NOTICE INVITING BUDGETORY OFFERS

Name of Work	**"**Providing high mast lighting facility on newly constructed extended Railway platform at MPA" on turnkey basis
Date of submission of budgetary quotation	On or Before **08/08/2022 at 15:00 Hrs.**
Address for communication:	Executive Engineer (E-HR), 2nd floor, Mechanical Engineering Department, Mormugao Port Authority, Admin. Building, Headland sada Vasco-de-Gama Goa - 403804
Contact Details	Phone : (0832) 2594207, 2594577 Email : mohamed.shaik@mptgoa.gov.in
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EXECUTIVE ENGINEER (E-HR)
MORMUGAO PORT AUTHORITY

CME/XEN(E-HR)/H-1/2022/3204 **Date: 28.07.2022**

Sub: Providing high mast lighting facility on newly constructed extended Railway platform at MPA" on turnkey basis

Ref: Budgetary Quotation No. CME/XEN (E)/HR/ H-1/22/B1

Mormugao Port Authority, intends to provide 7 numbers 30 meter High Mast lighting towers on newly extended Railway platform.

As such it is requested to kindly furnish budgetary quotation for the same (Scope of work, technical specifications are enclosed at Annexure-I and Price Schedule enclosed at Annexure- II.)

Your budgetary quotation should reach to this office on or before 08/08/2022 at 15:00 Hrs.

Thanking you,

Yours sincerely,

EXECUTIVE ENGINEER (E-HR)

Annexure-I

TECHNICAL SPECIFICATION

Scope of work : The proposed job is to be carried out at Mormugao Port Authority, on newly extended Railway platform by providing 7 numbers 30 meters High Mast lighting towers with LED luminaries . The brief scope of the work involves but not limited to the following,

1) High mast :30 M

Applicable Standards:

The following shall be the Reference Standards for the loading of the High mast:

Code No.	Title
a). I.S.875 (Part III) 1987.	Code and practice for design loads for Structures.
b). BSEN 10025.	Grades of MS. Plates.
c). BS.ISO 1461.	Galvanizing.
e). TR. No.7 2000 of ILE, UK.	Specification for Mast and foundation.
f) BS: 5135	Welding
g) IS 4237	General requirements for switchgears and control gears.

1.01 **Structure**:

The High mast shall be continuously tapered, presenting a good and pleasing appearance and shall be based on proven In-Tension design conforming to the standards referred to above, to give an assured performance, and reliable service. The high mast structure shall be suitable to withstand wind speed of minimum 180 Km/hr confirming to IS 875 part3 1987.

1.02 **Construction:**

The mast shall be manufactured using special steel plates, conforming to BS-EN10-025/DIN 17100/BS 4360 or equivalent and shall be delivered in multiple sections of effective length 10 meters. Thus a **30m** mast shall be delivered in 3 sections. At site the sections shall be joined together by slip-stressed-fit method. No site welding or bolted joint shall be done on the mast. The high mast shall withstand wind speed of more than 180 Km/hr

The mast shall be provided with fully penetrated flange, which shall be free from any lamination or incursion. The welded connection of the base flange shall be fully developed to the strength of the entire section. The base flange shall be provided with supplementary gussets between the bolt-holes to ensure elimination of helical stress concentration. For the environmental protection of the mast, the entire fabricated mast shall be hot dip galvanized, internally and externally, having a uniform average thickness of 86 microns to 65 micron as per BSEN-1461/BS ISO1461/IS/2629-1966. Galvanizing shall be done in single dipping method for better adhesion and life.

1.02.1 **Door Opening:**

An adequate door opening shall be provided at the base of the mast and the opening shall be such that it permits clear access to equipment like winches, cables, plug and socket, etc. and also facilitate easy removal of the winch. The door opening shall be complete with a close fitting, vandal resistant, weatherproof door, provided with a heavy-duty double internal lock with special paddle key.

The door opening shall be carefully designed and reinforced with welded steel section, so that the mast section at the base shall be unaffected and undue buckling of the cut portion is prevented. Size of door opening shall well suitable to avoid buckling of the mast section under heavy wind conditions.

1.03 **Dynamic Loading for the Mast:**

The mast structure shall be suitable to sustain an assumed maximum reaction arising from a wind speed of at least 180 Km/hr. confirming to IS 875.

