NATIONAL AUTOMOTIVE TEST TRACKS

NOTICE INVITING QUOTATION

FOR

SITC of AI Cable, Laying, Joint Kits cable route markers, LED Street light fitting near T-4

AT

NATRAX
PITHAMPUR, DIST. DHAR (Madhya Pradesh)

Tender No. - NATRAX/PROC/M&S/21/15

National Automotive Test Tracks (NATRAX)
NH-52, Old Agra- Mumbai Highway, Near to Pithampur Flyover,
Post Khandwa (Near Pithampur)
Dhar District, Madhya Pradesh-454774
Phone: +919893892310, Fax – 07292-256101
Email: a.prabhakar@natrip.in ,anuj.kumar@natrip.in,
tulika.mazumdar@natrip.in

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

1. **General Instructions:**

National Automotive Test Tracks (NATRAX) is an Automotive Testing & Certification Centre under NATRiP Implementation Society (NATIS)/National Automotive Board (NAB) which is an autonomous body constituted by Ministry of Heavy Industries, Government of India. NATRAX has been set up on approx. 3000 acres of land for comprehensive testing and evaluation of all types of automobiles, near Pithampur, Dist. Dhar, (Madhya Pradesh, India).

The National Automotive Test Tracks (NATRAX), invites **Password Protected Quotations/Bids** from the qualified and experience Bidder(s) who meets the specified eligibility criteria in this document in the prescribed Proforma for performing, executing and implementing the works on the terms and conditions contained in this Bid document. Brief description of works and the timelines for NIQ/tender are summarised in the table below:

Description of Work	Period of Contract	EMD	Date of start of floating of tender	Last date for submission of Bid	Date & Time of Bid opening	Estimated Cost
SITC of AI Cable, Laying, Joint Kits cable route markers, LED Street light fitting near T-4 at NATRAX	2 Months from the date of Issue of Work Order.	Rs. 16,000/-	08.10.2021	29.10.2021 at 1500 Hrs	29.10.2021 at 1530 Hrs	Rs 8.00 Lakh

The Bidder(s) who meet the mínimum eligibility criteria (MEC) as mentioned in the Instruction to Bidder (ITB) may be eligible to become successful in the Bidding process. **The bidder(s) in the form of JV/Consortium is not permitted.**

2. **Bid Submission details:**
   a. **Password protected** Bids/Quotations are to be submitted by the Bidder(s) at the following email ID's not later than the aforesaid time & date or as next convenient date & time on pre-intimation. (*for password protection details please refer Annexure IV of this document*).
   mailto:a.prabhakar@natrip.in, anuj.kumar@natrip.in, tulika.mazumdar@natrip.in

   OR
   Sealed Bids/quotations may also be submitted in the hard copy containing **Technical Bid and Financial Bids in TWO different sealed envelops at NATRAX Hub office** in the aforesaid date and time. However, Bidders are encourged to Bid/quote through electronic mode considering the ongoing Covid pandemic.

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

b. No Bids will be accepted after the aforesaid date and time. However, on exceptional cases, NATRAX reserves the right to extend the time/last date of submission of Bid to a next convenient date/time before opening of the Bids.

c. Bids sent telegraphically or through other means of transmission (telefax, etc.) which are not **Password Protected** shall be treated as defective, invalid and shall stands rejected.

Please Note: - In case of online Bid submissions Technical Bid and Financial Bid should have different passwords and in case of Bidder who are willing to submit the Bid in Sealed envelop in offline mode are advised to be present while Bid opening at NATRAX HUB.

d. NATRAX shall not be responsible for any delays for non-receipt /non-delivery/or any technical errors or due to wrong addressee. Bidders may confirm the receipt of their Bids submission from NATRAX

3. **Disclaimer:**

NATRAX reserves all rights to accept/ reject/modify/split any or all proposals without assigning any reasons. Bidders shall not have any cause of action or claim against NATRAX for any of its decisions.

For NATRAX

Head Procurement & Stores

ANNEXURE I

INSTRUCTION TO BIDDERS (ITB)

1. Bidders are required to submit their Bids in two parts in a **Password Protected PDF format**, named as **"Bid for Tender No.** NATRAX/PROC/M&S/21/15**" on the subject of the email, containing** two separate **Password Protected PDF document**, as given below. The **Password Protected** Bids shall be submitted at the mentioned email ID(s) before the closure of Bid submission date/time.

OR

Sealed Bids/quotations may also be submitted in the hard copy containing Technical Bid and Financial Bids in TWO different sealed envelops at NATRAX office in the aforesaid date and time. However, Bidders are encourged to Bid/quote through electronic mode considering the ongoing Covid pandemic.

a) The first **Password Protected document** marked as **"Technical Bid for Tender No.** NATRAX/PROC/M&S/21/15**"**shall consist of all the technical details eligibility, commercial terms and conditions and documents sought in the NIQ/Tender along with the signed copy the NIQ/Tender document. **Further, the Technical Bid must include a copy of the unfilled Financial Bid of the Bidderwithout any information on the prices**
OR
In case of offline Bid submission, the sealed document marked as **"Technical Bid for Tender No.** NATRAX/PROC/M&S/21/15**"**shall consist of all the technical details eligibility, commercial, terms and conditions and documents sought in the NIQ/Tender along with the signed copy the NIQ/Tender document. **Further, the Technical Bid must include a copy of the unfilled Financial Bid of the Bidderwithout any information on the prices**

b) The second **Password Protected document** marked as **"Financial Bid for Tender No.** NATRAX/PROC/M&S/21/15**"** should consist of the Financial Bid duly filled and signed by an authorised person from the Bidder's.
OR
In case of offline Bid submission, the sealed document marked as **"Finanical Bid for Tender No.** NATRAX/PROC/M&S/21/15**"**shall consist of Financial Bid duly filled and signed by an authorised person from the Bidder's.

c) Incase of online Bid submission, the password of the documents shall be submitted by the Bidders at the time of the Technical Bid opening and the Financial Bid Opening respectively.

Please Note: - Technical Bid and Financial Bid should have different passwords.

The Meeting link for the Technical Bid Opening is as follows:

[Will be shared before bid opening]

2. **Technical Bid Opening:**
The Technical Bids are opened at the first instance and evaluated. At the second stage, financial Bids of only technically qualified Bidder shall be opened with prior intimation about the date and time for further scrutiny, evaluation, ranking & placement of order.

3. The Bidders are expected to meet the minimum eligibility criteria (MEC) as given in this document. NATRAX will disqualify the Bid(s) those do not meet the minimum eligibility criteria as laid down, based on their submission along with the Tender documents even after the Bid opening process is concluded.

4. The Contract shall be governed by the terms and conditions specified in this tender document including amendments, work order etc.,

5. All Bidders are hereby explicitly informed that "CONDITIONAL OFFERS" or "OFFERS WITH DEVIATIONS" from the conditions of Contract, the quotation not meeting the minimum eligibility criteria, technical specifications, or any other requirements as stipulated in the Tender documents are liable to be "REJECTED".

6. **Bidders should give details of their technical soundness and provide list of customers/client of previous works of similar nature in Government Departments/ Undertakings/ Public / Private sectors/Autonomous etc.,**

Minimum Eligibility Criteria: -
Documents to be submitted along with the Bid:
The Bidders who's Bid meet the following criteria would only be considered as responsive and evaluated by NATRAX.

i. **MEC 1: -**
Legal Valid Entity: The Bidder shall necessary be a legal valid entity either in the form of Proprietary/Private Partnership/Private/Govt./ Public/Autonomous. **In form of JV/Consortium not permitted.**

List of acceptable documents to be submitted with Bid: -
a) License certificate/Gumasta of the firm or
b) Details of Owner/partners of the firm
c) Copies of Income Tax Registration/PAN Card, GST registration, PF registration and any other statutory requirements, etc.,

ii. **MEC – 2: Financial Capabilities:** The Bidder should have minimum 3 years' experience with Minimum **Average Annual Financial** turnover during the last three years, ending on 31st March of the previous financial year (2018-19, 2019-20 & 2020-21), should be as **Rs 15 Lakh**. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be submitted with the Bid.

In case the date of constitution / incorporation of the Bidder are less than3-year-old,

the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criterion.For startups registered firms, no turnover is required.

List of acceptable documents to be submitted with Bid:

a) Certified balance sheets for relevant period mentioned above
b) Certificate from charted accountant / cost accountant indicating turnover details for relevant period mentioned above
c) The CA certificate must necessarily have UDIN.

iii. MEC-3 -(A) Experience: Should have successfully completed minimum 3 similar works during last 3 years for any reputed firm/ Govt.,/Private institution etc., . Documentary evidence in the form of completion certificate, Work order, Agreement, Purchase Order shall be uploaded with the Bid.

(B)Similar works: The Bidder should have successfully completed **similar works*** component in the last 3 years meeting the following criteria: -

a. Three similar completed works costing not less than the amount equal to 40 (forty) percent of the estimated cost; or

b. Two similar completed works costing not less than the amount equal to 50 (fifty) percent of the estimated cost; or

c. One similar completed work costing not less than the amount equal to 80 (eighty) percent of the estimated cost;

Similar Works*: *successfully completed work for SITC of Electric Cable and jointing /SITC of Street Light, for any Govt Dept., reputed firm/Private institution etc.*

List of accepted documents as proof of MEC (iii) above:

a) Completion certificate along with PO/ work order, with value of works, etc.,

b) Incase completion certificate/Purchase order (PO) does not clearly mention the value of work executed, then the Bidder shall submit the fresh summary & proof as TDS, CA certificate, Excise, GST returns etc.,

c) Incase PO/Work order/completion certificate issued by any private employer, than form 26AS should be submitted to support the genuineness of the same.

