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RFP No. MPBSCDCL/TENDER NO -102 **September 2019**

Bhopal Smart City Development Corporation Limited

Design, Supply, Installation, Testing and Commissioning of Smart Street lighting and ICT works for Roads of ABD area of Bhopal Smart City including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis

REQUEST FOR PROPOSAL

INDEX

SECTION-1

1. NOTICE INVITING TENDER

Bhopal Smart City Development Corporation Limited

NOTICE INVITING e-TENDER (NIT)

BSCDCL invites online percentage rate /item rate tender as per schedule as under:

Tendering Document No.	:	MPBSCDCL/TENDER NO -102
Name of the Work	:	**Design, Supply, Installation, Testing and Commissioning of Smart Street lighting and ICT works for Roads of ABD area of Bhopal Smart City including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis**
Brief Scope of Work	:	Design, Supply, Installation, Testing and Commissioning of Smart street lighting and ICT works for Roads of ABD area under Bhopal Smart City Project.
Estimated Cost	:	Rs. 127.00 Cr. (Capex)
Period of Completion	:	(24 Months including raining season for Execution and as per schedules of Road projects) and (60 Months for O&M after commissioning of Project)
Earnest Money Deposit	:	Rs. 50,00,000/- (Fifty lakhs Rupees only)
Non-refundable cost of e- Tender Document	:	Rs. 50,000/- (Fifty Thousand rupees only)
Purchase of Tender Start Date	:	30/09/2019 10:30 Hrs
Purchase of Tender End Date	:	18/11/2019 17:00 Hrs
Last date & time of submission of Online Tender(Bid Submission)	:	18/11/2019 17:30 Hrs

Period during which hard copy of the documents as per NIT shall be submitted.(With all technical credentials)	:	19/11/2019 12:00 Hrs
Date & Time of Opening of Bid	:	20/11/2019 12:00 Hrs
Date & Time of Opening of Financial Tender	:	Will be intimated later to successful Bidder
Validity of offer		180 days from the date of Submission of price bid
Pre-Tender Meeting & Venue		14/10/2019 at 12.00 Hrs. At BSCDCL, Bhopal Office

The tender document can be downloaded from www.mptenders.gov.in **"Corrigendum, if any, would appear only on the** www.mptenders.gov.in **web site and not to be published in any News Paper".**

The tenderer if required may submit queries in writing on E-mail Id. tenderqueries@smartbhopal.city before 14/10/2019 **up to 11:00 Hrs**.

2. INSTRUCTION TO BIDDER:

The invitation for bids is open to all eligible bidders who may be proprietary firms, partnership firms or companies registered under company's act 1956 and meeting following criteria;

1. **Joint Venture is allowed.**

   Joint venture of **Maximum Two** firms/ members / companies, as partners shall be allowed for the works.

   All the Members of the JV shall be jointly and severally responsible for this Contract. The Member of the JV holding highest stake shall be the Lead Partner. The JV shall comply with the following requirements:

   (a) A Joint venture agreement must be submitted along with the documents in which minimum share of lead member shall have to be 60% and share of other members, individually shall not be less than 15%.
   (b) All the members of the Joint Venture firms shall have to collectively satisfy all the criteria mentioned.

   Note:

   In case, the applicant/JV partner has achieved physical & financial performance for the criteria mentioned above in past, in joint venture with other Contractor (other than present JV partner), the portion of the work (physically and financially) of the contractor included in their Joint Venture Agreement in original contract work shall only be considered for evaluation purpose.

   In joint venture consortium the lead partner shall only be an Indian citizen, Indian partnership firm or Indian private/ public limited company.

   The lead member shall be registered contractor in of appropriate class with the Central Govt. / State Governments or Central / State Government Undertakings.

   (c) The individual members who join in JV shall have to give an undertaking that they will maintain status-quo till the completion of the work, if the work is awarded to the JV Consortium, the same JV Consortium shall be maintained till the satisfactory completion of the work. This undertaking shall be submitted on Stamp paper Rs. 100. duly signed by authorized signatory, which shall be notarized.
   (d) In case of Bidder participating as a Joint Venture, on his selection for award of contract, all the partners/members of the Joint Venture will have to sign the Contract with the employer and will be jointly and severally liable for performance of the contract. Award of Contract will be in the name of Joint Venture consortium which will be considered as "Legal Entity" as far as this Bid/ Contract is concerned.
   (e) The Bid, and in case of a successful bid, the Form of Contract Agreement, shall be signed with the name of Joint Venture which will be legally binding on all the partners;
   (f) Lead partner shall be declared as Prime Bidder authorized to be in charge; and this authorization shall be evidenced by submitting a Power of Attorney signed by legally authorized signatories of all the partners;
   (g) The member in charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the Joint Venture and the entire execution of the contract including defect liability period;
   (h) All members of the Joint Venture shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the Authorization mentioned under

(b) above as well as in the Bid Form and the Form of Contract Agreement (in case of a successful Bid); and,

(i) A copy of the stamped and notarized agreement entered into by the Joint Venture partners shall be submitted with the Bid. Roles, responsibilities and financial stakes of all members of the Joint Venture consortium shall be clearly and unambiguously prescribed in the Joint Venture agreement. In case of non prescription, the JV agreement will be declared as invalid and the bid will be treated as non responsive.

(j) In case of Joint Venture financial strengths of each of the JV members individually shall not be less than Minimum Qualifying Criteria worked out in proportionate to their financial stakes in the JV. In case of physical criteria, the summation of performance of each JV member shall be considered for fulfilling the criteria without considering their stake in the JV agreement.

Each JV member shall have required registration certificate, existence of company as per tender requirement. Each member shall satisfy these requirements separately.

(k) The contractors participating in the name and form of a Joint Venture consortium shall have to clearly and unambiguously define the role, responsibilities and financial stake of each of the partners, the lead partner shall also have to be defined. On award of contract to such a Joint Venture consortium, each of the members of the Joint Venture consortium shall have to sign the Contract. Each member of the JV shall be jointly and severally responsible for the performance of the contract.

(l) An original notarized copy of the agreement as prescribed in Form-8 entered into by the joint venture partners shall be submitted with the bid. It should also distinctly show the financial participation of each member of the joint venture and the responsibility of each member as regards planning and execution of the work.

In case of conflict between the terms in contract agreement and the Joint Venture documents, the terms in the contract agreement shall prevail.

2. Equipment Capabilities:

The Bidder(s) shall have minimum equipment in full working order, and must demonstrate that based on known commitments, they will be available for timely use in the proposed contract. The bidder should, undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with assessment study of requirements of equipment/plants & machineries to allow the employer to review their proposal. The bidder will ensure his commitment to make the arrangements of the required equipment on the day of commencement or with respect to the progress of the work in phases, as per the instructions of site in charge on an undertaking on Rs. 100 stamp paper or of value as approved by Client to be submitted along with the Bid.

3. Personnel Capability

Contractor must produce documentary evident having the following staff on their establishment at least six months prior to submission of bid and during the duration of contract and should submit undertaking stating that this staff or equivalent will be deployed on site after award of contract as per necessity and instruction of

Engineer in Charge. Key personnel should have experience in similar type of work i.e in **Smart street lighting and ICT works**.

S. No.	Position	Nos.	Experience In Similar Works [years]
1	Project Manager –Multidisciplinary (Graduate Engineer)	1	15-20
2	Design Manager (Graduate Engineer)	1	15-20
3	Electrical Engineer (Graduate Electrical Engineer)	2	10-15
4	Instrumentation/Electronics & Communication Engineer (Graduate Engineer)	2	10-15
5	IT Engineer (Graduate Engineer/ CCNE certified professionals)	2	10-15
6	Safety Engineer (Graduate Engineer)	1	10

4. Eligible Plant, Equipment and Services

It is desired that the successful bidder selects a manufacturer for supply of equipment from the list of preferred experienced manufacturers given in Section-7 of the Bid document.

3. ELIGIBILITY CRITERIA FOR BIDDER:

To qualify for award of the contract, bidders are advised to note the minimum qualification criteria specified below;.

1. **Company Registration:** The bidder shall be proprietary firms, partnership firms or companies registered under company's act 1956 in India and should have established office in India since past 5 years.
2. **Similar nature of Work:** The Bidder in their own name should have satisfactorily completed the work of similar nature Semi Govt. / Govt. & Public / Private Sector Organizations in India, during last 7 years ending last day of month previous to the one in which bids are invited as a prime Contractor.

   Three completed works of similar nature each costing not less than 40% of the estimated cost

   OR

   Two completed works of similar nature each costing not less than 50% of the estimated cost.

   OR

   One completed work of similar nature of costing not less than 80 % of the estimated cost.

Similar works means: Smart Street lighting and ICT works consisting of Street light decorative poles, City wide CCTV surveillance system, Smart city solutions, Traffic Enforcement solutions viz. Red light violation detection (RLVD), Speed violation Detection (SVD), Automatic Number Plate Recognition (ANPR) system, Smart Street LED lighting along with smart controller and Traffic signal along with control room/ Command & control center integration on EPC/ DBO Basis as main contractor.

Note:

a) The value of executed works shall be brought to current costing level by enhancing the actual value of work at compound rate of 10 % per annum; calculated from the date of completion to last date of receipt of applications for tenders.

b) The Bidder should demonstrate through submission of experience certificates for collective experience

c) Bidder should submit Client/Users Certificate of satisfaction for the work they have executed. The certificate for experience & performance report must be issued by the User Agencies.

3. **Technical Experience:** The Bidder should have following minimum experience:-

(A) Qualification of the Original equipment manufacturer (OEM) as the Bidder:-

(i) OEM should have development center/ manufacturing facility in India.

(ii) OEM/Bidder should have local service support office in ABD Area of Bhopal or they should give undertaking that they will establish service center in Bhopal smart city 45 days before start of operation and maintenance period.

(iii) OEM/Bidder should have installed a similar system using Video Management integrated with Command and Control, Video Analytics and integration of 3rd. party applications like Face recognition system, Automatic Number plate recognition etc. in at least 2 Projects in India. All Projects mentioned should be running with minimum 98% uptime.

(iv) OEM/Bidder should have completed minimum two similar projects on Design, Supply, Installation, Testing and Commissioning basis and it should have integrated with City ICCC.

(v) OEM/Bidder should have completed at least 1500 Nos Smart Street Light Poles with LED lights on EPC/DBO basis (Cumulative quantity of various projects) in India in last Five years.

(B) Qualification for EPC contactor as the Bidder:

(i) The bidder shall supply equipments as per this tender from any national / internationally reputed manufacturer of equipments who meets the QR as laid down in clause (A) above.

(ii) The Bidder must obtain authorization from the manufacturer of equipments meeting the above criteria and also submit Joint Deed of Undertaking with the Manufacturer.

(ii) The bidder should have completed at least 1500 Nos Smart Street Light Poles with LED lights on EPC/DBO basis (Cumulative quantity of various projects) in India in last Five years.

(iii) The bidder should have installed a similar system using Video Management integrated with Command and Control, Video Analytics and integration of

3rd. party applications like Face recognition system, Automatic Number plate recognition etc. in at least 2 Projects in India.

(iv) The bidder should have completed minimum two similar projects on Design, Supply, Installation, Testing and Commissioning basis and it should have integrated with City ICCC.

4. **Turnover:** The average annual financial turnover during the last 3 years ending 2017-18 should not be less than 50 Cr. To ascertain this, Bidder(s) shall furnish the financial statement (Audited balance sheet) duly certified by Chartered Accountant.

   Turnover, for financial 2017-2018 shall be considered subject to submission of provisional/audited certificate from chartered accountant by the Bidder. If the certificate for financial year 2017-18 is not available, then previous 3 years ending 2016-17 should be considered.

5. **Net worth:** The Bidder(s) net worth should be positive in the last year (2017-18).
6. Bidder shall have valid registration in GST registration, EPF Registration Certificate & PAN Card.
7. The bidder should not got black listed by any government organization (Central/State/PSU), bidder should submit affidavit signed by Director of the company.

Note to eligibility criteria:-

I. The bidder should necessarily submit completion certificate of the Qualifying works from the client/user/ duly signed by an officer not below the rank of Executive Engineer or equivalent of the concerned organization.
II. The Bidder shall submit the audited balance sheets / CA certified turnover for last 3 years (2015-16, 2016-17, and 2017-18).
III. For the purpose of determination of turnover of the bidder, only turnover from construction projects shall be considered. This shall be backed by a certificate from the Statutory Auditors of the company/Chartered Accountant.
IV. For the purpose of determining the relationship of the Bidder with their group companies, only the following documents such as the Annual Report, Balance Sheet or the Auditor Certificate, shall be considered.
V. Net worth shall be calculated as the sum of share capital and free reserves and surplus.
VI. Accumulated losses if not adjusted in reserves and surplus and shown separate in the balance sheet shall be deducted from the sum of share capital and free reserves and surplus. Reserves on account of revaluation of fixed assets shall be excluded.
VII. BSCDCL shall have the authority to make enquiries with the bidder's bankers and auditors.

VIII. The bidders shall indicate information regarding any litigation or arbitration resulting from contracts executed by the bidder in the last five years. The information shall include the name of the parties concerned, disputed amount, cause of litigation & matter in dispute.

4. DOCUMENTS COMRISING THE BID :

The Bidders should additionally submit the following details in their Bid along with documents mentioned in instruction to bidder and eligibility criteria for bidder but not limited to the same:

1. An Organization Chart of administration and execution of the contract showing the deployment of key personnel at Site with individual tasks
2. Copies of original documents defining the constitution or legal status, place of registration and principal place of business; written Power of Attorney authorizing the signatory of the bid to commit and bind the Bidder, details of arbitrations and litigations.
3. A letter of authority to seek references from the bidders' bankers and previous / existing Employer's.
4. Proposed general programme (Proposed Schedule and cash flow estimate in percentage form only) / method statements / Quality Plan / Site Management Plan in sufficient detail to demonstrate the adequacy of the bidder's proposals to meet the technical specifications and the completion time referred to in bid document.
5. All the document in support for meeting the Qualification Criteria
6. Signed copy of Pre-Bid Meeting held, if any.
7. Copies of all schedules, Technical Specifications and Deviations, if any, drawings, literature, brochures.
8. Proposed Safety plan and procedures that shall be followed during the execution of the Works
9. List of equipment / plant and machinery proposed to be deployed for executing the Contract in line with proposed general program/method statement . Availability (either owned or leased or by procurement) of key and critical equipment for the Works list of equipment to be enclosed with the bid.
10. Experience in handling Similar Projects to be supported by WO/PO Copies, Project Completion certificate , Project Status Report (duly certified by respective authority) and Performance Certificates from clients.

Even though the bidders meet the above qualifying criteria, they are liable to be disqualified if they have;

(a) Made misleading or false representations in the forms, statements and attachments submitted by them which comes to the knowledge of Employer; and/ or;

(b) Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, financial failures, etc.

Evaluation Criteria:

The lowest evaluated rates including O&M for Five years will be considered at the time of evaluation.

Annexure-I

5. MEMORANDUM

Sl. No.	Description	Cl. No. of NIT/ITT/Clauses of Contract (CC)	Values/Description to be Applicable for Relevant Clause (S)
1)	Name of Work		**Design, Supply, Installation, Testing and Commissioning of Smart Street lighting and ICT works for Roads of ABD area of Bhopal Smart City including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis**
2)	Client/Owner		Bhopal Smart City Development Corporation Ltd.
3)	Type of Tender		Engineering, Procurement & Construction (EPC) Basis /Item rate
4)	Earnest Money Deposit		Rs. 50,00,000/- (Fifty Lakhs Thousand rupees only)
5)	Estimated Cost		Rs. 127 Cr. (One Hundred Crore only) (Capex)
6)	Time allowed for Completion of Work		(24 Months including raining season for Execution and as per schedule of Road projects) and (60 Months for O&M After commissioning of project)
7)	Mobilization Advance		**10%** of contract value
8)	Interest Rate of Mobilization Advance		Simple Interest Rate of 10 % Percent only) (Per Annum)
9)	Schedule of rates applicable		DSR and NON SOR Items.

10)	Validity of Tender		180 days from the date of Submission of price bid	
11)	Performance Guarantee		5.00 % (Five Percent Only) of contract value within 30 days from the issue of Letter of Intent	
12)	Security Deposit/Retention Money		5.00% (Five Percent Only) of the gross value of each running bill.	
13)	Time allowed for starting the work		The date of start of contract shall be reckoned from 10 days after the date of work order.	
14)	Deviation limit beyond as per tender document except foundation.		Building work as per requirement.	Annual repair & maintenance of buildings As per requirement.
			Note:-The Deviation Limit of Building Work shall also apply for combined works (Building).	
15)	Deviation limit beyond as per tender document shall apply for Foundation		Building work as per requirement	Annual repair & maintenance of buildings as per requirement
			Note:-The Deviation Limit of Building Work shall also apply for combined works	
16)	Escalation		All rates as per Bill of Quantities (BOQ) quoted by contractor shall be firm and fixed for entire contract period as well as extended period for completion of the works. **No escalation shall be applicable on this contract.**	
17	Operation and Maintenance Period		**Five (5) years after successful commissioning of all Tendered works**	
17)	Defects Liability Period		**Two (2) years after successful commissioning of all works. However Comprehensive Operation and maintenance should be done for operation and maintenance period i.e 5 years**	

The intending tenderer must read the terms and conditions of BSCDCL carefully. He should only submit his tender if he considers himself eligible and he is in possession of

all the documents required.

Information and Instructions for Tenderers posted on Website(s) shall form part of tender Document.

The Tender Document as uploaded can be viewed and downloaded free of cost by anyone including intending tenderer. But the tender can only be submitted after uploading the mandatory scanned documents .

The Bidder shall submit the Technical BID & Financial Bid online through e-procurement portal www.mptenders.gov.in in comprising of the following documents along with supporting documents as appropriate:

Checklist for Online Submission: Envelope (A, B and C)

(a) Envelope-A will contain:

1. Proof of e-payment towards cost of tender document/ Acknowledgement towards cost of tender fee submission
2. Proof of online payment through e-portal www.mptenders.gov.in/ o r Bank Guarantee of any Nationalized or Commercial Scheduled Bank against EMD in favor CEO, BSCDCL shall be as per Notice Inviting e- tender.

(b) Envelope-B will contain:

1. Scanned copy of all approved/authenticated “Eligibility Criteria for Bidder” documents as per Para of this RFP.
2. Letter of Acceptance of tender condition unconditional as per format enclosed
3. Certificate of Financial Turnover duly certified by CA as indicated above.
4. GST registration number, EPF registration, PAN No.
5. All pages of the entire Corrigendum (if any) duly signed by the authorized person.
6. Affidavit as per “Appendix-O” of tender document.
7. Acceptance letter and Affidavit/Undertaking for Blacklisting/ Debar.
8. Should submit the list of tools plant and machinery.
9. If applicable, Joint venture agreement
10. Any other documents as asked in RFP document.

(c) Envelope-C will contain:

The Financial Bids shall be uploaded online only strictly in the prescribed format.

If any condition or conditional rebate is offered by the tenderer, their tender shall summarily

be rejected.

The tenderers are required to quote strictly as per terms and conditions, specifications, standards given in the tender documents and not to stipulate any deviations.

After submission of the tender the tenderer can re-submit revised tender any number of times but before last time and date of submission of tender as notified.

When it is desired by BSCDCL to submit revised financial tender then it shall be mandatory to submit revised financial tender. If not submitted then the tender submitted earlier shall become invalid. On opening date, the tenderer can login and see the tender opening process. Contractor can upload documents in the form of JPG format and PDF format.

If the contractor is found ineligible after opening of tenders, his tender shall become invalid and cost of tender document and processing fee shall not be refunded.

If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies as submitted physically by the contractor the tender shall become invalid and cost of tender document and processing fee shall not be refunded.

Notwithstanding anything stated above, BSCDCL reserves the right to assess the capabilities and capacity of the tenderer to perform the contract, in the overall interest of BSCDCL. In case, tenderer's capabilities and capacities are not found satisfactory, BSCDCL reserves the right to reject the tender.

Examination of Technical Bids and Determination of Responsiveness:

1. Prior to detailed evaluation of Technical Bids, the Employer will determine whether each Bid
   (a) meets the eligibility criteria defined in Clause
   (b) has been properly signed by an authorized signatory (accredited representative) holding power of Attorney in his favor.
   (c) is accompanied by the required Bid security and;
   (d) is responsive to the requirements of the Bidding documents.

2. A substantially responsive Technical Bid is one which conforms to all the terms, conditions and specification of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one
   (a) which affects in any substantial way the scope, quality or performance of the works;
   (b) which limits in any substantial way, the Employer's rights or the Bidder's obligations under the Contract; or
3. If a Technical Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

Instructions for financial bid submission-

In case of Percentage Rate Tender, Contractor must ensure to quote single percentage rate in attached financial bid format. Quote should be in percentage higher or below on the SOR Rates the same is to quoted in the form of decimal only. For example if contractor wants to quote 5 percent higher then he have to quote 1.05 and if he wants to quote 5 [percent below he have to quote 0.95 in given column of financial bid sheet.

In case of Item Rate Tender, price shall be entered against each item in the Bill of Quantities / Schedule of Quantities. The cost of item against which the contractor has failed to enter a rate or price shall be deemed to be covered by rates and prices of other items in Bill of Quantities / Schedule of Quantities and no payment shall be made for the quantities executed for items against which rate has not been quoted by the contractor.

In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as “0”. Therefore, if any cell is left blank and no rate is quoted by the tenderer, rate of such item shall be treated as “0” (ZERO).

i. Financial Bid format is uploaded in Excel Format in www.mptenders.gov.in. At the time of financial bidding, bidder is requested to download the file, and update the same.
ii. For SOR items bidder need to quote 1 plus percentage higher of below the quoted rate for example if bidder wants to quote 5% higher the SOR price then he have to quote1.05 and similarly if he wants to quote 5% below the SOR price then he have to quote0.95.
iii. For Non SOR items bidder can quote for individual item rates in respective financial bid sheet.
iv. Bidders are requested to check final figure in all the totals of all sheets. BSCDCL is not responsible for errors in the financial bid document.
v. Bidders are required to upload the updated financial bid in the prescribed excel format in the www.mptenders.gov.in at the time of final financial bid submission.

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SECTION-2

Instruction to Tenderer (ITT)

1. Instruction to Tenderer (ITT)

A. GENERAL INSTRUCTIONS:

2.1. General terms of Bidding-

2.1.1 No Bidder shall submit more than one BID for the Project.

2.1.2 The Feasibility Report / Preliminary Project Report of the Project has been assessed however the Bidders are expected to carry out their own surveys, investigations and other Preliminary examination of the Project before submitting their Bids. Nothing contained in the attached drawings/BOQ shall be binding on the BSCDCL nor confer any right on the Bidders, and the BSCDCL shall have no liability whatsoever in relation to or arising out of any or all contents of TENDER.

2.1.3 Notwithstanding anything to the contrary contained in this RFP, the Preliminary terms specified in the draft Agreement shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Agreement.

2.1.4 The BID shall be furnished in the financial bid format attached separately in the Excel format

1. BID to be quote 1 plus % above or below (for Example. If want to quote 5% above then write 1.05 and if want to quote 5% below then write 0.95) for the SOR sheets.
2. BID shall be quoted item wise in the given excel sheet for the NON SOR items.

2.1.5 The Bidder shall deposit a BID Security (EMD) of (Rs. 50,00,000/- (Fifty lakhs rupees only) in accordance with the provisions of this RFP. The Bidder has to provide the BID Security (EMD) through online payment or in the form of a Bank Guarantee acceptable to the BSCDCL, as per format.

Company Name: Bhopal Smart City Development Corporation Ltd.
Bank Name: Allahabad Bank.

Branch Address: Arera Colony, Bhopal

A/C no. : 50327343809

IFSC Code: ALLA0210197

PAN No. : AAGCB6537N

TIN No. : 23889236926

Service Tax No. : AAGCB6537NSD001

GST no: 23AAGCB6537N1ZE.

2.1.6 The validity period of the Bank Guarantee, shall not be less than 180 (one hundred and eighty) days from the BID Due Date, inclusive of a claim period of 60 (Sixty) days, and may be extended as may be mutually agreed between the BSCDCL and the Bidder.

2.1.7 The BID shall be summarily rejected if it is not accompanied by the BID Security. The BID Security shall be refundable no later than 150 (one hundred and fifty) days from the BID Due Date except in the case of the Selected Bidder whose BID Security shall be retained till it has provided a Performance Security under the Agreement.

2.1.8 The Bidder should submit a Power of Attorney as per the format, authorizing the signatory of the BID to commit the Bidder.

2.1.9 Any condition or qualification or any other stipulation contained in the BID shall render the BID liable to rejection as a non-responsive BID.

2.1.10 The BID and all communications in relation to or concerning the Bidding Documents and the BID shall be in English language.

2.1.11 The documents including this RFP and all attached documents, provided by the BSCDCL are and shall remain or become the property of the BSCDCL and are Transmitted to the Bidders solely for the purpose of preparation and the submission of a BID in accordance herewith. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their BID.

2.1.12 The provisions of this Clause shall also apply mutatis mutandis to BIDs and all other documents submitted by the Bidders, and the BSCDCL will not return to the Bidders any BID, document or any information provided along therewith.

2.1.13 This RFP is not transferable.

2.1.14 Any award of Project pursuant to this RFP shall be subject to the terms of Bidding Documents and also fulfilling the criterion as mentioned in tender document.

2.1.15 While bidding is open to persons from any country, the following provisions shall apply then the Eligibility of such Bidder shall be subject to approval of the BSCDCL from national security and public interest perspective. The decision of the BSCDCL in this behalf shall be final and conclusive and binding on the Bidder. The holding or acquisition of equity or control, as above, shall include direct or indirect holding/ acquisition, including by transfer, of the direct or indirect legal or beneficial ownership or control, by persons acting for themselves or in concert and in determining such holding or acquisition, the BSCDCL shall be guided by the principles, precedents and definitions contained in the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulations,1997, or any substitute thereof, as inforce on the date of such acquisition. The Bidder shall promptly inform the BSCDCL of any change in the shareholding, as above, and failure to do so shall render the Bidder liable for disqualification from the Bidding Process.

2.1.17 Notwithstanding anything to the contrary contained herein, in the event that the Bid Due Date falls within three months of the closing of the latest financial year of a Bidder, it shall ignore such financial year for the purposes of its Bid and furnish all its information and certification with reference to the 5 (five) years or 1 (one) year, as the case may be, preceding its latest financial year. For the avoidance of doubt, financial year shall, for the Purposes of a Bid hereunder, mean the accounting year followed by the Bidder in the course of its normal business. Latest Financial Year will be (2017-2018)

2.1.18 Any entity which has been barred by GOI or Govt. of Madhya Pradesh for the works of expressways, National highways, and the bar subsists as on the Bid Due Date, would not be eligible to submit the BID, bidder need to submit Affidavit regarding the same.

2.1.19 The BSCDCL reserves the right to reject an otherwise eligible bidder on the basis of the information provided in tender document. The decision of the BSCDCL in this case shall be final.

2.2 Eligibility and qualification requirements of Bidder

2.2.1 For determining the eligibility of Bidder the following shall apply:

(a) An Bidder shall not have a conflict of interest (the "Conflict of Interest") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified and liable for forfeiture of the BID Security or Performance Security as the case may be. A Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:

(b) A Bidder shall be liable for disqualification and forfeiture of BID Security, if any legal, financial or technical adviser of the BSCDCL in relation to the Project is engaged by the Bidder, its Member or any Associate thereof, as the case may be, in any manner formatters related to or incidental to such Project during the Bidding Process or subsequent to the (i) issue of the LOA or (ii) execution of the Agreement. In the even though such adviser is engaged by the selected Bidder or Contractor, as the case may be, after issue of the LOA or execution of the Agreement for matters related or incident alto the project, then notwithstanding anything to the contrary contained herein or in the LOA or the Agreement and without Prejudice to any other right or remedy or the BSCDCL, including the forfeiture and appropriation of the BID Security or Performance Security, as the case may be, which the BSCDCL may have there under or otherwise, the LOA or the Agreement, as the case may be, shall be liable to be terminated without the BSCDCL being liable in any manner whatsoever to the Selected Bidder or Contractor for the same. For the avoidance or doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated 6 (six) months prior to the date of issue of this RFP. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the date of commercial operation of the Project.

Other Instructions-

On line percentage rate tenders on behalf of Owner/Client are invited for the work. The pre-qualification / enlistment of the contractors should be valid on the last date of submission of tenders. In case the last date of submission of tender is extended, the pre-qualification of contractor should be valid on the original date of submission of tenders.
The work is estimated to _____ however, is given merely as a rough guide.

The tender document as uploaded can be seen on website www.mptenders.gov.in and can be downloaded free of cost.
Mode of Submission: **Earnest Money Deposit** Earnest Money Deposit of amount as mentioned in "NIT/ Memorandum (Annexure-I)" required to be submitted along with the tender shall be payable online through E-tendering portal www.mptenders.gov.in through NEFT/RTGS. The EMD shall be valid for minimum period of 180 (One Hundred Eighty) days from last day of submission of Tender.
The EMD of all unsuccessful tenderers will be returned within thirty (30) days of the Award of the contract to successful tenderer through online portal.
Financial Bidding can be done through the excel sheet uploaded on www.mptenders.gov.in, which contains four sheets: 1. SOR 2. NON SOR *BID to be quote 1 plus % above or below (for Example. If want to quote 5% above then write 1.05 and if want to quote 5% below then write 0.95) for SOR items. *Rates for NON SOR item can be filled in the NON SOR sheet *Rates can be quoted in the yellow highlighted cell of the financial bid * Bidder should fill there company/organization name in the space provided (yellow section)
Interested Bidder who wish to participate in the tender has also to make following payments through online payment e-proc portal only. Cost of Tender Document –Rs. 50,000/- To be submit online only/- e-Tender Processing Fee – As applicable for MPEPROC portal, Cost of Tender Document and, e-Tender Processing Fee online payment shall be payee online Copy of pre-qualification/enlistment letter and certificate of work experience (if required) and other documents as specified in the tender shall be scanned and uploaded to the e-Tendering website within the period of tender submission.
Online technical tender documents submitted by intending tenderers shall be opened only of those tenderers, whose Earnest Money Deposit, Cost of Tender Document and e-Tender Processing Fee and other.

The tender submitted shall become invalid if: the tenderer is found ineligible.

The tenderer does not upload all the documents (including GST registration) as stipulated in the tender document. If any discrepancy is noticed between the documents as uploaded at the time of submission of tender and hard copies as submitted physically in the office of tender opening authority.

VALIDITY OF TENDER

The tender for the works shall remain open for acceptance for a period of One Eighty (180) days from the date of bid submission date. If any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the BSCDCL, then the BSCDCL shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money as aforesaid. Further the tenderers shall not be allowed to participate in the retendering process of work.

ACCEPTANCE OF TENDER

BSCDCL reserves the right to reject any or all the tenders in part or full without assigning any reason whatsoever. BSCDCL does not bind itself to accept the lowest tender.

The tenders shall be strictly as per the conditions of contract. Tenders with any additional condition(s)/modifications shall be rejected.

The witnesses to the Tender/Contract Agreement shall be other than the tenderer/ tenderers competing for this work and must indicate full name, address, and status/occupation with dated signatures.

The acceptance of tender will rest with the BSCDCL who does not bind itself to accept the lowest tender and reserves to itself the right to reject any or all the tenders received without assigning any reason thereof. Tenders in which, any of the prescribed conditions are not fulfilled or found incomplete in any respect are liable to be rejected.

On acceptance of tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from Engineer-in-Charge or its authorized representative shall be intimated by the contractor within 07 days of issue date of Letter of Intents by BSCDCL.

The tenderer shall not be permitted to tender for works if his near relative is posted in the project office or concerned Office of the BSCDCL. The contractor shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any of the officers in BSCDCL. Any breach of this condition by the tenderer would render him liable to the withdrawal of the work awarded to him and forfeiture of Earnest Money and Security Deposit. This may also debar the contractor from tendering for future works under BSCDCL.

For the purpose of operation of this clause a near relative shall mean wife, husband, parents, grandparents, children, grandchildren, brothers, sisters, uncles, aunts, cousins and their corresponding in-laws.
The time of completion of the entire work, as contained in contract shall be as mentioned in “Memorandum - Annexure-I”, which shall be reckoned from the 10th day after issue of the Letter of Intent by the BSCDCL.
Canvassing whether directly or indirectly, in connection with tenderers is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.
The tender award, execution and completion of work shall be governed by tender documents consisting of (but not limited to) Letter of Intent/Letter of work order, Bill of Quantities, Special Conditions of Contract, General Conditions of Contract, Specifications, Drawings. The tenderers shall be deemed to have gone through the various conditions including sub-soil water conditions, topography of the land, drainage and accessibility etc. or any other condition which in the opinion of contractor will affect his price/rates before quoting their rates. No claim whatsoever against the foregoing shall be entertained.
The drawings with the tender documents are Tender Drawing and are indicative only.
ADDENDA/CORRIGENDA Addenda/Corrigenda to the tender documents may be issued prior to the date of submission of the tender to clarify or effect modification in specification and/or contract terms included in various tender documents. The tenderer shall suitably take into consideration such Addenda/Corrigenda while submitting his tender. The tenderer shall return such Addenda/ Corrigenda duly signed and stamped as confirmation of its receipt & acceptance and submit along with the tender document. All addenda/ Corrigenda shall be signed and stamped on each page by the tenderer and shall become part of the tender and contract documents.
SITE VISIT AND COLLECTING LOCAL INFORMATION Before tendering, the tenderers are advised to visit the site, its surroundings to assess and satisfy themselves about the local conditions such as the working and other constraints at site, approach roads to the site, availability of water & power supply, application of taxes, duties and levies as applicable & any other relevant information required by them to execute complete scope of work. The tenderer may obtain all necessary information as to risks, weather conditions, contingencies & other circumstances (insurgencies etc.) which may influence or affect their tender prices. Tenderer shall be deemed to have considered site conditions whether he has inspected it or not and to have satisfied himself in all respect before quoting his rates and no claim or extra charges whatsoever in this regard shall be entertained / payable by the BSCDCL at a later date.

ACCESS BY ROAD

Contractor, if necessary, shall build temporary access roads to the actual site of construction for the works at his own cost to make the site accessible. The Contractor shall maintain the same in motorable condition at all the times as directed by Engineer-in-Charge at his own cost. The contractor shall be required to permit the use of any roads so constructed by him for vehicles of BSCDCL or any other agencies/ contractors who may be engaged on the project site, free of cost.
Non-availability of access roads or approach to site, for the use of the contractor shall in no case condone any delay in the execution of work nor be the cause for any claim for compensation.

HANDING OVER & CLEARING OF SITE

The Contractor should note that area for construction may be made available in phases as per availability and in conjunction with pace of actual progress of work at site. The work may be required to be carried out in constrained situations. The work is to be carried out in such a way that the traffic, people movement, if any, is kept operative and nothing extra shall be payable to the contractor due to this phasing / sequencing of the work. The contractor is required to arrange the resources to complete the entire project within total stipulated time. Traffic diversion, if required, is to be done and maintained as per requirement of local traffic police or/and as per specification, by the contractor at his own cost and the contractor shall not be entitled for any extra payment, whatsoever, in this regard.

