**PARTICULAR**
IS : 732	Code of practice for electrical wiring installation (System voltage not exceeding 650 V)
IS : 1646	Code of practice for fire safety of buildings (General) Electrical installation.
IS : 2509	Rigid non-metallic conduits for electrical wiring.
IS : 6946	Flexible (Pliable) non-metallic conduits for electrical installation.
IS : 1293	3 pin plugs and sockets.
IS : 8130	Specifications of conduits for electrical installation.
IS : 3854	Switches for domestic purpose.
IS : 3415	Fittings for rigid non-metallic conduits.
IS : 4648	Guide for electrical layout in residential building Indian electricity act and rules.

Regulations for the electrical equipment in buildings issued by the Bombay Regional Council of Insurance Association of India.

All standards and codes mean the latest.

1.2 POINT WIRING

A point shall consist of the branch wiring from the distribution board together with a switch as required, including the ceiling rose or pendant holder or swan holder, or ceiling fan box or socket or suitable termination. A point shall include, in addition, the earth continuity conductor / wire from the distribution board to the earth pin / stud of the outlet / switch box and to the outlet points.

The point wiring shall be carried out in the under mentioned manner :

1.2.1 Supply, installation, fixing of conduits with necessary accessories, junction / pull / inspection / switch boxes and outlet boxes.

1.2.2 Supplying and drawing of wires of required size including earth continuity wire.

1.2.3 Supply, installation and connection of flush type switches, sockets, cover plates, switch plates, etc.

1.2.4 The point shall be complete with the branch wiring from the Switch board to the outlet point, Pre laid conduit with accessories, junction, pull, inspection boxes, control switch, socket, outlet boxes, ceiling roses, button / swan holder, connector etc.

1.3 POINT RATE

The rate per point shall include supply, installation, connection, testing and commissioning of point as described under "point wiring". The measurements of the points will be enumerated.

Circuit Mains shall not be paid extra. Rate for the point shall consist of wiring from the outlet point to the switch board as required with a connector/ plate/ ceiling rose fan box with hook socket with switch. The point rate shall include in addition to phase and neutral wire a PVC insulated earth continuity wire from switch to outlet. The unit rate for the point shall consist of the circuit wiring form LDB to outlet point through switch and/or socket, switch board as required and including the outlet points with connector, fan hook box or sockets. A point shall include in addition to phase and neutral wire a PVC insulated Earth continuity wire from LDB to the final termination at outlet points. No extra rate shall be paid for circuit mains for looping switch board to switch board.

.

1.4 SYSTEM OF WIRING

Unless otherwise mentioned on the drawings, the system of point wiring shall be as follows:

The system of wiring shall consist of single core, PVC insulated, 650/1100 volt grade, copper conductor FRLS wires laid through concealed PVC conduits as directed.

1.5 GENERAL

The contractor shall submit for approval, the drawing of conduit layout indicating the route of the conduits, number and size of the conduits, location of junction / inspection / pull / outlet boxes, size and location of switch boxes, number and size of wires pulled through each conduit and all other necessary relevant details prior to laying of conduits. Only after the drawings are approved, the contractor shall proceed the work of conduit laying.

Prior to laying and fixing of conduits, the contractor shall carefully examine the working drawings prepared by him and approved by the Consultant indicating the layout, satisfy himself about the sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor shall be gotten approved before the actual laying of conduits is commenced.

In laying of conduits it is important that not more than two right angle bends are provided for each circuit and as far as possible. No junction box shall be provided in the entire length of conduit run for drawing of wires. Only switch outlets, lighting fixture outlets, equipment power outlets and socket outlets shall be considered for drawing of wires.

1.6 MATERIAL

1.6.1 PVC CONDUITS :

All non-metallic PVC conduits shall conform to IS : 9537. The conduit shall be plan and type as specified in IS : 9537 and shall be used with the corresponding accessories (Refer IS : 3419 specification for fittings for rigid non PVC metallic conduits). PVC conduits shall be rigid unplasticised, medium gauge having 1.6 – 1.8 mm. wall thickness up to 20 mm. diameter conduit and 1.8 - 2 mm. wall thickness for all sizes above 20 mm. diameter.

1.6.2 BOXES :

All the boxes for switches, sockets and other receptacles, junction boxes, pull boxes and outlet boxes shall be fabricated from 2.0 mm. thick mild sheet painted with two coats of red-oxide and then two coats of enamel paints as called for. Colour of the paints shall be as approved by the client. The boxes shall have smooth external and internal finished surface. Boxes in contact with earth or exposed to the weather shall be of 2 mm. mild steel and hot dip galvanized after fabrication. Separate screwed earth terminal shall be provided in the box for earthing purpose. All boxes shall have adequate no. of knock out holes of required diameter for conduit entry. Switch boxes to receive switches, socket outlets, power outlets, telephone outlets, fan regulators, etc. shall be fabricated to the approved shape and size to accommodate all the devices without overcrowding. Outlet boxes to receive ceiling fan shall be fitted with adequately sized rod / hook to fix ceiling fan. The boxes shall be of minimum depth of 65 mm.

1.6.3 COVER PLATE:

The cover of the boxes to receive outlet points shall be of best anodized sheet cut to shape and size or plate of approved manufacturers of switches.

1.6.4 CABLES:

The cables shall conform to IS : 694. For all internal wiring FRLS wires of 650 / 1100 volts grade, single core shall be used.

The conductors shall be plain annealed copper conductors complying with IS : 1554.

The conductors shall be circular copper conductor.

The insulation shall be PVC complying with the requirements of IS : 694. It shall be applied by an extrusion process and shall form a compact homogenous body.

The thickness of PVC insulation shall be as set out in the relevant standards

The cores of all cables shall be identified by colours in accordance with the following sequence.

Single phase	-	Red
Three phase	-	Red, Yellow, Blue
Neutral	-	Black
Earth	-	Green or Green/Yellow

Means of identifying the manufacturer shall be provided throughout the length of cable.

Unless otherwise specified in the drawings the size of the cables used for internal wiring shall be as follows:

In case of circuit wiring for lights, exhaust fans, convenience socket outlet points (P+N+E) :
3 nos. of 1.5 mm.^{2} - From switch boards to outlet points

1.6.5 SWITCHES :

Switches shall conform to IS : 3854, IS : 1293 and IS : 4615. The switches shall be single pole, single or two way and shown on the drawings or as specified. They shall be of piano(tissino type) type rated for 250 volt, and of full 5 / 15 A capacity. They shall be provided with insulated dollies and covers.