7. **Tender Fee & Exemptions: -**

a) This tender is free of cost.

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

b) If registered under Startups and "Micro & Medium Small Enterprises" (MSME's), supporting documents need to be submitted to avail exemption from Earnest Money, subject to verification of certificate.

c) If registered under **Start-ups** and MSME's, shall be exempted from the prior experience and turnover as per the guidelines issued by Govt., subject to submission of valid certificate. **In-case of 'Start-ups' a detailed report on the technical skillset & capability of the company may be submitted.**

d) For Startups and MSME, price benefit shall be given as per the guideline, subject to submission of valid certificate.

e) The Bids accompanied **without EMD/ MSME certificate shall be deemed as unresponsive and shall not be evaluated further.**

8. The Bidders are expected to carefully examine all the contents of the Tender documents/NIQ including instructions, conditions, terms, specifications, drawings (if any), shall inspect the Site with prior notice to NATRAX and at Bidders own cost, acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto & take them fully into account before submitting their offer. Failure to comply with the requirements as detailed in these documents shall be at the Bidder's own risk. Bids which are not responsive to the requirements of the Tender will be rejected.

9. While all efforts have been made to avoid errors in drafting of the Tender documents, the Bidder is advised to check the same carefully. No claim on account of any errors detected in the Tender documents shall be entertained.

10. The Bidder shall carry out all the work strictly in accordance with Specification, Standard Practices and instructions of NATRAX or NATRAX's representative and deviation on any account will not be permitted. If in the opinion of NATRAX, changes have to be made and it desires the Bidder to carry out the same. The decision of NATRAX in such cases shall be final and shall not be open to arbitration.

11. The successful Bidder is bound to carry out associated work necessary for the completion of the job even though such items are not included in the quantities to achieve end results and deemed to be priced in the other items. No claim on this account shall be entertained.

12. Addendum / Corrigendum (if required) to the Tender may be issued prior to the date of opening of the Bid to clarify or to intimate any changes/modifications etc. All such addendum / corrigendum shall be treated as an integral part of the Tender.

13. Any effort by a Bidder to influence NATRAX or any of its functionaries in the process of examination, clarification, evaluation and comparison of tenders and in decisions concerning award of contract, may result in rejection of the Bid.

14. In order to afford prospective bidders, reasonable time for preparing their Quotes after taking into account such amendments, NATRAX may, at its discretion, extend the deadline for submission of Bids.

15. Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations concerning the award of Contract shall not be disclosed to Bidders or other persons not officially concerned with such process.

16. NATRAX reserves the right to accept / reject or modify any Bids, and to annul the Tender process and reject all Bid(s)/quotation(s), at any time prior to award of Contract, or to divide the Contract between/amongst Bidders without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the grounds for NATRAX's action. Any Bidder not following ITB stands rejected.

17. **TECHNICAL BID EVALUATION**

a) **NATRAX** shall follow the **Segregated Bid evaluation** system (No bearing of technical score in the financial Bid evaluation and L-1 in the financial Bid shall be deemed as successful Bidder) to determine the successful Bidder. (Bidders may also refer the SCC)

b) The Bidder must qualify the all three MEC's.

c) The Bidder is requested to specify what particular value he is offering for each particular requirement, rather than just stating he is fulfilling the Minimum Requirement.

d) During the technical Bid evaluation process, NATRAX may ask clarifications to the Bidder through E-mail for confirming and consolidating their technical offers.

e) All such clarifications are required to be answered by the bidders by E-mail, within the time specified by NATRAX.

f) Only the technically qualified bidders shall be intimated for financial bid opening in writing.

g) The Financial Bids of the Technically qualified Bidders shall be opened through online mode and the Financial Bids received through off-line mode shall also be opened on the same day and time at NATRAX Hub.

18. **FINANCIAL BID EVALUATION**:

a) For the evaluation of the Financial Bids, the eventual Bid prices shall be ascertained after considering all the terms and conditions associated with the Bid price specified in the Financial Bid document and after detailed scrutiny of the financial bid.

b) No Bidder shall be allowed to propose/carry out any revision / correction / modification in his Price Bid offer.

NATIONAL AUTOMOTIVE TEST TRACKS

c) If there is a discrepancy between the sub total/s and the total price that is obtained by multiplying the unit price and quantity/adding the sub total/s, the sub total/s shall prevail and the total price shall be corrected, unless in the opinion of the Employer that there is an obvious misplacement of the decimal point in the sub total price, in which case the total price as quoted shall govern and the sub total/s shall be corrected;

d) If there is an error in a total, corresponding to the addition or subtraction of sub totals, the subtotal/s shall prevail and the total shall be corrected; and

e) The Bidder needs to fill the rates against each item in word as well as in figures as mentioned in BOQ (Financial Bid). In case of any discrepancy, the rate provided in word shall prevail and correct the amount against the item. **All the prices should be inclusive of all taxes and GST**.

f) The amount stated in the Letter to Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the Bidder does not accept the corrected amount of Bid, the bid will be rejected.

g) Contract negotiations, if any, will be held before the issuance of Letter of Acceptance/ Notification of Award. The negotiation shall conclude with a revised offer letter from the successful bidder, affecting the discounts if any and accepted by NATRAX.

19. Award of Work:

a) Prior to the expiry of the period of Bid validity prescribed, NATIS will issue to the Successful Bidder, the Work Order. The Successful Bidder shall return one copy of the Work Order to NATRAX duly acknowledged and signed by the authorized signatory, within two [2] days of receipt of the same by him.

b) NATRAX shall notify all the unsuccessful Bidders and discharge/ return their Earnest Money Deposit. No correspondence will be entertained by NATRAX from the unsuccessful Bidders.

20. Validity of bids:
The rate quoted should be valid for **a minimum period of 60 days** from the last date of Submission of Quotation. No claim for escalation of rate will be considered at any point of time.

21. Prospective bidders requiring any clarification of the Tender may write to a.prabhakar@natrip.in; anuj.kumar@natrip.in,

22. The Bids / related correspondences shall be made in English language.

23. Special Terms & Conditions:

NATIONAL AUTOMOTIVE TEST TRACKS
NATRAX

a.	**Scope of work**	**Supply, Installation, Testing and Commissioning of AI Cable, Laying, Joint Kits cable route markers, LED Street light fitting near T-4 at NATRAX**
b.	Completion Schedule	60 Days from the date of acceptance of Purchase Order/Work Order.
c.	Contract price	The unit rate and the total contract price are inclusive of all charges & Taxes and remain constant throughout the Contract period. Price escalation/variation is not accepted.
d.	Liquidated Damages	0.5% of the Contract Price per day to a maximum of 10% of the Contract Price.
e.	Amount of Recoverable advance Payments towards Mobilization of works/Materials.	Not Applicable
f.	Payment & Mode	i. 95% payment, after satisfactory completion of the work, on submission of invoice alongwith supporting document and certified by Engineer In-charge. ii. Payment shall be made after statutory deduction as applicable. iii. The payment shall be released within 15 working days from the date of certification by EIC.. iv. 5% of certified bill value of respective work order shall be retained towards retention amount and shall be released after completion of DLP/Warrantee period i.e., 12 months from the date of completion certificate. v. Advance payment: maximum 30% of contract value may be paid after receiving request from contractor and submission of bank guarantee of 110% of the requisite amount. An interest 10% per annum shall be charged on the outstanding advance payment. The said advance payment shall be released in minimum two instalments. Contractor has to submit a utilization certificate for the said advance payment. All the payments shall be made through RTGS only. vi. GST shall reimburse after production of challan(s) only after having deposited the same with

		concerned authorities.
g.	Retention	5% (Five) of the Contract Price.
h.	Release of Retention Amount	On completion of Defect rectification period.
i.	Warranty Period/Defect rectification period (DLP)	12 (Twelve) months from the date of issue of work completion certificate.
j.	Project Facility / Place of Installation/delivery	NATRAX Site NH-52, Old Agra- Mumbai Highway, Near to Pithampur Flyover, Post Khandwa (Near Pithampur), Dhar District, Madhya Pradesh-454774
k.	Performance Security	Three (3) % of the contract amount should by valid for 6 Months from the date of Issuance. Performance Security may be furnished in the form of a Fixed Deposit Receipt or Bank Guarantee from a Nationalized Bank favouring "National Automotive Test Tracks" & payable at Pithampur and should remain valid for a period of Sixty days beyond the date of completion of all Contractual Obligations.
l.	Date of return of the Performance Guarantee	Shall be released within one month after Completion of Defect rectification period.
m.	Engineer In-charge (EIC)	To be nominated
n.	Health, safety and Environment.	Contractor's/Vendor's responsibility.
o.	Contractors obligations/ indemnities	Without limiting to obligations, the Contract shall exercise due care and diligence in the aforesaid works and indemnify NATRAX against all claims, proceedings, damages, costs, losses, charges, and expenses of any nature whatsoever arising from contractor's failure to comply with its obligations. NATRAX shall not at any time be liable for any kind of loss to the Contractor/Vendor.
p.	Disclaimer	NATRAX reserves all rights for any of its decisions taken time to time without assigning any reasons and the Contractor/Vendor shall not have any cause of action or claim against NATRAX for any of such decision.

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

n.	Termination of Contract	If the work/service is found to be not satisfactory or not found as per the specification indicated in this document, the Service Contract will be terminated with short notice. Downtime penalty will be considered as one of the factors for gauging service efficiency.