The efforts will be made by the BSCDCL to handover the site to the Contractor free of encumbrances. However, in case of any delay in handing over of the site to the Contractor, the BSCDCL shall only consider suitable extension of time for the execution of the work. It should be clearly understood that the BSCDCL shall not consider any revision in contract price or any other compensation whatsoever viz. towards idleness of contractor's labour, equipment etc. Old structures on the proposed site, if required, shall be demolished by the contractor properly at his own cost unless and otherwise mentioned elsewhere in the tender document. The useful material obtained from demolition of structures & services shall be the property of the owner/BSCDCL and these materials shall be stacked in workmanship like at the place specified by the Engineer-in-charge.
Necessary arrangement including its maintenance is to be made by the contractor for temporary diversion of flow of existing drain and road, as the case may be. The existing drain, road would be demolished, wherever required, with the progress of work under the scope of proposed project. The existing Road and Drain which are not in the alignment of the said project but are affected and/ or need to demolished during execution for smooth progress of the project, shall be rehabilitated to its original status and condition (including black topping) by the contractor at his own cost. The cost to be incurred by contractor in this regards shall be deemed to be included in the quoted rates of the bill of quantity items and contractor shall not be entitled for any extra payment whatsoever in this regard.
The information about the public utilities (whether over ground or underground) like electrical/ telephone/ water supply lines, OFC Cables, open drain etc. is the responsibility of contractor to ascertain the utilities that are to be affected by the works through the site

investigation.

The contractor shall be responsible to obtain necessary approval from the respective authorities for shifting/ re-alignment of existing public utilities. BSCDCL shall only assist the contractor for visioning in obtaining the approval from the concerned authorities.

Any services affected by the works must be temporarily supported by the contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of works. It shall be deemed to be the part of the contract and no extra payment shall be made to the contractor for the same.

SCOPE OF WORK

The scope of work covered in this tender shall be as per the Bill of Quantities, specifications, drawings, instructions, orders issued to the contractor from time to time during the pendency of work. The drawings for this work, which may be referred for tendering, provide general idea only about the work to be performed under the scope of this contract. The Work Shall be executed on Engineering, Procurement & Construction (EPC) Basis. Details and drawings given in Tender document is for information purpose only and successful bidder shall undertake confirmatory survey for accuracy and completeness of data. It is in scope of successful Bidder to undertake all Site surveys, Geotechnical investigations, obtaining all required approvals from the relevant authorities, Carry out Shop Drawings, Further detailing of Architectural, Structural works, MEP works …etc as per Employers requirement and submit the same to client for review and approval, Prepare Good for Construction Drawings, submit maintenance manual to client for approval before start of Maintenance period. The successful bidder shall have to prepare and submit 'As Built Drawings' depicting the exact construction carried out on site, in soft and hard copy format.

Statutory and other charges for getting various required approvals shall be in scope of Successful bidder

The quantities of various items as entered in the "BILL OF QUANTITIES" are indicative only and may vary depending upon the actual requirement. The contractor shall be bound to carry out and complete the stipulated work irrespective of the variation in individual items specified in the bill of quantities. The variation of quantities will be governed as per conditions of contract. Also refer section 7 for detailed Scope of work.

APPROVAL OF TEMPORARY / ENABLING WORKS

The setting and nature of all offices, huts, access road to the work areas and all other temporary works as may be required for the proper execution of the works shall be subject to the approval of the Engineer- in-charge. All the equipment's, labour, material including cement, reinforcement and the structural steel required for the enabling/ temporary works associated with the entire Contract-shall have to be arranged by the Contractor only. Nothing extra shall be paid to the Contractor on this account.

CLARIFICATION AFTER TENDER SUBMISSION

Tenderer's attention is drawn to the fact that during the period, the tenders are under consideration, the tenderers are advised to refrain from contacting by any means, the BSCDCL and/or his employees/ representatives on matters related to the tender under consideration and that if necessary, BSCDCL will obtain clarifications in writing or as may be necessary. The tender evaluation and process of award of works is done by duly authorized Tender Scrutiny Committee and this committee is authorized to discuss and get clarification from the tenderers.

ORDER OF PRECEDENCE OF DOCUMENTS

In case of difference, contradiction, discrepancy, with regard to conditions of contract, Specifications, Drawings, Bill of quantities etc. forming part of the contract, the following shall prevail in order of precedence.

Letter of Intent, along with statement of agreed variations and its enclosures, if any.

Description of Bill of Quantity / Schedule of Quantities.

Special Condition of Contract.

Technical specifications (General, Additional and Technical Specification) as given in Tender documents.

General Conditions of Contract.

Drawings

CPWD/ UADD specifications (as specified in Technical

Specification of the Tender) update with correction slips issued up to last date of receipt of tenders.

Relevant B.I.S. Codes

2. Financial Bid

Online tender filled in either percentage plus or minus Bid to be quoted 1 plus % above or below (for example: If want to quote 5% above the write 1.05 and if want to quote 5% below then write 0.95) in the given uploaded Excel Sheet format

For NON SOR item sheet individual rates has to be quoted for each item in the given uploaded excel sheet

(If entered '0' it will be treated as 'at par'. By default the value is zero only).

Note: In case of rebate/premium of 15% and above as quoted by the Bidder, the rate analysis of major items shall be submitted by L1 and L2 bidder after demand notification by e-mail to bidders by concerned EIC.

BID SECURITY OR EMD

The Bidder shall furnish, as part of the Bid, Bid Security/EMD, in the amount specified in the Bid Data Sheet. This bid security shall be in favor of the authority mentioned in the Bid Data Sheet and shall be valid till the validity of the bid.

Any bid not accompanied by an acceptable Bid Security and not secured as indicated in sub- clause mentioned above, shall be rejected by the Employer as non-responsive.

The Bid Security of the successful Bidder will be discharged when the Bidder has signed the

Agreement and furnished the required Security Deposits.

The Bid Security may be forfeited:

a) if the Bidder withdraws the Bid after bid opening (opening of technical qualification part of the bid during the period of Bid validity;

b) in the case of a successful Bidder, if the Bidder fails within the specified time limit to:

i. sign the Agreement; and/or

ii. Furnish the required Security Deposits.

No rejections and forfeiture shall be done in case of curable defects,. For non-curable defects the 10% of EMD shall be forfeited and bid will be liable for rejection.

Failure of the bidder to submit the documents will lead to rejection of Bid.

3. ACCEPTANCE OF TENDER CONDITIONS

From: (On the letter head of the company by the authorized officer having power of attorney)

BSCDCL Limited,

_____

_____

Sub: Name of the work & NIT No.:

Sir,

This has reference to above referred tender. I/We are pleased to submit our tender for the above work and I/We hereby unconditionally accept the tender conditions and tender documents in its entirety for the above work. I/we are eligible to submit the tender for the subject tender and I/We are in possession of all the documents required. I/We have viewed and read the terms and conditions of this GCC/SCC carefully. I/We have downloaded the following documents forming part of the tender document:

a) Notice Inviting e-Tender. (pg- to pg-)
b) Quoting Sheet for Tenderer (pg- to pg-)

c) Instructions to Tenderers & General Conditions of Contract (Vol- I/2013) :(pg- to pg)

d) Technical Specifications (Vol-II) (pg- to pg-)

e) Bill of Quantities (Vol-III) (pg- to pg-)

f) Tender Drawing (pg- to pg-)

Acceptance of Tender Conditions (Annexure II)

g) Corrigendum, if any (pg- to pg-)

I/we have uploaded the mandatory scanned documents such as cost of tender document, EMD, e-Tender Processing Fee and other documents as per Notice Inviting e-tender AND I/We agree to pay the cost of tender document, EMD, e-Tender Processing Fee (only receipt/proof of online payment) and other documents in the form and manner as described in NIT/ITT .Should this tender be accepted, I/We agree to abide by and fulfill all terms and conditions referred to above and as contained in tender documents elsewhere and in default thereof, to forfeit and pay BSCDCL, or its successors or its authorized nominees such sums of money as are stipulated in the notice inviting tenders and tender documents. If I/we fail to commence the work within 10 days of the date of issue of Letter of Intent and/or I/we fail to sign the agreement as per Clauses of Contract and/or I/we fail to submit performance guarantee as per Clauses of Contract, I/we agree that BSCDCL shall, without prejudice to any other right or remedy, be at liberty to cancel the Letter of Intent and to forfeit the said earnest money as specified above.

Dated:_____ Yours faithfully,

(Signature of the tenderer with rubber stamp)

SECTION-3

GENERAL CONDITIONS OF CONTRACT (GCC)

CLAUSES OF CONTRACT (CC)

1. DEFINITIONS

The Contract means the documents forming the tender and acceptance thereof and the formal agreement executed between the competent authority on behalf of BSCDCL and the contractor, together with the documents referred to therein including these conditions, the specifications, Designs, drawings and instructions issued from time to time by the Engineer-in-Charge and all these documents taken together, shall be deemed to form one contract and shall be complementary to one another. Bhopal Smart City Development Corporation Limited, hereinafter called 'BSCDCL' proposes to get the works executed as mentioned in the Contract on behalf of Owner/ Client as Implementing agency/Executing Agency.

In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-

APPROVAL means approved in writing including subsequent written confirmation of previous verbal approval.

BILL OF QUANTITIES or SCHEDULE OF QUANTITIES means the priced and completed Bill of Quantities or Schedule of Quantities forming part of the tender.

CONTRACTOR shall mean the individual, firm**,** LLP or company, whether in corporate or not, undertaking the works and shall include the legal personal representative of such individual or the persons composing such firm or LLP or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.

CONTRACT VALUE means the sum for which the tender is accepted as per the Letter of Intent.

DRAWINGS mean the drawings referred to in the contract document including modifications if any and such other drawings as may from time to time be furnished and/ or approved by BSCDCL.

DATE OF COMMENCEMENT OF WORK: The date of start of contract shall be reckoned from 10 days after the date of issue of Letter of Intent.

ENGINEER-IN-CHARGE means the Engineer of BSCDCL who shall supervise and be in-charge of the work.

LANGUAGE: All documents and correspondence in respect of this contract shall be in English Language.

"LETTER OF INTENT" shall mean BSCDCL's letter or notification conveying its acceptance of the tender subject to such conditions as may have been stated There in.

MONTH means English Calendar month 'Day' means a Calendar day of 24 Hr **BSCDCL** shall means Bhopal Smart City Development Corporation Limited, a company registered

under the Indian Company Act, with its registered office at Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal, Madhya Pradesh 462023 or its Administrative officers or its engineer or other employees authorized to deal with any matter with which these persons are concerned on its behalf.

OWNER/ CLIENT means the Government, Organization, Ministry, Department, Society, Cooperative, etc. who has awarded the work/ project to BSCDCL and/ or appointed BSCDCL as Implementing / Executing Agency/ Project Manager and/ or for whom BSCDCL is acting as an agent and on whose behalf BSCDCL is entering into the contract and getting the work executed.

SCHEDULE(s) referred to in these conditions shall mean the standard schedule of rates of the government mentioned in the Memorandum (Annexure-I) with the amendments thereto issued up to the date of receipt of the tender.

SITE means the lands and other places on, under, in or through Which the works are to be executed or carried out and any other lands or places provided by BSCDCL/client/owner or used for the purpose of the contract.

TENDER means the Contractor's priced offer to BSCDCL for the execution and completion of the work and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Intent or Award letter. The word TENDER is synonymous with Tender and the Word TENDER DOCUMENTS with "Tendering Documents" or "offer documents".

WRITING means any manuscript typed written or printed statement under or over signature and/or seal as the case may be.

Works or Work shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional.

The headings in the clauses/ conditions of tender documents are for convenience only and shall not be used for interpretation of the clause/ condition.

Words imparting the singular meaning only also include the plurals and vice versa where the context requires. Words importing persons or parties shall include firms and corporations and organizations having legal capacities.

Excepted Risk are risks due to riots (other than those on account of contractor's employees), war (whether declared or not) invasion, act of foreign enemies, hostilities, civil war, rebellion revolution, insurrection, military or usurped power, any acts of Government, damages from aircraft, acts of God, such as earthquake, lightening and unprecedented floods, and other causes over which the contractor has no control and accepted as such by the BSCDCL or causes solely due to use or occupation by Government of the part of the works in respect of which a certificate of completion has been issued or a cause solely due to BSCDCL's faulty design of works.

Market Rate shall be the rate as decided by the Engineer-in-Charge on the basis of the prevailing cost of materials and labour at the site where the work is to be executed plus the percentage mentioned elsewhere in the tender document to cover, all overheads and profits.

2. PERFORMANCE GUARANTEE:

"Within 30 (Thirty) days from the date of issue of Letter of Intent or within such extended time as may be granted by BSCDCL in writing, the contractor shall submit to BSCDCL an irrevocable performance bank guarantee in the form appended, from any Nationalized Bank or all Commercial schedule bank equivalent to 5% (five per cent only) of the contract value for the due and proper execution of the Contract. The Performance Guarantee shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case the time for completion of works gets extended, the contractor shall get the validity of Performance Guarantee extended to cover such extended time for completion of work.

BSCDCL reserve the right of forfeiture of the performance guarantee in the event of the contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract.

Performance guarantee shall be returned after successful completion / testing / commissioning and handing over the project to the client up to the entire satisfaction of BSCDCL / Client.

In case the contractor fails to submit the performance guarantee of the requisite amount within the stipulated period or extended period, Letter of Intent automatically will stand withdrawn and EMD of the contractor shall be forfeited.

3. SECURITY DEPOSIT/ RETENTION MONEY

The Security deposit or the retention money shall be deducted from each running bill of the contractor @ 5% (five per cent only) of the gross value of the Running Account bill. Earnest money shall be adjusted first in the security deposit and further recovery of security deposit shall commence only when the upto date amount of security deposit exceeds the earnest money deductible under this clause. No Interest shall be paid on amount so deducted.

Security deposit will be released after completion of defect liability period.

In lieu of security deposit /retention money BG can be submitted which shall be released after completion of defect liability period.

The release/refund of security deposit of the contractor shall be subject to the observance/compliance of the conditions as under and whichever is later:

a) Expiry of the defect liability period in conformity with provisions contained in clause (Defect liability clause). The expiry of defect liability period shall be extended from time to time depending upon extension of time granted by BSCDCL.

The contractor produces a clearance certificate from the labour office. As soon as the work is virtually completed, the contractor shall apply for the labour clearance certificate to the Labour Officer under intimation to the Engineer-in-Charge. The Engineer-in-Charge, on receipt of the said communication, shall write to the Labour Officer to intimate if any complaint is pending against the contractor in respect of the work. If no complaint is pending, on record till after 3 months after completion of the work and/or no

communication is received from the Labour Officer to this effect till six months after the date of completion, it will be deemed to have received the clearance certificate.

BSCDCL reserves the right of part or full forfeiture of security deposit in addition to other claims in the event of contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract.

4. MOBILIZATION ADVANCE

Mobilization advance up to maximum of amount as mentioned in the

"Memorandum (Annexure-I)" shall be paid to the contractor, if requested by him, on submission of irrevocable Bank Guarantee valid for contract period of an amount 1.2 times of the mobilization advance to take care of advance and interest at prescribed rate from a nationalized bank or all Commercial scheduled bank in the enclosed Performa. The Mobilization advance shall be interest bearing @ as mentioned in the "Memorandum (Annexure-I)".

This advance shall be paid in three installments as follows:

First Installment of fifty percent of total mobilization advance shall be paid after the agreement is signed and upon submission of performance guarantee for full amount as specified.

2nd installment of twenty five percent of total mobilization advance will be paid after the setting up of site office and site laboratory, complete mobilization of plant and machinery, scaffolding & shuttering materials etc.

The Balance twenty five percent of total mobilization advance shall be paid on completion of 10% of work in terms of cost and after the contractor has fully mobilized the work at site.

The mobilization advance bear simple interest at the rate as mentioned in the Memorandum (Annexure-I) and shall be calculated from the date of payment to the date of recovery (365 days in a year) both days inclusive, on the outstanding amount of advance. Recovery of such mobilization advanced including interest shall be made by the deduction from the contractor's bills commencing after first ten percent of the gross value of the work is executed and paid, on pro-rata percentage basis to the gross value of the work billed beyond 10% in such a way that the entire advance is recovered either by the time eighty percent of the gross value of the contract is executed and paid, together with interest due on the entire outstanding amount up to the date of recovery of the installment or on expiry of eighty percent of contract period (i.e. time allowed for completion of work in terms of Memorandum-Annexure-I) whichever is earlier.
The bank guarantee submitted by contractor against mobilization advance shall initially be made for the full amount as mentioned in para 4.1 above

and valid for the contract period, and be kept renewed from time to time to cover the balance amount and likely period of completion of recovery together with interest. However, the contractor can submit part bank guarantees against the mobilization advance in as many numbers as per proposed number of recovery installments equivalent to the amount of each installment.

Notwithstanding what is contained above, no mobilization advance whatsoever shall be payable, if payment of mobilization advance is not mentioned in the Memorandum (Annexure-I).

5. SECURED ADVANCE AGAINST NON-PERISHABLE MATERIALS

Interest free secured advance up-to a maximum of 75 % (seventy five percent) of the Market Value of the Materials or the 75 % (seventy five percent) cost of materials as derived from the tendered item rate of the contractor, whichever is less, required for incorporation in the permanent works and brought to site and duly certified by BSCDCL site Engineer shall be paid to the Contractor for all non-perishable items as per UADD/MPPWD/CPWD norms. The advance will be paid only on submission of Indemnity Bond in the prescribed pro-forma. The advance shall be recovered in full from next Running Account bill and fresh advance shall be paid for the balance quantities of materials. The contractor shall construct suitable go-down at the site of work for safe storage of the materials against any possible damages due to sun, rain, dampness, fire, theft etc. at his own cost. He shall also employ necessary watch & ward establishment for the purpose at his costs and risks.

Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Engineer-in-Charge provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Engineer-in-Charge shall be final and binding on the contractor in this matter. No secured advance shall however, be paid on high risk materials such as ordinary glass, sand, petrol, diesel etc.

6. DEVIATIONS / VARIATIONS EXTENT AND PRICING

The Engineer-in-Charge shall have power (i) to make any alterations in, omissions from, additions to or substitutions for, the original specifications, drawings, designs and instructions that may appear to him to be necessary during the progress of the work, (ii) to omit part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions, or substitutions shall form part of the contract as if originally provided therein and any altered, additions or substituted works which the contractor may be directed to do in the manner specified above as part of the work, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereunder provided:

The time for the completion of the work shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered be extended, if requested by the contractor, as follows:

in the proportion which the additional cost of the altered, additional or substituted work bears to the original tendered value plus 25% of the time calculated in (i) above or such further additional time as may be considered reasonable by the Engineer-in-Charge.

If the extra items includes any work for which no rate is specified in the contract, then such work shall be carried out at the rates entered in the schedule of rates (as mentioned in Memorandum (Annexure-I)) for Civil Works minus/plus the percentage which the tendered amount of scheduled items bears with the estimated amount of schedule items based on the Schedule of Rates (as mentioned in Memorandum (Annexure-I) for Civil/ Sanitary Works). The scheduled item means the items appearing in the Schedule of Rates (as mentioned in Memorandum (Annexure-I)for Civil/ Sanitary Works) which shall be applicable in this clause. This clause will apply mutates mutandis to electrical work except that Electrical Schedule of Rates as mentioned in Memorandum (Annexure-I) will be considered in place of Civil works Schedule of rates as mentioned in Memorandum (Annexure-I)

However, In the case of extra item(s), (items that are completely new, and are in addition to the items contained in the contract, and not included in the schedule of rates (as mentioned in Memorandum (Annexure-I)), the contractor may within fifteen days of receipt of order or occurrence of the item(s) claim rates, supported by proper analysis, for the work and the engineer-in-charge shall within one month of the receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

In the case of substituted items (items that are taken up with partial substitution or in lieu of items of work in the contract), the rate for the agreement item (to be substituted) and substituted item shall also be determined in the manner as mentioned in the following para:

If the market rate for the substituted item so determined is more than the market rate of agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so increased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

If the market rate for the substituted item so determined is less than the market rate of the agreement (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so decreased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted)

In the case of contract item(s), substituted item(s), contract cum substituted items, which exceed the limits laid down in Memorandum (Annexure-I), the contractor shall within fifteen days of receipt of order of occurrence of the excess, claim revision of the rates, supported by proper analysis for the work in excess of the above mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the scheduled of quantities, the Engineer-in-Charge shall within one month of receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the Contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

The provisions of the preceding paragraph shall also apply to the decrease in the rates of items for the work in excess of the limits laid down in Memorandum (Annexure-I), and the Engineer-in-charge shall after giving notice of the contractor within one month of occurrence of the excess and after taking into consideration any reply received from him within fifteen days of the receipt of the notice revise the rates for the work in question within one month of the expiry of the said period of fifteen days having regard to the market rates.

The contractor shall send to the Engineer-in-Charge once every three months,an up to date account giving complete details of all claims for additional payments to which the

contractor may consider himself entitled and of all additional work ordered by the Engineer-in-Charge which he has executed during the preceding quarter failing which the contractor shall be deemed to have waived his right. However, the Engineer-in-charge may authorize consideration of such claims on merits.

For the purpose of operation of Memorandum (Annexure-I), the following works shall be treated as works relating to foundation unless and otherwise defined in the Contract:

For Buildings: All works up to 1.2 meters above ground level or up to floor 1 level whichever is lower.

For abutments, piers and well staining: All works upto 1.2m above the bed level.

For walls, compound walls, , and other elevated structures: All works upto 1.2 metres above the ground level.all items of excavation and filling including treatment of sub base.

Any operation incidental to or necessarily has to be in contemplation of tenderer while filling, tender or necessary for proper execution of the item

included in the Schedule of quantities or in the schedule of rates mentioned above, whether or not specifically indicated in the description of the item and the relevant specifications shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said schedule or rates as the case may be Nothing extra shall be admissible for such operations.
Market Rates to be determined as per various sub-clauses given in tender document shall be on the basis of Prevailing rates of Material (unless mentioned otherwise), Relevant Labour authority rate for Labour, market rates of T&P etc. plus 15% towards Contractors' Profits and Overheads.
The following factors may be considered in the justification of rates on which
Contractor's overhead & profit shall not be applicable:
Buildings and Other Construction Worker Cess as applicable in the state of work place
EPF (Employer Contribution) component, as per EPF act on the portion of labour's wages, on works contract / WCT, as per composite scheme in the State of work place, if applicable GST

7. ESCALATION

No claim on account of any escalation on whatsoever ground shall be entertained at any stage of works. All rates as per Bill of Quantities (BOQ) quoted by contractor shall be firm and fixed for entire contract period as well as extended period for completion of the works. No escalation shall be applicable on this contract.

8. COMPENSATION FOR DELAY

If the contractor fails to maintain the required progress in terms of clause
or relevant clause of GCC & Special Conditions of Contract, to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the BSCDCL on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the Engineer in charge (whose decision in writing shall be final and binding) may decide on the amount of tendered value of the work for every completed day / week (as applicable) that the progress remains below that specified in Clause
or the relevant clause in GCC & Special Conditions of Contract or that the work remains incomplete.

This will also apply to items or group of items for which a separate period of completion has been specified

i) Compensation for delay of work @ 1.5% per month delay to be computed on daily basis. Provided always that the total amount of compensation for delay to be paid under this Condition shall not exceed 10% of the Tendered Value of work or of the Tendered Value of the item or group of items of work for which a separate period of completion is originally given. The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with BSCDCL.

In case, the contractor does not achieve a particular milestone mentioned elsewhere in the tender document, or the re-scheduled milestone(s) the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. With-holding of this amount or failure to achieve a milestone, shall be automatic without any notice to the Contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

9. ACTION IN CASE WORK NOT DONE AS PER SPECIFICATIONS

All works under or in course of execution or executed in pursuance of the contract, shall at all times be open and accessible to the inspection and supervision of the Engineer-in-charge, his authorized subordinates in charge of the work and all the superior officers, officer of the Quality Assurance Unit of the BSCDCL or any organization engaged by the BSCDCL for Quality Assurance and the contractor shall, at all times, during the usual working hours and at all other times at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for that purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the contractor himself. If it shall appear to the Engineer-in-charge or his authorized subordinates in-charge of the work or to the officer of Quality Assurance or his subordinate officers or the officers of the organization engaged by the BSCDCL for Quality Assurance or his subordinate officers, that any work has been executed with unsound, imperfect, or unskillful workmanship, or with materials or articles provided by him for the execution of the work which are unsound or of a quality inferior to that contracted or otherwise not in accordance with the contract, the contractor shall, on demand in writing which shall be made within twelve months of the completion of the work from the Engineer-in-Charge specifying the work, materials or articles complained of notwithstanding that the same may have been passed, certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the failing to do so within a period specified by the Engineer-in-Charge in his demand aforesaid, then the contractor shall be liable to pay compensation at the same rate as per conditions of contract (for non-completion of the work in time) for this default. In such case the Engineer-in-Charge may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates as the Engineer in charge may consider reasonable during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and/or get it

and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of the Engineer-in-Charge to be conveyed in writing in respect of the same will be final and binding on the contractor.

10. ACTION IN CASE OF BAD WORK

If it shall appear to the Engineer-in-Charge or his authorized representative in charge of the work or to the Chief Technical Examiner or to any other inspecting agency of Government/ State Government/ Owner where the work is being executed, that any work has been executed with unsound, imperfect, or unskillful workmanship or with materials of any inferior description, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract, the contractor shall on demand in writing which shall be made within twelve months of the completion of the work from the Engineer-in-Charge specifying the work, materials or articles complained of notwithstanding that the same may have been passed, Certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own proper charge and cost, and in the event of his failing to do so within a period to be specified by the Engineer-in-Charge in his demand aforesaid while the contractor failure to do so shall continue, the Engineer-in-Charge may rectify or remove and re-execute the work or remove and replace with others, the material or articles complained of as the case may be at the risk and expense in all respects of the contractor.

11. CANCELLATION/DETERMINATION OF CONTRACT IN FULL OR PART

Subject to other provisions contained in this clause the Engineer-in-Charge may, without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and / or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases:

If the contractor having been given by the Engineer-in-Charge a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or un-workmanlike manner shall omit to comply with the requirement of such notice for a period of seven days thereafter; or

If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of the Engineer-in-Charge (which shall be final and binding) he will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of seven days from the Engineer-in-Charge; or

If the contractor fails to complete the work within the stipulated date or items of work with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing in that behalf by the Engineer-in-Charge; or

If the contractor persistently neglects to carry out his obligations under the contract and / or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-Charge; or

If the contractor shall offer or give or agree to give to any person in BSCDCL service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any action relation to the obtaining or execution of this or any other contract for BSCDCL; or

If the contractor shall enter into a contract with BSCDCL in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to the Engineer-in-Charge; or

If the contractor shall obtain a contract with BSCDCL as a result of wrong tendering or other non-bona-fide methods of competitive tendering or commits breach of Integrity Pact; or If the contractor being an individual, or if a firm, any partner thereof shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors; or If the contractor being a company, shall pass a resolution or the Court shall make an order for the winding up of the company, or a receiver or manager on behalf of the debenture holders or otherwise shall be appointed or circumstances shall arise which entitle the Court or debenture holders to appoint a receiver or manager; or If the contractor shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days, or. If the contractor assigns, transfers, sublets (engagement of labour on a piece-work basis or of the labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer sublet or otherwise parts with the entire works or any portion thereof without and prior written approval of the Engineer-in-Charge.

When the contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in-Charge may without prejudice to any other right or remedy which shall have accrued or shall accrue hereafter to BSCDCL, by a notice in writing to cancel the contract as whole or only such items of work in default from the Contract, the Engineer-in-charge shall have powers:
Take possession of site and any materials, constructional plant, implements, stores, etc. thereon; and/ or Carry out the incomplete work by any means at the risk and cost of the contractor; and/ or

The Engineer-in-charge shall determine the amount, if any, is recoverable from the contractor for completion of the part work/part incomplete work of any item(s) taken out of his hands and execute at the risk and cost of the contractor, the liability of contractor on account of loss or
damage suffered by BSCDCL because of action under this clause shall not exceed 10% of the tendered value of the work.

To determine or rescind the contract as aforesaid (of which termination or rescission notice in writing to the contractor under the hand of the Engineer-in-Charge shall be conclusive evidence). Upon such determination or rescission the full security deposit recoverable under the contract and performance guarantee shall be liable to be forfeited and un-used materials, construction plants, implements, temporary buildings, etc. shall be taken over and shall be absolutely at the disposal of the BSCDCL. If any portion of the Security Deposit has not been paid or received it would be called for and forfeited; and/ or

To employ labour paid by the BSCDCL and to supply materials to carry out the work or any part of the work debiting the contractor with the cost of the labour and the price of the materials of the amount of which cost and price certified by the Engineer-in-Charge shall be final and conclusive) against the contractor and crediting him with the value of the work done in all respects in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the Engineer-in- Charge as to the value of the work done shall be final and conclusive against the contractor provided always that action under the sub-clause shall only be taken after giving notice in writing to the contractor. If the expenses incurred by the BSCDCL are less than the amount payable to the contractor at his agreement rates, the difference shall not be paid to the contractor; and/ or

After giving notice to the contractor to measure up the work of the contractor and to take such whole, or the balance or part thereof as shall be un-executed or delayed with reference to the General Conditions of Contract / or relevant clause of Condition Special of Contract, out of his hands and to give it to another contractor to complete in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor if the whole work had been executed by him (of the amount of which excess the certificate in writing of the Engineer-in-Charge shall be final and conclusive) shall be borne and paid by the original contractor and may be deducted from any money due to him by BSCDCL under his contract or on any other account whatsoever or from his security deposit or the proceeds of sales of unused materials, construction plants, implements temporary buildings etc. thereof or a sufficient part thereof as the case may be. If the expenses incurred by the BSCDCL are less than the amount payable to the contractor at his agreement rates, the difference shall not be paid to the contractor; and/or

By a notice in writing to withdraw from the contractor any items or items of work as the Engineer-in-charge may determine in his absolute discretion and get the same executed at the risk and cost of the contractor.

Any excess expenditure incurred or to be incurred by BSCDCL in completing the works or part of the works or the excess loss or damages suffered or

may be suffered by BSCDCL as aforesaid after allowing such credit shall without prejudice to any other right or remedy available to BSCDCL in law be recovered from any moneys due to the contractor on any account, and if such moneys are not sufficient the contractor shall be called upon in writing and shall be liable to pay the same within 30 days.

If the contractor shall fail to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to sell any or all of the contractors unused materials, constructional plant, implements, temporary buildings, etc. and apply the proceeds of sale thereof towards the satisfaction of any sums due from the contractor under the contract and if thereafter there be any balance outstanding from the contractor, it shall be recovered in accordance with the provisions of the contract and law.

Any sums in excess of the amounts due to BSCDCL and unsold materials, constructional plant etc. shall be returned to the contractor, provided always that if cost or anticipated cost of completion by BSCDCL of the works or part of the works is less than the amount which the contractor would have been paid had he completed the works or part of the works, such benefit shall not accrue to the contractor.

In the event of anyone or more of the above courses being adopted by the Engineer-in-Charge the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid the contractor shall not be entitled to recover or be paid any sum for any work thereof or actually performed under this contract unless and until the Engineer-in-Charge has certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified.

Provided further that if any of the recoveries to be made, while taking action as above, are in excess of the security deposit forfeited, these shall be

Limited to the amount by which the excess cost incurred by the BSCDCL exceeds the security deposit so forfeited.

12. CONTRACTOR LIABLE TO PAY COMPENSATION EVEN IF ACTION NOT TAKEN Under Clause 6.0

In any case in which any of the powers conferred upon the Engineer-in-Charge by relevant clause thereof, shall have become exercisable and the same are not exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the contractor and the liability of the contractor for compensation shall remain unaffected. In the event of the Engineer-in-Charge putting in force all or any of the powers vested in him under any clause he may, if he so desires after giving a notice in writing to the contractor, take possession of (or at the sole discretion of the Engineer-in-Charge which shall be final and binding on the contractor) use as on hire (the amount of the hire money being also in the final determination of the Engineer-in-Charge) all or any tools, plant, materials and stores, in or upon the works, or the site thereof belonging to the contractor, or procured by the contractor and intended to the used for the execution of the work/or any part thereof, paying or allowing for the same in account at the contract rates, or in the case of these not being applicable, at current market rates to be certified by the Engineer-in-Charge, whose certificate thereof shall be final and binding on the contractor and/or direct the contractor, clerk of the works, foreman or other authorized agent to remove such tools, plant, materials, or stores from the premises (within a time to be specified in such notice) in the event of the contractor failing to comply with any such requisition, the Engineer-in-Charge may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor and his risk in all respects and the certificate of the Engineer-in-Charge as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the contractor.

13. CARRYING OUT PART WORK AT RISK & COST OF CONTRACTOR

If contractor:

At any time makes default during currency of work or does not execute any part of the work with due diligence and continues to do so even after a notice in writing of 7 days in this respect from the Engineer-in-Charge;

or

Commits default in complying with any of the terms and conditions of the contract and does not remedy it or takes effective steps to remedy it within 7 days even after a notice in writing is given in that behalf by the Engineer-in-Charge;

or

Fails to complete the work(s) or items of work with individual dates of completion, on or before the date(s) so determined, and does not complete them within the period specified in the notice given in writing in that behalf by the Engineer-in-Charge.

The Engineer-in-Charge without invoking action under conditions of contract may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to BSCDCL, by a notice in writing to take the part work/part incomplete work of any item(s) out of his hands and shall have powers to:

Take possession of the site and any materials, constructional plant, implements, stores, etc., thereon; and/orCarry out the part work / part incomplete work of any item(s) by any means at the risk and cost of the contractor.

The Engineer-in-Charge shall determine the amount, if any, is recoverable from the contractor for completion of the part work/ part incomplete work of any item(s) taken out of his hands and execute at the risk and cost of the contractor, the liability of contractor on account of loss or damage suffered by BSCDCL because of action under this clause shall not exceed 10% of the tendered value of the work.

In determining the amount, credit shall be given to the contractor with the value of work done in all respect in the same manner and at the same rate as if it had been carried out by the original contractor under the terms of his contract, the value of contractor's materials taken over and incorporated in the work and use of plant and machinery belonging to the contractor. The certificate of the Engineer-in-Charge as to the value of work done shall be final and conclusive against the contractor provided always that action under this clause shall only be taken after giving notice in writing to the contractor. Provided also that if the expenses incurred by the department are less than the amount payable to the contractor at his agreement rates, the difference shall not be payable to the contractor.

Any excess expenditure incurred or to be incurred by BSCDCL in completing the part work/ part incomplete work of any item(s) or the excess loss of damages suffered or may be suffered by BSCDCL as aforesaid after allowing such credit shall without prejudice to any other right or remedy available to BSCDCL in law or per as agreement be recovered from any money due to the contractor on any account, and if such money is insufficient, the contractor shall be called upon in writing and shall be liable to pay the same within 30 days.

If the contractor fails to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to sell any or all of the contractors' unused materials, constructional plant, implements, temporary building at site etc. and adjust the proceeds of sale thereof towards the dues recoverable from the contractor under the contract and if thereafter there remains any balance outstanding, it shall be recovered in accordance with the provisions of the contract. In the event of above course being adopted by the Engineer-in-Charge, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any engagements or made any advance on any account or with a view to the execution of the work or the performance of the contract.

14. SUSPENSION OF WORKS

The contractor shall, on receipt of the order in writing of the Engineer-in-charge, suspend the progress of the works or any part thereof for such time and in such manner as the Engineer-in-charge may consider necessary for any of the following reasons:

On account of any default on part of the contractor, or For proper execution of the works or part thereof for reason other than the default of the contractor, or For safety of the works or part thereof.