1.04 **Lantern Carriage**: with 12 arms suitable to mount up to 24 LED fittings

1.04.1 **Fabrication:**

A fabricated Lantern Carriage shall be provided for fixing and holding the 12 Nos. 350W LED flood light fittings and control gear boxes and also have a perfect self-balance. The Lantern Carriage shall be fabricated in two halves and joined by bolted flanges with stainless steel bolts and nuts to enable easy installation or removal from the erected mast. The inner lining of the carriage shall be provided with protective PVC arrangement, so that no damage is caused to the surface of the mast during the raising and lowering operation of the carriage. The entire Lantern Carriage shall be **hot dip galvanized** after fabrication.

1.04.2 **Junction Box.**

Weather proof junction box, **IP 66** made of Cast Aluminum shall be provided on the Carriage Assembly as required, from which the inter-connections to the designed number of the flood light luminaires and associated control gears fixed on the carriage, shall be made.

1.05 **Raising and lowering mechanism**:

For the installation and maintenance of the luminaires and lamps, it will be necessary to lower and raise the Lantern Carriage Assembly. To enable this, a suitable Winch Arrangement shall be provided, with the winch fixed at the base of the mast and the specially designed head frame assembly at the top.

1.05.2 **Winch: Double drum with double gears type**

The winch shall be of completely self-sustaining type, without the need for brake shoe, springs or clutches. Each driving spindle of winch shall be positively locked when not in use, by gravity activated PAWLS. The capacity, operating speed, safe working load, recommended lubrication and serial number of the winch shall be clearly marked on each winch.

The gear ratio of the winch shall be 53:1. However the minimum working load shall not be less than 750 Kg. The winch shall be self-lubricating type by means of an oil bath and the oil shall be readily available grades of reputed producers.

The winch shall have double drum having grooves to ensure perfect seating suitable and tight rope lay with no chances of rope slippage. The rope termination in the winch shall be such that distortion or twisting is eliminated and at least 5 to 6 turns of wire ropes remain on the drum when the lantern carriage is fully lowered and rested on the pads. It should be possible to operate the winch manually by a suitable handle and by an integral power tool. Operation of the winch with manual handle shall be independent of the power tool. Winches with manual operation through the power tool shaft shall not be accepted. Individual drum operation of the winch shall be possible. A double drum winch shall have two drums and two worm gears independent in operation for increased safety. It shall be possible to remove the double drum after dismantling through the door opening provided at the base of the mast. Also a winch gear box for simultaneous and reversible operation of double drum winch shall be provided. Manufacturer Test certificates shall be submitted along with the winch.

1.05.3 **Head Frame**: (with **top canopy)**

The head frame which is to be designed as a capping unit of the mast, shall be of welded steel construction, galvanized both internally and externally after assembly. The top pulley shall be of appropriate diameter, large enough to accommodate the stainless steel wire ropes and the multi-core electric cable. The pulley block shall be made of non-corrosive material, and shall be of die cast Aluminum Alloy (LM-6). Pulley made of synthetic materials such as Plastic or PVC are not acceptable. Self-lubricating bearings and stainless steel shaft shall be provided to facilitate smooth and maintenance free operation for a long period. The pulley assembly shall be fully protected by a canopy galvanized internally and externally.

Close fitting guides and sleeves shall be provided to ensure that the ropes and cables do not dislodged from their respective positions in the grooves. The head frame shall be provided with guides and stops with PVC buffer for docking the lantern carriage.

1.05.4 **Stainless Steel Wire Ropes**:

The suspension system shall essentially be without any intermediate joint and shall consist of only non-corrosive stainless steel of AISI 316 grade or better grade.

The stainless steel wire ropes shall be of 7/19 construction, the central core being of the same material. The overall diameter of the rope shall not be less than 6 mm. The breaking load of each rope shall not be less than 2350 kg, giving a factor of safety of over 5 for the system at full load. The end constructions of ropes to the winch drum shall be fitted with talugrip. The thimbles shall be secured on ropes by compression splices. Two continuous lengths of stainless steel wire ropes shall be used in the system and no intermediate joints are acceptable in view of the required safety. **No intermediate joints/terminations, either bolted or else, shall be provided on the wire ropes between winch and lantern carriage**. Manufacturer certificate for the rope to be produced.