The switches shall be rocker operated with a quite operating mechanism with bounce free snap action mechanism enclosed in an arc resistant chamber. The switches shall have pure silver and silver cadmium contacts. The switches shall be flush modular type The make of the switches shall be as indicated in the drawings or BOQ or make of material or as suggested and approved by the client. The switches installed in outdoor area shall be industrial, metal clad type, and shall be provided in weather proof enclosures, complete with weather proof gasketed covers.

1.6.6 SOCKETS :

The sockets shall conform to IS : 1293. Each socket shall be provided with control switch of appropriate rating. The sockets shall be piano(tissino type) type, rated for 250 volts, and either of full 5 A or 15 A capacity, as mentioned on the drawings.

Sockets shall be of three pin type, the third in being connected to earth continuity conductor. The socket shall be flush modular type. The sockets installed in machine room, plant room or wet / damp area shall be metal clad weather proof type. The finishing and make of all the sockets shall be same as light switch. The socket shall have fully sprung contacts and solid brass shrouded terminals to ensure positive electrical connections.

The sockets shall be provided with automatic shutters, which opens only when earth pit of the plug inserts in the socket.

The socket shall be provided with three pin plug top suitable to the socket and of the same make as socket.

1.7 DRAWING OF CONDUCTORS

The drawing and joining of copper conductor or wires shall be executed with due regard to the following precautions, while drawing insulated wires into the conduits, care shall be taken to

avoid scratches and kinks which may cause breakage of conductors. There shall be no sharp bends.

Insulation shall be shaved off for a length of 15 mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or ringing.

PVC insulated copper conductor wire ends before connection shall be properly soldered (at least 15 mm length) with soldering flux / copper solder, for copper conductor. Strands of wires shall not be cut for connecting to the terminals. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminals block / connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors having nominal cross section are exceeding 4 sq. mm shall always be provided with crimping type cable sockets. At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

Only certified wire man and cable jointers shall be employed to do joining work.

For all internal wiring PVC insulated wires of 650 / 1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in looping system and no joint shall be allowed in the length of the conductors. No wire shall be drawn in to any conduit, until all work of any nature that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits the conduits shall be thoroughly cleaned of moisture, dust, and dirt or any other obstruction by forcing compressed air through the conduits.
Maximum permissible number of 1100 volt grade PVC insulated wires that may be drawn into rigid non metallic or PVC Conduits are given below :

Size of wires Nominal Cross section Area (Sq. mm.)	**Maximum number of wires within conduit size(mm)**				
	20	**25**	**32**	**40**	**50**
1.5	5	10	14	--	--
2.5	5	8	12	--	--
4	3	7	10	--	--
6	2	5	8	--	--
10	--	3	5	6	--
16	--	2	3	--	6
25	--	--	2	4	6
35	--	--	--	3	5

1.8 JOINTS

The wiring shall be by looping back system, and hence all joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. **No joints shall be made inside conduits and junction boxes**. Joints where unavoidable , due to any specified reasons, prior permission in writing shall be obtained from the client before making such connections. Joints by twisting conductors are prohibited.

1.9 LOAD BALANCING

Balancing of circuit in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

1.10 EARTHING

All earthing systems shall be in accordance with IS : 3043 - 1985 code of practice for earthing.

1.11 TESTING OF INSTALLATION

Before a completed installation is put into service, the following tests shall be complied with.

1.11.1 INSULATION RESISTANCE

The insulation resistance shall be measured by applying 500 volt megger with all fuses in places, circuit breaker and all switches closed.

The insulation resistance in giga ohms of an installation, measured shall not be less than 50 mega ohms divided by the number of points on the circuit.

The insulation resistance shall be measured between
EARTH TO PHASE
EARTH TO NEUTRAL
PHASE TO NEURAL
PHASE TO PHASE

1.11.2 EARTH CONTINUITY PATH :

The earth continuity conductors shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit-breaker, measured from the connection, with the earth electrode to any point in the earth continuity conductor in the completed installation and shall not exceed one ohm.

1.11.3 POLARITY OF SINGLE POLE SWITCHES :

A test shall be made to verify that every no-linked, single pole switch is connected to one of the phase of the supply system.

1.11.4 COMPLETION CERTIFICATES :

All the above tests shall be carried out in presence of client and the results shall be recorded in a prescribed forms. Any default during the testing shall be immediately rectified and that section of the installation shall be re tested. The completed test result from shall be submitted to the client for approval.

On completion of an electric installation a certificate shall be furnished by the contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in a prescribed form as required by the local electric supply authority.

2.0 DISTRIBUTION BOARDS

DISTRIBUTION BOARDS (DB's)

Distribution Boards (DB's) shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, neutral grounded at transformer. The DB shall be minimum di-electric strength of 2.5 KV / Sec. All Distribution Boards shall manufactured by a manufacturer listed in Appendix-I.

DB's shall comply with the latest Relevant Indian Standards and Electricity Rules and Regulations and shall be as per IS-13947-1993.

2.1 CONSTRUCTION FEATURES

DB's shall be **IP 43**& made out of 1.6 mm thick high quality CRCA sheet steel and shall be pre-treated and powder coated sheet steel used in the construction of DB shall be folded and braced as necessary to provide a rigid support for all component. DB shall be suitable for indoor / outdoor installation, wall mounting free standing type, in double door construction. The Distribution Boards shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors, Neoprene gasket, padlocking arrangement. All removable/ hinged doors and covers shall be grounded by 4.0 sq mm tinned stranded copper connectors. Distribution Boards shall be suitable for the climatic conditions. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall confirm to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage up to and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of DBs.

Three phase boards shall have phase barriers and a wire channel on three sides. Neutral bars shall be solid tinned copper insulated bars with tapped holes and chase headed screws. For 3 phase DB's, 3. Independent neutral insulated bars shall be provided. All DB's shall be internally pre-wired using copper insulated PVC wires brought to a terminal strip of appropriate rating for outgoing feeders.

Knockout holes of appropriate size and number shall be provided in the DB's in conformity with the location of cable/conduit connections. Detachable sheet steel gland plates shall be provided at the top / bottom to make holes for additional cable entry at site if required.

Distribution Boards shall comprises of the following:

1.1.1 A panel for mounting where appropriate incoming supply circuit breaker & other auxiliaries for Control & distribution as required.

1.1.2 Installation accessories shall be part of the DB for fixing conductor and rails for mounting MCB's and RCCB's etc.. neutral bus bars & earthing bus bars required in the circuit. All busbars in the FDB shall be insulated type.

1.1.3 Service cable /interconnection shall be part of the Distribution Boards.

1.1.4 The board shall be installed at a height such that the operating is within reach of the normal human height i.e. 1.2 to 1.8 meters from finish floor level.