24. The bidder should give the following, duly signed and sealed, failing to which the bids will be summarily rejected:

25. **DECLARATION:**

(To be executed on Bidder's letter head)

I/We having aquainted with the content & requirement of this Tender No. **NATRAX/**--------, dated _____ and do hereby accept to furnish the same in compliance with all terms & conditions. I/we have not tampered/modified the tender in any manner and breach of any such, will result in rejection of Tender and / or prosecuted.

I / We hereby declare that the firm/company has not been blacklisted or debarred in the past by any other Government organization from taking part in Government tenders.

In case the above information found false or in case of breach of any of terms and conditions at any stage of Tender or Contract, I/We are fully aware that the Tender/ Contract will be rejected / cancelled by NATRAX and Payments (for completed/partially completed), Retention, Bid Security (EMD), Performance Security, etc., shall be forfeited.

Signature of the Bidder:

_____

Name and Designation:

_____

Address:

_____

Contact details:

_____

Place:
Date:

Seal of the Bidder's Firm

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

ANNEXURE – II

TECHNICAL SPECIFICATIONS

The Electrical system comprises of following:

a. Cables

b. Earthing

c. External Lighting

d. Panel

1. MEDIUM VOLTAGE 1.1 KV GRADE XLPE / PVC CABLES

1.1 General

The MV cables shall be supplied, inspected, laid, tested and commissioned in accordance with drawings, Specifications, relevant Standard Specifications and cable manufacturer's instruction.

1.2 Material

The MV cables shall be cross linked polyethylene (XLPE) insulated PVC inner sheathed and HR PVC / FRLS PVC outer sheath of 1100 volts grade as asked for in the schedule of quantities. Cables up to 16 sq.mm shall be with copper conductor and 25 sq.mm and above shall be with aluminium conductor.

The MV cables 25 sq. mm & above shall be cross linked polyethylene (XLPE) insulated PVC inner sheathed and FRLS PVC outer sheath of 1100 volts grade. Cables below 25 sq.mm shall be with copper conductor , with HR PVC core insulation and sheathing..

1.2.1 Specifications of PVC insulated copper cable shall be as follows:

a Conductor

Stranded compacted circular conductor shall be of electrical grade high conductivity copper below 25 sq.mm as per IS 8130 / 84

b. Insulation

The insulation shall be PVC, application shall be by extrusion process insulation confirming to IS 5831-1984. The thickness of insulation will be as per the relevant codes.

c. Laying-up

Insulated conductors of multi core cables shall be with thermoplastic fillers in the interstices. The phase identification of cores shall be by coloured strips.

d. Inner Sheath

Cores shall be surrounded either by a wrapped or an extruded PVC sheath.

The thickness of the inner – sheath shall be as per relevant codes.

e. Armouring

The armouring shall be provided over the inner sheath.

Single core cable shall have dia -magnetic armouring. Multi core cables shall have either galvanized round steel wires or flat steel strip armouring. Steel wires and strips for armouring confirm to IS:3975. The direction of lay of armouring shall be opposite to that of cores.

f. Outer Sheath

Single and multi core cables are provided with an extruded FRLS grade PVC outer-sheath. The thickness of the sheath shall be as per IS:1554-1988. The PVC compound for the outer-sheath shall confirm to Type ST1 of IS 5831. The colour of the outer sheath shall be black with marking at every meter.

1.3 Specifications for XLPE aluminium / copper cable shall be as follows:

a Conductor

Stranded compacted circular conductor shall be of electrical grade high conductivity aluminium per IS 8130/84

b. Insulation

The insulation shall be of natural unfilled chemically cross linked polyethylene conforming to IS 7098. The thickness of insulation shall be as per the relevant codes.

c. Laying-up

Insulated conductors of multi core cables shall be with plastic fibre in the interstices. The phase identification of cores shall be by coloured strips.

d. Inner Sheath

The cores shall be surrounded by either a wrapped or by an extruded PVC sheath.

The thickness of the inner sheath shall be as indicated in the relevant codes.

e. Armouring

The armouring shall be provided over the inner sheath.

Single core cable shall have non-magnetic armouring. Multi core cables shall have either galvanized round steel wires or flat steel strip. Steel wires and strips for armouring confirm to IS:3975. The direction of lay of armouring shall be opposite to that of cores.

f. Outer Sheath

Single and multi core cables are provided with an extruded FRLS grade PVC outer-sheath. The thickness of the sheath shall be as per IS:1554-1988. The PVC compound for the outer-sheath shall confirm to Type ST2 of IS 5831. The colour of the outer sheath shall be black with marking at every meter.

1.2.3 Current ratings of the cables shall be as per IS : 3961. The Conductor shall be stranded Aluminum/Copper circular/ sector shaped and compacted. In multi core cables the core shall be identified by red, yellow, blue and black coloring of insulation .
Repaired cables shall not be used.

3.2.4 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.

3.2.5 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.

3.2.6 Cables shall be supplied in non returnable wooden drums as per IS : 10418.

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.

3.2.7 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	

3.3 Inspection

All cables shall be inspected by the contractor upon receipt at site and checked for any damage during transit.

3.4 Joints in Cables

The Contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoid cable jointing. This apportioning shall be got approved by the Owner's site representative before the cables are cut to lengths. Where joints are unavoidable heat shrinkable type joints shall be made. The location of such joints shall be got approved from the Owner's site representative and shall be identified through a marker.

3.5 Jointing Boxes for Cables

Cable joint boxes shall be installed with heat shrinkable sleeve and of appropriate size, suitable for XLPE armoured cables of particular voltage rating.

3.6 Jointing of Cables

All cable joints shall be made in suitable, approved cable joint boxes and the filling in of compound shall be done in accordance with manufactures' instructions and in an approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resin.

All cables shall be joined colour to colour and tested for continuity and insulation resistance before jointing commence. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using of spreaders

of approved size and pattern. The joints shall be completely topped up with epoxy compound so as to ensure that the box is properly filled.

3.7 Cable End Terminations

Cable end termination shall be done in cable terminal box using crimping sockets and proper size of glands of double compression type

3.8 Bonding of Cables

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armour clamp and gland. The clamps must grip the armouring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors.

3.9 Cable Installation

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks.

3.9.1 Laying of Cables on Cable Trays

The relative position of the cables, laid on the cable tray shall be preserved and the cables shall not cross each other. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius as recommended by the manufacturers. All cables shall be laid with minimum one diameter gap and shall be clamped at every meter to the cable tray. Cables shall be tagged for identification with aluminum tag and clamped properly at every 20M. Tags shall be provided at both ends and all changes in directions both sides of wall and floor crossings. All cable shall be identified by embossing on the tag the size of the cable, place of origin and termination.

All cables passing through holes in floor or walls shall be sealed with fire retardant Sealant and shall be painted with fire retardant paint up to one meter on all joints, terminations and both sides of the wall crossings

3.9.2 Laying of Cables in Ground

The width of trench for laying single cable shall be minimum 350 mm. Where more than one cable is to be laid in horizontal formation, the width of the trench shall be workout by providing 200 mm gap between the cables, except where otherwise specified. There shall be clearance of 150 mm between the end cable and the side wall of the trench. The minimum depth of the cable trench shall not be less than 750 mm for single layer of cables. When the cables are laid in more than one tier the depth of the trench shall be increased by 300 mm for each additional tier.

Excavation of trenches : The trenches shall be excavated in reasonably straight lines. Wherever there is a change in direction, suitable curvature shall be provided. Where gradients and changes in depth are unavoidable, these shall be gradual. The excavated soil shall be stacked firmly by the side of the trench such that it may not fall back into the trench. The bottom of the trench shall be levelled and shall be made free from stone, brick bats etc. The trench shall then be provided with a layer of clean, dry sand cushion of not less than 100 mm in depth. Prior to laying of cables, the cores shall be tested for continuity and insulation resistance. The cable drum shall be properly mounted on jacks, at a suitable location, making sure that the spindle, jack etc. are strong enough to carry the weight of the drum and the spindle is horizontal. Cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains. The entire drum length shall be laid in one stretch. However, where this is not possible the remainder of the cable shall be removed by `Flaking' i.e. by making one long loop in the reverse direction. After the cable has been uncoiled and laid into the trench over the rollers, the cable shall be lifted off the rollers beginning from one end by helpers standing about 10 meters apart and laid in a reasonably straight line. Cable laid in trenches in a single tier formation shall have a cover of clean, dry sand of not less than 150 mm. above the base cushion of sand before the protective cover is laid. In the case of vertical multi-tier formation after the first cable has been laid, a sand cushion of 300 mm shall be provided over the initial bed before the second tier is laid. Finally the cables shall be protected by second class bricks before back filling the trench. The buried depth of uppermost layer of cable shall not be less than 750mm.

Back Filling : The trenches shall be back filled with excavated earth free from stones or other sharp edged debris and shall be rammed and watered, if necessary, in successive layers not exceeding 300 mm. Unless otherwise specified, a crown of earth not less than 50 mm in the centre and tapering towards the sides of the trench shall be left to allow for subsidence.

3.10 Cables inside Building

Cables inside buildings shall be laid on the cable trays. All cables passing through walls shall run through GI Pipes sleeves of adequate diameter 50 mm apart maintaining the relative position over the entire length.

3.11 Route Marker

Route marker shall be provided along straight runs of the cables not exceeding 30 meters also for change in the direction of the cable route and underground joints.

Route marker shall be of cast iron painted with aluminum paint. The size of marker shall be 100 mm dia with "Cable" and voltage grade inscribed on it.