1.06 **Electrical System, Cable and Cable Connections**:

A suitable terminal box shall be provided as part of the contract at the base compartment of the high mast for terminating the incoming cable. The electrical connections from the bottom to the top shall be made by special **trailing cable**. The cable shall be minimum size 5 core 4 sq mm copper EPR insulated and PCP sheathed to get flexibility and endurance with **Rodent proof coating**. The cable shall be of reputed make. At the top there shall be weather proof junction box to terminate the

trailing cable. Connections from the top junction box to the individual luminaires shall be made by using 3 core 2.5 sq. mm flexible PVC copper cables of reputed make. The system shall have in-built facilities for testing the luminaries while in lowered position.

Also, suitable provision shall be made at the base compartment of the mast to facilitate the operation of internally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by means of specially designed, metal clad, multi-pin plug and socket provided in the base compartment to enable easy disconnection when required. The costs of copper cable, cable connections, terminations must be included in the High mast quoted price itself and no separate item/quantity is considered.

1.06.01 **Cable from control panel to High MAst**

A cable of size 4 X 10 cable sq.mm Copper conductor Armoured cable for High MAst lighting load and 4 x 4 sq.mm Copper conductor Armoured cable for motor supply shall be provided from control panel to the base compartment of the high mast. Cable shall be taken to the base compartment of the high mast from control panel through the pipes of suitable diameter embedded in the foundation for protection of the cables. The incoming power cable for lighting and motor from control panel to the base compartment of the high mast shall be included in the High mast price and no separate item/qty. is considered.

1.07 **Power Tool for the Winch**:

A suitable, high-powered, electrically driven, internally mounted power tool, with manual over ride shall be supplied for the raising and lowering of the lantern carriage for maintenance purposes. The speed of the power tool shall be to suit the system. The power tool shall be single speed, provided with a motor of the required rating. The power tool shall be supplied complete with suitable control. The capacity and speed of the electric motor used in the power tool shall be suitable for the lifting of the design load installed on the lantern carriage.

The power tool mounting shall be so designed that it will be not only self-supporting but also aligns the power tool perfectly with respect to the winch spindle during the operations. Also, a handle for the manual operation of the winches in case of problems with the electrically operated tool, shall be provided and shall incorporate a torque limiting device. The power tool operation shall always be through a separate torque-limiting device to protect the wire ropes from over stretching. It shall be mechanical with

suitable load adjusting device. The torque limitor shall trip the load when it exceeds the adjusted limits. There shall be suitable provision for warning the operator once the load is tripped off. The torque limitor is a requirement as per the relevant standards in view of the overall safety of the system. Each mast shall have its own power tool motor.

1.08 **Lightning Finial:**

One number heavy duty hot dip galvanised lighting finial shall be provided for each mast. The lightning finial shall be minimum 1.2 M in length and shall be provided at the centre of the head frame. It shall be bolted solidly to the head frame to get a direct conducting path to the earth through the mast. **The lightning finial shall not be provided on the lantern carriage under any circumstances in view of safety of the system.**

1.09 **Aviation Obstruction Lights**:

Suitable Aviation Obstruction Lights of reliable design and reputed manufacturer shall be provided on top of each mast. The aviation fitting shall be Heavy duty & whether proof and yellow painted suitable for housing two nos. 10 Watt LED lamps. The Omni directional red colour light shall be prewired up to the terminal block. The unbreakable red coloured polycarbonate dome shall be provided and secured to housing by 3 nos. screws. The Aviation obstruction light shall be Degree of protection: IP 66 and Electrical safety-Class-I. Threaded stem with lock nuts for mounting on the pipe above the high mast structure to be provided.

1.10 **Earthing Terminals**:

Suitable earth terminal using 12 mm diameter stainless steel bolts shall be provided at a convenient location on the base of the Mast, for lightning and electrical earthing of the mast.

2. Control Panel (Feeder panel)

Design, Manufacture, Supply, Installation, testing and commissioning of stainless steel control panel with Rain Canopy. It shall be IP 66 compliant, dust, damp, vermin and weather proof fabricated from SS-316 grade Sheet of 2 mm. thick and shall be fabricated with the SS-316 angle & flat of suitable size as directed. It shall be provided with, single door type (Right side door hinge) with cam lock door sealing Gasket and Gland plate with required openings etc., complete. The drawing of the Panels shall be got approved from Engineer-in-Charge prior to manufacture. The control Panel shall be

spacious for easy maintenance and shall be provided with following components with control wiring with 10 Sq.mm copper wire and 4 Sq.mm copper wire for motor circuit and termination with suitable lugs. Work including supply & fixing of the components as per BOQ.