The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the Engineer-in-charge.

(b) If the suspension is ordered for reasons (ii) and (iii) in sub-para (a) above.

i) The contractor shall be entitled to an extension of the time equal to the period of every such suspension plus 25% for completion period. No adjustment in contract price will be allowed for reasons of such suspension.

ii) In the event of the Contractor treating the suspension as an abandonment of the Contract by BSCDCL, he shall have no claim to payment of any compensation on account of any profit or advantage which he may have derived from the execution of the work in full.

15. TERMINATION OF CONTRACT ON DEATH OF CONTRACTOR

Without prejudice to any of the right or remedies under this contract if the contractor dies, the Engineer in-charge shall have the option of terminating the contract without compensation to the contractor.

16. TIME ESSENCE OF CONTRACT & EXTENSION FOR DELAY

The time allowed for execution of the Works as specified in the Memorandum (Annexure-I) or the extended time in accordance with these conditions shall be the essence of the contract. The execution of the works shall commence from such time period as mentioned in MEMORANDUM (ANNEXURE – I) or the date on which the Engineer-in-Charge issues written orders to commence the work. If the Contractor commits default in commencing the execution of the work as aforesaid, the BSCDCL shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money & performance guarantee absolutely.

Within 10 (Ten) days of Letter of Intent, the Contractor shall submit a time and Progress Chart (CPM/ PERT/ Quantified Bar Chart) and get it approved by the Engineer-in-Charge. The Chart shall be prepared in direct relation to the time stated in the contract documents for completion of items of the works. It shall indicate the forecast (mile-stones) of the dates of commencement and completion of various items, trades, sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time stipulated in the Contract documents and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work exceeds one month (save for special jobs for which a separate program has been agreed upon) complete 1/8th of the whole of work before 1/4th of the whole time allowed in the contract has elapsed, 3/8th of the work before one half of such time has elapsed and 3/4th of the work before 3/4th of such time has elapsed. The physical progress report including photographs shall be submitted by the contractor on the prescribed format & the intervals (not exceeding one month)as decided by the Engineer in Charge. The compensation for delay as per tender document shall be enviable at intermediate stages also, in case the required progress is not achieved to meet the above time deadlines of the completion period and/ or milestones of time and progress chart, provided always that the total

amount of Compensation for delay to be paid under this condition shall not exceed 10% of the tendered value of work".

If the work(s) be delayed by:

1. force-majeure or

2. Abnormally bad weather, or

3. Serious loss or damage by fire, or

4. Civil commotion, local commotion of workmen, strike or lockout, affecting any or the trades employed on the work, or

5. Delay on the part of other contractors or tradesmen engaged by Engineer-in-Charge in Executing work not forming part of the Contract, or

6. Non-availability of stores, which are responsibility of the BSCDCL or,

7. Non-availability or break down of tools and plant to be supplied or supplied by BSCDCL or,

8. Any other cause which, in the absolute discretion of the BSCDCL, is beyond the Contractor's control, then upon the happening of any such event causing delay, the

Contractor shall immediately give notice thereof in writing to the Engineer-in-Charge within 07 days but shall nevertheless use constantly his best endeavor to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.

Request for extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay in the prescribed form. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired. In any such case BSCDCL may give a fair and reasonable extension of time for completion of work. Such extension shall be communicated to the Contractor by the Engineer-in-Charge in writing within a reasonable time from the receipt of such request. Non application by the contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Engineer-in-Charge and the extension of time so given by the Engineer-in-Charge shall be binding on the contractor.

17. TIME SCHEDULE & PROGRESS

Time allowed for carrying out all the works as entered in the tender shall be as mentioned in the "Memorandum (Annexure-I)" which shall be reckoned from the 10th day from the date on which the Letter of Intent is issued to the Contractor. Time shall be the essence of the contract and contractor shall ensure the completion of the entire work within the stipulated time of completion.

The contractor shall also furnish within 10 days of date of issue of Letter of Intent a CPM network/ PERT chart/ Bar Chart for completion of work within stipulated time. This will be duly got approved from BSCDCL. This approved Network/ PERT Chart shall form a part of the agreement. Achievement of milestones as well as total completion has to be within the time period allowed.

Contractor shall mobilize and employ sufficient resources for completion of all the works as indicated in the agreed BAR CHART/PERT Network. No additional payment will be made to the contractor for any multiple shift work or other incentive methods contemplated by him in his work schedule even though the time schedule is approved by the Engineer-in-Charge.

During the currency of the work the contractor is expected to adhere to the time schedule on mile stone and total completion and this adherence will be a part of Contractor's performance under the contract. During the time schedule on mile stone and total completion and this adherence will be a part of Contractor's performance under the contract. During the execution of the work contractor is expected to participate in the review and updating of the Network/BAR CHART undertaken by the BSCDCL. These reviews may be undertaken at the discretion of Engineer-in-charge either as a periodical appraisal measure or when the quantum of work order on the contractor is substantially changed through deviation orders or amendments. The review shall be held at site or any of the offices of BSCDCL/owner /consultant at the sole discretion of BSCDCL. The contractor will adhere to the revised schedule thereafter. The approval to the revised schedule resulting in a completion date beyond the stipulated date of completion shall not automatically amount to a grant of extension of time to the contractor.

Contractor shall submit (as directed by Engineer-in-Charge) progress reports on a computer based program (program and software to be approved by Engineer-in-Charge) highlighting status of various activities and physical completion of work. The contractor shall send completion report with as built drawings to the office of Engineer-in-Charge, of BSCDCL in writing within a period of 30 days of completion of work.

The photographs of the project taken on last day of every month indicating progress of work (in soft copies) shall be attached along with the physical progress reports to be submitted to Engineer-in-charge.

18. TAXES AND DUTIES

Except as otherwise specifically provided in the contract, the contract or shall be liable and responsible for the payment, of all taxes, such as GST (State and Central) & any other applicable tax(es), duty(ies), levy, cess if any, in the state concerned which may be specified by local/state/ central government from time to time on all material articles which may be used for this work. The rates quoted by him in the tender in bill of quantities shall be inclusive of all taxes and GST.

In the event of nonpayment/default in payment of any of the above taxes, BSCDCL reserves the right to with-hold the dues/payments of contractor and make payment to local/state/Central Government authorities or to labourers as may be applicable.

The imposition of any new and/or increase in the aforesaid taxes, duties levies (including fresh imposition of any other Tax) is imposed by Statute, after the last stipulated date for the receipt of tender including extensions if any and the contractor thereupon necessarily and properly pays such taxes/levies/cess, the contractor shall be reimbursed the amount so paid, provided such payments, if any, is not, in the opinion of Engineering-in charge attributable to delay in execution of work within the control of contractor. The contractor shall, within a period of 30 days of the imposition of any such further tax or levy or cess, give a written notice thereof to the Engineering-in-charge that the same is given pursuant to this condition, together with all necessary information relating thereto.

The rate quoted by the contractor shall be deemed to be inclusive of all taxes and GST as given in tender document Tax deductions at source shall be made as per laws prevalent in the State as applicable for the work.

The stamp duty and registration charges, if any, on the contract agreement levied by the Government or any other statutory body, shall be paid by the contractor as applicable in the state of work.

It will be incumbent upon the Contractor to obtain a registration certificate as a dealer under the GST Act and necessary evidence to this effect shall be furnished by the Contractor to BSCDCL.

The Bidder shall quote his rates inclusive of GST in conjunction with other terms and conditions. In case, the GST on Works contract on execution of works is waived off by the State Govt. at later stage for this project, the equivalent amount from the date of waiver of such tax (as per prevailing rate as on the date of waiver of all type of Taxes and GST Works Contract) shall be deducted from the amount payable to the contractor from subsequent RA bills.

In the event of decrease / relaxation and / or waiver of any of the existing / prevailing tax(es), duties, levies, cess by Central / state Govt. Or any other statutory body (ies), after the last stipulated date for the receipt of tender including extension (if any), and the contractor thereupon has been paid or has raised claims of such tax(es), duties, levies, cess; such sums shall be recovered / deducted (from claims raised but which has not been paid) effective from the date as reckoned in the relevant statutory order / law / ordnance etc. The contractor, shall, within a period of 30 days of any such waiver/relaxation/decrease in tax(es), duties, levies, cess, give a written notice thereof to Engineer-in-charge stating the statutory change with Documentary proof thereto. Provided always that Engineer-in-charge shall have full powers to effect recovery/deduction on account of any such statutory change even if contractor has not intimated in the event when any such statutory action comes to his notice.

19. INCOME TAX DEDUCTION (TDS)

Income tax deductions shall be made from all payments made to the contractor including advances against work done, as per the rules and regulations in force, in accordance with the Income Tax act prevailing from time to time.

20. GOODS AND SERVICES TAX (GST)

The Bidder shall quote rates **inclusive of all type of tax and GST nothing extra shall be paid.** The contractor must have **GST registration number** and will provide copy of Registration to BSCDCL before release of any payment by the Corporation. The contractor will submit regular Invoice / Bill fulfilling `all conditions of Goods and Service Tax (GST) Rules.

21. ROYALTY ON MATERIALS:

The contractor shall deposit royalty and obtain necessary permit for supply of bajri, stone, kankar, sand and other materials etc. from the local authorities and quoted rates shall be inclusive of royalty.
The contractor shall be deemed to have inspected the site, its surrounding and acquainted itself with the nature of the ground, accessibility of the site and full extent and nature of all operations necessary for the full and proper execution of the contract, space for storage of materials, constructional plant, temporary works, restrictions on the plying of heavy vehicles

in area, supply and use of labour materials, plant, equipment and laws, rules and regulations, if any, imposed by the local authorities.

The rates and prices to be tendered in the bill of quantities are for completed and finished items of works and complete in all respects. It will be deemed to include all constructional plant, labour, supervision materials, transport, all temporary works, erection, maintenance, contractor's profit and establishment/overheads, together with preparation of designs & drawings pertaining to casting yard, shop drawing, fabrication drawing (if required), staging form work, stacking yard, etc. all general risk, all taxes, royalty, duties, cess,octroi and other levies, insurance liabilities and obligations set out or implied in the tender documents and contract .

If any temporary/ permanent structure is encountered or safety of such structure in the vicinity is endangered due to execution of the project, the contractor has to protect the structures by any means as per direction of Engineer-in–Charge. If any damage is caused to any temporary or permanent structure(s) in the vicinity due to execution of the project, the contractor has to make good the same by any means as per direction of Engineer-in–Charge. The contractor should inspect the site of work from this point of view. The cost to be incurred in this regard shall be deemed to be included in his quoted rates of BOQ items and the contractor shall not be entitled for any extra payment in this regard.

22. INSURANCE OF WORKS ETC

Contractor is required to take contractor's all risk policy or erection all risk policy (as the case may be) from an approved insurance company in the joint name with BSCDCL and bear all costs towards the same for the full period of execution of works including the defect liability period for the full amount of contract against all loss of damage from whatever cause arising other than **excepted risks** for which he is responsible under the terms of the contract and in such manner that the BSCDCL and the contractor are covered during the period of construction of works and/or also covered during the period of defect liability for loss or damage. The work and the temporary works to the full value of such works.

The materials, constructional plant, centering, shuttering and scaffolding materials and other things brought to the site for their full value.Whenever required by BSCDCL, the contractor shall produce the policy or the policies of insurance and the receipts for payment of the current premium.

INSURANCE UNDER WORKMEN COMPENSATION ACT

Contractor is required to take insurance cover under the Workman Compensation Act, 1923 amended from time to time from an approved insurance company and pay premium charges thereof. Wherever required by BSCDCL the contractor shall produce the policy or the policies of Insurance and the receipt of payment of the current premiums.

THIRD PARTY INSURANCE

Contractor is required to take third party insurance cover for an amount of 5%(five percent) of contract value from an approved insurance company for insurance against any damage, injury or loss which may occur to any person or property including that of BSCDCL / owner / client, arising out of the execution of the works or temporary works. Wherever required by BSCDCL the contractor shall produce the policy or the policies of Insurance and the receipt of payment of the current premiums.

In case of failure of the contractor to obtain contractors all risk policy, insurance under workman compensation act and third party insurance as described above within one month

from the date of commencement of work, running account payments of the contractor shall be withheld till such time the aforesaid insurance covers are obtained by the contractor.

If the Contractor could not effect a comprehensive insurance cover against risks which he may be required to effect under the terms of the contract, then he shall give his attention to get the best insurance cover available and even in case of effecting a wider insurance cover than the one which the subsidiary of the General Insurance Company could offer, such an insurance is ought to be done after the BSCDCL's approval, by or through the subsidiary of the General Insurance Company.

The contractor shall at all times indemnify BSCDCL and Owner against all claims, damages or compensation under the provision of Payment of wages act-1936, Minimum Wages Act-1948, Employer's liability Act-1938, the workmen's compensation Act-1947, Industrial Disputes Act-1947 and Maternity Benefit Act-1961 or any modifications thereof or any other law in force or as consequence of any accident or injury to any workman or other persons in or about the works, whether in the employment of the contractor or not, against all costs, charges and expenses of any suit, action or proceedings arising out of such incident or injury and against all sum or sums which may with the consent of the contractor be paid to compromise or compound any such claim. Without limiting his obligations and liabilities as above provided, the contractor shall insure against all claims, damages or compensation payable under the Workmen's Compensation Act 1923 or any modification thereof or any other law relating thereto.

23. PAYMENTS

All running payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and/or accepted by BSCDCL and shall not preclude the recovery for bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the Contract, or any part thereof, in this respect, or the accruing of any claim, nor shall it conclude, determine or affect in any way the powers of the BSCDCL under these conditions or any of them as to the final settlement and adjustments of the accounts or otherwise, or in any other way vary/ affect the contract. The final bill shall be submitted by the contractor within three months of the completion of work, otherwise BSCDCL's certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on contractor. Each Running Bills should be accompanied by two sets of at-least 20 (twenty) photographs as per direction of Engineer-in-charge taken from various points depicting status of work as on Report/ Bill date and Monthly Progress Report for the concerned month in the pro-forma to be given/ approved by Engineer-in-Charge. Intermittent progress Photographs as and when required shall also be provided by the Contractor at his own cost as per direction of Engineer-in-Charge. No payment of running account bill shall be released unless it is accompanied by photographs and Monthly Progress Report as above.

It is clearly agreed and understood by the Contractor that notwithstanding anything to the contrary that may be stated in the agreement between BSCDCL and the contractor; the contractor shall become entitled to payment only after BSCDCL has received the corresponding payment(s) from the client/ Owner for the work done by the contractor. Any delay in the release of payment by the client/ Owner to BSCDCL leading to a delay in the release the corresponding payment by BSCDCL to the contractor shall not entitle the Contractor to any compensation/ interest from BSCDCL.

All payments shall be released by way of e-transfer through RTGS/NEFT in India directly at their Bank account by BSCDCL.

24. MEASUREMENTS OF WORKS

Engineer-in-charge shall, except as otherwise provided, ascertain and determine by measurement, the value of work done in accordance with the contract.
Except where any general or detailed description of the work expressly shows to the contrary, measurement shall be taken in accordance with the

Procedure set forth in the UADD Specification. In the case of items which are not covered by specifications, mode of measurement as specified in the Technical Specifications of the contract and if for any item no such technical specification is available, then a relevant standard method of measurement issued by the Bureau of Indian Standard shall be followed.

Provided further that, In case of Cancellation/Determination of Contract in Full or in Part in accordance with clause of tender document (and its sub-clauses), following methodology shall be adopted in respect of measurements in addition to what has been mentioned in foregoing:-

All measurements and levels shall be taken jointly by the Engineer-in-Charge or his authorized representative and by the contractor or his authorized representative from time to time during the progress of the work and such measurements shall be signed and dated by the Engineer-in-Charge and the contractor or their representatives in token of their acceptance. If the contractor objects to any of the measurements recorded, a note shall be made to that effect with reason and signed by both the parties.

If for any reason the contractor or his authorized representative is not available and the work of recording measurements is suspended by the Engineer-in-Charge or his representative, the Engineer-in-Charge and BSCDCL shall not entertain any claim from contractor for any loss or damages on this account. If the contractor or his authorized representative does not remain present at the time of such measurements after the contractor or his authorized representative has been given a notice in writing three (3) days in advance or fails to countersign or to record objection within a week from the date of the measurement, then such measurements recorded in his absence by the Engineer-in-Charge or his representative shall be deemed to be accepted by the Contractor. The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for measurements and recording levels.

25. COMPUTERISED MEASUREMENT BOOKS

Engineer-in-Charge shall, except as otherwise provided, ascertain and determine by measurement the value of work done in accordance with the contract. All measurements of all items having financial value shall be entered by the contractor and compiled in the shape of the Computerized Measurement Book as per the format of BSCDCL so that a complete record is obtained of all the items of works performed under the contract. All such measurements and levels recorded by the contractor or his authorized representative from time to time, during the progress of the work, shall be got checked by the contractor from the Engineer-in-Charge or his authorized representative as per interval or program fixed in consultation with Engineer-in-Charge or his authorized representative.

After the necessary corrections made by the Engineer-in-Charge, the measurement sheets shall be returned to the contractor for incorporating the corrections and for resubmission to the Engineer-in- Charge for the dated signatures by the Engineer-in-Charge and the contractor or their representatives in token of their acceptance.

Whenever bill is due for payment, the contractor would initially submit draft computerized measurement sheets and these measurements would be got checked/test checked from the Engineer-in-Charge and/or his authorized representative. The contractor will, thereafter, incorporate such changes as may be done during these checks/test checks in his draft computerized measurements, and submit to BSCDCL a computerized measurement book, duly bound, and with its pages machine numbered. The Engineer-in-Charge and/or his authorized representative would thereafter check this MB, and record the necessary certificates for their checks/test checks.

The final, fair, computerized measurement book given by the contractor, duly bound, with its pages numbered, should be 100% correct, and no cutting or over-writing in the measurements would thereafter be allowed. If at all any error is noticed, the contractor shall have to submit a fresh computerized MB with its pages duly numbered and bound, after getting the earlier MB cancelled by the BSCDCL. The contractor shall submit two spare copies of such computerized MB's for the purpose of reference and record by the various officers of the BSCDCL.

The contractor shall also submit to the department separately his computerized Abstract of Cost and the bill based on these measurements, duly bound, and its pages numbered along with two spare copies of the "bill.

The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements /levels by the Engineer-in-Charge or his representative.

The contractor shall give not less than seven days' notice to the Engineer-in-Charge or his authorized representative in charge of the work before covering up or otherwise placing beyond the reach of checking and/or test checking the measurement of any work in order that the same may be checked and/or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking and/or test checking measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Engineer-in-Charge or his authorized representative in charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of checking and/or test checking measurements without such notice having been given or the Engineer-in-Charge's consent being obtained in writing the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer-in-Charge or his authorized representative may cause either themselves or through another officer of the BSCDCL to check the measurements recorded by contractor and all provisions stipulated herein above or anywhere in the tender document shall be applicable to such checking of measurements or levels.

It is also a term of this contract that checking and/or test checking the measurements of any item of work in the measurement book and/or its payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defects liability period.

26. WITHHOLDING AND LIEN IN RESPECT OF SUMS DUE FROM CONTRACTOR

Whenever any claim or claims for payment of a sum of money arises out of or under the contract or against the contractor, BSCDCL shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any, deposited by the contractor and for the purpose aforesaid, BSCDCL shall be entitled to withhold the security deposit, if any, furnished as the case may be and also have a lien over the same pending finalization or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the contractor, BSCDCL shall be entitled to withhold and have a lien to retain to the extent of such claimed amount or amounts referred to above, from any sum or sums found payable or which may at any time thereafter become payable to the contractor under the same contract or any other contract pending finalization of adjudication of any such claim.

It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to above by the Engineer-in-Charge or BSCDCL will be kept withheld or retained as such by the Engineer-in-Charge or BSCDCL till the claim arising out of or under the contract is determined by the competent court and that the contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to above and duly notified as such to the contractor. For the purpose of this clause, where the contractor is a partnership firm or a limited company, the Engineer-in-Charge or the BSCDCL shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company, as the case may whether in his individual capacity or otherwise. BSCDCL shall have the right to cause an audit and technical examination of the works and the final bills of the contractor including all supporting vouchers, abstract, etc, to be made after payment of the final bill and if as a result of such audit and technical examination any sum is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed to have been done by him under the contract and found not to have been executed, the contractor shall be liable to refund the amount of over-payment and it shall be lawful for BSCDCL to recover the same from him in the manner prescribed in tender document of this clause or in any other manner legally permissible; and if it is found that the contractor was paid less than what was due to him under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by BSCDCL to the contractor, without any interest thereon whatsoever.

LIEN IN RESPECT OF CLAIMS IN OTHER CONTRACTS

Any sum of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by the Engineer-in-Charge or by BSCDCL against any claim of the Engineer-in-Charge or BSCDCL in respect of payment of a sum of money arising out of or under any other contract made by the contractor with the Engineer-in-Charge or the BSCDCL. It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the Engineer-in-Charge or the BSCDCL will be kept withheld or retained as such by the Engineer-in-Charge or the BSCDCL or till his claim arising out of the same contract or any other contract is either mutually settled or determined by the competent court, as the case may be, and that the contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

27. WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWINGS AND ORDERS ETC.

All items of work in the bill of quantities/ schedule of quantities shall be carried out as per the UADD (as the case may be) specifications, drawings and instructions of the Engineer-in-Charge of BSCDCL and the rates shall include for supply of required materials including proper storage, consumables, skilled & unskilled labour, supervision and tools, tackles, plant & machinery complete as called for in the detailed specifications and conditions of the contract. Latest updated UADD specification shall be followed for execution of work.
The contractor shall execute the whole and every part of the work in the most substantial and workman like manner both as regards materials and otherwise in every respect in strict accordance with the specifications.

The contractor shall also conform exactly, fully and faithfully to the design, drawings and instructions in writing in respect of the work assigned by the Engineer-in-Charge.

The contractor shall comply with the provisions of the contract and execute the works with care and diligence and maintain the works and provide all labour and materials, tools and plants including for measurements and supervision of all works, structural plans and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods of construction.

28. MATERIALS TO BE PROVIDED BY THE CONTRACTOR

The contractor shall, at his own expense, provide all materials, required including Cement & Steel for the works. The contractor shall at his own expense and without delay; supply to the Engineer-in-Charge samples of materials to be used on the work and shall get the same approved in advance. All such materials to be provided by the Contractor shall be in conformity with the specifications laid down or referred to in the contract.

The contractor shall, if requested by the Engineer-in-Charge furnish proof, to the satisfaction of the Engineer-in-Charge that the materials so comply.

The contractor shall at his risk and cost, submit the samples of materials to be tested or analyzed and bear all charges and cost of testing unless specifically provided for otherwise elsewhere in the contract or specifications. The Engineer-in-Charge or his authorized representative shall at all times have access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the works and the contractor shall afford every facility and every assistance and cost in obtaining the right and visit to such access. The Engineer-in-Charge shall have full powers to require the removal from the premises of all materials which in his opinion are not in accordance with the specifications and in case of default, the Engineer-in-Charge shall be at liberty to employ at the expense of the contractor, other persons to remove the same without being answerable or accountable for any loss or damage that may happen or arise to such materials. The Engineer-in-Charge shall also have full power to require other proper materials to be substituted thereof and in case of default, the Engineer-in-Charge may cause the same to the supplies and all costs which may require such removal and substitution shall be borne by the contractor
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29. MATERIALS AND SAMPLES

The materials/products used on the works shall be one of the approved make/ brands out of list of manufacturers / brands /makes given in the tender documents. The contractor shall submit samples/ specimens out of approved makes of materials/ products to the Engineer-in-

Charge for prior approval. In exceptional circumstances Engineer-in-Charge may allow alternate equivalent makes/brands of products/ materials at his sole discretion. The final choice of brand / make shall remain with the Engineer- in-Charge, whose decision in this matter shall be final and binding and nothing extra on this account shall be payable to the Contractor. In case single brand/ make are mentioned, other equivalent makes/ brands may be considered by the Engineer-in-Charge. In case of variance in UADD Specifications from approved products/makes specification, the specification of approved product/make shall prevail for which nothing shall be paid extra to the Contractor. In case no make or brand of any materials, articles, fittings and accessories etc. is specified, the same shall comply with the relevant Indian Standard Specifications and shall bear the ISI/BIS mark. The Engineer of BSCDCL and the owner shall have the discretion to check quality of materials and equipment's to be incorporated in the work, at source of supply or site of work and even after incorporation in the work. They shall also have the discretion to check the workmanship of various items of work to be executed in this work. The contractor shall provide the necessary facilities and assistance for this purpose.

The above provisions shall not absolve the contractor from the quality of final product and in getting the material and workmanship quality checked and approved from the Engineer-in-Charge of BSCDCL.

The contractor shall well in advance, produce samples of all materials, articles, fittings, accessories etc. that he proposes to use and get them approved in writing by BSCDCL. The materials articles etc. as approved shall be *LABELLED* as such and shall be signed by BSCDCL and the Contractor's representative.

The approved samples shall be kept in the custody of the Engineer-in- Charge of BSCDCL till completion of the work. Thereafter the samples except those destroyed during testing shall be returned to the contractor No payment will be made to the contractor for the samples or samples destroyed in testing.

The brands of all materials, articles fittings etc. approved together with the names of the manufacturers and firms from which supplies have been arranged shall be recorded in the site order book.

The contractor shall set up and maintain at his cost, a field testing laboratory for all day to day tests at his own cost to the satisfaction of the Engineer-in-Charge. This field testing laboratory shall be provided with equipment and facilities to carry out all mandatory field tests as per UADD (as the case may be) specifications. The laboratory building shall be constructed and installed with the appropriate facilities, Temperature and humidity controls shall be available wherever necessary during testing of samples. All equipment's shall be provided by the Contractor so as to be compatible with the testing requirements specified. The Contractor shall maintain all the equipment's in good working condition for the duration of the contract. The Contractor shall provide approved qualified personnel to run the laboratory for the duration of the Contract. The number of staff and equipment available must at all times be sufficient to keep pace with the sampling and testing programmer as required by the Engineer-in-charge. The Contractor shall fully service the site laboratory and shall supply everything necessary for its proper functioning, including all transport needed to move equipment and samples to and from sampling points on the site, etc. The Contractor shall re-calibrate all measuring devices whenever so required by the Engineer-in-charge and shall submit the results of such calibration without delay. All field test shall be carried out in the presence of BSCDCL's representative. All costs towards samples, materials, collection, transport, manpower, testing etc. shall be borne by the Contractor and are deemed to be included in the rates quoted by him in the bill of quantities.

The contractor(s) shall display the calibration certificate of each equipment at the location of equipment & shall get recalibrated at least one week before its expiry date.

30. MATERIALS PROCURED WITH THE ASSISTANCE OF BSCDCL

If any material for the execution of this contract is procured with the assistance of BSCDCL either by issue from its stores or purchase made under orders or permits or licenses obtained by BSCDCL, the contractor shall hold and use the said materials economically and solely for the purpose of this contract and shall not dispose them without the permission of Engineer-in-charge. The contractor, if required by the BSCDCL, shall return all such surplus or unserviceable materials that may be left with him after the completion of the contract or at its termination on whatsoever reason, on being paid or credited such price as the Engineer-in-charge shall determine having due regard to the conditions of materials. The price allowed to the contractor, however, shall not exceed the amount charged to him excluding the element of storage charges which shall be 10% of the cost charged to contractor. The decision of the Engineer-in-charge shall be final and conclusive.

Contractor(s) has / have to deploy security personnel for safeguarding of materials procured at site.

31. CONTRACTOR TO SUPPLY TOOLS & PLANTS

The contractor shall provide at his own cost all materials, machinery, tools & plants as require for completion of work. In addition to this, appliances, implements, other plants, ladders, cordage, tackle, scaffolding and temporary works required for the proper execution of the work, whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in these conditions or not, or which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer-in-Charge as to any matter as to which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials, necessary for the purpose of setting out works, and counting, weighing and assisting the measurement or examination at any time and from time to time of the work or materials. Failing his so doing, the same may be provided by the Engineer-in-Charge at the expense of the contractor and the expenses may be deducted, from any money due to the contractor, under this contract or otherwise and/or from his security deposit or the proceeds of sale thereof, or of a sufficient portions thereof.

32. MOBILIZATION OF MEN, MATERIALS AND MACHINERY:

All expenses towards mobilization at site and de-mobilization including bringing in equipment, work force, materials, dismantling the equipment's, clearing the site etc. shall be deemed to be included in prices quoted and no separate payment on account of such expenses shall be entertained.

It shall be entirely the Contractor's responsibility to provide, operate and maintain all necessary construction equipment's, scaffoldings and safety, gadget, lifting tackles, tools and appliances to perform the work in a workman like and efficient manner and complete all jobs as per the specifications and within the schedule time of completion of work. Further, contractor shall also be responsible for obtaining temporary electric and water connection for all purposes. The contractor shall also make standby arrangement for water & electricity to ensure un-interrupted supply.

It shall be the responsibility of the contractor to obtain the approval for any revision and/or modification desired by him from BSCDCL before implementation.

The procurement and supply in sequence and at the appropriate time of all materials and consumable shall be entirely the contractor's responsibilities and his rates for execution of work shall be inclusive of supply of all these items.

It is mandatory for the contractor to provide safety equipment's and gadgets to his all workers, supervisory and Technical staff engaged in the execution of the work while working. The minimum requirement (but not limited to) shall be gum boots, safety helmets, Rubber hand gloves, face masks, safety nets, safety belts, goggles etc. as per work requirements. Sufficient nos. of these equipment's and gadgets shall also be provided to BSCDCL by the contractor at his own cost for use of BSCDCL Officials and/ or workforce while working/supervision of work at site. No staff/ worker shall be allowed to enter the site without these equipment's/ gadgets.

The cost of the above equipment's/ gadgets are deemed to be included in the rates quoted by the contractor for the items & works as per Bill of Quantities and contractor shall not be entitled for any extra payment in these regard. The above norm is to be strictly complied with at site. In case the contractor is found to be deficient in providing Safety Equipment's/ Gadgets in the opinion of Engineer-in-charge, the Engineer-in-charge at his option can procure the same at the risk & cost of contractor and provide the same for the use of worksite and shall make the recoveries from the bills of the contractor for the same. The contractor shall abide by all rules & regulations pertaining to Health, Safety and Environment.

It shall be the duty and responsibility of the contractor to bring to the notice of the BSCDCL in writing as to any variation, discrepancy or any other changes required and to obtain revised drawings and designs and / or approval of the BSCDCL in writing for the same.

All materials, construction plants and equipment's etc. once brought by the contractor within the project area, will not be allowed to be removed from the premises without the written permission of the Engineer-in-charge. Similarly all enabling works built by the contractor for the main construction undertaken by him, shall not be dismantled and removed without the written authority of the BSCDCL.

Contractor shall have to prepare the Bar Bending Schedule, shop and fabrication drawings free of cost, if required for any of the items of work.

Five copies of these drawings each including for revision will be submitted to BSCDCL for approval. Before executing the item, shop drawings and bar bending schedule should be approved by BSCDCL.

BSCDCL shall supply Work Force in the various categories to assist the contractor in execution of the works on recoverable basis as per provision mentioned elsewhere in the contract.

All contractors' plant, machinery and equipment shall be kept in perfect condition during currency of the contract.

33. QUALITY ASSURANCE PROGRAMME

To ensure that the services under the scope of this contract are in accordance with the specifications, the Contractor shall adopt Quality Assurance Programme to control such activities at the necessary points:
The contractor shall prepare and finalize such Quality Assurance Programme within 15 days from date of issue Letter of Intent. BSCDCL shall also carryout quality audit and quality surveillance of systems and procedures of Contractor's quality control activities. A Quality Assurance Programmer of Contractor shall generally cover the following:

His organization structure for the management and implementation of the proposed Quality Assurance Program.

- Documentation control system.
- The procedure for purpose of materials and source inspection.
- System for site controls including process controls.
- Control of non-conforming items and systems for corrective actions.
- Inspection and test procedure for site activities.
- System for indication and appraisal of inspection status.
- System for maintenance of records.
- System for handling, storage and delivery.

A quality plan detailing out quality practices and procedures, relevant standards and acceptance levels for all types of work under the scope of this contract.

All the quality reports shall be submitted by the Contractors in the formats appended hereto. Checklist enclosed here in this document shall be followed while carrying out Construction activities (items). If any item is not covered by the Checklist/ Formats appended hereto, the Format for the same may be developed and submitted to Engineer-in-Charge for approval and the same shall be adopted. These filled in formats shall be prepared in two copies and duly signed by representatives of contractor and BSCDCL. All the costs associate with Printing of Formats and testing of materials required as per technical specifications or by Engineer-in-charge shall be included in the Contractor's quoted rates in the Schedule/ Bill of quantities.

34. CONTRACT COORDINATION PROCEDURES, COORDINATION MEETINGS AND PROGRESS REPORTING

The Contractor shall prepare and finalize in consultation with BSCDCL, a detailed contract coordination procedure within 15 days from the date of issue of Letter of Intent for the purpose of execution of the Contract. The Contractor shall have to attend all the meetings at any place in India at his own cost with BSCDCL, Owners/ Clients or Consultants of BSCDCL/ Owner/ Client during the currency of the Contract, as and when required and fully cooperate with such personal and agencies involved during these discussions. The Contractor shall not deal in any way directly with the Clients/ Owners or Consultants of BSCDCL/Owner/ Clients and any dealing/correspondence if required at any time with Clients/ Owners/ Consultants shall be through BSCDCL only. During the execution of the work, Contractor shall submit at his own cost a detailed Monthly progress & programme report to the Engineer-in-charge of BSCDCL by 5th of every month. The format of monthly progress & programme report shall be as approved by Engineer-in-Charge of BSCDCL.

35. COMPLETION CERTIFICATE AND COMPLETION PLANS

Within ten days of the completion of the work, the contractor shall give notice of such completion to the Engineer-in-Charge and within thirty days of the receipt of such notice, the Engineer-in-Charge shall inspect the work and if there is no defect in the work, shall furnish the contractor with a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates, shall be issued. But no final certificate of completion shall be issued, nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials, rubbish and all huts and sanitary arrangements required for his/their work people on the site in connection with the execution of the works as shall have been erected or constructed by the contractor(s) and cleaned off the dirt from all wood work, doors, windows,

walls, floor or other parts of the building, in, upon, or about which the work is to be executed or of which he may have had possession for the purpose of the execution; thereof, and not until the work shall have been measured by the Engineer-in-Charge. If the contractor shall fail to comply with the requirements of this Clause as to removal of scaffolding, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning off dirt on or before the date fixed for the completion of work, the Engineer-in-Charge may at the expense of the contractor remove such scaffolding, surplus materials and rubbish etc., and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor shall have no claim in respect of scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof less actual cost incurred on removal of materials / debris / malba etc.

The contractor shall submit completion plan as required vide General Specifications for Electrical works as applicable within thirty days of the completion of the work. In case, the contractor fails to submit the completion plan as aforesaid, he shall be liable to pay a sum equivalent to 2.5% of the value of the work subject to a ceiling of Rs.5,00,000 (Rs. Five Lakhs only) as may be fixed by the Engineer-in-charge concerned and in this respect the decision of the Engineer-in-charge shall be final and binding on the contractor.