3.12 Cable Trays

Ladder and perforated type Cable Trays shall be of Hot dip Galvanized bolted type and factory fabricated out of CRCA sheet with standard accessories like tee, bends, couplers etc. for different loads and number and size of cables as given below :

Cable trays shall be galvanized as per Specification given under 3.14.

a. 1500 mm wide

Runners 25 x 100 x 25 x 3 mm

Rungs 2# 20 x 40 x 20 x 3 mm 250 mm C/C

Suspenders 2 Nos. 40 x 40 x 5 mm GI angle 1500 mm C/C with base support of 40x 40 x 5mm GI angle.

b. 1200 mm wide

Runners 25 x 100 x 25 x 3 mm

Rungs 2# 20 x 40 x 20 x 3 mm 250 mm C/C

Suspenders 2 Nos. 40 x 40 x 5 mm GI angle 1500 mm C/C with base support of 40x 40 x 5mm GI angle.

c. 1000 mm wide

Runners 25 x 100 x 25 x 3 mm

Rungs 2# 20 x 40 x 20 x 3 mm 250 mm C/C

Suspenders 2 Nos. 40 x 40 x 5 mm GI angle 1500 mm C/C with base support of 40x 40 x 5mm GI angle.

d. 750 mm wide
Runners 20 x 75 x 20 x 2.5 mm

Rungs 20 x 30 x 20 x 2.5 mm 250 mm C/C

Suspenders 2 Nos. 32 x 32 x 5 mm GI angle 1800 mm C/C with base support of 40x 40 x 5mm GI angle.

e 600 mm wide

Runners 20 x 75 x 20 x 2.5 mm

Rungs 20 x 30 x 20 x 2.5 mm 250 mm C/C

Suspenders 2 Nos. 32 x 32 x 5 mm GI angle 1800 mm C/C with base support of 40x 40 x 5mm GI angle.

f. 450 mm wide
Runners 20 x 75 x 20 x 2.5 mm

Rungs 20 x 30 x 20 x 2.5 mm 250 mm C/C

Suspenders 2 Nos. 25 x 25 x 4 mm GI angle 1800 mm C/C with base support of 40x 40 x 5mm GI angle.

g. Supply and fixing of perforated type cable trays of the following sizes of pre-galvanized iron.

i. 600 x 40 x 40 x 2 mm thick

ii. 450 x 40 x 40 x 2 mm thick

iii 300 x 40 x 40 x 2 mm thick

iv. 150 x 40 x 40 x 2 mm thick

Note : Suitable length of 10 mm dia GI rod suspenders at 1800 mm interval shall be included in the item for perforated type cable tray.

Alternative to fabricated support of cable tray, Steel wire rope hangers shall be used to suspend the cable trays. This hanger shall consist of a pre-formed wire rope sling with a range of end fixings to fit various substrates and service fixings. The end fixings and wire must be of the same manufacturer with several options available. The system shall be secured and tensioned with a hanger self locking grip at the other end. Once the grip is locked for safety purpose, unlocking shall only be done by using a separate setting key and shall not be an integral part of the self locking grip. Only wires and/or supports supplied and/or approved shall be used with the system.

3.13 Specification for Hot Dip Galvanizing Process

(for Mild Steel Used For Earthing, Cable Trays Or Junction Boxes 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.

3.14.2 Fire Barrier sheet for floor and wall sealing

The framing & fixing part of fire barrier sheet shall be very simple & directly fixed around walls & floors by help of anchored bolts & washer. For 2 hour fire rating the fire barrier sheet shall be minimum 7.62 mm thick and shall be cut as per the profile of penetration and opening. The small gap left around the penetration shall be closed with fire rated soft &mouldable putty. Fire barrier must be design on the intumescent technology to seal larger penetration through the fire rated walls &floors.Fire barrier must be a composite construction with the quality incorporated with organic/ inorganic fire resistive elastomeric sheet with specific gravity of 1.6 gm/ cubic centimeter.

3.15 Testing of Cables

Cables shall be tested at works for all routine tests as per IS including the following tests before being dispatched to site by the project team.

a) Insulation Resistance Test.
b) Continuity test.
c) Sheathing continuity test
d) Earth test.(in armoured cables)
e) Hi Pot Test.

Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Owner's site representative.

a) Insulation Resistance Test(Sectional and overall)
b) Continuity test.
c) Sheathing continuity test
d) Earth test.

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Owner's site representative, results will be noted and signed by all present and record be maintained.

7. EARTHING

7.1 Earthing

The system shall be TNS with four wire supply system (R, Y, B, N and. 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.

7.2 Earthing Conductors

Earthing conductors shall be of copper for equipment neutral earthing, IT equipment earthing, Server / Hub rack earthing, Isolation transformer neutral earthing etc. as per as mentioned in Schedule of quantities.

Copper \ GI conductor shall be used for general body earthing as mentioned in the Schedule of quantities. Conductor shall be protected against mechanical injury and corrosion.

7.3 Sizing of Earthing Conductors

Sizing of earth conductor for receiving station , HV equipment and main LV panels etc. shall be based on actual fault current calculated.

Earthing grid near substation station & earthing grids for other building shall be connected together at ground floor for equipotential bonding& to minimize overall resistance of earthing path.

Earthing grids of electronic \ IT equipment shall be separate & shall not be connected to general earthing grids with prior consent from user . Electronic \ IT equipment earthing grids for various buildingscanbe interconnected for equipotential bonding & to minimize overall resistance of earthing path

For lighting & power circuits 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.

7.4 Connection of Earthing Conductors

All joints in tapes shall be with four rivets (minimum 2 nos. diagonally opposite in case of smaller width strip) 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 andarmouring 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 installation shall be complete in all respects for efficient and trouble free service. All work shall be carried out in a first class quality and neat workmanship. Grounding conductors shall be handled carefully to avoid kinking and cutting of the conductors during their installation. All exposed ground conductors run shall be taken in a neat manner horizontal, vertical and parallel to the building walls or columns and shall not be laid haphazardly. All connections to the grounding grid shall be made with **earthing** strip welded to grid and bolted at equipment ends.

7.5 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. Equi-potential bonding of all metallic structures shall be done.

7.6. 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.

7.7 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.

7.8 Resistance to Earth

The resistance of earthing system shall not exceed 1 ohm.

7.9 Specification for Hot Dip Galvanizing Process

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 meter 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.

7.10 **Earthing Electrode**

(Note : Please specify only one type as per project requirement)

Conventional Plate electrode (Alternate-I)

Copper Earth Electrode

Earthing electrode shall be600 x 600 x 3.15 mm thick tined copper plate electrode, with 2 Nos 50 x 6 mm copper strips from earth plate electrode to inspection chamber, 50 mm dia medium class GI pipe, CI funnel with 20 gauge GI wire mesh, masonry chamber 1000 x 500 mm with concrete base as per IS3043 with C I heavy duty / chequered plate manhole cover with frame painted with bitumastic paint and packing with mixture of charcoal and common salt around plate electrode including digging of pit up to permanent moisture level and as per soil condition but not less than 3 meters and back filling as required.

GI Earth Electrode

Earthing electrode shall be 600 x 600 x 6.3 mm thick GI plate electrode, with 2 nos. 50 X 6 mm GI strips from earth plate electrode to inspection chamber, 50 mm dia medium class GI pipe, CI funnel with 20 gauge GI wire mesh, masonry chamber 1000 X 500 mm with concrete base as per IS3043 with CI manhole cover with frame painted with bitumastic paint and packing with mixture of charcoal and common salt around plate electrode including digging of pit upto permanent moisture level but not less than 3 meters and back filling as required.

Maintenance free Earthing Electrode System/ Chemical Earthing (Alternate-II)

In maintenance free earthing copper bonded earthing rod electrode shall be of 14.35 mm in diameter and 3 meter length. The rod shall be placed in a 150 mm dia an augured hole in the ground and then surrounded by ground enhancement material in either a dry form or pre mixed in a slurry. Once set, ground enhancement material becomes hard and as such holds positively to the rod as well as surrounding ground.

Earth rod offered shall have passed the test required of BS7430/ ANSI/ UL467 and confirm to the adhesion of the copper coating to the steel core (Design feature that prevents the ingress of moister and subsequently the integrity of the rod.

Minimum 0.25 mm thickness of copper shall be deposited over the steel core as per BS 7430/ UL 467. Average life of the ground rod shall be 30 years in most soil.

Ground enhancement material shall be as per IEEE-80 clause 14.5d with a resistivity of less than 0.12 ohm-meter. The ground enhancement material shall be permanent and not leach any chemicals in to the ground. The pH value of the ground enhancement material shall be 6.9 to 7.2 of 100 gm/ lit @ 20 deg.C.

Minimum 30 Kg of ground enhancement material shall provided for each earth electrode.

Inspection chamber shall be of 400 x 500 mm with concrete base CI manhole cover with frame painted with bitumastic paint. 2 Nos. of 50 x 6 mm cross section & 300 mm long copper strip to be clamped with copper claded rod electrode have sufficient nos(But not less than 4 Nos.) of 10φ mm GI nuts & bolts for connection to the equipment / interconnection to the other pits to form equi-potential bonding.

7.11 Earth for UPS / Low volt / Servers

Clean earth shall be used for earthing UPS / Low volt / Server systems and shall be separate from safety earthing. Separate earthing electrode shall be provided in the ground and from this electrode, single core copper cable of required size shall be taken as earth conductor to be laid in the vertical shaft. This cable shall be terminated on each floor in a earth terminal box located in the shaft. The earth terminal box shall have 50x6mm copper busbar mounted on insulators. The busbar shall have facility to terminate the incoming earth cable as well as required number of outgoing earth conductors.

5. EXTERNAL / STREET LIGHTINGPOLES

5.1 Galvanized Octagonal Poles

5.1.1 Design

The Octagonal poles shall be designed to withstand the maximum wind speed of 169 KM / Hr. as per IS 875.The top loading i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BS : 5649 Part VI 1982.