1.1.5 Degree of protection shall be IP-52 for indoor application, IP-54 for kitchen & laundry and IP-55 for outdoor application.

1.1.6 All three phase distribution boards shall have 4 rows and single phase distribution boards shall have single rows for housing of MCB's and RCCB's unless noted otherwise.

1.1.7 Phase segregation to be maintained in all three phase distribution boards.

1.1.8 Earthing shall be provided in each FDB's.

2.2 MINIATURE CIRCUIT BREAKER (MCB)& MCCB

MCB

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B,C,D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the

external operating handle.

MCB should be having an integrated label holder with dual side din rail locking facility. Incoming & Outgoing should have facility for termination of Busbar & Cable separately.

Cable termination facility should be up to 35 sq. mm.

MCCB

The MCCB shall be thermal magnetic having features of indication and protection for overload, short circuit, earth fault. MCCB should be confirming to IS 13947 or IEC-947.

Important Parameters

Sr No	Parameters	Data
1.	Rated Operating Voltage	500 V
2.	Rated Insulation Voltage	1000 V
3.	Rated Impulse Withstand voltage	8 Kv
4.	Rated ultimate short ckt breaking capacity @ 415V	35 kA
5.	Rated Short time withstand current for 1sec	35kA
6.	Rated Short time withstand current for 3 Seconds	--
7.	Rated short circuit making capacity @ 440V ac	105kA
8.	Protection range for over load and short circuit	from 40% to 100%
9.	Utilization category	B
10.	Mechanical Life operations without Maintenance	4000
11.	Mechanical Life operations with Maintenance	4000
12.	Electrical Life operations @ 440V without maintenance	4000
13.	Number of poles	3 or 4 as applicable

The MCCB shall be with protections and having various setting range as below with 2NO+2NC auxiliary contacts.

Protection	**Current Adjustment**	**Time Adjustment**
Overload (Ir)	0.4 – 1 times In	Min.5 Setting
Short circuit	1.5 – 10 times Ir.	Min 4 Setting
Instantaneous	1.5 – 11 times In	Fixed

Earth fault	0.2 – 1 times In	Min. 4 Setting

Following constructional features are required:

- Trip free mechanism
- Total segregation between power and front shield so as to guarantee maximum operational safety.
- Operating lever should indicate true position of contacts.
- Provision for ROH with door interlock facility and pad lock facility. Adjustable shaft for ROH.

2.3 RESIDUAL CURRENT CIRCUIT BREAKER CURRENT OPERATED TYPE (RCCB)

I. System of Operation

Residual Current Circuit Breaker shall confirm to IEC 61008.RCCB shall work on the principle of core balance transformer. The incoming shall pass through the torroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a predetermined critical value. RCCB shall be current operated independent of the line voltage, current sensitivity shall be of 30 / 100 mA at 240/415 volts AC and shall have a minimum of 20,000 electrical operations.

It should provide full protection as envisaged by IE rules – 61-A, 71 – ee, 73 – ee, 1985 and also rule 50 of IE rule1956.

II. Mechanical Operation

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing /opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

III. Neutral Advance Feature

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact First before the phases; and at the time of opening, the neutral shall breaks last after allowing the phases to open first. This is an important safety feature which is also required by regulations.

MCB should be having an integrated label holder with dual side din rail locking facility. Incoming & Outgoing should have facility for termination of Busbar & Cable separately.

Cable termination facility should be up to 35 sq. mm.

IV. Testing Provision

A test device shall be incorporated to check the integrity of the earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB / RCCB and the operating handle shall move to the "OFF" position.

2.4 **EARTHING**

Earthing shall be provided as per IS:3043-1987.

2.5 **PAINTING**

All sheet steel work shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphating, passivaiting (seven tank processing) and then painted with electrostatic paint (Powder coating). The shade of colour of panel inside/outside shall be of Siemens gray paint shade no. RAL-7032 of IS Code No.5.

2.6 **LABELS**

Engraved PVC labels shall be provided on all incoming and outgoing feeder. Circuit diagram showing the arrangements of the circuit inside the distribution panels shall be pasted on inside of the panel door and covered with transparent plastic sheet.

2.7 **TESTING**

Testing of panels shall be as per following codes:

IS: 8623 (Part -I) 1977 for factory built assemblies of switch gear for voltages upto and including 1000 VAC.

IS: 13947 : 1993 Degree of protection

2.8 **WIRING**

In wiring a distribution panel it shall be insured that total load of various distribution panel and/or consuming devices is divided evenly between the phases and number of ways as per Consultants drawing.

3.0 MEDIUM VOLTAGE CABLES

3.1 SCOPE

This section shall cover supply of medium voltage cables.

3.2 STANDARDS

The following standards and rules shall be applicable :

IS : 1554	PVC insulated electric cables (heavy duty).
IS : 1753	Aluminium conductors for insulated cables.
IS : 3961	Recommended current ratings for cables.
IS : 8130	Aluminium conductors for insulated cables

Indian Electricity Act and Rules.

3.3 MEASUREMENTS

The cables will be measured in meters. The unit rate shall include cutting the cable into required lengths, packing , loading , unloading, insurance, transportation, delivery to stores/site as per work order, stocking in stores, testing of cables at stores etc. of medium voltage cable.

3.4 GENERAL

The medium voltage cables shall be supplied, laid, connected, tested and commissioned in accordance with the drawings, specifications, relevant Indian Standards specifications, manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name, size, and type, clearly written on the drums.

3.5 MATERIAL

The MV cables shall be cross linked polyethylene (XLPE) insulated PVC sheathed of 1100 volts grade aluminium or copper conductor, armoured and unarmoured heavy duty, conforming to IS : 7098 Part I IS : 1988 Part I. as asked for in the schedule of quantities.

3.5.1 All XLPE Aluminium/Copper Power cables shall be 1100 Volts grade, multi core constructed as per IS : 7098 Part-I of 1988 as follows :

a) Stranded Aluminium /Copper conductor of high conductivity upto 4 mm.^{2} size, the conductor shall be solid and above 4 mm.^{2}, conductors shall be concentrically stranded as per IEC : 328.

b) Cores laid up

c) The inner sheath should be bonded over with thermo-plastic material for protection against mechanical and electrical damage.

d) Armoring should be provided over the inner sheath to guard against mechanical damage. Armouring should be Galvanised steel wires or galvanised steel strips. (In single core cables used in A.C. system armouring should be non-magnetic hard aluminium Wires/Strips. Round steel wires should be used where diameter over the inner sheath does not exceed 13 mm; above 13 mm flat steel armour should be used. Round wire of different sizes should be provided against specific request.)

e) The outer sheath should be specially formulated heat resistant black PVC compound conforming to the requirement of type ST2 of IS : 5831-1984 extruded to form the outer sheath.