36. PROHIBITION OF UNAUTHORISED CONSTRUCTION & OCCUPATION

No unauthorized buildings, construction of structures should be put up by the contractor anywhere on the project site, neither any building built by him shall be occupied in un-authorized manner by him or his staff.

It shall be the responsibility of the contractor to see that the building under construction is not occupied by anybody in un-authorized manner during construction, and is handed over to the Engineer-in-Charge with vacant possession of complete building. If such building though completed is occupied illegally, then the Engineer-in-Charge shall have the option to refuse to accept the said building/buildings in that position. Any delay in acceptance on this account will be treated as the delay in completion and for such delay, a levy of compensation upto 5% of tendered value of work may be imposed by the Engineer-in-Charge whose decision shall be final both with regard to the justification and quantum and shall be binding on the contractor.

However, the Engineer-in-Charge, through a notice, may require the contractor to remove the illegal occupation any time on or before construction and delivery.

37. FORECLOSURE OF CONTRACT BY BSCDCL/OWNER

If at any time after the commencement of the work the BSCDCL shall for any reason whatsoever is required to abandon the work or is not require the whole work thereof as specified in the tender to be carried out, the Engineer-in-Charge shall give notice in writing of the fact to the contractor, who shall have no claim to any payment of compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full, but which he did not derive in consequence of the foreclosure of the whole or part of the works.

38. DEFECTS LIABILITY PERIOD

The contractor shall be responsible for the rectification of defects in the works for a period 5 years from the date of taking over of the works by the BSCDCL or clients whichever is later. Any defects discovered and brought to the notice of the contractor forthwith shall be attended to and rectified by him at his own cost and expense. In case the contractor fails to carry out these rectifications, the same may without prejudice to any other right or remedy available, be got rectified by BSCDCL at the cost and expense of the contractor.

The Contractor is expected to carry out the construction work in Workmen like manner so as to meet the requirement and specification for the project. It is expected that the Workmanship and materials will be reasonably fit for the purpose for which they are required.

Defects or defective work is where standard and quality of workmanship and materials as specified in the contract is deficient. Defect is defined as a failure of the completed project to satisfy the express or implied quality or quantity obligations of the construction contract. Defective construction works are as the works which fail short of complying with the express descriptions or requirements of the contract, especially any drawings or specifications with any implied terms and conditions as to its quality, workmanship, durability, aesthetic, performance or design. Defects in construction projects are attributable to various reasons.

Some of the defects are structural defects results in cracks or collapse of faulty defective plumbing, inadequate or faulty drainage system, inadequate or faulty ventilation, cooling or heating systems, inadequate fire systems etc. The defects could be various on accounts of different reasons for variety of the projects.

The Engineering In charge/Project Officer shall issue the practical completion certificate for the project. During the Defect Liability Period which commences on completion of the work, the Engineering In charge shall inform or the contractor is expected to be informed of any defective works by the Employer's representative of the defects and make good at contractor's cost with an intention of giving opportunity to the contractor of making good the defects appeared during that period. It is the contractor's obligation under the contract to rectify the defects that appear during Defect Liability Period and the contractor shall within a reasonable time after receipt of such instructions comply with the same at his own cost. The Engineering In charge/Project Officer shall issue a certificate to that effect and completion of making good defects shall be deemed for all the purpose of this contract to have taken place on the day named in such defect liability certificate.

If defective work or workmanship or design have been knowingly covered-up or conceived so as to constitute fraud, commencement of the Defect Liability Period may be delayed. The decided period may be delayed until **discover** actually occurs on at least the defect could have been discovered with reasonable diligence, whichever is earlier.

Also, in case of defect, the Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at. The Defects Liability Period shall be extended for as long as Defects remain to be corrected. Every time notice of Defect/Defects is given, the Contractor shall correct the notified Defect/Defects within the duration of time specified by the Engineer's notice. The Engineer may issue notice to the Contractor to carry out removal of defects or deficiencies, if any, noticed in his inspection, or brought to his notice. The Contractor shall remove the defects and deficiencies within the period specified in the notice and submit to the Engineer a compliance report.

It is the Completion Stage when the contractor has completed all of the works and fixed all of the defects that were on the list of issue by Engineer-in-charge. When this happens, the engineer must issue a 'Certificate of Completion'. On the

issue of 'Certificate of Completion', the 'Defect Liability Period 'starts. The contractor also must issue a 'Certificate statement' as an acknowledgment to the engineer not later than 14 days after the 'Certificate of Completion' has been issued. During the 'Defect Liability Period', the contractor has to obey all written instructions from the engineer to carryout repairs and fix any defects which appear in the Permanent Works. If the contractor does not ,due to his own faults finish the repair works or fix the defects by the end of 'Defect Liability Period', the 'Defect Liability Period' will continue until all works instructed by engineer is done.

39. RESTRICTION ON SUBLETTING

The contractor shall not sublet or assign the whole or part of the works except where otherwise provided, by the contract. The provision of labour on piece work basis shall not be deemed to be a subletting under this clause.

The contractor may entrust specialist items of works like MEP services, Water Proofing, interiors, landscaping etc. to the agencies specialized in the specific trade. The contractor shall give the names and details of such firm whom it is going to employ for approval of BSCDCL. These details shall include the expertise, financial status, technical manpower, equipment, resources and list of works executed and on hand of the specialist agency. Further, prior written approval is required from BSCDCL to deploy such agency / sub-contractor.

40. FORCE MAJEURE

Any delay in or failure to perform of either party, shall not constitute default so as to give rise to any claim for damages, to the extent such delay or failure to perform is caused by an act of God, or by fire, explosion, flood or other natural catastrophe, governmental legislation, orders or regulation etc. Failure of the client / owner to hand over the entire site and / or release funds for the project, to BSCDCL, shall also constitute force majeure. The time for performance of the obligation by the parties shall be deemed to be extended for a period equal to the duration of the force majeure event. Both parties shall make their best efforts to minimize the delay caused by the force majeure event. If the failure / delay of the client /owner in handing over the entire site and / or in releasing the funds continues even on the expiry of the stipulated date of completion, BSCDCL, may, at the request of the contractor, foreclose the contract without any liability to either party. In the event of such foreclosure, the contractor shall not be entitled to any compensation whatsoever. If prior to such foreclosure the contractor has brought any materials to the site, the Engineer-in-Charge shall always have the option of taking over of all such materials at their purchase price or at the local current rates, whichever is lower.

41. NO COMPENSATION CLAUSE

The contractor shall have no claim whatsoever for compensation or idle charges against BSCDCL on any ground or for any reason, whatsoever.

42. DIRECTION FOR WORKS

All works under the contract shall be executed under the direction and subject to approval in all respect of the Engineer-in-Charge of BSCDCL who shall be entitled to direct at whatever point or points and in whatever manner works are to be commenced and executed.

The Engineer-in-Charge and his representative shall communicate or confirm their instructions to the contractor in respect of the execution of work during their site inspection in a 'Works Site Order Book' maintained at the site office of Engineer-in-Charge. The contractor or his authorized representative shall confirm receipt of such instructions by signing against the relevant orders in the book.

43. WORK IN MONSOON AND RAIN

The execution of the work may entail working in the monsoon also. The contractor must maintain labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No special/ extra rate will be considered for such work in monsoon. The contractors' rate shall be considered inclusive of cost of dewatering due to rains required if any and no extra rate shall be payable on this account. The stipulated period for completion of project includes the monsoon period, holidays & festivals.

44. WORK ON SUNDAYS, HOLIDAYS AND DURING NIGHT

For carrying out work on Sunday and Holidays or during night, the contractor will approach the Engineer-in-Charge or his representative at least two days in advance and obtain his permission. The Engineer-in- Charge at his discretion can refuse such permission. The contractor shall have no claim on this account whatsoever. If work demand, the contractor shall make arrangements to carry out the work on Sundays, Holidays and in two, three shifts with the approval of Engineer-in-Charge at no extra cost to BSCDCL.

45. WATER AND ELECTRICITY

The contractor shall make his own arrangement for Water & Electrical power for construction and other purposes at his own cost and pay requisite electricity and water charges. The contractor shall also make standby arrangement for water & electricity to ensure un-interrupted supply.

46. LAND FOR LABOUR HUTS/ SITE OFFICE & STORAGE ACCOMMODATION

The contractor shall arrange the land for temporary office, storage accommodation and labour huts at his own cost and get the clearance of local authorities for setting up/construction of labour camp and same is deemed to be included in the rates quoted by the contractor for the works. The contractor shall ensure that the area of labour huts is kept clean and sanitary conditions are maintained as laid down by the local authorities controlling the area. The labour huts shall be so placed that it does not hinder the progress of work or access to the worksite. The vacant possession of the land used, for the purpose shall be given back by contractor after completion of the work.

The security deposit of the contractor shall be released only after contractor demolishes all structures including foundations and gives back clear vacant possession of this land In the event the contractor has to shift his labour campus at any time during execution of the work on the instructions of local authorities or as per the requirement of the work progress or as may be required by BSCDCL, he shall comply with such instructions at his cost and risk and no claim whatsoever shall be entertained on this account.

47. WATCH, WARD AND LIGHTING OF WORK PLACE

The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, OBSTRUCTIONS, lights, watchmen etc. during the progress of work as directed by Engineer-in- charge.

48. SCHEDULE OF QUANTITIES / BILL OF QUANTITIES

The quantities shown against the various items of work are only approximate quantities which may vary as per the actual requirement at site. No item which is not covered in the bill of quantities shall be executed by the Contractor without the approval of the BSCDCL. In case any Extra/Substituted item is carried out without specific-approval, the same will not be paid.

49. WATER PROOF TREATMENT

The water proof treatment shall be of type and specifications as given in the schedule of quantities.

The water-proofing of basement, roofs, water retaining areas shall be and remain fully effective for a period of not less than 10(Ten) years to be reckoned from the date of expiring of the Defect Liability period, prescribed in the contract. At any time during the said guarantee period if BSCDCL finds any defects in the said treatment or any evidence of re-infestation, dampness, leakage in any part of buildings or structure and notifies the contractor of the same, the contractor shall be liable to rectify the defect or give re-treatment and shall commence the work or such rectification or re-treatment within seven days from the date of issue of such letter to him. If the contractor fails to commence such work within the stipulated period, the BSCDCL may get the same done by another agency at the Contractor's cost and risk and the decision of the Engineer-in-Charge of BSCDCL for the cost payable by the contractor shall be final and binding upon him.

Re-treatment if required shall be attended to and carried out by the Contractor within seven days of the notice from Engineer-in-Charge of BSCDCL.

The BSCDCL reserves the right to get the quality of treatment checked in accordance with recognized test methods and in case it is found that the **c**hemicals with the required concentration and rate of application have not been applied, or the water proofing treatment is not done as per specifications, the contractor will be required to do the re-treatment in accordance with the required concentration & specifications at no extra cost failing which no payment for such work will be made. The extent of work thus rejected shall be determined by BSCDCL. Water proofing shall be got done through approved / specialized agencies only with prior approval of Engineer-in-Charge.

The contractor shall make such arrangement as may be necessary to safe guard the workers and residents of the building against any poisonous effect of the chemicals used during the execution of the work.

During the execution of work, if any damage shall occur to the treatment already done, either due to rain or any other circumstances, the same shall be rectified and made good to the entire satisfaction of Engineer-In-Charge by the contractor at his cost and risk.

The contractor shall make his own arrangement for all equipment's required for the execution of the job. The contractor whose tender is accepted shall execute Guarantee Bond in the prescribed form as appended for guaranteeing the water proofing treatment.

50. INDIAN STANDARDS

Wherever any reference is made to any IS in any particular specifications, drawings or bill of quantities, it means the Indian Standards editions with up to date amendments issued till last date of receipt of tender documents.

51. CENTERING & SHUTTERING

Marine plywood or steel plates or any material mentioned elsewhere in the tender document or as approved by Engineer-in-Charge shall be used for formwork. The shuttering plates shall be cleaned and oiled before every repetition and shall be used only after obtaining approval of BSCDCL's Engineers at site. The number of repetitions allowed for plywood and steel shuttering shall be at the discretion of Engineer-in-Charge of BSCDCL depending upon the condition of shuttering surface after each use and the decision of Engineer-in-Charge in this regard shall be final and binding on the contractor. No claim whatsoever on this account shall be admissible.

52. RECORDS OF CONSUMPTION OF CEMENT & STEEL

For the purpose of keeping a record of cement and steel received at site and consumed in works, the contractor shall maintain a properly bound register in the form approved by the BSCDCL, showing columns like quantity received and used in work and balance in hand etc. This register shall be signed daily by the contractor's representative and BSCDCL's representative.

The register of cement & steel shall be kept at site in the safe custody of BSCDCL's Engineer during progress of the work. This provision will not, however, absolve the contractor from the quality of the final product.

In case cement or steel quantity consumed is lesser as compared to the

theoretical requirement of the same as per MORTH/UADD/MPPWD/CPWD (as the case may be) specifications/ norms, the work will be devalued and/ or a penal rate (i.e. double the rate at which cement/ steel purchased last) recovery for lesser consumption of cement/ steel shall be made in the item rates of the work done subject to the condition that the tests results fall within the acceptable criteria as per MORTH/UADD/MPPWD/CPWD (as the case may be) specifications otherwise the work shall have to be dismantled and redone by the contractor at no extra cost. In case of cement, if actual consumption is less than 98% of the theoretical consumption, a recovery shall be effected from the contractors bills at the penal rate for the actual quantity which is lower than 98% of theoretical consumption.

53. TESTS AND INSPECTION

The contractor shall carry out the various mandatory tests as per specifications and the technical documents that will be furnished to him during the performance of the work. All the tests on materials, as recommended by UADD/MPPWD/CPWD, MORTH and relevant Indian Standard Codes or other standard specifications (including all amendments current at the last date of submission of tender documents) shall be got carried out by the contractor at the field testing laboratory or any other recognized institution/ laboratory, at the direction of the BSCDCL. All testing charges, expenses etc. shall be borne by the contractor. All the tests,

either on the field or outside laboratories concerning the execution of the work and supply of materials shall be got carried out by the contractor or BSCDCL at the cost of the Contractor.

54. WORKS TO BE OPEN TO INSPECTION

All works executed or under the course of execution in pursuance of this contract shall at all times be open to inspection and supervision of the BSCDCL. The work during its progress or after its completion may also be inspected, by Chief Technical Examiner of Government of India (CTE) and/or an inspecting authority of State Government of State in which work is executed and/or by third party checks by owner/lients. The compliance of observations/improvements as suggested by the inspecting officers of BSCDCL/CTE/ State authorities/ Owners shall be obligatory on the part of the Contractor at the cost of contractor.

55. BORROW AREAS

The contractor shall make his own arrangements for borrow pits and borrow disposal areas including their approaches and space for movement of man, machinery, other equipment's as required for carrying out the works. The contractor shall be responsible for taking all safety measures, getting approval, making payment of royalties, charges etc. and nothing extra shall be paid to the contractor on this account and unit rates quoted by the contractor for various items of bill of quantities shall deemed to include the same.

56. CARE OF WORKS

From the commencement to the completion of works and handing over, the contractor shall take full responsibility for care thereof all the works and in case of any damage/loss to the works or to any part thereof or to any temporary works due to lack of precautions or due to negligence on part of Contractor, the same shall be made good by the Contractor.

57. CO-ORDINATION WITH OTHER AGENCIES

Work shall be carried out in such a manner that the work of other Agencies operating at the site is not hampered due to any action of the Contractor. Proper Co-ordination with other Agencies will be Contractor's responsibility. In case of any dispute, the decision of BSCDCL shall be final and binding on the contractor. No claim whatsoever shall be admissible on this account.

58. SETTING OUT OF THE WORKS

The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works. If at any time during the progress of works, shall any error appear or arise in the position, levels, dimensions or alignment of any part of the works, the contractor shall at his own expenses rectify such error to the satisfaction of Engineer-in-charge. The checking of any setting out or of any line or level by the engineers of BSCDCL shall not in any way relieve the contractor of his responsibility for the correctness.

59. NOTICE BEFORE COVERING UP THE WORK

The contractor shall give not less than seven days' notice before covering up or otherwise placing beyond the reach of measurement any work, to the Engineer-in-charge in order that the same may be inspected and measured. If any work is covered up or placed beyond the reach of inspection/measurement without such notice or his consent being obtained the same shall be uncovered at the contractor expenses and he shall have to make it good at his own expenses.

60. SITE CLEARANCE

The contractor shall ensure that the working site is kept clean and free of obstructions for easy access to job site and also from safety point of view. Before handing over the work to the BSCDCL the contractor shall remove all temporary structures like the site offices, cement go-down, stores, labour hutments etc., scaffolding rubbish, debris etc. left over materials tools and plants, equipment's etc., clean the site to the entire satisfaction of the Engineer-in-charge. If this is not done the same will be got done by BSCDCL at his risk and cost.

The contractor shall clean all floors, remove cement/ lime/ paint drops and deposits, clean joinery, glass panes etc., touching all painter's works and carry out all other necessary items of works to make the premises clean and tidy before handing over the building, and the rates quoted by the contractor shall be deemed to have included the same.

61. SET-OFF OF CONTRACTOR'S LIABILITIES

BSCDCL shall have the right to deduct or set off the expenses incurred or likely to be incurred by it in rectifying the defects and/or any claim under this agreement against the Contractor from any or against any amount payable to the contractor under this agreement including security deposit and proceeds of performance guarantee.

62. POSSESSION PRIOR TO COMPLETION

BSCDCL shall have the right to take possession of or use any completed or partially completed work or part of the work. Such possession or use shall not be deemed to be any acceptance of any work not completed in accordance with the contract agreement. If such prior possession or use by BSCDCL delays the progress of work an equitable adjustment in the time of completion will be made and the contract agreement shall be deemed to be modified accordingly. The decision of BSCDCL in such case shall be final binding and conclusive.

When the whole of the works or the items or the groups of items of work have been completed the contractor will give a notice to that effect to the Engineer in writing. The Engineer shall within 7 days of the date of receipt of such notice inspect the works and give instructions in writing to the contractor specifying the balance items of work which are required to be done by the contractor and shall also notify the contractor of any defect in the works affecting completion.

The contractor shall during the course of execution prepare and keep updated a complete set of 'as built' drawings to show each and every change from the contract drawings, changes recorded shall be countersigned by the Engineer-in-Charge and the contractor. Four copies of 'as built' drawings shall be supplied to BSCDCL by the contractor within 30 days of the completion. All costs incurred in this respect shall be borne by the contractor.

63. EMPLOYMENT OF PERSONNEL

The contractor shall employ only Indian Nationals as his representatives, servants and workmen after verifying their antecedents and loyalty. He shall ensure that no personnel of doubtful antecedents and any other nationality in any way is associated with the works.

In case BSCDCL observed misconduct negligence or incompetence etc. on the part of any representative, agent, servant and workmen or employees etc. of the contractor, the BSCDCL shall have full power and without giving any reason to the contractor, instruct the contractor to remove such engineer / staff / worker from site and provide suitable

replacements. The decision of the Engineer-in-charge shall be final and binding on the contractor. The contractor shall not be allowed any compensation on this account.

64. TECHNICAL STAFF FOR WORK

The contractor shall employ at his cost the adequate number of technical staff during the execution of this work depending upon the requirement of work. For this purpose the numbers to be deployed, their qualification, experience as decided by BSCDCL shall be final and binding on contractor. The contractor shall not be entitled for any extra payment in this regard.

The technical staff should be available at site, whenever required by BSCDCL to take instructions.

Within 15 days of Letter of Intent, the contractor shall submit a site organizational chart and resume including details of experience of the Project-in-Charge and other staff proposed to be deputed by him and the technical team shall be deputed by them on the Project after getting approval from Engineer-in-Charge. If desired by the contractor at later date, the Project-in-Charge and other staff whose resume is approved by BSCDCL can be replaced with prior written approval of BSCDCL and replacement shall be with equivalent or superior candidate only. Decision of Engineer-in-Charge shall be final and binding on the contractor.

Even after approving the site organizational chart, the Engineer-in-Charge due to technical reasons and exigency of work can direct the contractor to depute such additional staff as in view of Engineer-in-Charge is necessary and having qualification and experience as approved by the Engineer-in-Charge. The removal of such additional staff from the site shall only be with the prior written approval of Engineer-in-Charge. The contractor shall not be paid anything extra whatsoever on account of deployment of additional staff and decision of the Engineer-in-Charge shall be final and binding on the contractor.

In case the contractor fails to employ the staff as aforesaid he shall be liable to pay a reasonable amount not exceeding a sum of Rs. 50,000 (Rupees Fifty Thousand only) for each month of default in the case of each person. The decision of the Engineer-in-charge as to number of Technical Staff to be adequate for the project and the period for which the desired strength of technical staff was not employed by the contractor and as to the reasonableness of the amount to be deducted on this account shall be final and binding on the contractor as to the amount and the contractor's liability to pay the said amount.

65. VALUABLE ARTICLES FOUND AT SITE

All gold, silver and other minerals of any description and all precious stones, coins, treasure, relics, antiques and all other similar things which shall be found in, under or upon the site, shall be the property of the owner/ BSCDCL.

66. MATERIALS OBTAINED FROM DISMANTLEMENT TO BE OWNER'S PROPERTY

All materials like stone, boulders and other materials obtained during the work of dismantling, excavation etc. will be considered BSCDCL/owner property and such materials shall be disposed off to the best advantage of BSCDCL/owner according to the instructions in writing issued by the Engineer-in-charge.

67. FURNISHED OFFICE ACCOMMODATION & MOBILITY COMMUNICATION TO BE ARRANGED BY CONTRACTOR

On acceptance of tender, the contractor at his own cost will construct a suitably equipped office at site with basic facilities such as telephone(s), fax, internet, photocopier, computer(s) and printer(s) along with operator(s), regular electric & drinking water supply and and e-vehicles for the BSCDCL's staff / Engineer in Charge (EIC) with driver, fuel and maintenance etc. as per the requirement of the project. The contractor shall maintain the aforesaid facilities intact/operational during the tenancy of the contract or maximum up to 6 months beyond the stipulated contractual completion date if the work is delayed due to any reasons. Operation and maintenance cost of all such materials, equipment's / services shall be borne by the contractor.

The contractor shall also make sufficient arrangement for photography/video-graphy so that photographs video can be taken of any specific activity at any point of time. The contractor shall also make arrangement of software like MS Project etc. for the purpose of preparing progress report etc.

The contractor shall make all arrangements for ground breaking ceremony/inaugural function etc. for the project as required and the cost towards it deemed to be included in his rates/offer. Any expenditure already incurred/to be incurred by BSCDCL, shall be recovered from the contractor.

68. LABOUR LAWS

LABOUR LAWS TO BE COMPLIED BY THE CONTRACTOR

The contractor shall obtain a valid license under the contract labour (Regulation & Abolition) Act 1970 and the contract labour Act (Regulation &Abolition) Central Rules 1971 and amended from time to time, and continue to have a valid license until the completion of the work including defect liability period. The contractor shall also adhere by the provision of the child labour (Prohibition and Regulation) Act. 1986 and as amended from time to time.

The contractor shall also comply with the provisions of the building and other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996.

Any failure to fulfill above requirement shall attract the penal provisions of this contract arising out the resultant for non-execution of the work before the commencement of work. No labour below the age of 18 years shall be employed on the work.

Payment of wages:

The contractor shall pay to labour employed by him either directly or through subcontractors, wages not less than fair wages as defined in the BSCDCL Contractor's Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

The contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied

with the BSCDCL contractor's Labour Regulations in regard to payment of wages, wage period, deductions from wages recovery of wages not paid and deductions unauthorized made, maintenance of wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

(a) The Engineer-in-Charge concerned shall have the right to deduct from the moneys due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfilment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the Regulations.

(b) Under the provision of Minimum Wages (Central) Rules, 1950, the contractor is bound to allow to the labours directly or indirectly employed in the works one day rest for 6 days continuous work and pay wages at the same rate as for duty. In the event of default, the Engineer-in-Charge shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labours and pay the same to the persons entitled thereto from any money due to the contractor by the Engineer-in-Charge concerned

The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made there under from time to time.

The contractor shall indemnify and keep indemnified BSCDCL against payments to be made under and for the observance of the laws aforesaid and the BSCDCL Contractor's Labour Regulations without prejudice to his right to claim indemnity from his sub-contractors.

The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

LABOUR SAFETY PROVISION

The contractor shall be fully responsible to observe the labour safety provisions:

The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, lights, watchmen etc. during the progress of work as directed by Engineer-in- charge

In case of all labour directly or indirectly employed in work for the performance on the contractor's part of this contract, the contractor shall comply with all rules framed by Govt. from time to time for the protection of health and sanitary arrangements for workers.

OBSERVANCE OF LABOUR LAWS

The contractor shall be fully responsible for observance of all labour laws applicable including local laws and other laws applicable in this matter and shall indemnify and keep indemnified BSCDCL against effect or non observance of any such laws. The contractor shall be liable to make payment to all its employees, workers and sub-contractors and make compliance with labour laws. If BSCDCL or the client/ owner is held liable as "Principal Employer" to pay contributions etc. under legislation of Government or Court decision in respect of the employees of the contractor, then the contractor would reimburse the amount of such

payments, contribution etc. to BSCDCL and/ or same shall be deducted from the payments, security deposit etc. of the contractor.

The Contractor shall submit proof of having valid EPF registration certificate. He shall within 7 days of the close of every month, submit to BSCDCL a statement showing the recoveries of contributions in respect of each employee employed by or through him and shall furnish to BSCDCL such information as the BSCDCL is required to furnish under the provisions of para 36 B of the EPF scheme 1952 to the EPF authorities and other information required by EPFO authorities from time to time. He shall also submit a copy of challan every month in token of proof of having deposited the subscription and contribution of workers engaged on the project.

In case, the contractor is not complying the above provision BSCDCL shall withhold payment to the extent of 4.70% (Four point Seven Zero percent) of the value of the Running Account bill and shall release only after the submission of above mentioned details. If it is incumbent upon BSCDCL to deposit withhold amount with EPF authorities, the withhold amount shall be deposited by BSCDCL with EPF authorities. In such a case BSCDCL shall not refund this withheld amount to the contractor even after the production of EPF registration certificate.

MINIMUM WAGES ACT

The contractor shall comply with all the provisions of the minimum wages Act, 1948, contract labour Act (Regulation & Abolition) 1970, and rules framed there under and other labour laws/local laws affecting contract labour that may be brought into force from time to time.

69. LABOUR CESS

The rates of the contractor shall be inclusive of labour cess. BSCDCL shall make a recovery @ 1% on account of labour cess from each RA bill of the contractor and labour cess so recovered/deducted shall be deposited with the Labour Board of the concerned state. In case the Labour Board is not established in the state, recovery made by BSCDCL on account of labour cess shall be retained under suspense account and will be deposited with the Labour Board at later date as & when the Labour Board is constituted in the state.
Every contractor, sub-contractor, affiliates, their legal assigns or heirs as the case may, shall be responsible for registration of every Building worker who has completed eighteen years of age but has not completed sixty years of age and who has been engaged in any Building or Other Construction Work for not less than Ninety Days during the preceding twelve months; with the Board / Funds as applicable under various sections of “THE BUILDINGS AND OTHER Construction workers (regulation of employment and conditions of service) act, 1996 and the building and other Construction workers’ welfare cess act, 1996.

The contractor shall also be responsible for maintaining register of beneficiaries i.e. the workers in such form as may be prescribed by the competent authority & the same shall be kept open at all reasonable times for inspection of relevant authority and officials of client / BSCDCL.

The contractor shall be further responsible for maintaining such register & records; giving such particulars of Building workers employed by him, the work performed by them, the number of hours of work which shall constitute a normal working day, the wages paid to them, the receipts given by them and, such other particulars in such form as may be prescribed by the authority or BSCDCL.

In the event of contractor failing to comply with the above clause(s) in part or in full, BSCDCL, without prejudice to any other rights or remedy available under law or any other clause(s) of contract, shall be at absolute liberty to forfeit any sum or sums that are payable or could become payable on account of execution of contract work and decision of Engineer-in-charge shall be final & binding in this regard on the contractor.

70. RECOVERY OF COMPENSATION PAID TO WORKMEN

In every case in which by virtue of the provisions sub-section (1) of Section 12, of the Workmen's Compensation Act, 1923, BSCDCL is obliged to pay compensation to a workman employed by the contractor, in execution of the works, BSCDCL will recover from the contractor, the amount of the compensation so paid; and, without prejudice to the rights of the BSCDCL under sub-section (2) of Section 12, of the said Act, BSCDCL shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due to the contractor whether under this contract or otherwise. BSCDCL shall not be bound to contest any claim made against it under sub-section (1) of Section 12, of the said Act, except on the written request of the contractor and upon his giving to BSCDCL full security for all costs for which BSCDCL might become liable in consequence of contesting such claim.

71. ENSURING PAYMENT AND AMENITIES TO WORKERS IF CONTRACTOR FAILS

In every case in which by virtue of the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and of the Contract Labour (Regulation and Abolition) Central Rules, 1971, BSCDCL is obliged to pay any amounts of wages to a workman employed by the contractor in execution of the works, or to incur any expenditure in providing welfare and health amenities required to be provided under the above said Act or under the BSCDCL Contractor's Labour Regulations, or under the Rules framed by Government from time to time for the protection of health and sanitary arrangements for workers employed by BSCDCL's Contractors, BSCDCL will recover from the contractor, the amount of wages so paid or the amount of expenditure so incurred; and without prejudice to any other right or remedy available under this contract, BSCDCL shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by BSCDCL to the contractor whether under this contract or otherwise BSCDCL shall not be bound to contest any claim made against it under sub-section (1) of Section 20, sub-section (4) of Section 21, of the said Act, except on the written request of the contractor and upon his giving to the BSCDCL full security for all costs for which BSCDCL might become liable in contesting such claim.

72. CHANGE IN FIRM'S CONSTITUTION TO BE INTIMATED

Where the contractor is a partnership firm, the prior approval in writing of the Engineer-in-Charge shall be obtained before any change is made in the constitution of the firm. Where the contractor is an individual or a Hindu undivided family business concern such approval as aforesaid shall likewise be obtained before the contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the works hereby undertaken by the contractor. If prior approval as aforesaid is not obtained, the contract shall be deemed to have been assigned in contravention as per conditions of tender document hereof and the same action may be taken, and the same consequences shall ensue as provided in the said conditions of contract.

73. INDEMNITY AGAINST PATENT RIGHTS

The contractor shall fully indemnify the BSCDCL from and against all claims and proceedings for or on account of any infringement of any patent rights, design, trademark or name or other protected rights in respect of any construction plant, machine, work or material used for in connection with the works or temporary works.

74. LAW COVERING THE CONTRACT

This contract shall be governed by the Indian laws for the time being in force.

75. LAWS, BYE-LAWS RELATING TO THE WORK

The contractor shall strictly adhere by the provisions, for the time being in force, of law relating to works or any regulations and bylaws made by any local authority or any water & lighting agencies or any undertakings within the limits of the jurisdiction of which the work is proposed to be executed. The contractor shall be bound to give to the authorities concerned such notices and take all approvals as may be provided in the law, regulations or bylaws as aforesaid, and to pay all fees and taxes payable to such authorities in respect thereof.

76. CONTRACT AGREEMENT

The Contractor shall enter into a Contract Agreement with the BSCDCL within 10 (TEN) days from the date of Letter of Intent or within such extended time, as may be granted by the BSCDCL failing which no payment shall be released to the contractor. The cost of stamp papers, stamp duty, registration, if applicable on the contract, shall be borne by the Contractor. In case, the contractor does not sign the agreement as above or start the work within 10 (Ten) days of the issue of Letter of Intent, his earnest money is liable to be forfeited and Letter of Intent consequently will stand withdrawn.

77. MANNER OF EXECUTION OF AGREEMENT

The agreement as per prescribed Performa as enclosed shall be signed at the office of the BSCDCL within 10(TEN days) days from the date of issue of Letter of Intent. The Contractor shall provide for signing of the Contract, appropriate Power of Attorney and the requisite documents/ materials. Unless and until a formal contract is prepared and executed, the Letter of Intent read in conjunction with the Tendering Documents will constitute a binding contract.

The agreement will be signed in five originals and the Contractor shall be provided with one signed original and the other four originals will be retained by the BSCDCL

The Contractor shall provide free of cost to the BSCDCL all the Engineering data, drawings and descriptive materials submitted along with the tender, in at least three (3) copies to form an integral part of the Agreement within seven 7 days after issuing of Letter of Intent.

Subsequent to signing of the Agreement, the Contractor at his own cost shall provide to the BSCDCL with at least five (5) true hard bound copies of Agreement within thirty (30) days of its signing.

78. JURISDICTION

The agreement shall be executed at BHOPAL on non-judicial stamp paper purchased in BHOPAL and the courts in BHOPAL alone will have jurisdiction to deal with matters arising there from, to the exclusion of all other courts.

79. ARBITRATION

1. Arbitration Procedure:

If the efforts, to resolve all or any of the disputes through conciliation fail, then such a dispute shall be referred within 30 days from conclusion of conciliation process to a Sole Arbitrator who would be nominated by Executive Director Bhopal Smart City Development Corporation Limited, Bhopal. The arbitration and conciliation act 1996 as amended from time to time will be applicable. The venue of such arbitration shall be at Bhopal. The award of the sole Arbitrator shall be binding on all parties. The cost of Arbitration shall be borne by the respective parties. There will be no objections if the sole arbitrator nominated or appointed is an employee of BSCDCL.

2. The place of arbitration shall be Bhopal, M.P.

3. English Language
The request for arbitration, the answer to the request, the terms of reference, any written submissions, any orders and awards shall be in English and, if oral hearings take place, English shall be the language to be used in the hearings. The award shall be made in writing.

4. Enforcement of Award
The Parties agree that the decision or award, which shall be a speaking order, resulting from arbitration shall be final and binding upon the Parties and shall be enforceable in accordance with
the provision of the Arbitration and Conciliation Act 1996 subject to the rights of the aggrieved parties to secure relief from any higher forum.

5. Performance during Arbitration
The Arbitration Proceedings shall be governed by Indian Arbitration and Conciliation Act 1996, as amended from time to time including provisions in force at the time the reference is made. Pending the submission of and/or decision on a Dispute and until the arbitral award is published; the Parties shall continue to perform their respective obligations under this Agreement without prejudice to a final adjustment in accordance with such award. The courts at Bhopal shall have the sole exclusive jurisdiction to try all the cases arising out of this agreement.

6. Notices
That any notice under the terms of this License shall be in writing by registered post or delivered personally and signed by the party or his/its duly authorized representative giving such notice. All activities including day to day management, billing, termination etc. will be carried out from the office of the CEO, Smart City Development Corporation Limited Bhopal or by his duly authorized representative. Notice shall be addressed as follows:

Chief Executive Officer

SECTION-4

LABOUR SAFETY, HEALTH AND REGULATIONS INCLUDING FORMS

1. LABOUR SAFETY PROVISIONS

Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than ¼ to 1 (1/4 horizontal and 1 vertical).

Scaffolding or staging more than 3.6m (12 feet) above the ground or floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3 feet) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

Working platforms, gangways, and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more that 3.6m (12 feet) above ground level or floor level, they should be closely boarded, should have adequate width & should be suitable fastened as described in (2.0) above.
Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 90 cm (3 feet).

Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30 feet) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (11.5”) for ladder up to and including 3m (10 feet) in length. For longer ladders this width should be increased at least 1/4" for each additional 30 cm (1 ft.) of length. Uniform step spacing shall not exceed 30 cm (12"). Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of the work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident, and shall be bound to bear the expenses of defense of every suit, action or other proceeding at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceedings to any such person or which may, with the consent of the Contractor, be paid to compensate any claim by any such person.

2. EXCAVATION AND TRENCHING

All trenches, 1.2mts.(four feet) or more in depth, shall at all times be supplied with at least one ladder for each 30m.(100 feet) in length or fraction thereof, ladder shall be extended from bottom of the trench to at least 90cm (3feet) above the surface of the ground. The side of the trenches, which are 1.5 m. (5feet) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger or sides to collapsing. The excavated materials shall not be placed within 1.5m (5 feet) of the edges of the trench or half of the depth of the trench whichever is more.

Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

Demolition - Before any demolition work is commenced and also during the progress of the work following precautions shall be observed:

All roads and open areas adjacent to the work site shall either be closed or suitably protected.

No electric cable or apparatus which is likely to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.

All practical steps shall be taken to prevent danger to persons employed from risk or fire or explosion or flooding. No floor, roof or other part of the building shall be overloaded with debris or materials as to render it unsafe.

All necessary personal safety equipment's as considered adequate by the Engineer-in-charge should be kept available for the use of persons employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate step to ensure proper use of equipment by those concerned. The following safety equipment shall be invariably provided.

Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

Those engaged in white washing and mixing or stacking of cement bags or any materials which are injurious to the eye shall be provided with protective goggles.

Those engaged in welding works shall be provided with welders protective eye shields.

Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe interval.

When workers are employed for works in sewers and manholes, which are in active use, the Contractors shall ensure that the manhole covers are opened and ventilated at-least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident the public. In addition, the contractor shall ensure that the following safety measures are adhered to:

Entry for workers into the sewer line shall not be allowed except under supervision of the JE or any other higher officer.

At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manholes for working inside.

Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes color in the presence of such gases and gives indication of their presence.
Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.

Safety belt with rope should be provided to the workers. While working inside the manholes such rope should be handled by two men standing outside to enable him to be pulled out during emergency.

The area should be barricaded or cordoned off by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.

No smoking or open flames shall be allowed near the blocked manhole being cleaned.

The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.

Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The Engineer-In-charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.

Gas masks with Oxygen Cylinder should be kept at site for use in emergency.

Air-blowers should be used for flow of fresh air through the manholes. Whenever called for, portable air-blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at-least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.

The workers engaged for cleaning the manholes / sewers should be properly trained before allowing to work in the manhole.

The workers shall be provided with Gumboots or non sparking shoes, bump helmets and gloves non sparking tools, safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.

Workmen descending a manhole shall try each ladder step or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.

If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

The extent to which these precautions are to be taken depend on individual situation but the decision of the Engineer-In-charge regarding the steps to be taken in this regard in an individual case will be final.

The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form wherever men above the age of 18 are employed on the work of lead painting the following precautions should be taken.

No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scrapped.

Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

2.1 a) White lead, sulphate or lead work products containing those pigments shall not be used in painting operation except in the form of paste or of paints ready for use. Measures shall be taken whenever required in order to prevent danger arising from the application of paint in the form of spray.

Measures shall be taken, whenever practicable to prevent danger arising out of dust caused by dry rubbing down and scrapping.

b) Adequate facilities shall be provided to enable working painter to wash during and on cessation of work.
c) Suitable arrangements shall be made to prevent clothing put off during working hours being spoiled by painting materials.

2.2 a) Cases of lead poisoning and of suspected lead poisoning shall be notified and shall be subsequently verified by a medical man appointed by the competent authorities of BSCDCL.
The BSCDCL may require when necessary a medical examination of workers.

Instructions with regard to the special hygienic precautions to be taken in the painting trade shall be distributed to working painters.

When the work is done near any place where there is risk of drowning, all necessary equipment's should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions should be made for prompt first aid treatment for all injuries likely to be sustained during the course of the work.

Use of hoisting machines and tackle including their attachment encourage and supports shall conform to the following standard of conditions.

b) These shall be of good mechanical construction, sound material and adequate strength and free from patent, defects and shall be kept in good working order. Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.

Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in-charge of any hoisting machine including any scaffolding, winch or giving signals to operator.

In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this clause shall be loaded beyond the safe working load except for the purpose of testing.

In case of BSCDCL machines, the safe working load shall be notified by the Engineer-in-Charge. As regards Contractor's machines the Contractor shall notify the safe working load of the machine to the Engineer-in-charge whenever he brings any machinery to site of work and get verified by the Engineer-in-Charge.

Motors gearing, transmission electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguard. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce the minimum the risk of any

part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations, which are already energized, insulating mats, wearing apparel, such as gloves sleeves and boots as may be necessary be provided. The worker should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.

All scaffold, ladders, and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place of work spot. The person responsible for compliance of the safety codes shall be named therein by the contractor.

To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the Contractor shall be open to inspection by BSCDCL Official or their representatives.

Notwithstanding the above Clauses from (i) to (xiv) there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

SECTION-5

FORMS AND FORMATS

Appendix - 'N'

PROFORMAS: PROFORMA- I

The list of similar works as stated in the Minimum Qualification requirement for Bidders and Similar Works – Clause I

PROFORMA- I					
Sr.No.	Name of the Project	Name of the employer	Stipulated date of completion	Actual date of completion	Actual Cost of work done
1	2	3	4	5	6

NOTE:

Scanned Attested copies of completion/performance certificates from the Engineer-in- Charge for each work should be annexed in the support of information furnished in the above proforma.

Works shall be grouped financial year-wise.

PROFORMA- II

Yearly turnover of Construction Works during the last three years.

PROFORMA- II					
Sr.No.	Financial year	Annual Turnover of Civil Engineering Works	Updated value to current year	Average of last 3years	Page No.
1					
2					
3					
Total					

NOTE: The above figures shall tally with the audited balance sheets uploaded by the Bidders duly certified by Chartered Accountant.

FORM XXV

DETAILS OF THE BALANCE WORK IN HAND AS ON_____

(UPTO THE PRECEDING MONTH OF SUBMISSION OF BID) WITH BSCDCL

(To be submitted in Envelop-1)

S. No	Name of the Unit/Zone/SBG/RGB	Contract Value	Date of start as per LOI/ Contract	Date of completion as per LOI /Contract	Work done up to the preceding month of submission of bid	Balance value of work

Note: The bidder shall also include the value of all such works which are awarded tobidder but yet not started up to the preceding month of submission of bid.

Appendix - 'O'

FORM XXVI

AFFIDAVIT

(To be submitted by bidder on non-judicial stamp paper of Rs. 100/- (Rupees Hundred only) duly attached by Notary Public)

(To be submitted in Envelop-1)

Affidavit of Mr. .....S/o .....

R/o .....

I, the deponent above named do hereby solemnly affirm and declare as under:

That I am the Proprietor/Authorized signatory of M/s ……having its Head Office/Regd. Office at ……

That the information/documents/Experience certificates submitted by M/s……. along with the tender for …… *(NAME OF WORK*)……

To BSCDCL Ltd. are genuine and true and nothing has been concealed.

I shall have no objection in case BSCDCL verifies them from issuing authority (ies). I shall also have no objection in providing the original copy of the document(s), in case BSCDCL demand so for verification.

I hereby confirm that in case, any document, information & / or certificate submitted by me found to be incorrect / false / fabricated, BSCDCL at its discretion may disqualify / reject / terminate the bid/contract and also forfeit the EMD / All dues.

I shall have no objection in case BSCDCL verifies any or all Bank Guarantee(s) under any of the clause(s) of Contract including those issued towards EMD and Performance Guarantee from the Zonal Branch /office issuing Bank and I/We shall

have no right or claim on my submitted EMD before BSCDCL receives said verification.

That the Bank Guarantee issued against the EMD issued by (name and address of the Bank) is genuine and if found at any stage to be incorrect / false / fabricated, BSCDCL shall reject my bid, cancel pre-qualification and debar me from participating in any future tender for three years.

I, ..., the Proprietor / Authorised signatory of M/s..... do hereby confirm that the contents of the above Affidavit are true to my knowledge and nothing has been concealed there from..... and that no part of it is false.

Verified at ..... this..... day of .....

DEPONENT

ATTESTED BY (NOTARY PUBLIC)

APPLICATION FOR EXTENSION OF TIME

(To be completed by the Contractor)

P A R T –I

Name of Contractor

Name of the work as given in the Agreement

Agreement No.

Estimated amount put to tender

Date of commencement work as per agreement

Period allowed for completion of work as per agreement

Date of completion stipulated as per agreement

Period for which extension of time has been give previously

Extension granted

First extension vide Engineer-in- charge letter No… ……date	Months	Days
2nd extension vide Engineer-in-charge letter No…… date	Months	Days
3rd extension vide Engineer-in-charge letter No……. date	Months	Days
4th extension vide engineer-in-charge letter No……. date	Months	Days

Total extension previously given

Reasons for which extension have been previously given (copies of the previous application should be attached)
Period for which extension is applied for:

Hindrances on account of which extension is applied for with dates on which hindrances occurred, and the period for which these are likely to last.

Serial No.
Nature of hindrance
Date of Occurrence
Period for which it is likely to last
Period for which extension required for this particular hindrance.
Over lapping period, if any, with reference to item

Net extension applied for

Remarks, if any

Total period for which extension is now applied for on account of hindrances mentioned above ……. Month/ days.

Extension of time required for extra work.

Details of extra work and on the amount involved:

Total value of extra work

Proportionate period of extension of time based on estimated amount put to tender on account of extra work.

Total extension of time required for 11 & 12

Submitted to the Engineer-in-Charges office.

SIGNATURE OF CONTRACTOR

DATE

APPLICATION FOR EXTENSION OF TIME

(PART – II)

Date of receipt of application from Contractor for the work in the Engineer-in-charge office.

Acknowledgement issued by Engineer-in-charge vide his letter No.dated

Engineer-in-charge remarks regarding hindrances mentioned by the Contractor.

Serial No.

Nature of hindrance

Date of occurrence of hindrance

Period for which hindrance, is likely to last

Extension of time period applied for by the contractor

Over lapping period, if any, giving reference to items which over lap

Net period for which extension is recommended.

Remarks as to why the hindrance occurred and justification for extension recommended.

Engineer-in-charge recommendations.

The present progress of the work should be stated and whether the work is likely to be completed by the date up to which extension has been applied for. If extension of time is not recommended, what compensation is proposed to be levied under the agreement.

SIGNATURTE OF ENGINEER-IN-CHARGE

PROFORMA FOR EXTENSION OF TIME

P A R T –III

To

NAME

ADDRESS OF THE CONTRACTOR

SUBJECT:

Dear Sir(s)

Reference your letter No _____ dated _____ , in connection with the grant of extension of time for completion of the work…..

The date of completion for the above mentioned work, is …… as stipulated in the agreement, dated ……

Extension of time for completion of the above mentioned work is granted upto_____, without prejudice to the right of the BSCDCL to recover compensation for delay in accordance with the provision made in Clause of the said agreement dated the ___/ ___/ ___. It is also clearly understood that the BSCDCL shall not consider any revision in contract price or any other compensation whatsoever due to grant of this extension.

Provided that notwithstanding the extension hereby granted, time is and shall still continue to be the essence of the said agreement.

Yours faithfully,

FOR Bhopal Smart City Development Corporation Ltd.

PROFORMA OF BANK GUARANTEEIN LIEU OF EMD (TENDER BOND)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Ltd.

Near Tatpar Petrol Pump, Sector A, Berkheda,

Bhopal, Madhya Pradesh 462023

In consideration of Bhopal Smart City Development Corporation Limited, having its Registered Office at, Near Tatpar Petrol Pump Sector A, Berkheda (hereinafter called "BSCDCL" which expression shall unless repugnant to the subject or context include its successors and assigns) having issued Notice Inviting Tender No..... and M/s..... having its Registered Head Office at..... (hereinafter called the "TENDERER") is to participate in the said tender for.....

Whereas BSCDCL, as a special case, has agreed to accept an irrevocable and unconditional Tender Bond Guarantee for an amount of Rs..... valid upto.....from the tenderer in lieu of Cash Deposit of Rs..... required to be made by the tenderer, as a condition precedent for participation in the said tender.

We the ..... (hereinafter called the "BANK") having its Registered, Office at.....and branch office at..... do hereby unconditionally and irrevocably undertake to pay immediately on demand in writing and without demur/protest any amount but not exceeding Rs ..... Any such demand made by BSCDCL shall be conclusive and binding on us irrespective of any dispute or differences that may be raised by the tenderer. Any change in the constitution of the tenderer or the Bank shall not discharge our liability under the guarantee.

We, the..... Bank, lastly undertake not to revoke this guarantee during its currency without the prior consent of BSCDCL in writing and this guarantee shall remain valid upto.....Unless a claim is made within three months from the date of expiry i.e.....(three months after the date of expiry), we shall be relieved of our liability

under this guarantee thereafter.

FOR AND ON BEHALF OF BANK

PLACE : DATED :

WITNESS.

1.

2

PROFORMA OF BANK GUARANTEE (PERFORMANCE)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Ltd.

Near Tatpar Petrol Pump, Sector A, Berkheda,

Bhopal, Madhya Pradesh 462023

Whereas the Bhopal Smart City Development Corporation Limited, having its registered Office at BSCDCL Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal (hereinafter called "BSCDCL" which expression shall include its successors and assigns having awarded a work order/contract / supply order No. dated (hereinafter called the contract) to M/s ……(hereinafter called the contractor/supplier) at a total price of Rs. …….subject to the terms and conditions contained in the contract.

WHEREAS, the terms and conditions of the contract require the contractor to furnish a bank guarantee for Rs. ……(Rupees ……) being ……..% of the total value of the contract for proper execution and due fulfillment of the terms and conditions contained in the contract.

We the bank, (hereinafter called the “Bank”) do hereby unconditionally and irrevocably undertake to pay to BSCDCL immediately on demand in writing and without protest/or demur all the moneys payable by the contractor/supplier to BSCDCL in connection with the execution/supply of and performance of the works/equipment, inclusive of any loss, damages, charges, expenses and costs caused to or suffered by or which would be caused to or suffered by BSCDCL by reason of any breach by the contractor/supplier of any of the terms and conditions contained in the contract as specified in the notice of demand made by BSCDCL to the bank. Any such demand made by BSCDCL on the bank shall be conclusive evidence of the amount due and payable by the bank under this guarantee. However, the bank’s liability under this guarantee, shall be limited to Rs……. In the aggregate and the bank hereby agrees to the following terms and conditions:-

i. This guarantee shall be a continuing guarantee and irrevocable for all claims of BSCDCL as specified above and shall be valid during the period specified for the performance of the contract including the period of maintenance/warranty i.e up to…….

ii. We, the said bank further agree with BSCDCL that BSCDCL shall have the fullest liberty without our consent and without affecting in any manner our obligations and liabilities hereunder to vary any of the terms and conditions of the said contract or to extend time for performance of contract by the contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by BSCDCL against the contractor/supplier under the contract and

forbear or enforce any of the terms and conditions relating to the said contract and we shall not be relieved from our liability by reason of any such variations or extension being granted to the contractor or for any forbearance, act or omission on the part of BSCDCL or any indulgence by BSCDCL to the contractor or by any such matter or thing whatsoever, which under the law relating to the sureties would, but for this provision, have effect of so relieving us.

This guarantee/undertaking shall be in addition to any other guarantee or security whatsoever BSCDCL may now or at any time have in relation to the performance of the works/equipment and the company shall have full re-course to or enforce this security in performance to any other security or guarantee which the BSCDCL may have or obtained and there shall be no forbearance on the part of the company in enforcing or requiring enforcement of any other security which shall have the effect of releasing the Bank from its full liability. It shall not be necessary for BSCDCL to proceed against the said contractor/supplier before proceeding against the Bank.

This guarantee/ undertaking shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the supplier/ contractor, but shall in all respects and for all purposes be binding and operative until payment of all moneys payable to BSCDCL in terms thereof are paid by the Bank.

The Bank hereby waives all rights at any time inconsistent with the terms of this Guarantee and the obligations of the bank in terms hereof, shall not be otherwise effected or suspended by reasons of any dispute or disputes having been raised by the supplier/contractor (whether or not pending before any Arbitrator, Tribunal or Court) or any denial of liability by the supplier/contractor stopping or preventing or purporting to stop or prevent any payment by the Bank to BSCDCL in terms hereof.

We, the said Bank, lastly undertake not to revoke this guarantee during its currency except with the previous consent of BSCDCL in writing. Unless a claim is made in writing within three months from the date of expiry of this guarantee i.e……..(three months after the date of expiry) we shall be from all liabilities relived under this guarantee thereafter.

Signed this day of at…….

For and on behalf of Bank

WITNESS.

1._____

2._____

PROFORMA OF BANK GUARANTEE

(FOR MOBILIZATION ADVANCE)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Limited,

Near Tatpar Petrol Pump, Sector A, Berkheda,

Bhopal, Madhya Pradesh 462023

1.0 In consideration of the Bhopal Smart City Development Corporation Limited, having its Registered Office at BSCDCL, Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal (hereinafter called "BSCDCL" which expression shall unless repugnant to the subject or context include his successor and assigns) having agreed under the terms and conditions of Contract No..... dated..... made between..... and BSCDCL in connection with..... (hereinafter called "the said contract") to make at the request of the Contractor a Mobilization Advance of Rs..... for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable to BSCDCL, we the ..... Bank Ltd., (hereinafter referred to the "the said Bank") and having our registered office at..... do hereby guarantee the due recovery by BSCDCL of the said advance as provided according to the terms and conditions of the Contract. We..... do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on a demand from BSCDCL stating that the amount claimed is due to BSCDCL under the said Agreement. Any such demand made on the..... shall be conclusive as regards the amount due and payable by the..... under this guarantee and..... agree that the liability of the ..... to pay BSCDCL the amount so demanded shall be absolute and unconditional notwithstanding any dispute or disputes raised by the Contractor and notwithstanding any legal proceeding pending in any court or Tribunal relating thereto. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs..... We ……. Bank further agree that BSCDCL shall be the sole judge of and as to whether the amount claimed has fallen due to BSCDCL under the said agreement or whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and the extent of loss or damage caused to or suffered by BSCDCL on account of the said advance together with interest not being recovered in full and the decision of BSCDCL that the amount has fallen due from contractor or the said Contractor has not utilized the said advance or any part thereto for the purpose of the contract and as to the amount or amounts of loss or damage caused to or suffered by BSCDCL shall be final and binding on us.

We, the said Bank, further agree that the Guarantee herein contained shall remain in full force and effect till the said advance has been fully recovered and its claims satisfied or discharged and till BSCDCL certify that the said advance has been fully recovered from the said Contractor, and accordingly discharges this Guarantee subject, however, that BSCDCL shall have no claims under this Guarantee after the said advance has

been fully recovered, unless a notice of the claims under this Guarantee has been served on the Bank before the expiry of the said Bank Guarantee in which case the same shall be enforceable against the Bank.

BSCDCL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or indemnity from time to time to vary any of the terms and conditions of the said Contract or the advance or to extend time of performance by the said Contractor or to postpone for any time and from time to time of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of terms and conditions governing

the said Contract or the advance or securities available to BSCDCL and the said Bank shall not be released from its liability under these presents by any exercise by BSCDCL of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractor or any other forbearance, act or omission on the part of BSCDCL or any indulgence by BSCDCL to the said Contractor or of any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the bank from its such liability. 5.0 It shall not be necessary for BSCDCL to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which BSCDCL may have obtained or obtain from the Contractor or shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of BSCDCL in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

Dated this .....day of.....

Dated For and on behalf of Bank

(NAME AND DESIGNATION)

PROFORMA OF BANK GUARANTEE

(IN LIEU OF SECURITY DEPOSIT)

(Judicial Stamp paper of appropriate value as per stamp Act-of respective state)

Bhopal Smart City Development Corporation Ltd.,

Near Tatpar Petrol Pump, Sector A, Berkheda, Bhopal

In consideration of the Bhopal Smart City Development Corporation Ltd., having its registered Office at Near Tatpar Petrol Pump Sector A, Berkheda (hereinafter called "BSCDCL") which expression shall include its successors and assigns having awarded to M/s.....(hereinafter called "the supplier/Contractor") which expression shall wherever the subject or context so permits includes its successors and assigns) a Contract in terms inter-alia of BSCDCL's letter No..... dated..... and the Contract/Purchase Conditions of BSCDCL and upon the condition of the Supplier/Contractor furnishing Security for the performance of the Supplier's obligations and /or discharge of the contractor's/supplier's liability under and/or in connection with the said supply contract upto a sum of Rs..... (Rupees..... only)

We,..... ((hereinafter called "The Bank") which expression shall include its successors and assigns) hereby undertake and guarantee payment to BSCDCL forthwith on the same day on demand in writing and without protest or demur of any and all moneys payable by the supplier/contractor to BSCDCL under, in respect or in connection with the said contract inclusive of all the losses, damages, costs, charges and expenses and other moneys payable in respect of the above as specified in any notice of demand made by BSCDCL to the Bank with reference to this guarantee up to

and aggregate limit of Rs…....(Rupees.....only) and the bank hereby

agree with BSCDCL that:

This Guarantee shall be continuing guarantee and shall …… remain valid and irrevocable for all claims of BSCDCL and liabilities of Supplier/Contractor arising upto and until midnight of.....

This Guarantee shall be in addition to any other Guarantee or Security whatsoever that BSCDCL now or at any time have in relation to the Supplier's obligations/liabilities under and/or in connection with the said supply/contract, and BSCDCL shall have full authority to take recourse or to enforce this Security in preference to any other Guarantee or Security which BSCDCL may have or obtain and no forbearance on the part of BSCDCL in enforcing or requiring enforcement of any other Security shall have the effect of releasing the Bank from its liability hereunder.

BSCDCL shall be at liberty without reference to the Bank and without affecting the full liability of the Bank hereunder to take any other security in respect of the

Supplier's/Contractor's obligations and/ or liabilities under or in connection with the said supply/contract or to grant time and / or indulgence to the supplier / contractor or to increase or otherwise vary the prices or the total contract value or to release or to forbear from enforcement of all or any of the conditions under the said supply / contract and / or the remedies of BSCDCL under any other security/securities now or hereafter held by BSCDCL and no such dealings, increase(s) or other indulgence(s) or arrangement(s) with the supplier / contractor or releasing or forbearance whatsoever shall have the effect of releasing the Bank from its full liability to BSCDCL hereunder or prejudicing rights of BSCDCL against the Bank. This Guarantee shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the supplier / contractor but shall in all respects and for all purposes be binding and operative until payment of all moneys payable to BSCDCL in terms thereof.

5. The Bank hereby waives all rights at any time inconsistent with the terms of this Guarantee and the obligations of the Bank in terms hereof shall not be otherwise affected or suspended by reason of any dispute or disputes having been raised by the supplier /contractor (whether or not pending before any Arbitrator, Tribunal or Court) or any denial or liability by the supplier/ contractor stopping/ preventing or purporting to stop or prevent any payment by the Bank to BSCDCL in terms thereof.

   The amount stated in any notice of demand addressed by BSCDCL to the Guarantor as liable to be paid to BSCDCL by the supplier/contractor or as suffered or incurred by BSCDCL on account of any losses or damages, costs, charges and / or expenses shall as between the Bank and BSCDCL be conclusive of the amount so liable to be paid to BSCDCL or suffered or incurred by BSCDCL as the case may be and payable by the Guarantor to BSCDCL in terms hereof subject to a maximum of Rs ..... (Rupees ..... only), unless demand or claim under this Guarantee is made on the Guarantor in writing

   within three months form the date of expiry of the Guarantee i.e upto ..... the Guarantor shall be discharged from all liabilities under this Guarantee there under.

Notwithstanding anything contained herein before our liability under this guarantee is restricted to Rs . ..... (Rupees .....only). This guarantee will expire on..... Any claim under this Guarantee must be received by us within three months from the date of expiry i.e. ..... (date, three months after the expiry date) and if no such claim has been received by us by that date all your rights under this guarantee will cease.

For and on behalf of the Bank

Place

Date

WITNESS:

1.

2.

PROFORMA OF BANK GUARANTEE

(FOR MOBILIZATION ADVANCE WITH INTEREST BEARING)

(Judicial Stamp per Stamp Act - paper of appropriate value as respective state)

Bhopal Smart City Development Corporation Limited,

Bhopal, Pin- 462023

In consideration of the Bhopal Smart City Development Corporation Limited., having its Registered Office at Bhopal -462023 (hereinafter called “BSCDCL” which expression shall unless repugnant to the subject: or context Include his successor and assigns) having agreed under the terms and conditions of Contract No. dated made between (name of the contractor) and BSCDCL in connection with (name of work) (hereinafter called “the said contract”) to make at the request of the Contractor a Mobilization Advance of Rs. _____ carrying interest @ … % p.a. for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable to BSCDCL, we the Bank (hereinafter referred to the “the said Bank”) and having our registered office at do hereby guarantee the due recovery by BSCDCL of the said advance alongwith interest as provided according to the terms and conditions of the contract. We ...

do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely, on a demand from BSCDCL stating that the amount claimed is due to BSCDCL under the said Agreement. Any such demand made on the said bank shall be conclusive as regards the amount due and payable by the said contractor under this guarantee and agree that the liability of the said bank to pay BSCDCL the amount so demanded shall be absolute and unconditional notwithstanding any dispute or disputes raised by the Contractor and notwithstanding any legal proceeding pending in any court or Tribunal relating thereto. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs … inclusive of interest @ …….% p.a.

We the said bank further agree that BSCDCL shall be the sole judge of and as to whether the amount claimed has fallen due to BSCDCL under the said agreement or whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and the extent of loss or damage caused to or suffered by BSCDCL on account of the said advance together with interest not being recovered in full and the decision of BSCDCL that the amount has fallen due from' contractor or the said Contractor has not utilized the said advance or any part thereto for the purpose of the contract and as to the amount or amounts of loss or damage caused to or suffered by BSCDCL shall be final and binding on us.

We, the said Bank, further agree that the Guarantee herein contained shall remain

in full force and effect till the said advance has been fully recovered and its claims satisfied or discharged and till BSCDCL certify Contractor, and accordingly discharges this Guarantee subject, however, that BSCDCL shall have no claims under this Guarantee unless a notice of the claims under this Guarantee has been served on the Bank before the expiry of the said Bank Guarantee in which case the same shall be enforceable against the Bank.

BSCDCL shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or indemnity from time to time to vary any of the terms and conditions of the said Contract or the advance or to extend time of performance by the said Contractor or to postpone for any time and from time to time of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of terms and conditions governing the said Contract or the advance or securities available to BSCDCL and the said Bank shall not be released from its liability under these presents by any exercise by BSCDCL of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractor or any other forbearance, act or omission on the part of BSCDCL or any indulgence by BSCDCL to the said Contractor or of any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the bank from its such liability.

It shall not be necessary for BSCDCL to proceed against the Contractor before proceeding against the Bank and Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which BSCDCL may have obtained or obtain from the Contractor or shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of BSCDCL in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

Dated this…..… day of…….....

Place:

Date:

Witness:

FORM FOR GUARANTEE BOND

FOR ANTI-TERMITE TREATMENT

THIS AGREEMENT made this____ day of Two thousand _____ between M/s_____ (hereinafter called the guarantor of the one part and M/s Bhopal Smart City Development Corporation Limited, hereinafter called the BSCDCL hereinafter called the OWNER of the other part.

Whereas this agreement is supplementary to the contract hereinafter called the contract dated_____ made between the guarantor of the one part and National Buildings Construction Corporation Ltd., of the other part whereby the contractor inter-alia, understood to render the buildings and structures in the said contract recited, completed, termite proof. And whereas the guarantor agreed to give a guarantee to the effect that the said structure will remain termite proof for TEN YEARS to be so reckoned from the date after the maintenance period prescribed in the contract expires.

During this period of guarantee the guarantor shall make good all defects and for that matter shall replace at his risk and cost such wooden member as may be damaged by termite and in case of any other defect being found, he shall render the building termite proof at his cost to the satisfaction of the Engineer-in-charge and shall commence the works of such rectification within seven days from date of issuing notice from the Engineer-in-Charge calling upon him to rectify the defects falling which the work shall be got done by BSCDCL/ OWNER by some other contractor at the guarantor's cost and risk and in the later case the decision of the Engineer-in-charge as to the cost recoverable from the guarantor shall be final and binding.

That if the Guarantor fails to execute the Anti-Termite treatment or commits breaches hereunder then the Guarantor will indemnify BSCDCL against all losses damages, cost expenses or otherwise which may be incurred by him by reasons of any default on the part of the guarantor in performance and observance of this supplemental Agreement. As to the amount of loss and or damage and/or cost incurred by BSCDCL/ OWNER decision of the Engineer-in-charge will be final and binding on the parties.

In witness where of these presents have been executed by the Guarantor_____ and by_____ for and on behalf of BSCDCL on the day of month and year first above written.

Signed sealed and delivered by (Guarantor)

IN THE PRESENCE OF: 1.

2.

Signed for and on behalf of BSCDCL by/ in presence of:

1.

2.

GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS

The agreement made this …….. day of …….. Two thousand One and …….. between …… (hereinafter called Guarantor of the one part) and the BSCDCL (hereinafter called the Execution Agency of the other part).

WHEREAS this agreement is supplementary to a contract(hereinafter called the Contract), dated …… and made between the GUARANTOR OF THE ONE part and the BSCDCL of the other part, whereby the Contractor, inter-alia, undertook to render the buildings and structures in the said contract recited completely water and leak proof.

AND WHEREAS the Guarantor agreed to give a guarantee to the effect that the said structures will remain water and leak proof for ten years from the date of handing over o the structure of water proofing treatment.

NOW THE GUARANTOR hereby guarantees that water proofing treatment given by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be ten years to be reckoned from the date after the maintenance period prescribed in the contract.

Provided that the Guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose.

Misuse of roof shall mean any operation, which will damage proofing treatment, like chopping of fire wood and things of the same nature which might cause damage to the roof.

Alternation shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby proofing treatment is removed in parts

The decision of the Engineer-in-Charge with regard to cause of leakage shall be final

During this period of guarantee, the Guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the

Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the date of issue of notice from the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the BSCDCL by some other Contractor at the guarantor's cost and risk. The decision of Engineer-in-Charge as to the cost, payable by the Guarantor shall be final and binding.

That if the Guarantor fails to execute the water proofing or commits breach there-under, then the Guarantor will indemnify the principal and his successors against all laws damage, cost, expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and / or damage and/ or cost incurred by the BSCDCL, the decision of the Engineer-in-Charge will final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the Obligator,,,,…..and by ……. And for and on behalf of the BSCDCL on the day, month and year first above written.

Signed, sealed and delivered by Obligator in the presence of-

1.

2.

Signed for and on behalf of the BSCDCL by _____

In presence of:

1.

2.

PROFORMA OF

INDENTURE FOR SECURED ADVANCE OR CREDIT

THIS INDENTURE made this day of _____ Between _____

(hereinafter called the contractor) which expression shall where the Context as admits or implies be deemed to include his executor/administrators and assign of the one part and National Buildings Construction Corporation Ltd., having its Registered Office at BSCDCL, Bhopal (hereinafter called the Engineer) which expression shall where the context so admits or implies be deemed to include its successors and assign of the other part.

Whereas by an agreement dated (hereinafter called the said agreement). The

Contractor has agreed to construct.....

And whereas the Contractor has applied to the Engineer that he may be or be given credited for materials brought by him to the site of the work subject to the said agreement for use in construction of the work.

NOW THIS INDENTURE WITNESSETH that in pursuance of the said agreement and in consideration of the sum of Rs._____ (Rupees _____ only) paid to the contractor by the Engineer. The receipt where the Contractor hereby acknowledges and of such advance or credited (if any) as may be made to him as aforesaid the Contractor hereby covenants and agrees with The Engineer and declares as follows:

That all sums given as advance or credit by The Engineer to the Contractor as aforesaid shall be employed by the Constructor in or toward the execution of the said works and for no other purpose whatsoever.

That the material for which the advance or credit is given are offered to and accepted by The Engineer as security and are absolutely the Contractor's own property and free from encumbrances of any kind the Contractor will not make any application for or receives further advance or credit on the security or material which are not absolutely his own property and free from encumbrances of any kind and the Contractor shall indemnify The Engineer against any claims to any material in respect of which advance or credit has been made to him as aforesaid.

That the said material and all other material on the security of which any further advance or advances or credit may be given as aforesaid (hereinafter called the said materials) shall be used by the Contractor s solely in the execution of the said works in accordance with the direction of the Engineer and in terms of said agreement.

That the Contractor shall make at his own cost all necessary and adequate arrangement for the proper safe custody and protection against all risks of the said material and that until used in the construction as aforesaid the material shall remain at the site of the said works in Contractor's custody and on his responsibility and shall at all times be open to inspection by The Engineer. In the events of the materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in greater degree than in due to reasonable use and wear thereof the Contractor will replace the same with other materials of like quality of repair and make good the same as required by The Engineer.

That said material shall not on any account be removed from the site of work expect with the written permission of The Engineer.

That the advance shall be repayable in full when or before Contractor receives payment from The Engineer of the price payable to him for the said work under the term and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done then on the occasion of each payment The Engineer will be at liberty to make a recovery from the Contractor's bill from such payments by deducting there from the value of the said materials than actually used in the contraction and in respect of which recovery has not been made previously. The value of this purpose being determined in respect of each description of materials at the rates at which the amounts of the advance as made under these presents was calculated.

That if the Contractor shall at any time make at any default in the performance of observance in respect of any of the terms and provisions of the said agreement or of that provisions the total amount of the advance or advances that may still be owing to The Engineer, shall immediately on the happening of such default be repayable by the Contractor to The Engineer together with interest thereon at 12% p.a. from the date of respective dated to such advance or advances to the date of payment and with all costs. Damages and expenses incurred by The Engineer in or for recovery hereof or the Contractor hereby covenants and agrees with The Engineer to repay and pay the same respective to him accordingly

That the Contractor hereby charges all the said materials with the repayment to The Engineer of all sums advances or credit as aforesaid and all costs. Charges, damages and expenses payable under these presents PROVIDED ALWAYS it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the powers contained therein if and wherever the covenant for payment and repayment herein before contained shall be become enforceable and the money owing shall not be paid in accordance therewith. The Engineer may at any time thereafter adopt all or any of the following courses he may deem best:

Seize the utilize the said material or any part thereof in the completion of the said works in accordance with the provision in that behalf contained in the said agreement debating

the Contractor with the actual cost of effecting such completion and the amount due in respect of advance or credit under these presents and crediting the Contractor with value of work done as if he has carried it out in accordance with the said agreement and the rates thereby provided if the balance is against the Contractor is to pay the same to the engineer on demand.

Remove and sell by public action the seized materials or any part thereof and out of the money arising from the sale repay the engineer under these presents and pay over the surplus (if any) to the Contractor.

Deduct all or any part of the moneys owing from any sums due to the contractor under said agreement.

Expect in the event of such default on the part of contractor as aforesaid,interest or the said advance shall not be payable.

That in the event of conflict between the provisions of these presents and the said agreements, the provision of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents, the settlement of which has not been hereinbefore expressly provided for the same shall so far as is lawful be subject to jurisdiction of BHOPAL courts only.

IN WITNESS whereof the said the engineer and the contractor hereunto set their respective hands and seals the day year first above written.