5.1.2 Pole Shaft

The pole shaft shall have octagonal cross section and shall be continuously tapered with single longitudinal welding.There shall not be any circumferential welding.The welding of pole shaft shall be done by submerged Arc Welding (SAW) process.

All octagonal pole shafts shall be provided with the rigid flange plate of suitable thickness with provision for fixing 4 foundation bolts.This base plate shall be fillet welded to the pole shaft at two locations i.e. from inside and outside. The welding shall be done as per qualified MMAW process approved by Third Party Inspection agency.

5.1.3 Door Opening

The octagonal poles shall have door of approximate 500 mm length at the elevation of 500 mm from the Base plate.The door shall be vandal resistance and shall be weather proof to ensure safety of inside connections.The door shall be flush with the exterior surface and shall have suitable locking arrangement.There shall also be suitable arrangement for the purpose of earthing.

The pole shall be adequately strengthened at the location of the door to compensate for the loss in section.

5.1.4 Material

Octagonal Poles	HT Steel Conforming to grade S355JO

Base Plate	Fe 410 conforming to IS 226 / IS 2062
Foundation Bolts	EN.8 grade

5.1.5 Welding

The welding shall be carried out confirming to approved procedures duly qualified by third party inspection agency.The welders shall also be qualified for welding the octagonal shafts.

5.1.6 Pole Sections

The Octagonal Poles shall be in single section (upto 11 mtr).There shall not be any circumferential weld joint.

5.1.7 Galvanization

The poles shall be hot dip galvanized as per IS 2629 / IS 2633 / IS 4759 standards with average coating thickness of 70 micron.The galvanizing shall be done in single dipping.

5.1.8 Xing Type

The Octagonal Poles shall be bolted on a pre-cast foundation with a set of four foundation bolts for greater rigidity.

5.1.9 Top Mountings

The galvanized mounting bracket shall be supplied along with the Octagonal Poles for Installation of the luminaries.

5.1.10 Manufacturing

The pole manufacturing & galvanizing unit shall be ISO 9001 : 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

5.1.11 Service Window

A service window of the size 150 mm x 100 mm shall be provided in the base of the pole to allow access to electrical connections and terminations.It shall be covered with MS plate and proper rubber gaskets shall be provided to prevent any ingress of water etc..

5.1.12 Electrical Connections

Four way connectors shall be provided along with Slide lockand 1 no. 6 amps Sp MCB including 2.5 sqmm PVC insulated copper conductor wires from the terminal block to the fixture and 2 No. 32 mm dia GI sleeves of suitable length shall be provided upto the service window.An earth boss is provided on the control plate along with connectors and interrupters.

Galvanized Octagonal Poles Dimensions

Height	Top Dia (A/F)	Bottom Dia (A/F)	Sheet Thick Ness	Base Plate Dimensions (Lxbxt)	Foundation Bolt			
					Bolt Size (No. X Dia)	Pitch Circle Dia (PCD)	Bolt Length (MM)	Projected Bolt Length
(mtr)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
3	70	130	3	200 x 200 x 12	4 x 16 Dia	200	450	80
4	70	130	3	200 x 200 x 12	4 x 16 Dia	200	450	80
5	70	130	3	200 x 200 x 12	4 x 16 Dia	200	600	80
6	70	130	3	220 x 220 x 12	4 x 20 Dia	205	600	100
7	70	130	3	220 x 220 x 12	4 x 20 Dia	205	700	100

8	70	135	3	225 x 225 x 16	4 x 20 Dia	210	750	100
9	70	155	3	260 x 260 x 16	4 x 24 Dia	250	750	125
10	70	175	3	275 x 275 x 16	4 x 24 Dia	270	750	125
11	90	210	3	300 x 300 x 20	4 x 24 Dia	300	750	125
12	90	240	3	320 x 320 x 20	4 x 24 Dia	325	850	125

APPENDIX-I

LIST OF INDIAN STANDARDS (IS)

IS : 374 - 1979	Ceiling fans and regulators (3rd revision)
IS : 694 - 1990	PVC insulated Electric cable for working voltage upto and including 1100 volts.
IS : 732 - 1989	Code of practice for electrical wiring and installation
IS : 1255 - 1983	Code of Practice for installation and maintenance of Power Cables upto and including 33 KV rating (Second Revision)
IS : 1258 - 1987	Bayonet lamp holders(Third revision)
IS : 1293 - 1988	Three pin plugs and sockets outlets rated voltage upto and including 250 volts and rated current upto and including 160 amps.
IS : 1554 - 1988 (Part -I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts.
IS : 1646 - 1982	Electrical installation fire safety of buildings (general) Code of practice.
IS : 1885 - 1971	Glossary of items for electrical cables and conductors

NATIONAL AUTOMOTIVE TEST TRACKS

IS : 1913 - 1978	General and safety requirements for fluorescent lamps luminaries Tubular.
IS : 2026 - 1977 to 81 (Part I to IV)	Power Transformers
IS : 2071 - 1974 - 76	Methods of high voltage testing
IS : 2309 - 1989	Protection of building and allied structures against lightning
IS : 2551-1982	Danger notice plate.
IS : 3043 - 1987	Code of practice for earthing.
IS : 3480 - 1966	Flexible steel conduits for electrical wiring.
IS : 3837 - 1976	Accessories for rigid steel conduit for electrical wiring.
IS : 4146 - 1983	Application guide for voltage transformers
IS : 4615 - 1968	Switch socket outlets.
IS : 5133 - 1969 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216 - 1982 (Part-I)	Guide for safety procedures and practices in electrical work.
IS : 5424 - 1969	Rubber mats for electrical purposes.
IS : 5578 & 11353-1985	Marking and arrangement of bus bars
IS : 7098 – 1985 (Part -II)	Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV upto and including 33 KV
IS : 8130 - 1984	Conductors for insulated electric cables and flexible cords
IS : 8623 -1977 (Part -I)	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 V D C.
IS : 8623 – 1980 (Part -II)	Bus Bar trunking system
IS : 8828 - 1996	Miniature Circuit Breakers
IS : 9537 - 1981	Rigid Steel Conduits for electrical wiring (Second Revisions)
IS : 10810 - 1988	Methods of test for cables.

IS : 12640 - 1988	Earth Leakage Circuit Breakers
IS : 13947-1993 (Part-II)	Air Circuit Breakers
IS : 13947-1989	Moulded Case Circuit Breakers
IS : 13947 - 1993	Degree of protection provided by enclosures for LV switchgear and control gear.
IS : 13947 - 1993	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.
IS : 1651 & 1652 1991	Stationary cells and batteries lead acid type.
IS : 13779	Digital measuring instrument and testing accessories.
IS : 1651 & 1652 – 1991	Stationary cell & batteries, lead acid type.
IS : 1885 – 1971	Glossary of items for electrical cables and conductors
IS : 2551-1982	Danger notice plates.
IS : 3043 - 1987	Code of practice for earthing.
IS : 5133 – 1969 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216 – 1982 (Part-I)	Guide for safety procedures and practices in electrical work.
IS : 5424 - 1969	Rubber mats for electrical purposes.
IS : 5578 & 1984	Guide for marking of insulated conductors
IS : 8130 - 1984	Conductors for insulated electric cables and flexible cords
IS : 11353 – 1985	Guide for uniform system of marking and identification of conductors and apparatus terminals.
IS : 13947 – 1993	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.

NATIONAL AUTOMOTIVE TEST TRACKS

APPENDIX - II

ABBREVIATIONS

The following abbreviations have been used in the accompanying Specifications, drawings and Schedule of Quantities.

CU	Stands for copper.
GI	Stands for Galvanised Iron (Mild Steel)
V	Stands for Volts
KV	Stands for Kilo Volts
HV	Stands for High Voltage (3.3 KV and above)
MV	Stands for Medium Voltage (110 V ,230 V ,415 V, 600 V, 110 V)
LV	Stands for Low Voltage (32 V & Below)
HT	Stands for High Tension
LT	Stands for Low Tension
PVC	Stands for Polyvinyl Chloride
AMP	Stands for Amperes
KWH	Stands for Kilowatt Hours

KW	Stands for Kilo Watts
BIS	Stands for Bureau of Indian Standards
IS	Stands for Indian Standards
IEC	Stands for International Electrotechnical Commision
IEE	Stands for Institution of Electrical Engineers - London
IEEE	Stands for Institution of Electrical & Electronics Engineers
NEC	Stands for National Electrical Code
ACB	Stands for Air Circuit Breaker
RCCB	Stands for Residual Current Circuit Breaker
MCB	Stands for Miniature Circuit Breaker
MCCB	Stands for Moulded Case Circuit Breaker
SP	Stands for Single Pole
DP	Stands for Double Pole
TP	Stands for Triple Pole

TPN	Stands for Triple Pole and Neutral
4 Pole	Stands for 3 phase and neutral of same capacity (size)
MDB	Stands for Main Distribution Board
SDB	Stands for Sub Distribution Board
FDB	Stands for Final Distribution Board
MCC	Stands for Motor Control Centre

APPENDIX – III

LIST OF APPROVED MAKES FOR EQUIPMENT & MATERIALS

S. No.	Details of Materials / Equipment		Manufacturer's Name
A.	HIGH VOLTAGE EQUIPMENT		
1.	Outdoor Oil Filled Transformer :		Voltamp Areva Kirlosker Intra Vidyut
2.	VCB Panel		Siemens Areva ABB Schneider

3.	HT Termination/straight through joint Kit		Birla-3M M-Seal Raychem Mahiendra
4.	XLPE Cable		Cable Corporation of India Ravin RPG Skytone
5.	Protection Relay		
	Numeric Type		ABB AREVA L & T Schneider Electric Siemens
6.	Potential Transformer		Jyoti Kappa Pragati Precise G&M
7.	Current Transformer (Cast Resin Epoxy Coated)		Jyoti Kappa Pragati Precise G&M

8.	Static Power Meter & Logger (Trivector Meters)		Conzerv (Schneider) Secure L&T
9.	Electronic Digital Meter (A/V/PF/HZ/KWH) with LED Display.		Conzerv (Schneider) Larsen & Toubro Schneider Electric Secure AE
10.	HRC Fuse and Fuse Fitting		GE Siemens L&T

S. No.	Details of Materials / Equipment		Manufacturer's Name
11.	Battery Charger		Caldyne Chabbi Electricals Mahamai Volstat
12.	Sealed Maintenance Free Batteries		Exide Global (Rocket) Amar raja
13.	Insulating Mats		DL Miller & Co. Ltd. Premier Polyfilm Ltd. RMG Polyvinyl India Ltd.