i) MCCB, TPN, 100 A , 415 Volt, 25 KA, 50 Hz. - 2Nos. (1 as Incomer & other for next high mast)

ii) 25A, SP, MCB for High Mast lighting control - 3 Nos

iii) 16A, 3 pole MCB for Motor Control -1 no

iv) 24Hrs. Time switch -1 no

v) Auto Manual selector switch to bypass timer -1 no

vi) 3 phase Air Break Contactor of 40 A capacity - 1 no.

vil) Forward and Reverse Contactors with push button control to raise/lower the lantern carriage for “fixed 3 phase, 415 V Winch Electric Motor of suitable rating” as per the recommendations of manufacturer

vii) LED type indication Lamp, 220 V AC (Phase R, Y & B) - 1 Set

Suitable size and rating of electrolytic grade copper conductor/bus, phase to phase and Neutral with PVC sleeved color code shall be provided. Suitable size connectors -- shall be provided for termination of control and power cables.

All these components shall be mounted in the Control panel by means of anti-corrosive hardware. The control panel shall be complete in all respects with cable glands, lugs for incoming and outgoing cables including interconnection with PVC insulated cable single core, standard copper conductor of 650/1100V grade.

The incoming cables shall be terminated on both the MCCB .The output of one,100 A MCCB will be connected to the high mast control circuit and the output of other 100 A MCCB will be connected to the next high mast cable.

The Feeder Pillar shall be provided with 1 Nos. SS terminals for earthing.

3 : Main panel

Design, Manufacture, Supply, Installation, testing and commissioning of Load Point Panel Outdoor Pedestal type with top Canopy. It shall be IP 66 compliant, dust, damp, vermin and weather proof fabricated from SS-316 grade Sheet of 2 mm. thick and shall be fabricated with the SS-316 angle & flat of suitable size as directed. It shall be provided with, single door type (Right side door hinge) with cam lock door sealing Gasket and Gland plate with required openings etc., complete. The drawing of the Panels shall be got approved from Engineer-in-Charge prior to manufacture. The drawing of the Panels shall be got approved from Engineer-in-Charge prior to manufacture. The main Panel shall be spacious for easy maintenance and shall be provided with following Items.

i) 200 Amps, 35 KA, TPN MCCB – 2 Nos. (1 each for Incoming and spare)

ii) Neutral Link – 01 No.

iii) LED type indication Lamp, 220 V AC (Phase R, Y & B) – 1 set.

The MCBs and connector shall be mounted in the Panel by means of suitable hardware (nuts, bolts shall be of stainless steel). The Panel shall be complete in all respects with cable glands, lugs for incoming and outgoing cables including interconnection with PVC insulated cable single core, standard copper conductor of 650/1100V grade.

Load Point Legs shall be stainless steel legs of 316-grade in reinforced foundation of suitable design.

The Load Point Panel shall be tested as per IS: 4237. All the components shall be panel mounting type and stainless steel hardware and shall be provided with 2 Nos. SS terminals for earthing.

4 **Incoming Power Cable**

i) L.T. Aluminium XLPE cable of size 4 X 70 sq.mm for providing power supply to first 3 High MAst .

ii) L.T. Aluminium XLPE cable of size 4 X 35 sq.mm for providing power supply to remaining 4 High MAst

5 LUMINAIRES

350 W LED FLOOD LIGHT FITTINGS suitable for 30 m High mast applications.
Necessary warranty certificate of manufacturer for 350 W LED Flood light fittings has to be submitted for acceptance

1) Rated voltage: 240 V AC, 50 HZ. Operating voltage: 120-270 V AC
2) System wattage: 350 w
3) P.F: >=0.95
4) Lumen efficiency: >120L/W
5) CCT & CRI :- 5500K & >70
6) Driver efficiency:>85%
7) Total lumens:>=40000(system efficiency)
8) Protection: O.C, SC, Surge protection of min 10 KV , SPD
9) Mounting: bracket
10) Main housing/ heat shrinks material: Aluminum extruded/ Aluminum PDC
11) Housing end caps & CG box: aluminum PDC
12) Front cover: clear toughened glass
13) LED lumens maintenance: 50000 hrs. @L70
14) Control gear: isolated, electronic, CC drive
15) Hardware: SS
16) IP:66
17) Impact resistance: 1K07
18) Name of the make: shall be engraved/embossed/printed on light fitting
19) Fitting shall have NABL certification

6. Civil foundation:

The firms shall furnish necessary civil foundation drawing for approval based on the soil bearing capacity Test results. The foundation shall be designed to meet the soil conditions. The foundation provided shall have adequate bolts of adequate diameter and height for anchoring the base plate of the mast. The High Mast Towers along with base plate shall be erected on the concrete foundation which has to withstand minimum wind speed of 180 Km/hr. as per firms design approved by Mormugao Port Authority. The contractor shall ensure correct vertical and horizontal alignment of the foundation bolts while carryout the foundation works by using suitable steel template. Necessary electrical power supply required for erecting towers will be provided by MPA at free of cost for the above construction work for curing and erection works at nearest possible point. Contractor has to

make his own arrangements for conveying the water and electricity to the foundation site.