Signed Sealed and delivered by

Contractor The Engineers

AGREEMENT FORM

This agreement made this day of (Month) (Year), between the **Bhopal Smart City Development Corporation Limited (BSCDCL),** a company incorporated under the Companies Act, 1956 having its Registered Office at BSCDCL, Bhopal 462023 (hereinafter referred to as the "BSCDCL" which expression shall include its administrators, successors, executors and assigns) of the one part and **M/s(NAME OF CONTRACTOR)** (hereinafter referred to as the 'Contractor' which expression shall unless the context requires otherwise include its administrators, successors, executors and permitted assigns) of the other part.

WHEREAS, BSCDCL, has desirous of construction of **(NAME OF WORK)** (hereinafter referred to as the "PROJECT") on behalf of the **(NAME OF OWNER/MINISTRY)** (hereinafter referred to as "OWNER"), had invited tenders as per Tender documents vide NIT No. _____.

AND WHEREAS **(NAME OF CONTRACTOR)** had participated in the above referred tender vide their tender dated _____ and BSCDCL has accepted their aforesaid tender and award the contract for (NAME OF PROJECT) on the terms and conditions contained in its Letter of Intent No. _____ and the documents referred to therein, which have been unequivocally accepted by **(NAME OF CONTRACTOR)** vide their acceptance letter dated _____ resulting into a contract.

NOW THEREFORE THIS DEED WITNESSETH AS UNDER:

ARTICLE 1.0 – AWARD OF CONTRACT

SCOPE OF WORK

BSCDCL has awarded the contract to **(NAME OF CONTRACTOR)** for the work of **(NAME OF WORK)** on the terms and conditions in its letter of intent No.

_____ dated _____ and the documents referred to therein. The award has taken effect from **(DATE)** i.e. the date of issue of aforesaid letter of intent. The terms and expressions used in this agreement shall have the same meanings as are assigned to them in the "Contract Documents" referred to in the succeeding Article.

ARTICLE 2.0 – CONTRACT DOCUMENTS

The contract shall be performed strictly as per the terms and conditions stipulated herein and in the following documents attached herewith (hereinafter referred to as "Contract Documents").

BSCDCL Notice Inviting Tender vide No. _____ date _____and BSCDCL's tender documents consisting of:

General Conditions of Contract (GCC) along with amendments/errata to GCC (if any) issued (Volume-I).

Special Conditions of Contract including Appendices & Annexures, Volume-II.

Bill of Quantities along with amendments/corrigendum of schedule items, if any (Volume-II).

_____
_____

(NAME OF CONTRACTOR) letter proposal dated _____ and their subsequent communication:

Letter of Acceptance of Tender Conditions dated _____

_____

_____

BSCDCL's detailed Letter of Intent No. _____ dated ____ including Bill of Quantities. Agreed time schedule, Contractor's Organization Chart and list of Plant and Equipment's submitted by Contractor.

All the aforesaid contract documents referred to in Para 2.1 and 2.2 above shall form an integral part of this Agreement, in so far as the same or any part thereof column, to the tender documents and what has been specifically agreed to by BSCDCL in its Letter of Intent. Any matter inconsistent therewith, contrary or repugnant thereto or deviations taken by the Contractor in its "TENDER" but not agreed to specifically by BSCDCL in its Letter of Intent, shall be deemed to have been withdrawn by the Contractor without any cost implication to BSCDCL. For the sake of brevity, this Agreement along with its aforesaid contract documents and Letter of Intent shall be referred to as the "Contract".

ARTICLE 3.0 – CONDITIONS & CONVENANTS

The scope of Contract, Consideration, terms of payments, advance, security deposits, taxes wherever applicable, insurance, agreed time schedule, compensation for delay and all other terms and conditions contained in BSCDCL's Letter of Intent No. _____ dated _____ are to be read in conjunction with other aforesaid contract

documents. The contract shall be duly performed by the contractor strictly and faithfully in accordance with the terms of this contract.

The scope of work shall also include all such items which are not specifically mentioned in the Contract Documents but which are reasonably implied for the satisfactory completion of the entire scope of work envisaged under this contract unless otherwise specifically excluded from the scope of work in the Letter of Intent.

Contractor shall adhere to all requirements stipulated in the Contract documents.

Time is the essence of the Contract and it shall be strictly adhered to. The progress of work shall conform to agreed works schedule/contract documents and Letter of Intent.

This agreement constitutes full and complete understanding between the parties and terms of the presents. It shall supersede all prior correspondence to the extent of inconsistency or repugnancy to the terms and conditions contained in Agreement. Any modification of the Agreement shall be effected only by a written instrument signed by the authorized representative of both the parties.

The total contract price for the entire scope of this contract as detailed in Letter of Intent is Rs. _____ (Rupees_____ only), which shall be governed by the stipulations of the contract documents.

ARTICLE 4.0 – NO WAIVER OF RIGHTS

Neither the inspection by BSCDCL or the Engineer-in-Charge or Owner or any of their officials, employees or agents nor order by BSCDCL or the Engineer-in-Charge for payment of money or any payment for or acceptance of, the whole or any part of the work by BSCDCL or the Engineer-in-Charge nor any extension of time nor any possession taken by the Engineer-in-Charge shall operate as waiver of any provisions of the contract, or of any power herein reserved to BSCDCL, or any right to damage herein provided, nor shall any waiver of any breach in the contract be held to be a waiver or any other or subsequent breach.

ARTICLE 5.0 – GOVERNING LAW AND JURISDICTION

The Laws applicable to this contract shall be the laws in force in India and jurisdiction of BHOPAL Court (s) only.

Notice of Default

Notice of default given by either party to the other party under the Agreement shall be in writing and shall be deemed to have been duly and properly served upon the parties hereto, if delivered against acknowledgment due or by FAX or by registered mail duly addressed to the signatories at the address mentioned herein above.

IN WITNESS WHEREOF, the parties through their duly authorized representatives have executed these presents (execution whereof has been approved by the Competent Authorities of both the parties) on the day, month and year first above mentioned at BHOPAL.

For and on behalf of: For and on behalf of:

(NAME OF CONTRACTOR) (M/s Bhopal Smart City Development Corporation)

WITNESS: WITNESS:

1. 1.

FORM 7 - FORM OF POWER OF ATTORNEY FOR SIGNING THE BID DOCUMENTS

(On a Stamp Paper of relevant value)

Know all men by these presents, we, ... (name of Contractor and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr / Ms..... son/daughter/wife of ..... and presently residing at ....., who is presently employed with us and holding the position of ..... as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of bid for the for **"Design, Supply, Installation, Testing and Commissioning of Smart Street lighting and ICT works for Roads of ABD area of Bhopal Smart City including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis"** being developed by the BSCDCL including but not limited to signing and submission of all applications, proposals/bids and other documents and writings, participating in pre-bid and other conferences and providing information/ responses to BSCDCL, representing us in all matters before BSCDCL, signing and execution of all contracts and undertakings consequent to acceptance of our proposal and generally dealing with BSCDCL in all matters in connection with or relating to or arising out of our Proposal for the said work and/or upon award thereof to us till the entering into of the agreement with BSCDCL.

AND GENERALLY to act as our Attorney or agent on behalf of us in relation to the bid for **"Design, Supply, Installation, Testing and Commissioning of Smart Street lighting and ICT works for Roads of ABD area of Bhopal Smart City including operation & maintenance of project for 5 years on Engineering, Procurement & Construction (EPC) Basis"** (and to execute and do all instruments, acts, deeds, matters and things in relation to the said Proposal or any incidental or ancillary activity, as fully and effectually in all respects as we could do if personally present.

AND We hereby agree to ratify and confirm and agree to ratify and confirm all acts, deeds and things whatsoever lawfully done or caused to be done by our said Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ... THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS ..... DAY OF ....., 2018

For

.....

(Signature, name, designation and address)

Witness

1.

2.

Notarized

Accepted

(Signature, name, designation and address of the Attorney)

AFFIDAVIT *(Black listing)

1. I, the undersigned, do hereby certify that all the statements made in the Tender document are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s. _____ nor any of its constituent partners are blacklisted by any of the Govt./Semi Govt. institutions and not have abandoned any work of buildings / Infrastructures works in India nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this application.

_____

Signed by an Authorized Officer of the Firm

_____

Title of Officer

_____

Name of Firm

_____

Date

FORM 8 - JOINT VENTURE AGREEMENT

(To be notarized on stamp paper of appropriate value)

(1) The Joint Venture agreement made and entered into at _____(place) on _____day of _____ (YEAR) by and between.

a. Firm A (Name with address of the registered office)
b. Firm B (Name with address of the registered office)

(2) Definitions: In this deed the following words and expressions shall have the meaning set out below.

a. "The Employer" shall mean Bhopal Smart City Development Corporation Ltd.
b. "The Works" shall mean _____ _____(Name of work) which is more particularly described in the pre-qualification and tender documents issued thereof by the Employer.
c. "The Tender" shall mean the Tender to be submitted by Joint Venture to the Employer for the work /works.
d. "The Contract" shall mean the contract entered /to be entered into between the Joint Venture and the Employer for the works.

(3) Joint Venture (J.V):

The Parties hereto declare that they have agreed to form a Joint Venture for the purpose of submitting the pre-qualification Application/ tender document initially and then tender and if successful for the execution of the works as an integrated Joint Venture. The parties are not under this agreement entering into any permanent partnership of Joint Venture to tender or undertake any contract other than the subject works. Nothing herein contained shall be considered to constitute the parties of partners to constitute either Party the agent of the other.

(4) Witnesses : Where as Bhopal Smart City Development Corporation Ltd as Board. Employer has invited tenders from intending bidders and the Board has permitted a group of firms (not exceeding two) forming a Joint Venture to eligible to be a bidder. And whereas_____party of the first part and _____party of the Second part/third part(if applicable) are desirous to enter into a Joint Venture in the nature of partnership engaged in the joint undertaking for the specific purpose of execution of the work of constructing _____and whereas Parties of the first and

Second part /third part(if applicable) reached understanding to submit pre-qualified/ tender, if pre-qualification, and to execute the contract if awarded;

This agreement witness as follows.

(a) The parties do not enter into an agreement of any permanent partnership of Joint Venture to tender or undertake any Contract other than the specified above;

(b) That the operation of this Joint Venture firm concerns and is confined to the work of _____of Board

(c) The name of the Joint Venture firm for convenience and continuity shall be

(d) The Address of Joint Venture for communication shall be as under.

(e) The Joint Venture shall jointly submit pre-qualification application on the above name according to all terms and conditions stated in the relevant instructions contained in the bid documents.

(f) That this Joint Venture shall regulate the relations between the parties thereto and shall include without being limited to them the following conditions.

(1) _____ firm shall be the lead company in charge of the Joint Venture for all intents and purpose.

(2) In case the said work is awarded to the Joint Venture, the partners of the Joint Venture will nominate a person with duly notarized power of Attorney on stamp paper, who will represent the Joint Venture with the authority to incur liabilities, receive instructions and payments, sign and execute the contract for an on behalf of the Joint Venture,

(i) All the (Maximum Two) parties agree to make financial participation and to place at disposal of Joint Venture the benefits of its individual experience, technical knowledge, skill and shall in all respect bear its share as regards planning and execution of the work and responsibilities including the provision of information, advice and other assistance required in the Joint Venture and participation shall be in proportion of, Firm – A.....% Firm - B.....%

(ii) All rights, interests, liabilities, obligations work experience and risks (and all net profits or net losses) arising out of the contract shall be borne by the parties in proportion to their shares. Each of the parties shall furnish its proportionate share in any bonds, guarantees, sureties required for the works as well as its proportionate share in connection with the works. The share and participation of the two/three partners in working capital and other financial requirements shall be in ratio as mentioned above.

(5) Internal responsibilities and liabilities:

(a) The division of individual scope of work may be worked out mutually by the parties but the party shall be jointly and severally liable to the employer for the whole work.

(b) The parties specifically undertake to carry out their separate works in full compliance with the contract with the employer. Each party shall be responsible jointly and severally for consequences if any arising out of defective or delayed execution of works which falls within the individual's party's area of responsibility and/ or it has been caused due to acts and /or omission of the concerned party.

(c) The parties jointly and severally agree to replace modify or repair any defect in their respective portions of works in accordance with the terms and condition of the contract with the employer.

(d) The parties jointly and severally shall indemnify and hold harmless to each other against any claim made by the employer or any other third party for injury, damage, loss or expenses is attributed to the breach /non-performance of his responsibilities by the indemnifying party in accordance with the agreements and /or contract with the employer.

(e) None of parties have joined in any other Joint Venture for the said works.

(6) Responsibilities and liabilities of Joint Venture towards the employer:

(1) Parties hereto shall be jointly and severally liable and responsible for the acts, deeds and things done or omitted to be done in respect of the execution of the contract and for any financial liability arising there from.

(2) Parties hereto shall be jointly and severally responsible to the Employer for the execution of the works in accordance with the contract conditions;

(3) Parties hereto shall be jointly and severally indemnify to the Employer against any claim made against the employer or any other third party for any injury, damage or loss which may be attributed to the breach of the obligations under the contract pursuant to the contract.

(7) Site management:

(a) The execution of the work on the site will be managed by a Project Manager appointed by the Joint Venture and who will report to the _____(J.V.) the project manager shall be authorized to represent the Joint Venture on site in respect of matters arising under the contract.

(b) The _____(Name of the J.V.) shall be jointly and severally liable to the employer for the execution of the contract commitment in respect of the works in accordance with contract conditions.

(8) Termination of the Agreement:

This agreement shall be terminated in the following circumstances.

(a) The employer awards the contract for the work to the other Bidder.

(b) The employer cancels the work to award the contract.

(c) On completion of the defect liability period as stipulated in the contract agreement of the works and all the liabilities thereof are liquidated.

(9) No partner has right to assign any benefits, obligation of liability under the agreement to any third party without prior written consent of the other partner as well as Board

(10) Financial matter:

(a) Bank Account in the name of the Joint Venture will be opened with any scheduled or nationalized Bank to be operated by an individual signatory as decided mutually by the Joint Venture partners.

(b) All the partners shall be responsible to maintain or cause to maintain proper Books of accounts balance sheet and profit and loss account as to the state of affairs of the firm as at the end of the financial year and as to the profit and loss made or incurred by the firm for the year ended on that date, respectively shall be prepared and the same shall subject to audit by a Chartered Accountant.

(c) None of the party shall be entitled to make any borrowing on behalf of the Joint Venture without express prior written consent of the other party.

(d) Bank guarantee for the application /execution of the work shall be provided jointly from a bank acceptable to the employer.

(11) Negotiation : Any negotiation of agreement between the parties hereto and the employer subsequent to the submission of the tender and prior to award, shall take place only with consent of each of the parties who shall be represented at the such negotiation by one or more representative(s) duly empowered to make such negotiation or agreement.

(12) Legal jurisdiction: All questions relating to validity interpretation of this agreement shall be governed by the law of India and shall be subject to jurisdiction of High court at BHOPAL.

(13) **Settlement of disputes:** Any dispute in interpretation of any condition mentioned herein shall be referred to an arbitrator/tribunal by mutual consent of the partners and such proceedings shall be governed by the arbitration and conciliation act 1996 as amended from time to time will be applicable. The award of arbitrator shall be final and binding on the party hereto. Neither the obligation of each party here to the performance of contract nor the execution of work shall stop during the course of arbitration proceeding or as a result thereof.

(14) **Insurance:**

(a) The Joint Venture through the parties individually shall take such insurance in connection with the work in accordance with the tender condition as acceptable to the employer.

(b) The cost of the insurance premium paid by the Joint Venture shall be borne and paid by the parties in proportion to the respective shares of work. Other insurance taken individually by the parties shall be fully borne by the respective parties.

(15) No change shall be made in this agreement without prior written consent of the employer and other party. However if the employer directs the parties to make changes in the agreement so as to fulfill tender conditions the parties discuss with employer and mutually agreed such changes required to be made in the agreement.

(16) **Default and withdrawals from the Joint Venture**. : In case that either party fails to observe the provision stipulated in this agreement withdrawal from the Joint Venture, Loss and/or expenses incurred by other party due to such default and /or withdrawals shall be fully compensated by the party who has defaulted.

(17) All matter relating to or arising due to this agreement shall be treated as confidential and shall not be disclosed to any other party. In witness whereof the parties have caused their duly authorized representatives to sign below.

Witness:

1 Signed for and on behalf of firm-A
2 Date Seal

Witness:

1 Signed for and on behalf of firm-B
2

Date Seal

Witness:

SECTION-6

SPECIAL CONDITION OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

1.0 a) GENERAL-

1.1 The following special conditions shall be read in conjunction with General conditions of contract. If there are any provisions in these Special Conditions, which are at variance with the provisions of General Conditions of Contract, the provisions in the Special Conditions shall take precedence.

1.2 Where any portion of Special Conditions of Contract is repugnant to or at variance with any provision of the instructions to Tenderer and General Conditions of Contract and / or the other documents forming part of the contract then unless a different intention appears the provision of the Special Conditions of Contract shall be deemed to override the provisions of the general conditions of contract and / or the other documents forming part of the contract only to the extent such repugnant/various in the special conditions of contract as are not possible of being reconciled with the provisions in the special conditions of contract as are not possible of being reconciled with the provision with instructions to Tenderer or General Conditions of contract and / or the other documents from part of the contract.

1.3 Items mentioned in the BOQ may vary or any changes are needed then it should bring to the attention of BSCDCL.

1.4 Working drawings are given by BSCDCL in tender document; if any deviations found and correction required then it should be brought to BSCDCL for rectification.

1.5 The items which are missing or not defined in the given BOQ in this Tender Document, then the contractor has to submit the items for approval to BSCDCL.

1.6 The contractor has to submit sample of the items defined in BOQ the same to be Approved by BSCDCL, before use.

1.7 It is percentage rate tender/EPC Tender. For Civil works, bidder should quote percentage above or below of PAC.

1.0 b) Additional Conditions ;

1.1 Excavated good earth declared surplus or otherwise shall be disposed of at designated locations as per the directions of BSCDCL, which shall be different from the disposal site for disintegrated rock etc.

1.2 For soil required for re-filling, if sufficient space is not available for stacking at site of excavation, the Contractor shall make his own arrangements for transporting and stacking the earth elsewhere and then bring it back for re-filling. Nothing extra shall be paid on this account for to and fro carriage.

1.3 Disposal of surplus excavated earth including mud, liquid mud, dismantled RCC, dismantled brick work etc. shall be made only in the dumping yard approved by local authority. It will be the responsibility of the contractor to get the permission for dumping yard from local authority as required. If any royalty /fees is payable to local authority, such royalty / fees shall also be borne by the contractor. Disposal shall be carried out

strictly as per the regulations of local authority. However, the above materials shall not be removed out of owner's premises without prior written authorization of BSCDCL.

1.4 All the Charges required for vetting of the designs done by The Contractor by IIT or any other reputable agency approved by BSCDCL etc. shall be deemed to have been included in the quoted rates.

1.5 The Contractor shall, at his own expense and without extra charges, make provision for all pumping, dewatering, dredging or bailing out water, if necessary, irrespective of the source of water. The water so pumped out shall be discharged as per local byelaws and as approved by the Engineer-in-charge. The Contractor shall also take all necessary precautions in diverting channels and in discharging the drained water as not to cause damage to the works, crops or any other property within/outside the plot. Excavated area for the basement/ foundation trenches shall be kept free from water while all the works below Ground level are in progress. Nothing extra shall be paid on this account in terms of time and cost.

1.6 Further contractor shall take all necessary precautions to protect and safe guard the foundation of the adjacent building / Structure / Overhead/Underground utilities. Nothing extra shall be payable on this account.

2.0 Construction Power, Water and other facilities

2.1 BSCDCL may provide construction power for office purpose only, at one point, on chargeable basis. Client shall not provide power for any other purpose and the Contractor shall be exclusively responsible to make his own arrangements for supply of power for his use including area illumination, construction activities, fabrication, without any extra cost to Client.

2.2 BSCDCL shall provide water for construction purpose at one point, the vicinity of the site of work. Contractor shall make all arrangements for distribution, storage, use and drainage of the same at his own cost.

2.3 BSCDCL shall endeavor to provide land out of available land to the Contractor, for the sole purpose of field office using Contractor's own container (porta cabin). No land shall be provided for accommodation of workers/labour.

2.4 The Contractor shall remove all temporary buildings / facilities etc. before leaving the site after completion of works in all respect. In the event that Contractor fails to clear the site within 3 weeks after receiving intimation from BSCDCL to do so, BSCDCL shall be free to engage the services of any third party to clear the site at Contractors risk and cost. All expenses incurred on this account shall be recovered from the Contractor.

2.5 If BSCDCL provides water and electricity, the cost for such facility will be borne by the contractor at the prevailing rates of local Government bodies as per actuals.

3.0 TAXES, DUTIES, ROYALTY, PRICES

3.1 Royalty

3.1.1 All royalties etc., as may be required for any Borrow Areas, including right of way etc. to be arranged by Contractor shall be deemed to have been included in the quoted prices.

3.1.2 Contractor's quoted rates should include the royalty on different applicable items as per the prevailing State Government rates.

4.0 Underground and overhead structures

4.1 The Contractor will familiarise himself with and obtain information and details from BSCDCL in respect of all existing structures, overhead lines, existing pipelines and utilities existing at the job site before commencing work. The Contractor shall execute the work in such a manner that the said structures, utilities, pipelines etc. are not disturbed or damaged, and shall indemnify and keep indemnified BSCDCL from and against any destruction thereof or damages thereto.

5.0 Electrical Contractor's License

5.1 The CONTRACTOR or its nominated Sub-Contractor(s), as the case may be, shall have a valid electrical contractor's license for working in the State in which the job site is located. The CONTRACTOR shall furnish a copy of the same to Engineer-in-charge before commencement of any electrical work or work pertaining to Electrical System.

6.0 Project Review Meetings

6.1 The contractor, immediately on award of work shall submit details of his key personnel to be engaged for the work at site. In addition, he shall furnish the Engineer-in-Charge detailed organogram of his staff involved with the work.

6.2 The Contractor shall present the programme and status at various review meetings as required.

6.3 Weekly Review Meetings: Shall be attended by Local Team headed by Project -in-Charge.

Agenda	a) Weekly programme v/s actual achieved in the past week and programme for next week. b) Remedial Actions and hold up analysis. c) Client query approval.

6.4 Monthly Review Meetings: Shall be attended by Project-in-Charge and the Management Representative who can take independent decisions

Agenda	a) Progress Status/Statistics. b) Completion Outlook. c) Major hold ups / slippages. d) Assistance required. e) Critical issues. f) Client query/approval. g) Anticipated cash flow requirement for next two months

7.0 PROJECT OFFICE ACCOMMODATION

7.1 The contractor shall provide, erect and maintain at his own cost separate temporary water tight, Puff insulated air-conditioned office accommodation in the form of two (02) Nos. Porta Cabins each of size 20' X 10' or Quantity and Size of Porta cabin as approved by BSCDCL at designated locations for the use by BSCDCL with the following minimum facilities in each cabin. These shall be available till handing over of the project.

7.1.1 Toilet facility - 1 No. portable for each cabin

7.1.2 Modular Work Stations - 3 Nos. in each cabin
7.1.3 Executive Chairs - 3 Nos. shoulder rest
7.1.4 Visitors Chairs - 6 Nos.
7.1.5 Overhead Storage Racks - All along the walls
7.1.6 Adequate Number of Power plugs –
7.1.7 White Board with Markers - 1 No. in each cabin
7.1.8 Pin-Up Display board of size as required
7.1.9 Free Drinking water, stabilised power and lighting as required for the duration of the Project.
7.1.10 Janitorial and Housekeeping services

7.2 The contractor has to relocate the Porta Cabins if required as per the exigencies of the work and as directed by BSCDCL without any extra cost. After completion of the Project the Contractor shall take away this material and the site shall be cleaned free from all construction debris.

8.0 RECOMMENDED MAKES OF MATERIALS

8.1 A list of recommended makes of materials is as per Tender document

8.2 The order of preference amongst the various products/materials shall be as follows:

8.2.1 The products / materials shall be as per the Brand specified in the Tender document

8.2.2 If the Brand is not specified then the products/material shall be ISI marked and the same shall be got approved by the Engineer-in-Charge before execution.

8.2.3 If ISI marked product/material is not available, the same shall be as approved by the Engineer-in-Charge before execution.

8.3 In case of natural products such as Kota stone, Marble, Granite etc.,

8.3.1 the stones used shall be of **premium** grade and they shall be homogenous in colour with consistency in pattern, texture, tone, marking and colour. No discolouration, spots, fissures or cracks and pocked surfaces shall be allowed.

8.3.2 Where it is difficult to guarantee uniformity in colour and other properties, contractor shall make all efforts to match the colour, shade, texture of the product with the approved sample. If in the opinion of the BSCDCL there is significant variation in properties, BSCDCL shall direct the contractor to remove the same from the site immediately and replace with products matching with the approved sample within reasonable period. The decision of BSCDCL shall be final and binding.

9.0 COMPLETION CERTIFICATES/ NOC FROM LOCAL STATUTORY BODIES

9.1 Contractor has to arrange at his own cost building/ work completion certificates or NOCs if required to be obtained, from the local statutory bodies of central and state govt. such as Municipal Corporation, electrical, safety, Fire authority, Chief Controller of Explosives (CCOE) etc. Any fees required for obtaining such NOCs shall be paid by BSCDCL on production of relevant depository challans/ receipts from such Govt. authorities. Initial building approval drawings shall be made available by BSCDCL

9.2 The application on behalf of BSCDCL for submission to relevant authorities along with copies of required certificates complete in all respects shall be prepared and submitted by the Contractor well ahead of time so that the actual construction /

commissioning of the work is not delayed for want of the approval / inspection by concerned authorities.

9.3 The inspection of the works by the authorities shall be arranged by the Contractor and necessary co-ordination and liaison work in this respect shall be the responsibility of the Contractor.

10.0 TOOLS, PLANTS AND MACHINERY

10.1 The Contractor shall provide and install at site adequate T&P for construction of the Project Works. The deployment of T&P shall be planned as per work requirement to suit the nature, quantum and speed of the work for lifting/hoisting construction materials/equipment etc.

10.2 The T&P shall be maintained in good working condition throughout the progress of work.

10.3 All adequate precaution regarding formal upkeep of valid Statutory/Safety credentials of major construction equipment as directed by BSCDCL, their installation, operation, maintenance, materials etc., shall be taken care of.

10.4 The operating staff to be deployed shall be properly qualified and adequately trained and experienced. All safety precautions shall be taken during the project duration, against possible accident. The Contractor shall deploy his representative to effectively enforce the safety rules and regulations in this regard.

11.0 Construction Equipment & Mechanisation of Construction Activities

11.1 The above list is only minimal and indicative. The contractor shall deploy all necessary tools and plants as per the requirement of the work.

11.2 The Contractor shall without prejudice to his overall responsibility to execute and complete the work as per specifications and Time Schedule, progressively deploy adequate equipment, and tools & tackles and augment the same as decided by Engineer-in-Charge depending on the exigencies of the work so as to suit the construction schedule.

12.0 CENTRING AND SHUTTERING FOR R.C.C WORK:-

12.1 The work is to be completed within 24 months, hence the contractor shall adopt a suitable system complying with BIS standards regarding stripping time, with requisite number of sets of centring and shuttering. The slab cycle for each of the structures has to be designed for completing the construction within the stipulated completion time of the respective building, and the same shall be got approved by BSCDCL.

13.0 INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES/ BUILDINGS

13.1 In case any operation connected with the Works requires temporary diversion of the traffic, or obstruction or closure of any road, or any other ‘right of way’, the approval of BSCDCL and the respective competent authorities shall be obtained at least one week in advance.

13.2 The Contractor shall at all times during execution of the Works, ensure an uninterrupted flow of traffic around the plot so as not to cause any nuisance to the general public.

13.3 If in order to avoid undue interference with the traffic and adjoining properties, BSCDCL instructs the Contractor to take special precautions or work within restricted time periods; the Contractor shall carry out the Works during such time and in such manner as directed by BSCDCL.

14.0 LIGHTING & WATCH AND WARD:

14.1 The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, area lighting at the construction site and approaches, watchmen, necessary watch towers etc. during progress of work at all hours including night hours, if required, as directed by the Engineer-in-charge.

14.2 The Contractor shall be responsible for the watch and ward of the all construction premises and buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installation till handing over of all the works to BSCDCL.

15.0 Monthly Bills of Contractor

Contractor shall submit Monthly bills for the work Executed. Minimum amount of such bills shall not be less than 5 % of Contract value.

16.0 Payment Schedule :

Following payment schedule shall be adopted for EPC Works:

S. No.	Activity	Payment (%)
1.	On Supply & Delivery of Material. Prior to commencement of work, the contractor shall get approved, the procurement schedule from the Engineer-in-Charge. Quantity to be procured shall be as approved by Engineer-in-charge. Payment shall be strictly done only after approval from Engineer-in-charge	50% payment on pro-rata basis against delivered quantity.
2.	On Installation, Testing and commissioning of the equipments	30% payment on pro-rata basis against executed quantity
3.	Trial Run and configuration of complete Project as per scope of project and after approval from Engineer-in Charge	20% payment

Following Payment schedule shall be adopted for operation & maintenance for 5years.

Sr. No.	Bidder to consider Operation & Maintenance cost in their scope	Phase	Unit	Payment (%)
(a)	Operation & Maintenance Cost for 1st year	1	Quarter	25%
		2	Quarter	25%

Sr. No.	Bidder to consider Operation & Maintenance cost in their scope	Phase	Unit	Payment (%)
		3	Quarter	25%
		4	Quarter	25%
(b)	Operation & Maintenance Cost for 2nd year	5	Quarter	25%
		6	Quarter	25%
		7	Quarter	25%
		8	Quarter	25%
(c)	Operation & Maintenance Cost for 3rd year	9	Quarter	25%
		10	Quarter	25%
		11	Quarter	25%
		12	Quarter	25%
(d)	Operation & Maintenance Cost for 4th year	13	Quarter	25%
		14	Quarter	25%
		15	Quarter	25%
		16	Quarter	25%
(e)	Operation & Maintenance Cost for 5th year	17	Quarter	25%
		18	Quarter	25%
		19	Quarter	25%
		20	Quarter	25%

17.0 Time period of the Project

Entire project should be completed and delivered within Twenty Four Months of time from the date of award of contract that includes Monsoon.

The time allowed for carrying out the work as entered in the Tender shall be strictly observed by the Contractor and shall be reckoned from the date on which the Letter of Acceptance is given to the Contractor. The work shall throughout the stipulated period of the Contract be proceeded with all due diligence as time being deemed to be the essence of the contract on the part of the Contractor.

The Contractor should complete the physical work as far as possible as per phase given below :

¼ of the work in .. ¼ of the time

½ of the work in .. ½ of the time

¾ of the work in .. ¾ of the time

Full of the work in .. Full of the time

Full work will be completed in Twenty Four months including Monsoon.

However deviations if any from above phasing will be got duly approved by the engineer incharge.

The program for completion of work shall be a part of the Contract Document in the form of Bar Chart / GANTT Chart. The Contractor is supposed to carry out the work and keep the progress as per Bar Chart/GANTT Chart. The Contractor shall complete the work as per the Schedule given in the Contract and the program submitted by the Contractor.

18.0 Contract Execution

All required documents for execution of the contract shall be submitted within 30 days from the date of issue of letter of acceptance. If the documents are not submitted within the stipulated time a penalty of Rs 5000/- per day will be applicable to the contractor. All contract documents need to be duly affixed with stamp duty properly signed along with evidence/proof of payment of security/contract deposit/ within 30 days from the date of letter of acceptance received by him

If the amount of the Contract Deposit to be paid above is not paid within 30 days from the date of issue of Letter of Acceptance, the Tender / Contractor already accepted shall be considered as cancelled and legal steps be taken against the contractor for recovery of the amounts.

The amount of Security Deposit retained by the BSCDCL shall be released after expiry of period up to which the contractor has agreed to maintain the work in good order is over. In the event of the contractor failing or neglecting to complete the rectification work within the period up to which the contractor has agreed to maintain the work in good order, the amount of security deposit retained by BSCDCL shall be adjusted towards the excess cost incurred by the Department on rectification work.

19.0 Action when whole of security deposit / Retention Money is forfeited:

In any case in which under any Clause of this contract, the contractor shall have rendered himself liable to pay compensation amounting to the whole of this security deposit whether paid in one

sum or deducted by installments or in the case of abandonment of the work owning to serious illness or death of the contractor or any other cause, the Engineer-in-Charge shall have power to adopt any of the following process, as he may deem best suited to the interest of BSCDCL -

(a) To rescind the contract (for which recession notice in writing to the contractor shall be conclusive evidence) and in that case, the security deposit of the contract shall stand forfeited and be absolutely at the disposal of BSCDCL .

(b) To carry out the work or any part of the work departmentally debiting the contractor with the cost of the work, expenditure incurred on tools and plant, and charges on additional supervisory staff including the cost of work-charged establishment employed for getting the un-executed part of the work completed and crediting him with the value of the work done departmentally in all respects in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the Engineer-in-Charge as to the costs and other allied expenses so incurred and as to the value of the work so done departmentally shall be final and conclusive against the contractor.

(c) To order that the work of the contractor be measured up and to take such part thereof as shall be un-executed out of his hands, and to give it to another contractor to complete, in which case all expenses incurred on advertisement for fixing a new contracting agency, additional supervisory staff including the cost of work charged establishment and the cost of the work executed by the new contract agency will be debited to the contractor and the value of the work done or executed through the new contractor shall be credited to the contractor in all respects and in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the Executive Engineer as to all the cost of the work and other expenses incurred as aforesaid for or in getting the un-executed work done by the new contractor and as to the value of the work so done shall be final and conclusive against the contractor.

In case the contract shall be rescinded under Clause (a) above, the contractor shall not be entitled to recover or be paid any sum for any work there for actually performed by him under this contract unless and until the Executive Engineer shall have certified in writing the performance of such work and the amount payable to him in respect thereof and he shall only be entitled to be paid the amount so certified. In the event of either of the courses referred to in Clause (b) or (c) being adopted and the cost of the work executed departmentally or through a new contractor and other allied expenses exceeding the value of such work credited to the contractors amount of excess shall be deducted from any money due to the contractor, by BSCDCL under the contract or otherwise, howsoever, or from his security deposit or the sale proceeds thereof provided, however, the contractor shall have no claim against BSCDCL even if the certified value of the work done departmentally or through a new contractor exceeds the certified cost of such work and allied expenses, provided always that whichever of the three courses mentioned in clauses (a), (b) or (c) is adopted by the Executive Engineer, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchase or procured any materials or entered in to any engagements or made any advance on account of or with a view to the execution of the work or the performance of the contract.

20.0 Contract may be rescinded and security deposit forfeited for bribing a public officer or if contractor becomes insolvent

If the contractor assigns or sublets his contracts or attempt so to do, or become insolvent or commence any proceeding to get himself adjudicated and insolvent or make any composition with his creditors, or attempt so to do or if bribe, gratuity, gift, loan, perquisite, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given promised or offered by the contractor or any of his servants or agents through any public officer, or person in the employ of BSCDCL /Govt. in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract the Engineer In-charge may thereupon, by notice in writing rescind the contract and the Security Deposit of the Contractor shall thereupon stand forfeited and be absolutely at the disposal of BSCDCL and the same consequences shall ensure as if the contract had been rescinded under above clause J hereof; and in addition the contractor shall not be entitled to recover or be paid for any work therefore actually performed.