NATIONAL AUTOMOTIVE TESTING TRACKS

B.	MEDIUM VOLTAGE EQUIPMENT		
1.	LT Panel / Capacitor Panel / Busduct		Tricolite Switchgears Ltd. Adlec Control System Advance Panels & Switchgears Pvt. Ltd. SPC Electro Tech Pvt. Ltd.
2.	Main Distribution Panel, Sub- Main Distribution Panel and Motor Control Centre		Tricolite Switchgears Ltd. Adlec Control System Advance Panels & Switchgears Pvt. Ltd. SPC Electro Tech Pvt. Ltd.
3.	Final Distribution Board		Legrand Hager ABB Schneider Electric (MG)
4.	Air Circuit Breaker (3/4 Pole)		Schneider Electric (Master Pact NW) ABB (E-Max) L&T (U-Power) Siemens (3WL) GE (M-PRO)
5.	Moulded Case Circuit Breaker (MCCB)		Schneider Electric (Compact) Larsen & Toubro (Dsine) ABB (T – Max) Siemens (3VL) GE (Record plus)
6.	Motor Protection Circuit Breaker(MPCB)		Legrand Hager (L&T) ABB Siemens Schneider Electric (MG)
7.	Miniature Circuit Breakers (MCB)		Legrand

			Hager (L&T) ABB Siemens Schneider Electric (MG)
8.	Residual Current Circuit Breaker (RCCB)		Legrand Hager (L&T) ABB Siemens Schneider Electric (MG)
9.	Power/Aux. Contactor / Capacitor Duty Contactor		Schneider Electric (MG) -Telemechnaic L&T -MNX ABB-A range Siemens-Sinext GE-(CL) Ducati
10.	Change Over Switch		Larsen & Toubro C & S HPL – Socomec

11.	Control Transformer/Potential Transformers		Kappa G&M Automatic Electric Matrix Pragati Precise
12.	Current Transformer (Epoxy Cast Resin)		Kappa

			G&M Automatic Electric Matrix Pragati Precise
13.	Protection Relay		
	a. Numeric Type		ABB AREVA L & T Schneider Electric Siemens
	b. Electromagnetic Type		ABB Areva Larsen & Toubro Schneider Electric
14.	Indicating Lamps LED type and Push Button		Vaishno Electricals GE Power Controls Larsen & Toubro (ESBEE) Schneider Electric Siemens
15.	Overload relays with built in Single Phase preventer		Schneider Electric (MG) -Telemechnaic L&T -MNX ABB-A range Siemens-Sinext

			GE-(CL)
16.	a. Electronic Digital Meters (A/V/PF/Hz/KW/KWH) with LED Display		Conzerv (Schneider) Larsen & Toubro Schneider Electric Secure AE
	b. Energy Meter with centralized metering & billing system		Radius (Actress) Secure
17.	Static Power Meter & Logger (SPML) With RS 485 port		Conzerv (Schneider) Secure L&T
18.	Power Capacitor		ABB Ducati EPCOS Meher(Schneider)

9.	Autoamtic Power Factor Correction Relay (Numeric Type)		Areva L&T Conzerv Ducati Siemens Schneider
20.	PVC insulated XLPE aluminium/copper		Cable Corporation of India

	conductor armoured MV Cables upto 1100 V grade		Bonton RPG Universal NICCO Torrent Skytone Radient Ganak Paradise
21.	LT Jointing Kit / Termination		Birla-3M Raychem Mahindra Safe Kit
22	Cable Glands Double Compression with earthing links		Braco Comet (Comex) Hex Brass
23	Bimettalic Cable Lug		Braco Comet Dowell's (Biller India) Hex Brass (Copper Alloy India)
24.	PVC insulated copper conductor stranded flexible wires		Finolex R R Kabel Skytone KEI Polycab

			Batra Henlay Paradise
25.	Mettalic / GI Conduit (ISI approved)		AKG BEC B-Plast
26.	Lead Coated Flexible GI Conduit		PLICA India Pvt. Ltd. Flexicon
27.	PVC Conduit & Accessories (ISI approved)		AKG BEC B-Plast
	a) Switch & Socket		Clipsal (Opal Series) Crabtree Legrand (Mosaic) Wipro (NorthWest) Anchor Roma Opal (Schneider) Northwest (ABB)
28.	Industrial Socket		
	a. Splash Proof		Clipsal Gewiss Legrand Neptune Balls

			Schneider Electric IHavells

	b. Metal Clad		Clipsal Gewiss Legrand Neptune Balls Schneider Electric Havells
29.	Ceiling Fan		Crompton Greaves Havells Orient Usha
30.	Lighting Fxiture		
	a. Incandescent / Halogen / PL / Metal Halide) / Fluorescent		GE Philips Thorn Wipro
	b. External Lighting Fixture		Bajaj Electricals Ltd. Keslec LIGMAN Philips Wipro
	c. Aviation Obstruction Light (LED Type)		Actos

			Bajaj Binay
31.	Selector Switch, Toggle switch		Kaycee Salzer (Larsen & Toubro)
32.	Timer		ABB GE Power Control Larsen & Toubro Legrand Schneider Electric Siemens
33.	Cable Trays (Factory Fabricated) / Raceways		Profab Engineer Ricco STEEL Slotco Maheshwari Electrtricals CTM Engineer
34	Lightning Protection System (Early Streamer Emission Type)		Erico LPI OBO bettermann
35.	Terminal Block/Connector		Elmex Connectwell Wago Dowells

Form for the submission of Financial Bid

Financial Proposal Submission Form
(To be Executed on Letterhead of the Bidder)

FINANCIAL PROPOSAL SUBMISSION FORM

[*Location, Date*]

To:
The Head Procurement
NH-52, Old Agra- Mumbai Highway,
Near to Pithampur Flyover,
Post Khandwa (Near Pithampur)
Dhar District, Madhya Pradesh-454774

Dear Sir,

We, the undersigned, offer to provide the equipment & services in accordance with your Tender No. _____, dated _____ and our Technical Bid. Our attached Financial Bid includes the price in the format for financial bid provide as part of tender documents. The total price of our offer is _____ (in figures and words) and includes all the deliverables under this tender as per our Technical Bid.

We hereby declare that all the information and statements made in this Bid is true and complete in all respects and is as per the guidelines and terms & conditions laid down in the tender document. We further understand that any information which is found false or is not as per the guidelines and terms & conditions of the tender document may lead to our disqualification.

Our Financial Bid shall be binding upon us subject to the modifications resulting from Contract negotiations, up to expiration of the validity period of the Bid.

We understand NATRAX has right to accept or reject our Bid as per its discretion.

Yours sincerely,

Authorized Signature [*In full*]: _____

Authorized Signature [*In initials*]: _____

Name and Title of Signatory: _____

Name of Firm: _____

Address: _____

[Note : To be signed in blue ink]

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

ANNEXURE-III

Bill of Quantities (BOQ)/Financial Bid

Sr. No.	ITEM DESCRIPTION	Unit	BOQ Qty	Rate/Unit (Rs)	Ammount (Rs)	Remarks
1	Supply of XLPE insulated power cable (conforming IS 7098 Part I) 1100 Volt grade, 4 core Armourd,10 sq mm, ISI marked with alu. stranded / solid conductor	Mtr.	1000			
2	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size direct in ground including excavation and refilling the trench etc as required, but excluding sand cushioning and protective covering size up to 35 sq mm.	Mtr.	1000			
3	Supplying and making cable route marker with cement concrete 1:2:4 (1 cement: 2 coarse sands: 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10cm including inscription duly engraved as required. (Required Size-1/4 of above as aproved by E i/C)	Each	1500			
4	Supplying and making straight through joint with heat shrinkable kit including ferrules and other jointing materials for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required size-3.5 corex 300 sqmm.	Nos	2			
5	Supplying and making straight through joint with heat	Nos	10			

	shrinkable kit including ferrules and other jointing materials for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required size-4 core 10 sqmm. (eq-2core 16 sqmm)					
6	Erection of metallic pole of following length in cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as required. Above 4.5 metre and upto 6.5 metre.	Each	2			
7	Erection of metallic pole of following length in cement concrete 1:3:6 (1 cement: 3 coarse sands: 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. Above 6.5 metre and upto 8.0 metre.	Each	6			
8	Supplying and making straight through joint with heat shrinkable kit including ferrules and other jointing materials for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required.	Nos	4			
9	Supply and fixing street light with high power LED of 3 to 6 Watt each on existing bracket assembled on single MCPCB and additional unique peanut lens on each LED, system lumens output with efficacy>120 lm/Watt. luminiare having color temp upto 6500K & 50000 hrs. burning life with minimum @ L 70, The colour rendering index of LED	Nos	8			

	light should be more than 70. Luminiare comprises of driver, PF>0.95 & surge protection 10KV. Housing made of pressure die cast aluminium with heat resistant flat glass, IP65 protection. Submission LM 79-08/IS16106 (2012), IEC60598, IEC61347 i/c connection wire, testing etc. to complete the job.40Watt to 48Watt, color temp 3000-6500k as required.					
10	Supply and fixing street light with high power LED of 3 to 6 Watt each on existing bracket assembled on single MCPCB and additional unique peanut lens on each LED, system lumens output with efficacy>120 lm/Watt. luminiare having color temp upto 6500K & 50000 hrs. burning life with minimum @ L 70, The colour rendering index of LED light should be more than 70. Luminiare comprises of driver, PF>0.95 & surge protection 10KV. Housing made of pressure die cast aluminium with heat resistant flat glass, IP65 protection. Submission LM 79-08/IS16106 (2012), IEC60598, IEC61347 i/c connection wire, testing etc. to complete the job.180W Watt, color temp 3000-6500k as required	Nos	6			
	Total					
	Total in Words					