Note:

The Tenderer shall inspect the site and get acquainted with the nature of civil foundation that is required for erecting the High Mast before offering their Tender.

7 Cable Laying and Handling

This includes laying of LT XLPE armoured cable of 1.1KV Grade 4 c X 70sq.mm and 4C X 35 sq.mm through existing RCC trench. The cable shall be laid after opening of RCC trench by removing the RCC slabs. The cable trench shall be cleaned properly including removal of garbage, dust, etc., from the trench. After laying of the cable, cable trench shall be properly covered with existing cover slabs as per original. This work includes all labour, tools tackles necessary for satisfactory completion of the work.

The Single length of cable without any Joint shall be provided for connection from Junction Boxes to Junction Boxes.

8. Protection Guard/Fencing

Providing of Protection Guard/Fencing surrounding the high mast with suitable size MS channel of not less than ISMC 150 vertically at four corners and 2 horizontal runs of MS angles ISA 75, 10 mm thickness. The height of guard shall not be less than 1.5 Mtr. from the ground level. The foundation of the channels shall be with cement concrete with muffing no less than 45 Cm. above ground level. All the members of the guard shall be pre-treated and then painted with two coats of red oxide primer and two coats of yellow epoxy finish paint. The protected area surrounding the High Mast in no case shall be less than 2.5 Mtr. X 2.5 Mtr.

9. ALLIED ELECTRICAL WORKS:

a) All allied Electrical works as per the Bill of Quantities to be carried out by the Contractor in all respects invariably mentioned or not mentioned in the specification to complete the work in all respects.

b) The materials required / intended for the work should be handled carefully and neatly installed / laid / commissioned and any damages during installation will be Contractors account and same shall be rectified immediately to its original condition.

c) The Miscellaneous works to be carried out invariably whether clearly mentioned or not mentioned in the specifications and BOQ and to be completed in all respects as required for the said project work.

10. GENERAL NOTES:

All the drawings of Design, Construction, Foundation Details, Structural design, catalogues/Brochures of High Mast and cable layout drawings, type Test certificates, routine Test certificates etc. should be submitted by the contractor in THREE sets invariably mentioned or not in the Tender Schedule. After the completion of work, As Built drawings in THREE sets to be submitted.

All the drawings have to be got approved by the Engineer –in –charge before Fabrication, Assembly, installation etc.
All the works of installation, laying of cables, testing commissioning to be carried out in the presence of Engineer-in-charge.

Since the project / works is on turnkey basis, the items / components not specifically mentioned but required, shall be considered and included in the quoted price at the time of submission of bid. No claim will be entertained after opening of Price bid.

All the Hardware materials/Miscellaneous materials should be galvanized and conform to IS and Specification and got approved by the Engineer – in-charge before installation and commissioning.

The High Mast, lighting fixtures, cables etc. to be supplied for the work should conform to Applicable Standards as per Technical specifications of Tender Document. The High Mast offered shall be tendered for inspection at the manufacturer's works before

dispatch. Routine Test certificate of High Mast shall be furnished. Other items are inspected at site as per the requirement. The contractor should provide all facilities to test the materials at site.

The total turn-key project should be guaranteed for a period of 12 months from the last date of commissioning for all the materials and work carried out by the contractor. In the event of failure during the Guarantee Period, the restoration work shall be done free of cost by the Contractor within 3 working days of giving notice or else, the expenditure incurred by MPa to carry-out the defective work will be recovered from the performance guarantee amount with the MPA..

Necessary warranty certificate of manufacturer for 350 W LED Flood light fittings has to be submitted for acceptance

Annexure- II

BILL OF QUANTITIES

Name of work: "Providing HM lightings to the extended Railway platform.