3.5.2 Conductor shall be of electrolytic Aluminium/Copper conforming to IS : 8130 and are compact circular or compact shaped.

3.5.3 Insulation shall be of XLPE type as per latest IS general purpose insulation for maximum rated conductor temperature 70 degree centigrade.

3.5.4 In Inner sheath laid up cores shall be bonded over with thermoplastic material for protection against mechanical and electrical damage.

3.5.5 Insulation, inner sheath and outer sheath shall be applied by extrusion and lapping up process only.

3.5.6 Armouring shall be of galvanised steel wire/flat.

Galvanised steel flat strip / round wires applied helicaly in single layers complete with covering the assembly of cores.

For cable size upto 25 Sq. mm. : Armour of 1.4 mm dia G.I. round wire

For cable size above 25 Sq. mm. : Armour of 4 mm wide 0.8 mm thick G.I. strip

3.5.7 Repaired cables shall not be used.

3.5.8 Current ratings of the cables shall be as per IS : 3961.

3.5.9 The XLPE insulated cables shall conform to latest revision IS read along with this specifications. The Conductor shall be stranded Aluminium/Copper circular/ sector shaped and compacted. In multi core cables the core shall be identified by red, yellow, blue and black coloring of insulation as following.

CORE IDENTIFICATION :

Two core	:	Red and Black
Three core	:	Red, Yellow and Blue
Four core	:	Red, Yellow, Blue and Black
Single core	:	Green, Yellow for earthing

Black shall always be used for neutral.

3.5.10 The XLPE insulated 1100 Volts grade power cables shall conform to latest IS and shall be suitable for a steady conductor temperature of 70 degree centigrade. The conductor shall be stranded Aluminium/Copper as called for in the Schedule of quantities. The outer sheath shall be as per the requirement of type ST-2 of IS:5831 of 1984.

3.5.11 The cables shall be suitable for laying in racks, ducts, trenches, conduits and underground buried installation with uncontrolled back fill and chances of flooding by water.

3.5.12 Progressive automatic in line sequential marking of the length of cables in meters at every one meter shall be provided on the outer sheath of all cables.

3.5.13 Cables shall be supplied in non returnable wooden drums as per IS : 10418.

3.5.14 Both ends of the cables shall be properly sealed with PVC/Rubber caps so as to eliminate ingress of water during transportation, storage and erection.

3.5.15 The product should be coded as per IS :- 7098 Part-I as follows :-

Aluminium Conductor	A
XLPE Insulation	2X
Steel round wire armour	W

Steel strip armour	F
Steel Double round wire armour	WW
Steel Double strip armour	FF
Non-magnetic (Al.) round wire armour	Wa
Non-magnetic (Al.) strip armour	Fa
PVC outer sheath	Y

3.6 GENERAL

All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of handling during transportation, loading, unloading etc.

The cable shall be supplied in single length i.e. without any intermediate joint or cut unless specifically approved by the client.

The cable ends shall be suitably sealed against entry of moisture, dust, water etc. with cable compound as per standard practice.

3.7 TESTING

3.7.1 FINISHED CABLE TESTS AT MANUFACTURER'S WORKS :

The finished cables shall be tested at manufacturer's works. Following routine tests for each and every length of cable and copy of test results shall be furnished for each length of cable alongwith supply. If specified, the cables shall be tested in presence of clients representative.

(a) VOLTAGE TEST :

Each core of cable shall be tested at room temperature at 3 KV A.C. R.M.S. for a duration of 5 minutes.

(b) CONDUCTOR RESISTANCE TEST :

The D.C. Resistance of each conductor shall be measured at room temperature and the results shall be corrected to 20° c. to check the compliance with the values specified in IS 8130 - 1976.

Prior to dispatching cables, and at the time of delivering the cables at stores, following tests shall be carried our :-

Insulation Resistance test between phases and phase to Neutral and phase to earth.

Continuity test of all the phases, neutral and earth continuity conductor.

Sheathing continuity test.

Earth resistance test of all the phases and neutral.

All tests shall be carried out in accordance with relevant Indian Standard Code of practice and Indian Electricity Rules. The Vendor shall provide necessary instruments, equipments and labour for conducting the above test and shall bear all expenses in connection with such tests. All tests shall be carried our in the presence of the client and results shall be recorded in the prescribed forms.

3.8 CABLE MARKING

EMBOSSING ON OUTER SHEATH :

The outer sheath shall be legibly embossed with following legend :

ELECTRIC CABLE : 1100 V, SIZE : 3.5 C x ----- mm ^{2}.

Manufacturer's Name & year of manufacturing.

3.9 SEALING, DRUMMING & PACKING

After tests at the manufacturer's works, both ends of the cable shall be sealed to prevent the ingress of moisture during transportation and storage.

Cable shall supplied in length of 500 ± 10% meters on packed non-returnable drums of sufficiently sturdy construction.

Cables of length more than 250 meters shall also be supplied on non-returnable drums.

The spindle hole shall be 110 mm minimum diameter.

Each drum shall bear on the outside flange, legibly and indelibly in the English literature, a distinguishing number, the manufacturer's name and particulars of the cable i.e. voltage grade, length, conductor size, cable type, insulation type and gross weight shall also be clearly visible. The direction for rolling shall be indicated by an arrow. The drum flange shall also be marked with manufacturer's name and year of manufacturing etc.

4.0 LIGHTING FIXTURES & ACCESSORIES

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Project Manager.