Note: -

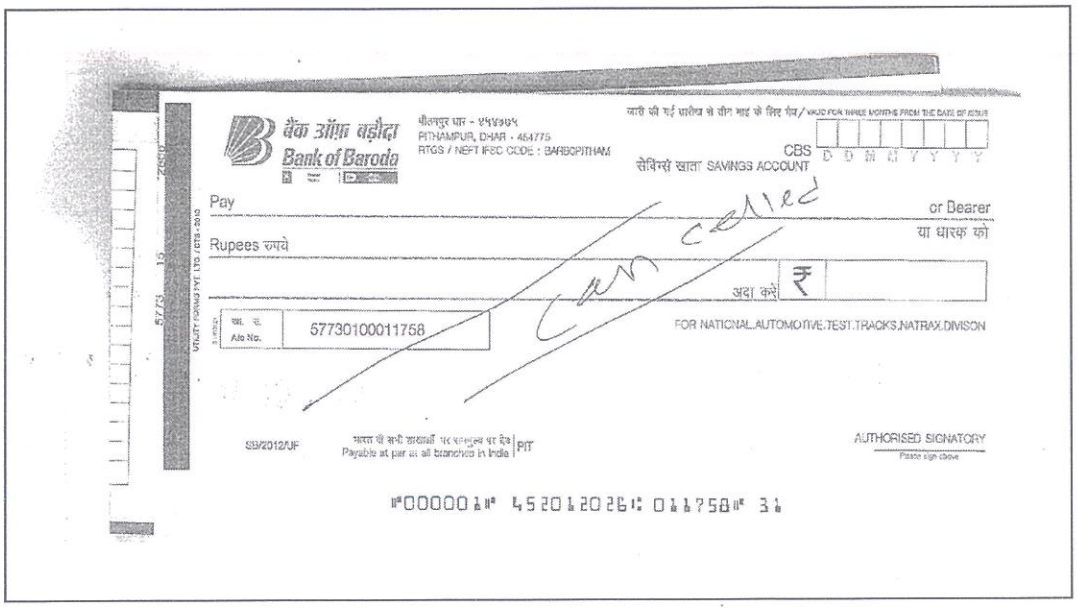
1. Note- Bracket repairing/ new Bracket cost may quote in the rate of light.
2. The cost should be inclusive of all Charges and Taxes

NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

Signature of bidder

ANNEXURE –IV

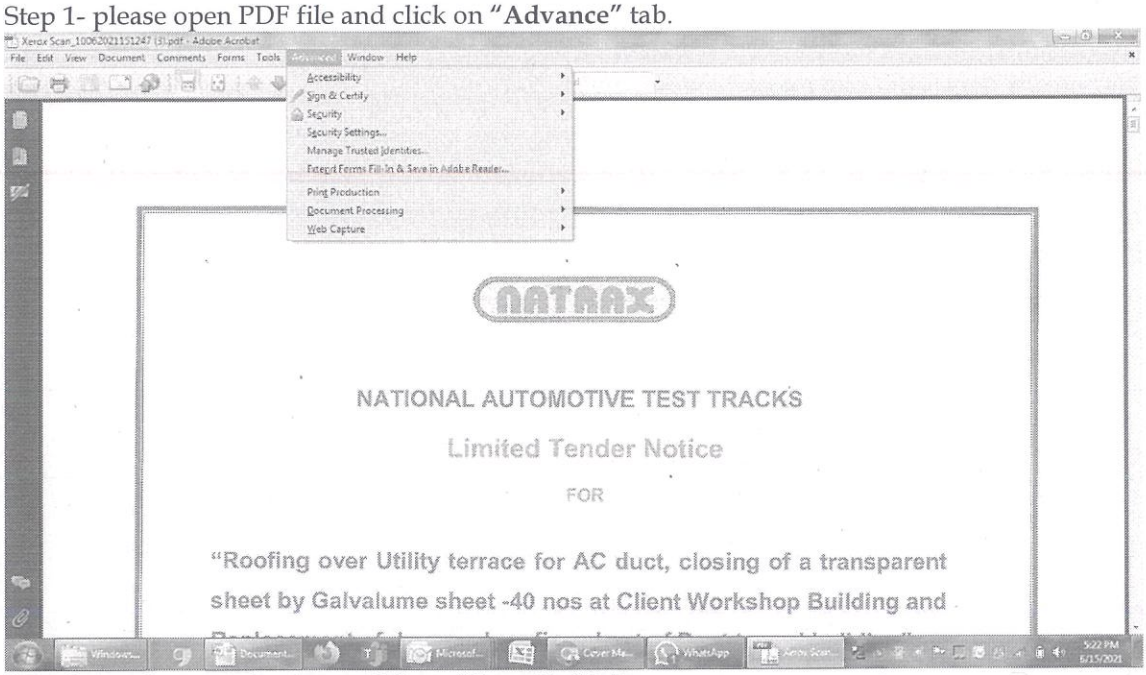
NATRAX Bank details to be used for submission of EMD/Tender Fee (if any) & procedure for passwords protection



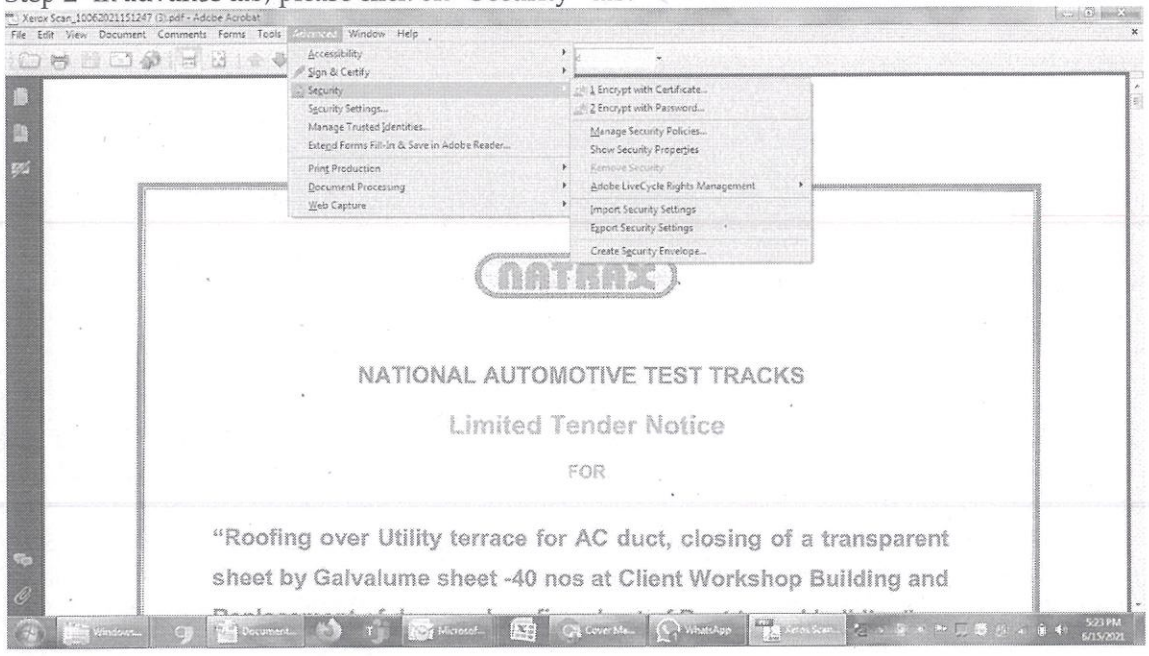
NATIONAL AUTOMOTIVE TEST TRACKS
NATRAX

Steps for loading passwords in PDF Files-Method I

Step 1- please open PDF file and click on "**Advance**" tab.