S.N	Item Description	Qty	UNIT	Rate (Rs)	Amount (Rs.)
01	Supply of 30 mtr. High mast lighting tower with all accessories , Head Frame, steel wire rope (not less than 6mm dia., 7/19 construction), reputed make trailing cable for lighting circuit & motor supply, Double drum winch with double gear & having individual drum adjustment facility. Galvanized lantern carriage arrangement suitable for 12 Nos. 350 watts LED flood light luminaries set. Foundation bolts manufactured from special steel along with nuts, washers, anchor plates and temp plates, twin dome aviation obstruction lights with 2 Nos. LED lamps. High powered three phase power tool for electrical operation of raising and lowering of lantern carriage with its supporting stand, torque limit and fixing chain etc. complete in all respect as per the Technical specifications.	7	set		
02	Design and casting of suitable foundation (reclaimed soil) with for the High mast confirming to SBC results. The foundation Height of the High mast shall be 500mm above the existing nearby ground level.	7	No		
03	Design, fabrication, Supplying of Control panel (outdoor type suitable) as per the technical specification.	7	No		
04	Providing RCC/Stone masonry foundation complete in all respect including plastering for the High Mast control Panel and the dimension .The gap between the pillars is 350 mm for cable connection to the control panel. The foundation starts 300mm below the ground after making 100mm stone soling and height of the foundation 750mm above the ground level and curing etc. and the panel should be stand on the well grouted Stainless steel bolts. The work shall be complete in all respect.	7	No		

05	Installation and commissioning of the stainless steel high mast control panel by terminating the required cables such as Incomer, lighting and motor. Work also including supply and fixing of required materials such as glands lugs etc. complete.	7	No		
06	Design, fabrication, Supplying of Main panel (outdoor type suitable) as per the technical specification	1	No		
07	Providing RCC/Stone masonry foundation complete in all respect including plastering for the Main Panel. The foundation starts 300mm below the ground after making 100mm stone soling and height of the foundation 750mm above the ground level and curing etc. and the panel should be stand on the Stainless steel bolts . The work shall be complete in all respect.	1	No		
08	Installation, testing and commissioning of supplied main panel by terminating the required incoming and outgoing cables fixing of required material such as glands, lugs etc.	1	No		
09	Supply of LT UG XLPE cable of size 4Cx35 Sq.mm having aluminium conductor PVC insulated, Galvanized, sheathed, 1.1 KV class	500	M		
10	Laying of 1.1KV 4Core x 35 sq.mm UG cable in existing trench as specified in technical specification	500	M		
11	Supply and making end terminations of cables of size 4Core x 35 sq.mm with suitable glands, crimping the lugs in the control panels with supply, fixing of all required hard wares complete.	8	set		
12	Supply of LT UG cable of size 4Cx70 Sq.mm having aluminium conductor PVC insulated, Galvanized, sheathed, 1.1 KV class.	600	M		
13	Laying of 1.1KV, 4Core x 70 sq.mm UG cable in existing trench as specified in technical specification	600	M		
14	Supply and making end terminations of cable of size 4Core x 70 sq.mm with suitable glands, crimping the lugs in the LT panel and Feeder Pillars with supply fixing of all required hard wares complete.	6	set		

15	Supply and fixing of LED flood light luminaries Fittings of capacity 350 Watts complete in all respect as per technical specifications	84	No.		
16	Design & construction of Protection Guard/Fencing surrounding the high mast with suitable size MS channel and MS angles as per the Technical specifications	7	No		
17	Providing GI pipe earthing for High Mast & feeder pillars using 40 mm dia 2.9 mm thick, 2.5 meter long GI pipe with GI funnel with mesh and suitable size reducer fixed on the top of the earth electrode. The funnel should be enclosed in a CC chamber of 400 x 400 x 400 mm with a cast iron cover. The electrode shall have staggered holes of 12-mm dia and the electrode should be covered 150 mm around with alternate layers of salt and charcoal from the bottom of the pipe to the bottom of the CC chamber the connection from the electrode is to be established through GI Flats. (25x3mm for lighting and panel & 50 x 6mm for lightning arrestor) using GI bolts and nuts. Work includes supply & fixing of required GI flats for each earthing connection.	22	No		
18	Erection, testing and commissioning of 30 mtrs high mast complete in all respect with the help of suitable equipment's	7	No.		
				Total Rs	
				Applicable GST	

(In Words Rupees _____ only exclusive of all taxes and duties)

Note: The rates quoted shall be inclusive of transportation, lodging and boarding, but excusive of GST. Applicable GST shall be paid extra as applicable.