SECTION-7

SCOPE OF WORK, EMPLOYER'S REQUIREMENT AND TECHNICAL SPECIFICATIONS

1 SCOPE OF WORK

This specification covers Design, Engineering, Manufacture, Testing & Inspection in accordance with agreed QAP and Standards at Manufacturer's/ Vendors' works, Packing, Forwarding and Delivery/ Supply from Manufacturer's Works to Erection site, Unloading, Handling, Assembly, Erection, Testing & Installation, Commissioning and Performance demonstration at site; Operation and Maintenance for 5 years after go live of the equipment and systems listed below for ABD area's roads of the Bhopal Smart City;

a) Design, Engineering, Supply, Installation, testing and Commissioning of Smart Street lighting system along with CCTV Cameras, environmental sensors, and traffic signal system shall be installed on the street lighting pole.
b) Supply, installation, testing & commissioning of IP based Cameras on streetlight pole of 10 meters & above height with outdoor IP66 camera housing, hinged mounting accessories, IP65 Junction box for keeping Communication equipments, UPS, Power Supply, etc.
c) Supply, installation, testing, Commissioning of underground Optical Fiber connectivity to each camera with CCC and other monitoring station.
d) All required active & passive components, accessories, power supply cables, UPS, for communicating live video stream and functioning of the Video surveillance System will be in the scope of the contractor.
e) Providing connectivity of the required bandwidth at camera location, CCC and monitoring stations will be in the scope of the contractor.
f) Supply, installation, testing, commissioning of Environmental sensors at strategic locations as indicated in the drawing to monitor PM2.5. PM10, SOx, NOx, CO2 as per CPCB norms.
g) All the data from Environmental sensor will be transmitted to Central server located at Command Control Center (CCC).
h) LED Street Luminaries with accessories including Dimmable and non- Dimmable Drivers as applicable.
i) MS Lighting pole hot dipped galvanized P.U.Painted with decorative arms for mounting lighting fixture, Camera, and environmental sensor, inbuilt Junction Box, RCC foundation, Mounting Brackets, hardware, and other accessories
j) Connecting power Cables and Optical fiber cable shall laid in DWC/ HDPE pipes in case of underground cabling and shall be concealed in GI conduit above ground.
k) Earthing system for each pole and feeder pillars with accessories and termination shall be provided.
l) Smart Outdoor Feeder Pillars (OFP) with Smart streetlight Controller for individual and Group Control and Monitoring System
m) Excavation of trench or Horizontal Drilling for laying DWC pipes
n) Appropriate connectivity at each smart street light controller and feeder pillar shall be provided to connect it to CCC.
o) It is preferred to have all the application software's installed at CCC, but for any cloud based solutions; Cloud registration; hosting; uploading and managing all data after

Mapping of Feeder Pillars and Light poles as applicable shall be provided free of cost for complete project lifecycle.

p) All civil works associated with installations of the equipment/systems within BIDDER's scope including excavation, concreting, back filling of soil for preparation of equipment foundation, laying of HDPE & DWC pipes either by excavating of through HDD; embedment, chipping, punching, making holes, pipe sleeves, fire/ water proof sealing etc

q) Any other electrical equipment/ component which are not specifically listed above but are necessary to make the system complete and functional in all respect as per specification and statute

r) Fiber optic cables and power cables for street light / camera/ sensors/PA etc.

s) Supply, Installation, Testing, Commissioning of Active and passive networking components including industrial grade switches, LIU, Patch panel, Power supply unit, UPS for connecting the system to Command and control center.

t) Supply, Installation, Testing, Commissioning of required outdoor weatherproof junction box mounted on street light pole at appropriate height (height of junction box shall be kept in such a way that it should not be accessible easily without ladder), for housing active and passive network equipment, Power supply unit and UPS.

u) Separate metering shall be provided for street light and other security systems including CCTV camera, Traffic Signals, environmental Signals.

v) UPS power supply shall be provided to all other security equipments such as CCTV camera, Environmental Sensors, Traffic Signals, and Network equipment with at least 2 hours back up.

w) Operation and maintenance of LED Smart Street Lighting, Video Surveillance Camera, Network and other sensors installed on street lighting pole and Centralized Control and Monitoring System including setting up of software, Hardware, call centre; maintaining a service team, spare parts and providing service 365 days as per the Service Level Benchmark specified. The same shall also include the following;

I. Appropriate up-keeping, maintenance, and operation of all network, hardware, and software components, and ensure smooth functioning of the system throughout the entire contract period.

II. After completing life of equipments, the same equipments shall be replaced with new hardware / software of same or better specifications free of cost throughout the Contract period.

III. During the guarantee period, if any hardware or software needs to be replaced, the same will be replaced with same or better OEM and with same or higher configuration free of cost.

x) Maintaining a status Dashboard on the progress of the project and submission of periodic report on weekly basis to ULB during execution.

y) Maintaining a status Dashboard regarding the road wise operational status of the Light Poles, No of Complaints, resolution status, Preventive maintenance status and submission of periodic report on weekly basis to ULB during O&M period.

z) Manning a control room 24X7, 365 days and Monitoring the entire system for all parameters through CCMS and reporting the same appropriately to the concerned Authority.

aa) List of manpower deployed by the bidder during Operation and Maintenance period after go live to keep all the system up and defect free shall be provided along with technical bid. List shall include proposed positions, number of persons in shift, minimum qualifications and experience shall be provided along with technical bid.

bb) All cables and connection to equipment shall be concealed in conduit. Underground cables shall be concealed in HDPE conduits and above ground cables to be concealed in GI conduits. There should not be any open accessible cable above ground. Appropriate cable glands shall be used at entry and exit point to the enclosure.

cc) Supply installation testing commissioning of central servers and storage along with required software to monitor the environmental parameter centrally and providing graphical user interface.

dd) Video management system shall be provided to monitor, record the video stream coming from all the cameras. Storage shall be provided for all the cameras for 90 days recording with 1090P resolution and 15 FPS at H.264 compression. Detailed calculation of the storage shall be provided in the technical bid.

ee) Reports & trends of environmental parameters shall be available based on the location, period and region in the central monitoring software of environmental monitoring.

ff) All hardware, software, storage for 2 years of environmental data, networking equipments, monitoring display required for environmental monitoring system shall be provided by the contractor.

gg) Power cable for camera and Optical Fiber Cable required for communication shall be installed in the HDPE conduit underground at least 1 meter below the ground level.

hh) SI shall use industry leading practices during the implementation phase w.r.t positioning and mounting the cameras, poles and junction boxes. Some of the check-points that need to be adhered to by the SI while installing / commissioning cameras are as follows:

   a. Ensure surveillance objective is met while positioning the camera such that the required field of view is being captured as finalized in field survey.
   b. Ensure camera is protected from the on field challenges of weather, physical damage and theft.
   c. Make proper adjustments to have the best possible image / video captured.
   d. Ensure that the pole is well placed for vibration resistance adhering to the road safety norms.
   e. Collusion preventive barriers around the junction box & pole foundation in case it's installed in collision prone place.
   f. Appropriate branding or color coding (Police/Authority Branding) of poles and junction boxes, to warn mischief mongers against tampering with the equipment at the junction.
   g. shall ensure that physical look of the installation area returns to neat & tidy conditions after installation of poles, cantilevers etc. The placement shall be designed keeping in mind the normal flow of vehicular traffic and pedestrian movement is not disturbed.

h. Bidder should co-ordinate with the contractor of the CCC building of ABD area while implementation.

i. INDICATIVE MILE STONES TO BE ACHIEVED DURING THE CONTRACT EXECUTION

Entire work shall be completed as per time schedule. However, the indicative period of completion for the following major mile stones is as follows. The same shall be finalised mutually after award of work based upon BSCDCL's requirement and contractor shall furnish micro detaining including resource planning to achieve such intermediate mile stones of the project. Such detailed schedule to be furnished by the contractor immediately after award of work but before mobilization.

2 LIST OF DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT

2.1 Following drawings, calculations & schedules shall be submitted for approval before procurement, fabrication and Installation of equipments at site,

A)	**Drawings**
1.0	Single Line Diagram of Complete Electrical System based on the design criteria.
2.0	415V LT Panel / Feeder Pillars
a.	Complete assembly drawings of distribution board showing plan, elevation and typical sectional views and location of cable boxes and control cable terminal blocks for external wiring connections, etc.
b.	Foundation plan showing the location of channel sills, foundation, and anchor bolts and anchors, floor plans and openings.
c.	Schematic power, Feeder operation logic and control wiring diagrams with control, interlocks, relays, instruments, space heaters, starters with Bi-metallic relay ratings and contactor ratings, bus bar rating with material etc.
d.	Details of breakers, relays and other components as may be incorporated.
e.	Type test certificates not older than last three years
3.0	Cabling system
a.	Construction of mains cable, streetlight cables, OFC inside trench and typical connectivity to streetlight poles.
b.	Details of Installation of Cables in Trenches/Tunnels, on cable trays, racks directly buried etc., at all locations as specified.
c.	1.1kV Cable routing layout for road lighting and security equipments.
d.	Bill of quantities of LT cables, lugs and glands
4.0	Earthing system
a.	Detail calculations of earthing network main grid calculations.
b.	Earthing notes including detail write up and drawings of earthing conductor layout, equipment & structural earthing, joints, cable earthing,

	instrument earthing and special earthing.
c.	Details such as material, sizes, etc. of the earth conductor and electrode pits
d.	Earthing layout drawing showing routing of strip with interconnection of equipment earthing to the grid and earth pits
5.0	Lighting System
a.	Road Lighting and Tunnel lighting layout with type of mounting details, Type of fixture details and Circuit diagram showing phase wise load distribution and Detailed lux level calculations.
b.	Street Light pole details with Foundation details.
c.	Flood light pole/tower/high mast with foundation details.
6.0	All Civil drawings related to foundation, earthling system at each pole.
B)	**Calculations**
a.	Fault level Calculations
b.	LT cable sizing
c.	Earthing Sizing Calculations
d.	External Lighting Calculations as per Lux level given in IS 1944 Part-I.
e.	Storage and bandwidth calculations for CCTV cameras with full HD resolution (1080P), 25 FPS for viewing and 15 FPS for recording with 90 days of storage
f.	UPS load calculations at each locations
C)	**Schedules**
a.	Cable Schedule
d.	Junction Box and other equipment Schedule,
7.0	Architecture diagram for video surveillance system (CCTV) including Video Management System and Video Analytics.
8.0	Architecture diagram for traffic Signal System and Central Monitoring System
9.0	Architecture diagram for environmental sensors and Central Monitoring System
10.0	Network Connectivity diagram for field sensor with Command and Control Center.

All equipment/system sizing calculations/drawings shall be submitted to the client for approval whether specifically mentioned or not.

2.2 DOCUMENTS REQUIRED TO SUBMIT BY SUCCESSFUL CONTRACTOR

a) Detailed Project report with proposed solution including the following;

i. Road details – Total RoW width, Width of carriage way/ foot path/ drains, road length etc.

ii. Design calculations for each road

iii. Summary of Road, road width as above, Design lux, Pole height, calculated lux level, no. of FP, Luminaire wattage

iv. Guaranteed Energy consumption for each FP including the losses.

v. Identified source of power, single line diagram and space provisions for Switching points for each road

vi. location drawings for poles, Switching points and cable laying corridor

vii. Offered systems, components, their technical data sheets and type test reports;

viii. System Architecture drawing

ix. Details regarding Cloud Server and Lighting management Software with compatibility to integrate with command control center.

x. Communication Protocol

xi. O&M SOP – Procedure, description of works to be carried out, Regular Inspection Plan, regular Quality Control Plan, regular maintenance plan for Predictive & Preventive maintenance.

xii. Office / Storage space General arrangement layout

xiii. Resource Deployment plan for manpower and tools

xiv. Details of Call centre & Complain management system – system and component technical details

xv. Organisation structure and team CVs

xvi. Detailed execution micro schedule to meet the target dates with milestones & deadlines – Order of roads for installation

xvii. BOQ

xviii. Make offered along with model number and data sheets of offered equipments.

b) Execution drawing with coordinates of each pole and Switching point for each road

c) Civil foundation drawings with Calculations for each height of pole

d) Equipment Manuals: Original Manuals from OEMs

e) Installation Manual: For all the application systems

f) User Manuals: For all the application software modules, required for operationalization of the system.

g) System Manual: For all the application software modules, covering detail information required for its administration.

h) Control schematic diagram and interconnection diagrams for switching points

i) Test reports of bought out components

j) Inspection reports of the components, luminaries and system

k) All drawings shall carry BSCDCL's name, purchase order no. with date, project title, consulting engineer's name and adequate space for drawing approval.

l) Training Material: Training Material will include the presentations used for trainings and also the required relevant documents for the topics being covered. Training registers should be submitted for same.

m) Standard Operational Procedure (SOP) Manuals: The draft process (SOP) document for O&M and all other services shall be formally signed off by BSCDCL before completion of Final Acceptance Test. This SOP manual will be finalized by the CONTRACTOR within 2 months of operationalization, in consultation with the BSCDCL and formally signed off by the BSCDCL.

n) The CONTRACTOR shall ensure upkeep & update all documentation and manuals during the Contract period. The ownership of all documents, supplied by the CONTRACTOR, will be with BSCDCL. Documents shall be submitted in two copies each in printed (duly hard bound) & in softcopy formats

o) Data sheet to be filled by CONTRACTORS as per Clause No. 3.

3 DESIGN CRITERIA

3.1 SYSTEM DESCRIPTION

INCOMING POWER SUPPLY ARRANGEMENT FOR STREET LIGHTING SYSTEM

Scope of contractor shall start from LT Cable laying and termination for feeder pillar from nearest Compact substation / DISCOM Distribution transformer.

3.2 GENERAL DESIGN CRITERIA

The proposed power distribution system shall be designed in accordance with this specification, taking into account all possible factors affecting the choice of the system to be adopted; such as required continuity of supply, flexibility of operation, Operational costs, reliability of supply from available power sources, total load and the concentration of individual loads.

All the components of the electrical system shall be sized to suit the maximum load under the most severe operating conditions. Accordingly, the maximum simultaneous consumption of power, required by continuously operating loads shall be considered and an additional margin shall be taken into account for intermittent service loads, if any. The amount of electrical power consumed by each area shall be calculated for its operation at the design capacity.

All the system and Equipment shall be designed with a reference ambient temperature of 50Deg C.

3.3 Codes and Standards:

a) National Lighting Code (2010)
b) National Electric Code (NEC)
c) IS Codes
d) IE rules
e) National Building Codes (NBC)
f) IS 1944 (Part I to V)

The codes and standards mentioned in this specification shall be latest as on the day of execution of the works unless otherwise specified. The revisions in the relevant codes and standards if any after the date of award of contract shall be informed by the Contractor to the Consultant/ Owner within 30 days of the issue of such revision of the codes/ standards. Consultant/ Owner may approve use of the earlier code/ standard if the revisions do not materially affect the statutory requirements of the project or does not impact safety practices. Any cost impact arising out of such revisions shall be mutually agreed. Nothing in this specification shall be construed to relieve the CONTRACTOR of this responsibility

3.4 System Design Criteria:

The system shall be designed taking in to consideration the following system variation:

Voltage: +10% to -10%

Frequency: +3% to -3%

Combined voltage and frequency variation: +10% to -10%

The load distribution should be such that the load unbalances does not exceed 5% at the point of commencement of supply.

The system power factor shall be at least greater than 0.9.

In normal operating condition, cumulative voltage drop from Main panel to the last equipment in the topmost floor shall not exceed 5% (measured at load end).

Fault level for HT shall be considered as 20kA for 1 sec or actual calculated during detailed design stage by the Contractor, the stringent being applicable.

The fault level for LT system at transformer terminal shall be calculated based on the transformer rating and its impedance as per relevant IS 2026 / 1180 and based on IS 1180 for transformer losses limitation. However, minimum short circuit rating of switchgear and cable withstanding capacity shall be considered as 25kA for 1 sec for ACB/MCCB at PCCs and Bus bar Short Circuit as per actual calculation.

3.5 LT Panels

All Panels shall be indoor / outdoor type having incoming sectionalisation and outgoing switchgears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP 52 for indoor and IP55 for outdoor as per IS: 13947 (Part-I). All LT Panels shall conform to FORM 3B as per IS 61439. The LT Panels shall be as per the standards IEC 61439.

LT Panel shall be of internal arc type tested with Internal Arc withstands level at rated fault level or 50kA or for actual fault level, for 0.3s.

Busbar: All panels shall be provided with Aluminum busbar. Distribution boards with incomers below and including 63A shall be provided with tinned copper bus bars.

The bus-bars shall be sized considering the following criteria:

a) Sleeves made of insulating material on all bus bars.
b) Design ambient temperature 50ºC.
c) Final temperature of the bus-bars complying with requirements of relevant standards.
d) Bus bars being inside the panel; De- ration for enclosure and ventilation.
e) Bus bar suitability for carrying rated current continuously. The current density (A/mm²) of the bus bar shall not exceed 0.8 for Aluminium bus and 1.6 for Copper bus.
f) Configuration of bus bars and Proximity effect.
g) The main bus shall be designed based on the load rating as well as the actual fault level for specified duration at the location of the panel with 10% positive tolerance.
h) Earth bus of the panel shall be sized suitable for the above fault level for the same duration.

Switchgear Sizing/ Selection:

Switchgear shall be sized/ selected considering the following:

(a) Rating suitable for carrying full load current of the equipment / feeder.
(b) Suitability for Short Circuit Rating for specified duration.
(c) In panel de-ration of minimum 20% or as provided in Manufacturer's catalogue, whichever is higher shall be considered.
(d) Switchgear rating for individual capacitor bank shall be sized at 1.5 times the rated current rating.
(e) Appropriate Electro-Mechanical Interlock (EMI) shall be provided between two transformer incomers.

(f) ACBs shall be considered for switchgear ratings above 630A and MCCB shall be considered up to 630A. All ACBs and MCCBs shall be rated for Bus fault level with Ics=Icu=Icw=100% for ACB and and Ics=Icu=100% for MCCBs.

(g) MCCBs up to 250A shall be thermal magnetic type and above 250A shall be microprocessor based.

(h) MCB shall not be used as power distribution at any LT Switchgear. MCBs shall be considered only for Lighting panels and Raw power distribution feeders i.e. feeders below 10kW load.

(i) Miniature Circuit Breaker (MCB) shall be considered where fault level is below 10kA.

(j) All Panel incomers shall be provided with Microprocessor based overload (O/L), Short circuit (SC) and Earth fault (E/F) release and Microprocessor based overload (O/L), Short circuit (SC) for outgoing feeders.

(k) Multi-function meter for measuring current, voltage, power, frequency, active and reactive power, and harmonics shall be provided for all the incomers.

(l) 20% spare capacity shall be considered on each panel for future.

3.6 Cabling System

LT Cables shall be 1100V earthed grade, single/multi-core, stranded and compacted aluminium conductor, extruded XLPE insulated, extruded PVC inner sheath (Type ST-2), armoured and extruded overall sheath with Fire Retardant Low Smoke (FRLS) PVC compound (Type ST-2). The cables shall conform to IS-7098 Part -I.

Cables up to & including 6 mm² shall be Copper multi-stranded conductor with PVC insulation galvanized steel round wire armoured & cables beyond 6 mm² shall be Aluminium multi-stranded conductor with XLPE insulation & galvanized steel flat strip armoured.

All LT cable shall be conforming to IS 7098 Part I for XLPE cables and IS 1544 – Part I for PVC cables.

All control cables shall be 650 V grade copper conductors FRLS PVC insulted cables conforming to IS 1544- Part I. For cables above 7 cores, minimum two spare cores shall be considered.

All the cabling and rising mains to the individual floors shall be laid through the electrical ducts provided in the building core with access window on each floor/ staircase landing.

The following main aspects shall also be considered while deciding the size of the cables/ wires:

(a) Supply voltage and frequency.

(b) Corresponding full load current under site conditions, i.e, necessary de-rating considerations.

(c) Route length and method of laying of cables.

(d) Maximum allowable temperature rise under normal full load condition based on the material of cable insulation (XLPE/ PVC).

(e) Maximum short circuit current duration (fault clearing time) and final temperature of cable during short circuit current flowing through the cable.

CONTRACTOR to note that, the above fault clearing times are minimum to be considered. Actual fault clearing time shall be considered as per actual relay co-ordination.

(f) Standardization of cable sizes shall be preferred.

(g) Appropriate de-rating factors as per cable manufacturer's catalogue and enlisted below shall be considered for sizing the cable:

(i) Ambient Air Temperature (minimum 50ºC).

(ii) Ambient ground temperature (minimum 40ºC to be considered).

(iii) Method of cable laying.

(iv) Depth of cable burial (minimum 750 mm for LT).Cables laid under the carriage way under any condition shall not be less than 1000mm for the FRL/FGL as the case may me.

(v) Thermal Resistivity of Soil (minimum 150ºC Cm/ W to be considered).

(vi) No. of cables in a group

(vii) No. of cable trays in tier.

(viii) Any other de-ration factors as applicable & as per Manufacturer's catalogue.

3.7 Manholes and Pipes:

(i) RCC pipes shall be provided where cables need to cross the roads, drive ways.

(ii) Power and control cables will be laid in DWC HDPE pipe.

(iii) Suitable size manholes with sufficient number of adequate size pipes will be provided for laying of different voltages of power and communication cables.

(iv) Manhole will be constructed at required intervals.

(v) Manhole covers will be water tight and shall fit the frame without undue play.

(vi) Frames and covers for manhole in vehicular traffic areas shall be flush with the finished surface of paving.

3.8 Earthing system

The earthing system shall comprise one or more earth electrodes, earthing network, mesh or a combination of these in order to obtain grid resistance of less than 1Ω.

Latest version including all amendments of following standards and codes shall be referred to for designing the Earthing and Lightning protection system:

a)	IS 3043- 1987, (Reaffirmed in 2016)	:	Code of practice for Safety Earthing
b)	CEA guidelines 2010	:	Measures related to safety & electric supply.
c)	IEEE 80-2000-2013		IEEE Guide for Safety in AC Substation
d)	CPWD Specifications - 2013		General Specifications for Electrical Works Part I - Internal

Soil Resistivity: The earthing system shall be designed by considering measured soil resistivity during detailed engineering and the earthing calculation shall be done. Measurement of soil resistivity at site by Wenner's four electrode method as per IS: 3043 – 1987 shall be carried out.

Size of Earthing Conductors: The earthing conductor sizes shall be calculated as per IS 3043. Following factors will be considered for sizing the earthing conductor:

Design Ambient Temperature	50°C
Allowable temperature rise	500°C
For steel welded joints Fault clearing time	1.0 s
Overall earthing resistance of the grid	Less than 1Ω

The maximum values of earth fault current for the design of the earthing system will be considered based on system requirement as follows:

a) 11 kV system : 20kA for 1s

b) 415 V system : 20kA for 1s (will be decided as per actual fault level calculation)

Equipment Earthing

GI pipe electrode as specified in IS 3043 or as per local electricity board, CEIG, CPWD requirements, whichever is stringent, shall be provided for the earthing of non-current carrying parts and enclosures of all electrical equipment such as LT panels, Feeder pillars, etc.

Two GI pipe electrodes shall be provided for each feeder pillar panel. Coil earthing will be used for lighting pole. The neutral point of the 11/0.433kV transformers secondary windings shall be solidly earthed. Electrode shall be connected to the equipments by two runs of GI strip of min size 25X6 mm laid in DWC HDPE pipes.

3.9 Materials used for earth electrodes shall be designed to suit the ground conditions and shall be galvanized. **Illumination System**

The CONTRACTOR shall design the system for each road keeping the following in view;

i. The level and type of lighting adopted for a street shall be based on its traffic importance, both vehicular and pedestrian. However, the system of lighting to be provided should take into account all the relevant factors, such as the presence of factories, market, or places of public resort, the character of the street like trees, landscape etc.

ii. Public lighting should permit users of the road at night to move about with the greatest possible safety and comfort so that the traffic capacity of the road at night is as much equal to that planned for the daytime as possible.

iii. The driver should be able to see distinctly without the use of dipped or driving headlights and locate with certainty and in time all significant details notably the alignment of the road (its direction and its surrounds)

iv. The glare due to luminaries should be controlled at a value which keeps the visual discomfort to which the driver is subjected below an acceptable level as per the latest standard.

v. The pedestrian should be able to see distinctly the edges of the footways, vehicles and obstacles; dark patches should not occur.

The above aim shall be achieved with due respect to the aesthetic appearance of the lighted road within acceptable limits of cost of installation and maintenance.

All the required Design Factors shall be considered as per the latest version of IS 1944 and National Lighting Code 2010

Maintenance factor shall not be considered less than 0.8 for the lighting calculation.

Lighting design shall be performed using latest validated version of DiaLux Software (Version 4.12 or higher)/ Original Equipment Manufacturer (OEM) validated software. The Validation Report validated from Accredited Authority shall be submitted along with the BID.

Maximum power output of each Feeder Pillar for calculating the incoming cable size shall be considered not less than 10 kVA. The voltage drop at the terminals of the farthest pole shall not exceed more than 3% from the Feeder Pillar. Cumulative voltage drop from HT to the farthest Point for one feeder Pillar group shall not exceed 5%.

The following criteria shall be followed for designing the CCMS system for the Indentified roads;

i. Only Group ON-OFF shall be provided for the cycle lane, footpath having lights on 6 mtr. Height pole.

ii. Group ON-OFF Plus individual Dimming shall be provided for the carriage way roads having Lights on 10 mtr. Height pole

iii. Dimming shall be possible up to 100% of the rated output. Setting shall be carried out site specific.

iv. Only Step-less Dimming shall be provided for the Luminaires where applicable.

v. Peak and off peak hours specific to each switching point / feeder panel would be defined by Employer.

vi. For street lighting, cabling shall be done with 4C armoured XLPE cable such that alternate fixtures are on R, Y, B Phases.

vii. Each street lighting controller shall be provided with Ethernet port with optical fiber backbone connecting to Command Control Center.

viii. Hot dipped Galvanized MS poles with decorative arms of suitable height and fittings with suitable wattage lamp will be provided on roads, cycle/ footpath/utility corridor to achieve suitable lux as recommended in IS 1944. Pole and arm design shall be approved by Employer.

ix. Power supply will be fed to street light poles from outdoor type feeder pillars which will receive power supply from nearest proposed compact type substation.

x. Comprehensive on-site warranty of 05 years from the date of Go Live shall be provided for all the components including LED Street light fixtures, CCTV Cameras, Network Equipment, Environmental sensors, traffic Signals and all accessories of associated systems.

Proposed road classification and lux level requirement for ABD area:

S.N.	Typical Road Type	Road Length (km)	Pole Height (m)	Street Lighting Arrangement type	Required LUX level (Carriage way)	Required LUX level (Footpath / cycle lane/ utility corridor)
1	45M	3.689	10 (carriage way median) 6 (Foot-path, cycle track))	Twin Central	40	30
2	30M	3.541	10(carriage way median) 6 (Footpath, cycle track))	Twin Central	40	30
3	24M	1.834	10 (carriage way)	Twin Central	40	30
4	18M	2.196	10 (carriage way)	Twin Central	40	-
5	12M	2.169	10	Single Sided	40	-
6	6M	1.352	6	Single Sided	30	-
	Total	**14.781***				

*Actual measurement shall be done at site.

4 TENDER DATA SHEETS

ELECTRICAL INSTALLATION WORKS

The Contractor shall furnish the following details as a part of technical bid. Contractor shall furnish all relevant catalogues relevant to the equipment required for Electrical Installation Works.

(I) 415V METAL ENCLOSED SWITCHGEAR

S. N.	Description	Unit	Technical Particulars
1	415 V Switchgear And Busbar Ratings		
(a)	Rated voltage phase and frequency		
(b)	System Neutral Earthing		
(c)	Maximum system voltage		
(d)	One minute power frequency voltage		
	i) Power circuits		
	ii) Control circuits		

S. N.	Description		Unit	Technical Particulars
	iii) Aux. Circuits connected to Sec of CTS			
(e)	Continuous current rating of Busbars under site reference Ambient Temperature and type			
(f)	Busbar insulation			
(g)	Reference Ambient Temperature			
(h)	Maximum Temperature of Busbars, Droppers and Contacts at Continuous			
	current rating under site ambient temperature			
(i)	Short Circuit current withstand for Busbars and droppers (i) Short time 1 sec			
	(ii) Dynamic Rating			
2	Switchgear Constructional Requirements			
(a)	Type of Construction			
(b)	Thickness of sheet steel (i) Frame, Frame enclosures, doors, covers and partitions			
(d)	Colour finish shade			
(e)	Earthing bus	Material		
		Size		
	Earthing conductor	Material		
		Size		
(g)	Minimum clearances in air of live parts (i) Phase to Phase			
	(ii) Phase to Earth			
(h)	Cable entry to cubicles			
3	Instrumentation Transformers			
(a)	Current transformer			
	(i) Ratio			
	(ii) Burden			
	(iii) Accuracy Class			
(b)	Voltage transformer			
	(i) Ratio			
	(ii) Burden			

S. N.	Description	Unit	Technical Particulars
	(iii) Accuracy Class		
4	Type of Starter for MCC Panel		

NOTE: CONTRACTOR HAS TO SUBMIT THE ABOVE DATA SHEETS FOR 415 V MCC/FEEDER PILLAR/ /LIGHTING DBS ETC.

(II) HV, LV POWER & CONTROL CABLES

S.N.	Description	Unit	Technical Particulars	Technical Particulars
			power cables	**Control cables**
1	Name of the Manufacturer			
2	Conductor(stranded/solid)			
2.1	Form circular/segmented			
2.2	Nominal diameter in mm			
2.3	Effective cross sectional area sq mm			
3	Whether cores identified by numeral for cable with five core and above.			
4	Whether incremental running lengths are marked on cable at every 1 m interval.	YES/NO		
5	Finished cable			
5.1	Diameter under armour in mm			
5.2	Diameter over armour in mm			
5.3	Overall diameter in mm			
6	Whether cables will carry ISI stamp.	YES/NO		
6.1	If not explain reasons			
7	Cable drums			
7.1	Length of cables in cable drum and tolerance			

S.N.	Description	Unit	Technical Particulars	Technical Particulars
			power cables	**Control cables**
7.2	Weight of cable drum without cables			
7.3	Weight of cable drum with cables			
8	Type of end sealing			
9				
9.1	Any other details the VENDOR would like to furnish?			
9.2	List of deviations if any from specification, data sheet-A and applicable standard furnished			
9.3	Conductor screen			
9.4	Insulation			
9.5	Insulation screen			
9.6	Sheath			
9.7	Armour			

(III) LIGHTING FIXTURES & ACCESSORIES

Sr. No.	Parameter	Technical Particulars (To be filled by BIDDER)
1.	Type	
2.	Rated Voltage	
3.	Expected Frequency	
4.	Operating Voltage Range	
5.	Power Factor	
6.	Operating Temperature Range	
7.	Working Humidity	
8.	Driver Type	

Sr. No.	Parameter	Technical Particulars (To be filled by BIDDER)
9.	Driver Efficiency	
10.	Driver Life	
11.	Protection required in Driver module	
a.	Short Circuit	
b.	Over Voltage	
c.	Over Temperature	
d.	Under Voltage	
e.	String Open Protection	
12.	Luminaire IP Protection	
13.	Minimum Surge Protection	
14.	THD	
15.	Rated Minimum LED Life (L70)	
16.	Rated Minimum Driver Life	
17.	CRI	
18.	Junction temperature rise	
19.	Solder point temperature	
20.	Maximum temperature rise for Driver	
21.	Make of LED	
22.	Make of Driver	
23.	Operating Hours	
24.	Luminous Efficacy	
25.	System Efficacy	
26.	Colour Temperature	
27.	Illumination Regulation	
28.	Material used for following	
a.	Housing	
b.	Heat Sink	
c.	Clip / Fasteners	
d.	Diffuser	

Sr. No.	Parameter	Technical Particulars (To be filled by BIDDER)		
29.	Maximum temperature of Heat sink			
30.	IK protection of Optic Cover			
31.	Wires used Inside Luminaries			
32.	Cable gland IP protection			
33.	Maintenance factor			
34.	Total of LED fixture			
35.	Wattage of each fixture			
36.	Total Power Consumption			
37.	Illumination			
a.	Average			
b.	Uniformity (Min./Avg.)			
c.	Uniformity (Min./Max.)			

(IV) EARTHING SYSTEM

S. N.	Description	Material	Technical Particulars
1	**Main Earthing Grid**		Quantity - As per requirement & Sizes – As per Fault level
a)	Buried in earth	MS	
b)	Buried in floor slabs in buildings	MS	
2	**Conductor Leads To Equipment (above ground) – Substation Equipment & Structures**		
a)	Transformers	GS	
b)	C.T. and P.T. body		
c)	Fence posts and gates (Flex. braid)		
d)	11kV Switchgear, 415V switchgear,	GS	
e)	Motors		
	(i) 415V Motors above 10 kW	GS	

S. N.	Description	Material	Technical Particulars
	(ii)415V Motors up to 10 kW	GI wire	calculations
	(iii)Fractional horse power motors	GI wire	
f)	Other Items		
	Main lighting D.B, Control panels and sub-lighting distribution boards	GS	
	Hand Rails	GS	
	Cable trays	GS	
	Tanks	GS	
	Junction boxes	GS	
	Lighting fixtures, receptacles, lighting conduits	GS	
	Push button stations, limit switches	GS	
	Crane rail	GS	
	Street lighting, flood lighting poles and junctions boxes	GS	
	Metallic non-current carrying structures	GS	
	Electrodes	GS	
	Pipe electrode	GS	

5 LIST OF SPARES

The Contractor shall provide all the spares required for the satisfactory & trouble free operation for complete electrical system. It is in the scope of the Contractor to supply all the spares part during the operation & maintenance period.

6 LIST OF RECOMMENDED MAKES

All the electrical equipments to be supplied under this contract have to be of reputed makes. The equipment of those manufacturers, who have sufficient proven experience of manufacturing the respective equipment of similar capacity, shall be considered. The respective equipment should have been manufactured, supplied, installed, commissioned successfully and should be running satisfactorily since at least last 5 years continuously. Certificates from end users, regarding their satisfactory Performances, shall have to be submitted in this regard.