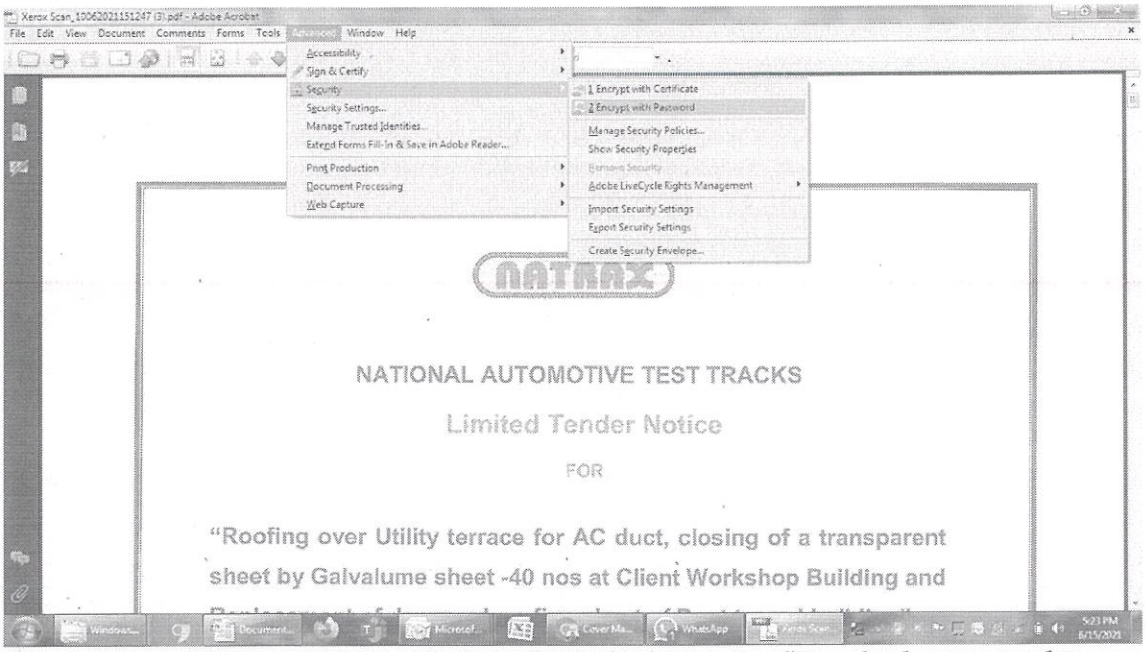


Step 2- in advance tab, please click on "**Security**" tab.

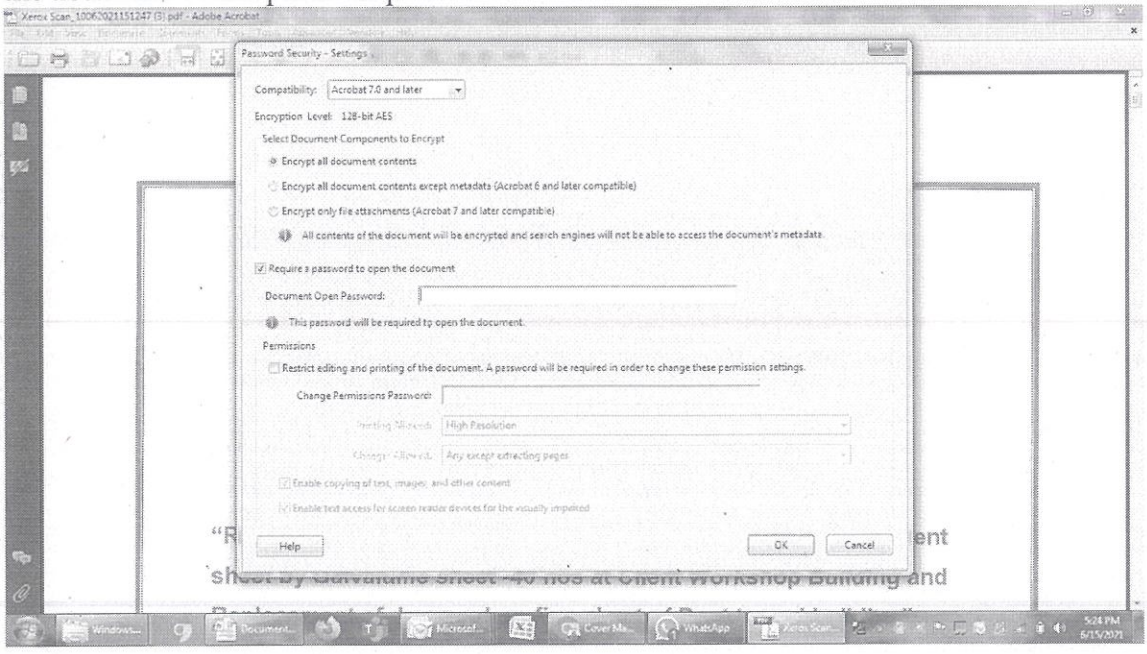


Step 3- in security tab, please click on "**2 Encrypt with Password**".

NATIONAL AUTOMOTIVE TEST TRACKS

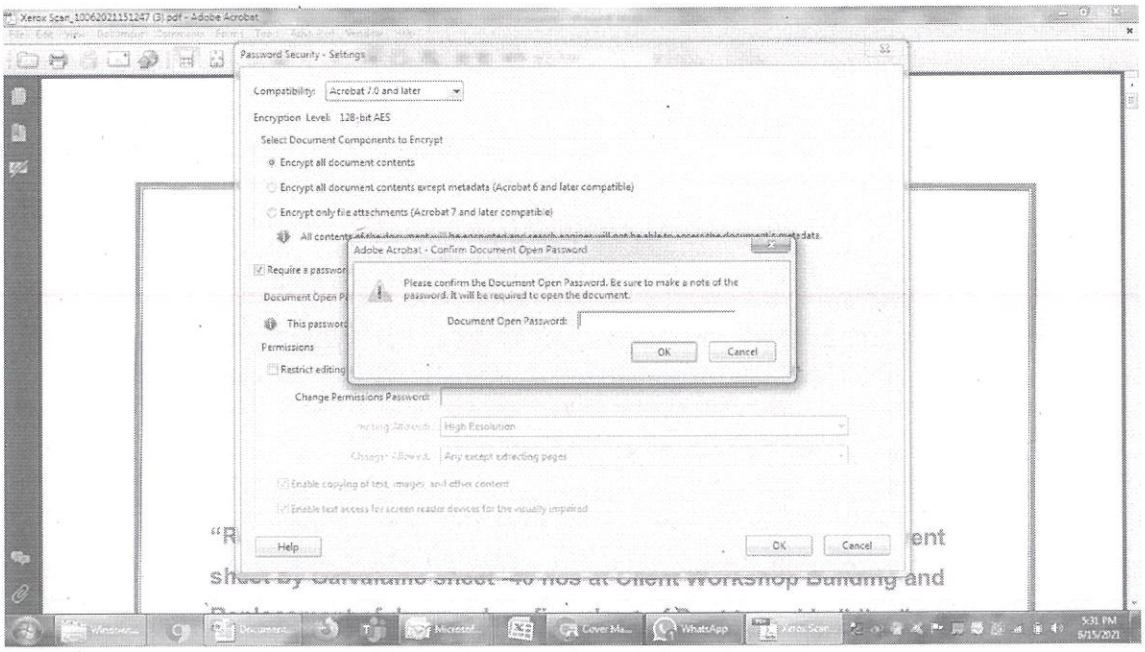


Step 4- after that below window will open, please check in option **"Required a password to open the document"**. Than please fill password and click "**ok**".



Step 5- after that below window will be open, please fill same password again, and click "**ok**".

NATIONAL AUTOMOTIVE TEST TRACKS


Xerox Scan_10062021151247 (3).pdf - Adobe Acrobat
Password Security - Settings
Compatibility: Acrobat 7.0 and later
Encryption Level: 128-bit AES
Select Document Components to Encrypt
Encrypt all document contents
Encrypt all document contents except metadata (Acrobat 6 and later compatible)
Encrypt only file attachments (Acrobat 7 and later compatible)
Adobe Acrobat - Confirm Document Open Password
Please confirm the Document Open Password. Be sure to make a note of the password. It will be required to open the document.
Document Open Password:
Ok
Cancel
Change Permissions Password:
High Resolution
Help
OK
Cancel

Check-list Tender No. NATRAX/PROC/M&S/21/15

S. No	Particulars	Document Attached
1	Have you submitted bids in 2 parts in sealed envelopes with the necessary headings? Have you submitted both the envelopes together in a sealed outer envelope?	Yes ☐ No ☐
2	Have you enclosed the EMD for Rs 16,000/- in the technical Bid?	Yes ☐ No ☐
3	Have you submitted the details of your technical soundness	Yes ☐ No ☐
4	Legal Valid Entity: Have the documents mentioned in the NIT have been submitted?	Yes ☐ No ☐
5	Is your firm a legal entity for the last 3 years. If yes, please provide Certificate of Incorporation,	Yes ☐ No ☐
6	Audited Balance sheet (2018-19, 2019-20 & 2020-21), should be provided.	Yes ☐ No ☐
7	It should have the average turnover of Rs. 15 Lac, in the last 3 financial years (2018-19, 2019-20 & 2020-21), please provide details	Yes ☐ No ☐
8	Details of Technical Capabilities (similar experience) in last 3 years with reference of clients (Name & Contact numbers) should be attached.	Yes ☐ No ☐

NATIONAL AUTOMOTIVE TEST TRACKS

9	If registered under "Micro, Small & Medium Enterprises" (MSME), supporting documents need to be submitted to avail exemption from Bid Security / Earnest Money.	Yes ☐ No ☐
10	Have your technical bid been prepared for packing as per Tender?	Yes ☐ No ☐
11	Duly Stamped and signed on all pages of the Tender/Quotation documents, as issued by NATRAX (in Original)	Yes ☐ No ☐
12	Have your financial Bid proposal is duly filled, sealed and signed on all pages?	Yes ☐ No ☐
13	Have you filled your quotes against all items?	Yes ☐ No ☐
14	Have you verified the calculation of prices ?	Yes ☐ No ☐
15	Have your financial bid been properly packed as per Tender?	Yes ☐ No ☐
16	Total no of pages submitted by the bidder as a part of the bid	Total no. of pages: _____pgs

NATIONAL AUTOMOTIVE TEST TRACKS