4.1 SCOPE :

Scope of work under this section shall include inspection at suppliers/manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection,

erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

4.2 STANDARDS :

The lighting and their associated accessories such as lamps, reflectors, housings, ballasts etc., shall comply with the latest applicable standards, more specifically the following:

General and safety requirements for Luminaries :

Part-1 Tubular fluorescent lamps	-	IS – 1913 (Part-1)
Bi-pin lamp holders for tubular fluorescent lamps	-	IS - 3323
Electronic Ballasts for fluorescent lamps – General & Safety requirement	-	IS – 13021 (Part-1)
Electronic Ballasts for fluorescent lamps – Performance requirement	-	IS – 13021 (Part-2)
Tubular Fluorescent lamps	-	IS - 2418 (Part-1to4)
Luminaries – General requirement	-	IS – 10332 (Part-1)
Luminaries – Constructional requirement	-	IS – 10332 (Part-2)
Luminaries – Screw and Screwless termination	-	IS – 10332 (Part-3)
Luminaries – Methods of Tests	-	IS – 10332 (Part-4)
Particular requirement – General purpose Luminaries	-	IS–10332(Part-5 / Sec - 1)
Particular requirement – Recessed Luminaries	-	IS–10332 (Part-5 / Sec – 2)
Particular requirement – Luminaries for Road and Street lighting	-	IS–10332 (Part-5/Sec-3)
Particular requirement – Portable General purpose Luminaries	-	IS–10332 (Part-5/Sec-4)

4.3 LIGHT FITTINGS-GENERAL REQUIREMENTS :

a). Fittings shall be designed for continuous trouble free operation under atmospheric conditions without reduction in lamp life or without deterioration of materials and internal wiring. Degree of protection of enclosure shall be IP-65 for outdoor fittings except bulkhead fitting. Bulkhead fitting shall be provided with IP-54 protection.

b) Fittings shall be so designed as to facilitate easy maintenance including cleaning, replacement of lamps/ ballasts.

c). All fittings shall be supplied complete with lamps. All mercury vapour and sodium vapour lamp fittings shall be complete with accessories like ballasts, power factor improvement capacitors, starters, etc. Out door type fittings shall be provided with weather proof junction boxes (IP-55) and IP-54 Control gear boxes.

d) Each fitting shall have a terminal block suitable for loop-out connection by 1100 V PVC insulated copper conductor wires up to 4 sq.mm. the internal wiring should be completed by the manufacturer by means of standard copper wire and terminated on the terminal block.

e) All hardwares used in the fitting shall be suitably plated or anodized and passivated.

f) Earthing : Each lighting fitting shall be provided with an earthing terminal. All metal or metal enclosed parts of the housing shall be bonded and connected to the earthing terminal so as to ensure satisfactory earthing continuity throughout the fixture.

g) Painting/Finish : All surfaces of the fittings shall be thoroughly cleaned and degreased and the fittings shall be free from scale, rust, sharp-edges, and burns.

h) The housing shall be powder coated/stove-enameled or anodised as required. The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 90 deg. over 12 mm dia mandrel.

i) Metal used in BODY of lighting fixtures shall be not less than 32 SWG or heavier if so required to comply with specification of standards. Sheet steel reflectors shall have a thickness of not less than 20 SWG. The metal parts of the fixtures shall be completely free from burns and tool marks. Solder shall not be used as mechanical fastening device on any part of the fixture.

4.4. LIGHT FITTINGS – SPECIAL REQUIREMENTS

Box Channel Type Industrial Fittings

Box type slim line channel must be in screw less construction manufactured from M.S. CRCA sheet steel powder coated with MS CRCA cover, powder coated white. Light reflection surface in Box/Channel type fittings shall be in a POLYESTER PRECOATED STEEL having a reflection factor of not less than 80%. SCREWLESS DESIGN & CONSTRUCTION Light fixtures shall be preferred due to their ease of maintenance, especially for box/channel for box/channel type fixtures.

Moisture Proof Industrial Fittings

Surface mounted totally enclosed moisture proof fixtures must be in polycarbonate body and diffuser with transparent prismatic interior and smooth exterior and frosted end. Fixture must be completely sealed with polyerethane double gasket to achieve IP 65 protection. Fixture is complete with CRCA steel white powder coated / enameled finish reflector.

18 W / 36 W Fluorescent and 36 W CFL Low Glare Light Fittings

Recessed mounted, modular fluorescent lighting fixture made of CRCA Sheet steel powder coated (white) housing, electro chemically brightened and anodised reflector, three dimensional cross louvers with concave contours, fresnel top at louver saddle to increase efficiency. The luminance of <200 cd/M^2 at 63 degree viewing angle in all directions so as to confirm Cat-2 classification of CIBSELG3

4.5 ACCESSORIES FOR LIGHT FITTINGS REFLECTORS

The reflectors shall be made of CRCA sheet steel/aluminium /Silvered glass/Chromium plated sheet copper as required. The thickness of reflectors shall be as per relevant standards. Reflectors made of steel shall have stove enameled/ vitreous enameled/epoxy coating finish. Aluminium used for reflectors shall be anodized/epoxy stove enameled /mirror polished. The finish for the reflector shall be as specified. The reflectors shall be free from scratches / blisters and shall have a smooth and glossy surface having optimum light reflecting coefficient. Reflectors shall be readily removable from the housing for cleaning and maintenance without use of tools.

4.6 LAMPS

4.6.1 TLD

Lamp shall be environment friendly low pressure mercury discharge lamp with mercury content less than or equal to 5 mg. The lamp shall have minimum lumen maintenance of 85 and CRI of 85. The lamp must comply to ROSH (Restriction of Hazardous substances) and covered by WEEE. Lamp should be fully re-cyclable. The lamp should be low on maintenance with life of 40 K hours in case of electromagnetic ballast and 65 K hours in case of HF ballast up to 10% failure. The discharge glass shall be lead free.

TLD Lamps shall be minimum tri-phosphor type and have bi-pin bases. Colour spectrum of light shall be equivalent to "PHILIPS color 84 or color 86 color 82 or "OSRAM color 21 or color 11 or color 41 (as required at site)".

The fluorescent Tubes (TLD) should have cool daylight colour designation. But Architects reserve the right to prescribe either Cool Daylight or Bright White or Incandescent Colour Designations for TLD. NO extra payment will be made over the quoted rate of bidder for this. The 36 W fluorescent tubes will have Nominal Luminous Flux of not less than 3350 lumens whether so mentioned in the Schedule of Quantities or not.

T 5 – HIGH EFFICIENCY ECO-FRIENDLY LAMPS

T-5 lamp shall be environment friendly low pressure mercury discharge lamp with mercury content less than or equal to 3 mg. lamp should have lowest CO2 emission compared to any other comparable light source (40% less than a TL-D standard lamp, 26% less than TL-D / 80). T-5 lamp shall be 100% lead free. T-5 lamp shall be designed for operation with electronic gear and well suited for dimming. Maximum lumen output to be reached at approx 35^{o}C in free burning position. T-5 lamp can be ignited from -15^{o}C to + 50^{o}C. Lamp should be fully recyclable and must comply to ROSH (Restriction of Hazardous substances) and shall be covered by WEEE. T-5 shall have 16 mm in diameter service life of TL-5 lamp should be 10% more than TL-D lamps. T-5 lamp shall have lumen efficacy of up to 104 Lux / W and shall have excellent colour rendering to En 12464 (Ra 80 to 89).

4.6.2 Compact fluorescent lamp shall have same luminous flux and power consumption as fluorescent tubes but less than half the length and more compact than U-shaped and circulator lamps. CFL shall be suitable for use with conventional control gear & standers and for HF electronic control gear. CFL lamp shall be non integral type of OSRAM / PHILIPS only.

4.7 HIGH FREQUENCY ELECTRONIC BALLAST

High frequency electronic ballast shall be used with fluorescent / Compact Fluorescent Lamps wherever specified in the schedule of quantities. High frequency electronic ballast shall comply to the following:

- IEC 927, IEC 928 for ≤10% total harmonic distortion.
- EMI / RFI – Confirming to FCC / VDE Class A/B.
- Line Transient as per IEEE C62.41.
- Ballast Crest Factor C1.7%.
- No Stroboscopic Effect
- Constant Wattage / Light output between 240 V ± 10%.
- Circuit protection for surge current and inrush current.
- Short circuits, open lamp protection
- PF > 70 for fluorescent / T5 lamp and CFL.

- Deactivated lamp protection
- Suitable for use with single and twin lamps
- RFI < 30 MHz EN 55015
- Total Harmonic Distortion (THD) ≤10%
- Immunity to interference EN 61547
- Safety EN 60928 / IEC 928 / IS 13021 (Part I)
- Performance EN 60929 / IEC 929 / IS 13021 (Part II)
- Vibrations & Bump tests IEC 68-2-6 FC

IEC 9001

- Quality Standard ISO 9001
- Environmental Standard ISO 14001
- DC Operation EN 60924
- Emergency Lighting Operation VDE 0108

Total System consumption (lamps + ballast) for
1 x 28 W T-5, shall not exceed 32 W

5. EARTHING

5.1 EARTHING

The system shall be TNS with four wire supply system (R,Y,B,N and 2 Nos. E) brought from the main L T Panel. All the non-current carrying metal parts of electrical installation and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, ducts, cable trays, stair case railing etc shall be bonded to earth.

All earthing shall be in conformity with IS:3043 1987, and the basic system of earthing shall be TNS.

5.2 EARTHING CONDUCTORS

Earthing conductors shall be of copper / GI as mentioned in schedule of quantities and shall be protected against mechanical injury and corrosion.

5.3 SIZING OF EARTHING CONDUCTORS

The cross sectional area of earthing conductor shall not be smaller than half of the largest current carrying conductor subject to an upper limit of 80 Sq.mm. If the area of the largest current carrying conductor or bus bar exceeds 160 sq.mm then two or more earthing conductors shall be used in parallel, to provide at least half the cross sectional area of the

current carrying conductor or bus bars. All fixtures, outlet boxes, junction boxes and power circuits up to 15 amps shall be earthed with PVC insulated copper wire.

All 3 phase switches and distribution panels up to 60 amps rating shall be earthed with 2 Nos. distinct and independent 4 mm dia copper / GI wires. All 3 phase switches and distribution panels up to 100 amps rating shall be earthed with 2 Nos. distinct and independent 6 mm dia copper / GI wires. All switches, bus bar, ducts and distribution panels of rating 200 amps and above shall be earthed with minimum of 2 nos separate and independent 25 mm x 3 mm copper / GI tape.

5.4 CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main L T panel to an earth electrode with which the connection is to be made. All joints in tapes shall be with four rivets and shall be brazed in case of copper and by welding bolting in case of GI, wires shall be connected with crimping lugs, all bolts shall have spring washers. Sub- mains earthing conductors shall run from the main distribution panel to the sub distribution panel. Final distribution panel earthing conductors shall run from sub-distribution panel.

Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution panel. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to distribution panel at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of the earthing conductor for earthing purposes, even though the run of metallic conduit is earthed.

The plate/pipe electrode, as far as practicable, shall be buried below permanent moisture level but in no case not less than 2.5 M below finished ground level.

The plate/pipe electrode shall be kept clear of the building foundation and in no case, it shall be nearer by less than 2 M from outer face of the respective building wall / column.

The plate electrode shall be installed vertically and shall be surrounded with 150 mm. thick layers of Charcoal dust and Salt mixture.

19 mm. dia. G.I. pipe for watering, shall run from top edge of the plate / pipe electrode to the mid level of block masonry chamber.

Top of the pipe shall be provided with G.I. funnel and screen for watering the earth / ground through the pipe.

The funnel with screen over the G.I. pipe for watering to the earth shall be housed in a block masonry chamber as shown in the drawing.

The masonry chamber shall be provided with a Cast Iron hinged cover resting over the Cast Iron frame which shall be embedded in the block masonry.

Construction of the earthing station shall in general be as shown in the drawing and shall conform to the requirement on earth electrodes mentioned in the latest edition of Indian Standard IS : 3043, Code of Practice for Earthing Installation.

The earth conductors (Strips / Wires copper / Hot dip G.I.) inside the building shall properly be clamped / supported on the wall with Galvanised Iron clamps and Mild Steel Zinc Passivated screws / bolts. The conductors outside the building shall be laid at least 600 mm. below the finished ground level.

The earth conductors shall either terminate on earthing socket provided on the equipment or shall be fastened to the foundation bolt and / or on frames of the equipment. The earthing connection to equipment body shall be done after removing paint and other oily substances from the body and then properly be finished.

Over lapping of earth conductors during straight through in joints, where required, shall be of minimum 75mm. long.

The earth conductors shall be in one length between the earthing grid and the equipment to be earthed.

EARTH LEADS AND CONNECTIONS :

Earth lead shall be bare copper or Galvanised steel as specified with sizes shown on drawings. Copper lead shall have a phosphor content of not over 0.15 %. G.I strips buried in the ground shall be protected with bitumen and hessian wrap or polythene faced hessian and bitumen coating. At road crossing necessary Hume pipes shall be laid. Earth lead run on surface of wall or ceiling shall be fixed on saddles so that strip is at least 8 mm away from the wall surface.

The complete earthing system shall be mechanically and electrically bonded to provide an independent return path to the earth source.

5.5 **PROHIBITED CONNECTIONS**

Neutral conductor, sprinkler pipes, or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures, metallic conduits and lightning protection system conductors shall not be used as a means of earthing an installation or even as a link in an earthing system. The electrical resistance measured between earth connection at the main L T panel and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate or circuit breakers, and shall not exceed 1 ohm. All switches carrying medium voltage shall be connected with earth by two separate and distinct connections. The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury by running the same in G I pipe of adequate size. The overlapping in strips at joints where required shall be minimum 75 mm. The joints shall be riveted and brazed in case of copper and by welding / bolting in case of GI in an approved manner. Sweated lugs of adequate capacity and size shall be used for termination of all conductor wires above 6 sq.mm size. Lugs shall be bolted to the equipment body to be earthed

after the metal body is cleaned of paint and other oily substances and properly tinned. Equipotent bonding of all metallic structures shall be done.

5.6. EARTHING

The following must always be ensured in earthing system.

- All earths must be interconnected at the earth pits. This includes generator neutrals, transformer neutrals, transformer body, lightning protection system earths, UPS earths etc.

- Extraneous conductive parts such as gas pipes, other service pipes and ducting risers and pipes of fire protection equipment and exposed metallic parts of the building structure.

5.7 The Contractor shall get the soil resistivity test done at his own cost of the area where earthing pits are to be located before starting the installation.

5.8 RESISTANCE TO EARTH

The resistance of earthing system shall not exceed 1 ohm.

5.9 SPECIFICATION FOR HOT DIP GALVANIZING PROCESS FOR MILD STEEL USED FOR EARTHING FOR ELECTRICAL INSTALLATION

GENERAL REQUIREMENTS

I. Quality of Zinc

Zinc to be used shall conform to minimum Zn 98 grade as per requirement of IS:209-1992.

II. Coating Requirement

Minimum weight of zinc coating for mild steel flats with thickness upto 6 mm in accordance with IS:6745-1972 shall be 400 g/sqm.

The weight of coating expressed in grams per square metre shall be calculated by dividing the total weight of Zinc by total area (both sides) of the coated surface.

The Zinc coating shall be uniform, smooth and free from imperfections as flux, ash and dross inclusions, bare patches black spots, pimples, lumpiness, runs, rust stains bulky white deposits, blisters.

Mild steel flats / wires shall undergo a process of degreasing pickling in acid, cold rinsing and then galvanizing. Jointing of earthing tape shall be by welding. All joints and cut ends shall be properly painted with aluminium paint.

5.10 TEST :

The entire earthing installation shall be tested as per requirements of Indian Standard Specification IS : 3043.

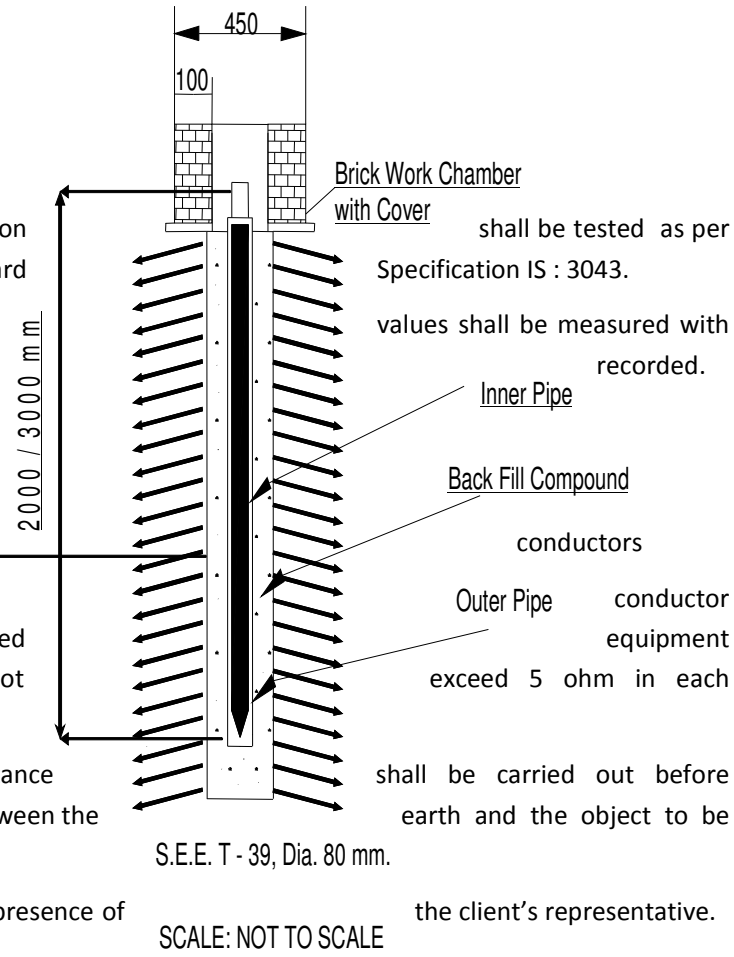
The following earth resistance values shall be measured with an approved earth megger and recorded.

1) Each earthing station
2) earthing system as a whole
3) Earth continuity conductors

Earth resistance for each earthed conductor shall be measured which shall not exceed 5 ohm in each case.

Measurements of earth resistance shall be carried out before earth connections are made between the earth and the object to be earthed.

All tests shall be carried out in presence of the client's representative.



Conformity to IE Act, IE Rules, and Standards

All Electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 2003 and Indian Electricity Rules, 1956 amended up to date (Date of call of tender unless specified otherwise). List of Rules of particular importance to Electrical Installations under these General Specifications is given in Appendix C for reference.

(13) DIESEL GENERATING SETS

Item No. 01:

Supplying and erecting, commissioning and testing diesel generating set having continuous rating, 3 phase, 415 volts, 50 cycles A.C. supply comprising of a totally enclosed air/water cooled diesel engine with multi-cylinders developing suitable BHP not less than following capacity at 1500 RPM with 10% overload for one hour in 24 hours with standard accessories like fly wheel, lubricating oil cooler, "A" class governor, heavy duty fuel wheel and lubricating oil filter, oil bath air filler, lubricating oil pressure gauge, end exhaust manifold, standard set of tools with adjustable spanners, screw drivers, feeder gauge, cylinder head to cover, joint cylinder head to exhaust, element lube oil filter, 12/24 volts electric starting equipment complete with standard battery, dynamo, cut-outs, ammeter, necessary wiring, pressure gauge, starter etc and heavy duty Residential type exhaust silencer and vertical hot air duct both logged with asbestos rope, save oil trays, exhaust piping of required length, standard wall/floor mounted fuel with level

indicator and piping and drip proof alternator, self excited, self regulated, screen protected, with excitation system, capable of delivering the rated system output at 415 volts, 3 phase, 0.8 PF, 50 Hz, 4 wire, running at 1500 RPM, conforming to IS-4722- 1968 with voltage regulation +/- 5% of rated voltage from no load to full load. Both the engine and alternator fitted on a common fabricated steel base plate with antivibration mounting engine and alternator both connected to each other by flexible flange coupling and with floor/wall mounted control panel box comprising of voltmeter ammeter, selector switches, ACB / MCCB / MCB of adequate capacity, indicator lamps duly wired with HRC fuses. The alternator & control panel shall be connected with provided suitable capacity armoured cable and complete with Acoustic enclosure (canopy) made out of 18 SWG CRCA Sheet, sound absorbing material Rockwool of 64 density & 100 mm thick conforming to IS:8183 The resin bonded rockwool covered from inside the canopy by perforated sheet with 3/4 mm holes, sound level not more than 75 dB at a distance of 1 mtr, as per PVCT norms. Erection, commissioning and satisfactory testing as per requirement with first filling of fuel, oil, etc. with guarantee of complete system for One year. & with obtaining all necessary certificate from Electrical Inspector. The Capacity and Ratings of DG sets are as below.
(G) Continuous Rating of 50 KVA ,BHP not less than 65.8 BHP

Workmanship and measurement:
Item shall be executed as per item description, manufacturers specification and instruction of engineer in charge.
Rate shall be for one number**.**

VENDOR LIST

- **Cement**

1) Ambuja
2) Ultratech
3) Siddhi
4) Hathi
5) J K Laxmi
6) Sanghi

- **TMT Steel(Fe-415)**

1) SAIL
2) TISCO
3) Elecctro-therm
4) Ramswaroop
5) National

- **Structural Steel**

1) Balbir
2) Paras
3) SOS
4) Malhotra
5) Ispat
6) Tata steel
7) SAIL
8) Vizag

- **Water proofing compound**

1) Roff
2) Dr. Fixit
3) Perma
4) Fosroc

- **Glazed tiles**

1) Kajaria
2) Nitco
3) Johnson
4) Somany

- **Epoxy Phenolic primer, Exterior sand textured matt paint, Oil bound washable distemper, plastic emulsion paint, Cement Paint**

1) Snow cem
2) I C I Duluxe
3) Narolac
4) Asian Paints
5) Berger Paints
6) Jonson & Nicolson

- **Water Cooler**

1) Voltas
2) Godrej
3) Blue star
4) Carrier
5) Electrolux

- **Wash basin,Urinal,Europeon type W.C.**

1) Cera
2) Hindware
3) Cotto
4) Prince

- **Bib tap, Non return full way wheel valve,Chromium plated brass half turn flash cock,Abonite Ball cock**

1) DRP
2) Vipul
3) Venus
4) Sai
5) VM

- **HDPE Pipe**

1) Duraline
2) Reliance
3) Penvolt

- **HDPE Storage tank**

1) Syntex
2) Poly chem

- **P.V.C Water stop**

1) Jyoti
2) Fixopan

- **G.I. Pipe**

1) TATA
2) Ambica
3) GST
4) Jindal

- **M.S. Pipe**

1) TATA
2) Jindal
3) Well spun
4) Asian
5) SAIL
6) Vizag

- **P.V.C. Pipe**

1) Prince
2) Supreme
3) Jain
4)

- **G.R.P. pipe**

1) Amiantit
2) Balaji
3) Graphite wika

- **Submersible pump**

1) Kirlosker
2) KSB
3) Grunfos
4) Aqva

- **DG Set**

1) Kirloskar
2) Eicher
3) Cummins
4) Mahindra
5) Bharat or equivalent

- **Slide Gate Valves**

6) Jash
7) IVC
8) Foures
9) Kirlosker

Or Equivalent

- **Sluice valve**

1) Kirlosker
2) IVC
3) Durga
4) Fouress

- **Weigh Bridge**

1) Allery
2) Unique instrument
3) Mattler
4) Eagle
5) Matrix

- **Electrical Items**

1) **RCBO**
Siemens /ABB / Hager / Marlin Gerin / GE / Legrand / Havells
2) **RCCB**
Siemens /ABB / Hager / Marlin Gerin / GE / Legrand / Havells
3) **MCB**
Siemens /ABB / Hager / Marlin Gerin / GE / Legrand / Havells
4) **MCB type Change over Switch**
Havells
5) **Wire & Cable**
RR Kable / Finolex / Havells / RPG / CCI / Torrent / Lapp Cab
6) **Switch & Socket**
Clipsel / North West / LK / Crabtree / ABB / MK / Rider / Gewiss / Legrand / Anchor / GM / Straco / elle / Alex / Jainex / CPL / Precision / WIT / Rider / Vinay / Goldmedal
7) **MCB Distribution Board**
Siemens /ABB / L&T / Marlin Gerin / GE / Legrand / Havells / Indo asian
8) **Distribution Board**
Hager / Havell's / Legrand / Schneider / ABB

9) **Earthing Electrode Copper Plate**

As per IS: 3043 / Ashlok make SEE

10) **Street Light Pole**

As per IS

11) **Exhaust Fan**

GEC / Crompton / Bajaj / Orient/ Khetan /Ortem

12) **Ceiling Fan**

GEC / Crompton / Bajaj / Orient/ Khetan / Ortem

13) **Air conditioner (Window/Split)**

Hitachi / Blue star / LG / Fader Loyyed / Voltas / Amtrex / General / Electrolux/Carrier

14) **Pumps**

K.S.B. / Mather & Platt / Beacon Weir / Kirloskar / Voltas / Worthington / Grundfoss

ADVANCE STAMP RECEIPT

Received with thanks the sum of Rs. ..... (In Words

.....) only from the Rajkot Municipal RMC being the

Refund of Earnest Money Deposit placed by me/us vide RMC's Receipt No. ..... dated

..... along with the tender paper for the

.....

(Name of the work)

Date :- Revenue Stamp

Signature of the Tenderer

f.w.c. to the Accountant,

2. For remarks whether the .....deposit amounting to

Rs. ..... placed on ..... by

Shri/M/s. ..... in connection

with the work of ....

stands in full in the name of the aforesaid party (R.No. ..... dated .....)

Environment Engineer

Rajkot Municipal Corporation

F.W.Cs. to Ex. Engineer -Solid Waste management dept.

To deposit of Rs. ..... placed on ..... by

Shri/M/s. ..... stands

in full in the name of the aforesaid party.

Accountant.
Submitted,

For favour of sanction of refund Rs. .....

being the amount of ..... deposit placed on

..... vide Receipt No. ..... by

Shri/M/s.....in connection with the work of

.....
.

as the tender of the above party has been accepted / had not been accepted and the concerned

contractor has paid security deposit of Rs. ..... for the above referred work

on Dt. ..... The party has also executed an agreement for the above work. The

above deposit stands in full in the name of the said party as certified by the Accountant on

..... The expenditure will be debited on

B.H.G. Tender Deposit Account.

Assistant Engineer / Jr. Engineer.

Ex. Engineer
Solid Waste management dept.