Following is the list of recommended makes:

Sr. No.	Material/ Equipment	Vendor
1.	Potential & control Transformer (CT/PT)	Automatic Electric Precise Kappa Pragati

Sr. No.	Material/ Equipment	Vendor
2.	Current Transformer (Cast Resin Epoxy Coated)	Automatic Electric Gilbert & Maxwell Kappa Pragati
3.	Electronic Digital Meter (A/V/PF/HZ/KWH) /MFM with LCD/LED Display.	Schneider Siemens AE Socomec L & T
4.	HRC Fuse and Fuse Fitting	ABB GE Siemens L&T
5.	ACB / MCCB/ Contactors	ABB Schneider Siemens L&T
6.	Change over switch (automatic/ manual)	HPL Hager Socomec GE
7.	Thermister relay	Alstom/ Minilec/ Siemens
8.	Push Buttons	ABB L&T Schneider Siemens BCH
9.	A. Power Distribution Panels & Boards Totally Type Tested Assembly (TTA) (AS PER IEC61439- 1 & 2). To be sourced directly from OEM or authorized licensed partner.	Advance Panels & switchgears (P) Ltd. Adlec Power Pvt Ltd. Control & Switchgears Jakson
10.	Switches, Time Delay Relay	Schneider Siemens Hager Legrand
11.	Indicating Lamps	Siemens Schneider ABB L&T BCH Esbee
12.	HT/ LT Power Cables	Universal

Sr. No.	Material/ Equipment	Vendor
		NICCO KEI KEC International Finolex CCI
13.	HT/ LT Jointing Kit & Termination Kits	Birla-3M Raychem M seal
14.	Termination (Lugs)/ Cable Glands(Double compression)	Commet Dowell Jainson
15.	Selector Switches	Kaycee ABB Siemens Schneider
16.	Copper Conductor PVC Insulated Wires/ Stranded Flexible Wires (FRLS) (including panel wiring)	Finolex RR Kabel KEI Havells LAPP India
17.	Non-insulated Copper Earthing conductors	Gupta Industrial Corporation (Vasai, Palghar) Bharat Wires & Ropes Diamond Cables
18.	Modular Switches, Socket Outlets And Wiring Accessories With Moulded Cover Plate.	Legrand Schneider MK Crabtree
19.	MCB/RCCB/ SPD/RCBO/ MPCB	Legrand Schneider Siemens ABB
20.	Distribution Boards(MCB DBs)	Legrand Schneider Siemens ABB L & T
21. a.	Street & Landscape Lighting	Wipro Disano Bajaj Philips Lighting technologies Keselec (Schreder)

Sr. No.	Material/ Equipment	Vendor
		Havells Neri
b.	LED / Driver	Cree Nichia Philips Lumileds Osram
22.	GI Decorative Poles	Bajaj Keselec-Schreder Valmount K-lite Jindal Power Aster Transrail Ltd utkarsh nezone Neri
23.	Lightning & Surge Voltage Protection	ABB Hager OBO Betterman DEHN
24.	Terminal Blocks /connectors	Jainson Elmex Connect well Wago
25.	Selector Toggle Switch	Kaycee Salzer (Larsen & Toubro) ABB
26.	Water barriers/sealing system	Roxtec Rayflate (Tyco Electronics)
27.	Fire Survival cables	INDIA-IMPEX(FRTEK) LEONI Bonton Fusion Polymer
28.	Timers	Schneider Siemens L&T Legrand
29.	Polycarbonate Sockets	Clipsal MANNEKER Legrand
30.	Water Tight Polycarbonate Boxes	Hensel

Sr. No.	Material/ Equipment	Vendor
		Legrand Phraser
31.	Astronomical Timer	The ben ABB Siemens

ICT RECOMMENDED MAKES for Bhopal Smart City ABD Area		
Sr. No.	**Component/ Equipment**	**Recommended Makes**
1	CCTV Outdoor Box Camera	Axis, Honeywell, Bosch, Panasonic, Pelco, Verint, Sony and Equivalent
2	Automatic Number Plate Recognition (ANPR) hardware and GUI application software.	Vehant technologies, Kapsch, Verint, Luxriot and Equivalent.
3	Red Light Violation Detection (RLVD) hardware and GUI application software.	Vehant technologies, Luxriot and Equivalent.
4	Speed Violation Detection System hardware and GUI application software.	Vehant technologies, Kapsch, Luxriot and Equivalent.
5	Face Recognition Software	Panasonic, Verint, NEC, Avigilon, Luxriot, AllGoVision and Equivalent.
6	Video Management System Software	Genetec, Mildstone, Verient, Luxriot, videonetics, Mirasys and equivalent
7	Video Wall along with Video Wall Controller	Barco, Delta, Plannar, LG, Pyrotech and Equivalent.

8	CCTV Server	DELL, HP, IBM and Equivalent
9	Ethernet L3 Core Switch, L3 POE Switch, Aggregation switch, Industry grade Switch,	CISCO, HP, ALLIED TELESIS, JUPITER and Equivalent.
10	Ambient Air Quality Monitoring (AAOMS) Sensors along with Data Acquisition system	Environment SA, Chemtrols, Envirotech, Thermofisher and Equivalent.
11	Optical fiber cable	Finolex, Sterlite, Commscope and Equivalent.
12	Variable Message Sign Board	Ortana, Swarco, Efftronics and Equivalent
13	Public Address System	Honeywell, Bosch, Ateis, Axis and Equivalent
14	Emergency Call Box	Ateis, Telcom-data, Trafitek and Equivalent
15	Adaptive Traffic Control System	CMS, Trafitronics, Keltron and Equivalent

Note:-

1) Only one of the above makes of the materials will be acceptable. The Contractor has to comply with the approved makes given in the tender document.
2) The Bidder shall offer the equipment of makes mentioned above. Other makes are subjected to Client approval before procurement.
3) For standardization, inventory, system coordination, the Employer/ Employer's Representative can insist on any one make from the makes indicated above or equivalent .
4) The items shall meet specifications. Mere mention of a make as approved make in the above list does not qualify for acceptance of an item.

7 PERFORMANCE CRITERIA

GENERAL

The contractor shall carry out the work in accordance with the Detailed design and Good for Construction drawings to be prepared by the Contractor.
Preliminary Drawings, Specifications, data sheets and other documents forming part of the Contract.

The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.
The contractor shall guarantee that the system as installed shall perform to complete satisfaction and requirements of the owner.
The contractor shall also guarantee that the performance of various equipments individually and integrated shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.
Rating of all items shall be appropriate for the conditions on the particular site on which the item will be used. All the equipment shall be fit for continuous work under the most severe weather conditions of site.
At the close of the work and before issue of final certificate of virtual completion, the contractor shall furnish written performance guarantee against defective materials and workman-ship for a period of five years from date of testing, commissioning and handing over.
The Contractor shall hold himself fully responsible for reinstallation or replacement free of cost to Owner the following:

a. Any defective work or material supplied by the Contractor.

b. Any material or equipment damaged or destroyed as a result of defective workmanship by the Contractor.

MANUFACTURERS

- All the equipments to be supplied under this contract have to be of reputed makes. The equipment of those manufacturers, who have sufficient proven experience of manufacturing the respective equipment of similar capacity, shall be considered. The respective equipment should have been manufactured, supplied, installed, commissioned successfully and should be running satisfactorily since at least last 5 years continuously. Certificates from end users, regarding their satisfactory Performances, shall have to be submitted in this regard.
- Where manufacturers have furnished specific instructions relating to the materials used in this job, covering points not specifically mentioned in these documents, these instructions shall be followed in all cases.
- Where manufacturer's names and/or catalogue numbers are given, this is an indication of the quality, standards and performance required.
- For items not covered under the List of Approved Makes', contractor shall offer items of first class quality, standards and performance and obtain the approval of Construction Manager/Consultants before procuring them.
- Where interfacing occurs, all equipments shall be mutually compatible in all respects.

8 TECHNICAL SPECIFICATIONS OF ICT COMPONENTS:

Technical Specifications mentioned below are the minimum required specifications and bidder can offer the product meeting the minimum specifications or exceed the specifications. Bidder is required to provide the offered model and Make along with technical compliance and OEM’s Datasheets in technical bid. The bid without technical compliance shall be considered non responsive and rejected.

I. Technical Specifications of IP Based CCTV Outdoor Box Camera

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Type Of Camera	Outdoor Box IP Night Vision High Definition Camera		
4	Housing	Vandal Proof, IP 66, Rugged, Durable, Industrial Grade, Cast Aluminum, with in-built heater /blower & sunshield.		
5	Image Sensor	Min. 1/2.8" Progressive Scan CMOS Sensor		
6	Video Resolution	Full High Definition, 1920x1080		
7	Lens	5 - 50 mm, Vari-focal lens		
8	Day/Night Operation	Required/ Automatic		
9	Iris Exposure Control	Auto mode/ manual mode		
10	Wide Dynamic Range	Required >80 dB		
11	Min. Illumination / Light Sensitivity (Lux)	0.2 lux for color and 0.1 for B/W		
12	Video Compression	H.264 or better		
13	White Balance	Automatic		
14	Electronic Shutter	Automatic		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
15	Infrared Capability	Required with at least 30 meter IR (internal/External)		
16	Multi Streaming	Required at least 2 streams. Both the streams shall be of independent resolution and compression. Maximum resolution for each stream shall be same as the resolution of the camera (i.e. 1080p)		
17	Frames Per Second	25 fps		
18	Signal to Noise Ratio	>50 dB		
19	Motion Detection	Built-in Required		
20	Back Light Compensation	Required, On/Off		
21	Tampering Alarm	Required (tampering such as de-focus/ move viewing direction/ masking)		
22	IEEE 802.1x Compatible	Required		
23	Network	IP v4/ v6		
24	Network Protocols	TCP, IP, HTTP, HTTPS, IGMP V2/ V3, SMTP, SNTP, SNMP		
25	Input Power	PoE IEEE 802.3af / 230V AC/ 24V/12V AC/DC		
26	Network Connectivity	10/ 100 Base-T, auto-sensing, full duplex, RJ 45		
27	AGC	Required		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
28	ONVIF Compatible	Required		
29	Operating Temperature	0-50deg.		
30	Mounting accessories	Shall have appropriate mounting arrangement stanchions, brackets & all mounting accessories like mounting brackets, nut bolts shall be SS316.		
31	IR filter	required		

II. Technical Specifications of Automatic Number Plate Recognition (ANPR)

The ANPR System shall enable monitoring of vehicle flow at strategic locations. The system shall support real-time detection of vehicles at the deployed locations, recording all types of vehicles, reading its number plate, database lookup from central server and triggering of alarms/alerts based on the vehicle status and category as specified by the database. The system usage shall be privilege driven using password authentication.

The ANPR System shall have the following in built features:

1. Vehicle Detection and Video Capture Module
    a. The System should automatically detect a vehicle in the camera view using video detection and activate license plate recognition.
2. License Plate Detection
    a. The System shall automatically detect the license plate in the captured video feed in real-time.
    b. The system shall perform OCR (optical character recognition) of the license plate characters (English alpha-numeric characters in standard fonts).
    c. The System shall store JPEG image of vehicle and license plate and enter the license plate number into PostgreSQL database along with date time stamp and site location details.
    d. System should be able to detect and recognize the English alpha numeric License plate in standard fonts and formats of all vehicles including cars, HCV, and LCV.
    e. The system should be able to process and read number plates of vehicles with speed of 120 km/hr and above.
    f. The system shall be robust to variation in License Plates in terms of font, size, contrast and color and should work with good accuracy.

3. Color Detection
    a. The system shall detect the color of all vehicles in the camera view during daytime and label them as per the predefined list of configured system colors. The system will store the color information of each vehicle along with the license plate information for each transaction in the database.
    b. The system shall have options to search historical records for post event analysis by the vehicle color or the vehicle color with license plate and date time combinations.
4. Alert Generation
    a. The system should have option to input certain license plates according to the hot-listed categories like “Wanted”, “Suspicious”, “Stolen”, etc by authorized personnel.
    b. The system should be able to generate automatic alarms to alert the control room personnel for further action, in the event of detection of any vehicle falling in the Hot-listed categories.
5. Vehicle Log
    a. The system shall enable easy and quick retrieval of snapshots, video and other data for post incident analysis and investigations.
    b. The system should provide advanced and smart searching facility of License Plates from the database. There should be an option of searching number plates almost matching with the specific number entered (up to 1 and 2 character distance).
6. Vehicle Make Detection Module
    a. System should be able to identify the make of the vehicle coming in the field of view of the camera with good accuracy.
7. Vehicle Classification module
    a. System should be able to classify the vehicle into LMV, HMV and 2-wheelers.
8. Central Management
    a. The Central Management Module shall run on the ANPRS Central Server in control room. It should be possible to view records and edit hot-lists from the Central Server.
9. The system should be able to do - No helmet detection for 2-wheelers.
10. The system should have reading accuracy of 80% on vehicles including 2 & 4 wheelers which are visible by human eye for English alphanumeric number plates excluding cursive fonts.

Datasheet:

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Interface	IP		
4	Video	Full High Definition, 1920x1080		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
	Resolution			
5	Shutter Speed	1/50 to 1/10000		
6	Operating Temp.	0 to 50°C		
7	Frame Rate	25-30 fps		
8	Lens	Varifocal 5-50mm		
9	IRIS Control	Electronic DC Type		
10	IR illuminator range	10-15 feet		
11	Camera Housing	IP 65		
12	Processing Unit	Intel Pentium(2.4Ghz) or Better		
13	RAM	2GB		
14	Hard Disk Capacity	500GB		
15	Speed Limit	120Km/ hr		
16	Installation and mounting	Pole mounted/ overhead gantry		
17	Video Compression	H.264& MJPEG		
18	Image Sensor	1/3” Progressive Scan CCD / CMOS		
19	IR Cut Filter	Automatically Removable IR-cut filter		
20	S/N Ratio	≥ 50 dB		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
21	Protocol	IPV4, IPV6, HTTP, HTTPS, FTP/SMTP, RTSP, RTP, TCP, UDP, RTCP, DHCP, UPnP, NTP, QoS, ONVIF Profile S		
22	Alarm I/O	Minimum 1 Input & 1 Output contact for 3rd part interface		
23	Data Storage on site	The system should be equipped with appropriate storage capacity for 7 days 24X7 recording, with overwriting capability. The images should be stored in tamper proof format only.		
24	Network Connectivity	10/ 100 Base-T, auto-sensing, full duplex, RJ 45		

III. Technical Specifications of Red Light Violation Detection (RLVD)

The objective of RLVD system is to capture any vehicle that tries to cross over while the traffic light signal for that directional movement is RED indicating a stopped traffic.

One single installation system should consist of minimum three cameras out of which one camera should be an overview camera providing evidence of the violation by capturing the offending vehicle and status of the traffic light in the same field of view, whereas the other cameras shall be covering single lanes of 3m/ 3.5m each, each system thereby covering minimum of two/ three lanes at each junction. The system shall have IR illuminators to provide illumination for night-time scenario. For places where more than two lanes are to be monitored, the lane cameras to be increased in proportion to the lane keeping the over view camera as 1 No. only. The system should fulfill following additional requirements.

1. The system should be able to process and read number plates of vehicles with speed even up to 120 km/hr.
2. The over view camera should provide at least 5 frames (or user configurable) of the offending vehicle as evidence.
3. Camera with IR illuminators should be deployed at heights above 6.0 mtrs. to allow HCV to pass underneath it, and to minimize occlusion.
4. The system should have the facility to provide the live feed of the camera to the central monitoring station or as per employer's requirement.

5. The system should not use any sensor to detect the presence of the vehicle in the field of view i.e. the system should be totally video based system.
6. The system should be able to provide video clips of the transaction also from the overview and lane cameras also as evidence.
7. The system should be able to take input of the traffic light controller/signal for detecting the phase of the traffic light.
8. System should be able to detect both Stop line violation, Red light violation & signal jump violation and categorize them separately as violations.
9. For each detected violation, the system should store 5 snapshots of both cameras, date and time, location, ANPR recognized license plate number, thumbnail of the license plate region, phase of light(red, amber), time since phase change (red, amber) and speed of the violating vehicle.
10. System should have option to record video of overview camera either during red phase of the traffic light only or always as per user requirement.
11. All evidence pictures should be saved in encrypted mode only so that it should be able to prove that the picture has not been tempered with.
12. The evidence image produced by the system should be wide enough to give the position of the infracting vehicles with respect to the stop line and indicate colour of the Traffic light. The vehicle number plate should be readable in the evidence image.

The system design should be based on open architecture and should have unrestricted scope for scalability and integration with similar surveillance systems in use or likely to be used by the employer/ client.

The system usage shall have role based access with following features protected with individual passwords. All logins should be logged. These logs should be non-tamperable.

1. Administrator – Full access to all functionalists.

2. Operator – Access to all functionalists (including recorded events) except system configuration.

3. Viewer – Access only to reports / Live screen

Datasheet:-

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Lane Coverage	2 to 3 lanes		
4	Video Resolution for	1920 X 1080		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
	both ANPR & Overview camera			
5	Frame rate	25-30 fps		
6	Shutter Speed	1/50 to 1/10000		
7	Operating Temp.	0 to 50°C		
8	Interface	IP		
9	Lens	wide angle		
10	IRIS Control	Electronic DC Type		
11	IR illuminator range	10-15feet		
12	Camera Housing	IP 65		
13	Processing Unit	Intel pentium(2.4Ghz) or Better		
14	RAM	2GB		
15	Hard Disk Capacity	500GB		
16	Speed Limit	120Km/hr		
17	Installation and mounting	Pole mounted/ overhead gantry		
18	Video Compression	H.264& MJPEG		
19	Image Sensor	1/3” Progressive Scan CCD / CMOS		
20	IR Cut Filter	Automatically Removable IR-cut filter		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
21	S/N Ratio	≥ 50 Db		
22	Protocol	IPV4, IPV6, HTTP, HTTPS, FTP/SMTP, RTSP, RTP, TCP, UDP, RTCP, DHCP, UPnP, NTP, QoS, ONVIF Profile S		
23	Alarm I/O	Minimum 1 Input & 1 Output contact for 3rd part interface. The system should be equipped with appropriate storage capacity for 7 days 24X7 recording, with overwriting capability. The images should be stored in tamper proof format only. Wired/GPRS based wireless technology with 3G upgradable to 4G capability.		

IV. Technical Specifications of Speed Violation Detection System

1. The system shall comprise of cameras and infrared illuminators installed at traffic junctions and stretches, computing equipment for processing the video feeds from the cameras, intelligent detection modules to detect hotlisted vehicles and traffic violations, networking infrastructure to provide required bandwidth for the cameras, central management infrastructure for monitoring of the hotlist and violation alerts and integration with the challan generation system.
2. The system design should be such that the user shall be able to configure either or both the following functional modules (Hotlist Detection and Violation Detection) on the same set of hardware (cameras as well as computing equipment).
3. The system should also be scalable to support an additional number of cameras by adding additional computing equipment to the network. This procedure should not require any system down time of the already installed systems.
4. The system should be able to handle multiple vehicles simultaneously i.e if there are more than one vehicle in the camera view the system should be able to detect all of them, extract their license plate numbers and perform OCR on the license plate characters.
5. The system should be able to detect speed of each and all vehicles in the camera view and tag them along with their license plate numbers simultaneously.

6. The System shall store JPEG images of vehicle as well as of thumbnail of the license plate for each vehicle.
7. The system shall store the vehicle license number into a relational SQL database (MSSQL, PostgreSQL, MySQL, Oracle, etc.) along with date timestamp and site location details.
8. The system processing should be real time i.e. the recognition of license number plates will happen instantaneously (within less than 2 seconds delay) on video feed from the camera.
9. The system shall be capable of reading different kinds of plates varying in size, fonts, single row/double row, square and rectangular plates as well as plates with dark characters on light background and reverse.
10. The system should be able to capture the number plate in night with the help of IR illuminator against the head light glare of the approaching vehicle.
11. The saved images of the vehicle should have tamper proof water marking of date and time of capture.
12. The system Graphical User Interface should be bi-lingual: it shall support both English and the official language of the state.
13. Integration and Reports
    a) The System should be able to export vehicle records of alerts as well as transactions of all vehicles in JPEG (for images and LP thumbnails) and XML (license plate number, timestamp, Hotlist category and other data) formats to third party platforms like VMS or command control for further action or generating reports.
    b) The system shall enable easy and quick retrieval of snapshots and other data for post incident analysis and investigations. The system should be able to generate customized MIS reports as per user's requirement.
    c) The system shall have search option to tune the reports based on one or more of the below combinations, as per the user needs
        i. license plate number – full or partial
        ii. date and time range
        iii. site location
        iv. Hotlist category like Stolen / Suspected / Wanted & etc.
        v. Violation Type: Over Speed
    d) The system shall have option to save customized reports for subsequent use.
14. The system should provide advanced and smart searching facility of License Plates from the database to search for records of wrongly recognized vehicles up to 1 and 2 character distance from the entered number plate.
15. In case system reads number plate wrongly, the system shall provide option to the authorized user(s) to manually correct the same. The system shall records Audit Trails of all such edit operations.
16. It should be possible to upgrade analytics like “Wrong direction Movement”, “Average Speed Detection” in the same set of installation.

HOT LIST DETECTION

The Hotlist detection module shall enable monitoring of vehicle flow at deployed locations and generation of automatic alerts based on hotlists. It should identify and capture the number plate of the vehicles and display the same in the text format after removing the unwanted areas / extra written material from the number plate. The system should generate automatic audio/visual alert at local/central control station on detection of any vehicle in the system Hotlists.

The System shall have the following features for Hotlist Detection:

ALERT GENERATION

The system should have option to input certain license plates according to the hotlisted categories like “Wanted”, “Suspicious”, “Stolen”, etc. by authorized personnel.

The system should have option to add new hotlist category by authorized personnel.

The system should be able to generate automatic alarms to alert the control room personnel for further action, in the event of detection of any vehicle falling in the Hotlisted categories.

On detection of any vehicle in the Hotlist categories, the system should generate alert at the control room within less than 2-3 seconds (subject to network availability).

For all Hotlisted vehicle transactions, the system should also be able to store a video few seconds before and after the transaction.

VIOLATION DETECTION

The system shall be able to detect violations of overspeeding of vehicles captured by the Traffic Alert camera. All violation transactions shall be stored along with the timestamped image(s) for evidence. Alerts for the same shall be dispatched to the control room on near real-time basis. The system shall also be able to export the violation transactions to command control server or challan generation software for further processing.

1. The system should be capable of detecting violations of over speeding by using video detection processing only and without the need for any physical sensors like induction loops, pressure sensors, IR sensors, radars, lasers, etc.
2. The system should be able to detect over speeding in both day and night time with good accuracy.
3. Speed Detection
    a) The system should detect the speed of all vehicles in the video feed from the Speed Camera and extract their license plate numbers online in real-time.
    b) The system should display the recognized license plate number along with the detected speed of the vehicle and store the same in the database for each transaction.
4. The system should be able to detect the speed of multiple vehicles traveling in different lanes covered in the camera view simultaneously.
5. The system should compare the speed computed for each vehicle with the pre-defined speed limit for the camera/ stretch and signal violation when the speed limit is exceeded.
6. The system would dispatch alerts for all violations detected to the control room in near real-time. The details of each violation transaction shall include
    a) Type of Violation

b) Details of Violation: vehicle speed and/or vehicle direction

c) License Plate Number along with thumbnail of the License Plate

d) At least 2 Timestamped Snapshot(s) of the Violation for Evidence

e) Camera Location and Site Details

7. Challan Generation

   a) The system shall be able to export all violation data captured including snapshots to the Challan Generation software being used by the state police / transport department, for further processing.

8. The system shall provide option to configure different speed limits for different cameras / stretches depending on their location in the city/highway.

9. The system shall provide option to configure different speed limits for different time-periods.

10. For all violations detected, the system should be able to automatically store video starting from few seconds before and till few seconds after the violation. Such time duration should be configurable.

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Interface	IP		
4	Video Resolution	1920 X 1080		
5	Shutter Speed	1/50 to 1/10000		
6	Operating Temp.	0 to 60°C (temperature), 50 to 90% (humidity)		
7	Frame Rate	25-30 fps		
8	Lens	10-40mm		
9	IR Illuminator Range	20-30m		
10	Environment Protection	IP 66		
11	Speed Limit	120 Km /hr		

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
12	Speed Enforcement Technology	with IP camera video based		
13	Video Compression	H.264 & MJPEG		
14	Image Sensor	1/2” Progressive Scan CCD / CMOS or better		
15	IR Cut Filter	Automatically Removable IR-cut filter		
16	Day/Night Mode	Color, Mono, Auto		
17	S/N Ratio	≥ 50 Db		
18	Protocol	IPV4, IPV6, HTTP, HTTPS, FTP/SMTP, RTSP, RTP, TCP, UDP, RTCP, DHCP, UPnP, NTP, QoS, ONVIF Profile S		
19	Network Connectivity	10/ 100 Base-T, auto-sensing, full duplex, RJ 45.		
20	Data Storage	The system should be equipped with appropriate storage capacity for 7 days 24X7 recording, with overwriting capability. The images should be stored in tamper proof format only.		

V. Technical Specifications of Face Recognition System

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	

2	**Model**	<to be provided by the bidder>	
3	The system should be of leading-edge technology with optimal system performance and reliability with real time face detection, concurrent multiple face recognition and instant face matching in 1-to-1 and 1-to-many modes.		
4	Enterprise Solution should have: 1) Recognition of 50 faces per 10 seconds 2) 10 number of simultaneous video stream with up to 200FPS per system 3) 0.1 second minimum face presence time		
5	The System should have User friendly interface for easy setup, monitoring and data retrieval.		
6	The system should have option to save every single recognized face along with option to save only persons matching one of the subjects from database.		
7	The system should be able to choose to save recognitions of every face, including those yet unknown – in case these are detected – and use these images to enhance subjects database later on; or, stick to saving pictures of known persons only. In the latter case, the system shall still have events of unknown persons' detection but there will be no pictures saved in the FR frame archive.		
8	Unknown Person Recognition Delay: time in milliseconds for the engine to try to find a match for the recognition result in the known persons' database. Delay should be consistent with the time period during which a person stays in the recognition area and adjusted for each individual scene.		
9	VMS/ Client should receive recognition events from FR as incoming messages containing information about recognized persons.		

10	Right-clicking the recognition event in Live View mode should give option to choose Open Archive to bring up the multichannel archive window. Archive view shall automatically switch to single camera view and jump to the exact moment of time when the clicked event has happened.		
11	Face Recognition events for every device should be also used as triggers for particular actions inside VMS, such as: start or stop recording, send e-mail, pop up camera, go to a PTZ preset, run third-party application and others.		

VI. Technical Specifications of Video Management System Software

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	There should be a Control System with Video Control Software to manage all the video surveillance Cameras.		
4	All the Proposed VMS and cameras should have ONVIF compliance		
5	The VMS should support IP cameras of different makes.		
6	The VMS should support fully distributed solution for monitoring and control function, designed for limitless multi-site and multiple server installations requiring 24/7 surveillance.		
7	Video stream from individual cameras should be recorded on respective Camera Server &, subsequently, archived to RAID backup device. System should have provision to automatically over-write the new information after the period of		

	90 days.		
8	IP video surveillance control software should be capable to display and manage the entire surveillance system. It should be capable of supporting variety of devices such as IP cameras, PTZ controller, Raid backup device etc.		
9	The software should have user access authority configurable on per device or per device group basis. The user should have the facility to request the access of any camera and can control the camera for a reservation period. Control of camera is released after the reservation period.		
10	The software is required to generate reports of stored device configuration. The control software is required to provide alarm and alarm log. The log should be able to be achieved, printed and displayed using a device filter, a device group filter and/or a time window.		
11	The VMS should be enabled for integration with any external Video Analytics Systems.		
12	The VMS should be capable of being deployed in a virtualized environment without loss of any functionality.		
13	The VMS server should be deployed in a clustered server environment for high availability and failover.		
14	The VMS should have an administrator interface to set system parameters, manage codec, manage permissions and manage storage.		
15	The VMS day to day control of cameras and monitoring on client workstations should be controlled through the administrator interface.		

16	Whilst live control and monitoring is the primary activity of the Operator workstations, video replay should also be accommodated on the GUI for general review and also for pre and post alarm recording display.		
17	The solution design for the VMS should provide flexible video signal compression, display, storage and retrieval.		
18	All the streams should be available in real-time (expecting the network latency) and at full resolution. Resolution and other related parameters shall be configurable by the administrator in order to provide for network constraints.		
19	The VMS should support field sensor settings. Each channel configured in the VMS should have an individual setup for the following minimum settings, the specific settings should be determined according to the encoding device: 1) Brightness 2) Contrast 3) Color 4) Sharpness 5) Saturation 6) Hue 7) White balance		
20	The VMS should support retrieving data from edge storage. Thus when a lost or broken connection is restored, it shall be possible to retrieve the video from SD card and store it on central storage.		
21	The VMS should be capable of intrusion detection: Detection of moving objects in selected areas covered by the camera (those that are specified as restricted areas like those before some major events, etc.). Avoid false alarms due to wildlife or other moving objects (e.g., tree leaves).		
22	The VMS should be capable of tracing of a specific person or object in multi-camera videos: Track a specific person or object across several surveillance (e.g., to trace and identify criminals		

	and/or anti-social elements).		
23	The VMS should be capable of counting of people and detection of abnormal crowd behavior: Detection of people flow and counting of people in selected areas. To identify abnormal crowd behavior and raise alarms to avoid untoward incidences in public places, and maintaining law & order.		
24	The VMS should be capable of summarize videos and create a content summary of the captured video depicting relevant movements or objects of interest. This would on off-line as well as online videos captured by the camera. For example, an hour-long surveillance video could be shortened by considering only the frames that depict major movements in the video.		
25	The VMS should allow the administrator to distribute camera load across multiple recorders and be able shift the cameras from one recorder to another by simple drag and drop facility.		
26	VMS should support automatic failover for recording.		
27	VMS should support manual failover for maintenance purpose.		
28	VMS should support access and view of cameras and views on a Smartphone or a tablet (a mobile device).		
29	VMS should support integration with the ANPR application.		
30	VMS should support integration with other online and offline video analytic applications.		
31	The VMS should be a highly scalable and professional level software solution.		

32	The VMS should offer a complete video surveillance solution that will be scalable from one to hundreds of cameras that can be added on a unit by unit basis.		
33	The VMS Software License cost should be one time and future versions should be available without any additional charges.		
34	The VMS Server should be a system service providing the following functionality: 1) Configuration of all VMS components 2) Video surveillance in four modes: Live Viewer, Alarm Viewer, Archive Viewer, Archive Search 3) Archive Search/Exploring 4) Map layout 5) Alarm Monitoring 6) Web Server 7) Video Analytics		
35	All video streams supplied from IP cameras shall be digitally encoded in H.264 compression formats and recorded simultaneously in real time. The VMS should interface with IP cameras.		
36	The VMS should use two independent streams from camera: one for visualization and one for recording. All settings for each stream including resolution, codec type, frame rate and compression level may be selected independently without affecting overall system performance and IP device functionality.		
37	The VMS should consist of the Server and Client. The Server and Client may be started on the following operating systems: Windows Server 2008, Windows Vista, and Windows - 10, 32-bit and 64-bit versions should be supported.		
38	The VMS Should support for wide screen display and touch screen displays.		
39	The Video Analytics solution should be provided for all the cameras along with VMS. Video Analytics shall be on an open architecture which can		

	integrate with all VMS.		
40	The Video Analytics solution should integrate into all leading VMS systems via SDK. Open standards such as RTSP for video and TCP Triggers/XML/JSON for metadata shall be supported.		
41	The Video Analytics solution should support any Intel/Windows-based server, as well as virtualized installations to ensure maximum flexibility and cost-effective, future proof solutions.		
42	The Video Analytics solution should include the following operational intelligence Analytics: a. Vehicle counting & classification b. Direction monitoring and counting c. Parking space analysis & management d.Illegal Parking & abandoned object e. People counting, queue & crowd detection f.Wrong Direction flow g.Trip wire detection h. Missing Object, etc.		

VII. Technical Specifications of Video Wall

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Display Wall Screen Size	Matrix of 4X2 display of 70"		
4	Projection Technology	DLP Rear Projection		
5	Native Resolution	1920x1080		

	per cube			
6	Aspect Ratio			
7	Light Source	LED		
8	Brightness	Max 700 cd/m2		
9	Brightness Uniformity	0.95		
10	Contrast ratio	166.6673611		
11	Response Time	8ms		
12	Color Calibration	Automatic inbuilt sensors for Continuous colour and brightness management mechanism to be provided.		
13	Connectivity	Each display Module shall support 4HD @ 30Hz inputs		
14	Full viewing angle	180°		
15	Lifetime	Normal mode: 60 000h		
16		Eco mode: 80 000h		
17	Inputs	Dual link DVI-D in/out		
18	Power	100 - 240 VAC, 60 - 50Hz, (below values are for 230V; 110V +5%)		
19	Power consumption	<220W		
20	Eco mode	Less than 120 Watt		
21	Humidity	Up to 80% non-condensing		
22	Temperature	10°C-40°C | 50°F-105°F		

23	Remote management through IP	Remote management through IP for parameter adjustment. Each cube should have built-in web server		
24	Signal Processing	Each cube should have cropping/scaling capability		
25	Screen Half-gain Viewing Angle	Hor: 28 degrees +/- 3 Ver: 13 degrees +/- 3		

VIII. Technical Specifications for Video Wall Controller

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Display controller	Controller to be able to control cubes		
4	Redundant Controller	The controller should be based on the latest architecture.		
5	Platform	Windows Xeon Quad core 3 GHz or Core i7 3 GHz above		
6	Processor	Intel Xeon		
7	RAM	32 GB		
8	Chassis Type	19" Rack mount industrial chassis		
9	Network	2 Network Ports		
10	Resolution Support For Outputs	Minimum1920 x 1080 or higher for each cube		

11	Ticker	There should be a possibility in the controller to create user defined multiple tickers. It should also be possible to place these tickers anywhere on the wall		
12	Scalability	The system should be able to add additional inputs as required in the future		
13	Control	The system should have the capabilities of interacting (Monitoring & Control) with various applications on different network through the single Operator Workstation. It shall be possible to launch layouts, change layouts in real time using Tablet		
14	Redundancy	Redundant Hot Swappable HDD in RAID 1 Configuration		
15	Keyboard & Mouse Extension	Keyboard and Mouse along with mechanism to extend them to 20 Mtrs. operator desk from display controller to be provided		
16	24 x 7 operation	The controller shall be designed for 24 x 7 operation		
17	Others	The Video Wall and the Controller should be of the same make to ensure better performance and compatibility		

IX. Technical Specifications of CCTV Server

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		

2	**Model**	<to be provided by the bidder>		
3	Application	Video Management Server, video recording server & Video Storage Server, video analytic server		
4	Redundancy	Redundant servers for VMS and n+1 server for Video Analytic Server & Storage servers, Hot standby Configuration. N+1 configuration shall also be applicable for NAS, if offered by bidder.		
5	Processor	Intel Xeon, 6core		
6	Speed	3.2 GHz		
7	Configuration	RAID 5		
8	Operating system	windows Server 2008 std 64 bit/ Latest at the time of supply		
9	RAM	8 GB		
10	OS drive	2x300 GB SAS, 10000rpms		
11	Hard disk drive	Min. 1 TB		
12	Optical drive	DVD/CDRW Combo drive		
13	Graphics	NVIDIA GeForce 9800GT/ 1GB for Video Storage Server		
14	Keyboard	Standard Qwerty full-stroke type INDUSTRIAL GRADE		
15	Mouse	Wired optical mouse		
16	Monitor Screen	20.1” LED screen, Common monitor to be provided for the redundant servers in case of Video Management Servers		

17	Mounting	The servers & monitor shall be mounted in standard 19” lockable racks. Suitable with draw able drawers shall be provided on the rack for mounting the keyboard & mouse.		
18	Power supply	230VAC/ 50Hz, inbuilt SMPS required		
19	Ethernet Card	Required for 10/100/1000 Mbps, TCP/IP, all interface cards shall be PCI based. Quantity shall be as per system requirements. Two cards shall be provided for redundant connections.		
20	Communication Ports	One RS- 232 serial ports, one parallel port, two USB ports, Ethernet ports as required for the system configuration.		
21	Expandable	Required,		
22	Sound card	Integrated 7.1 audio		
23	Software Loaded on Servers	CCTV server should includes: 1) Video Management Server, 2) Video Storage Server, 3) Video analytics server. With Licensed copy of Video Management Software (including video analytics) in the Video Management Server, Operating System Software, iii. Latest version of Adobe Acrobat read/write software, Latest version of Anti-virus kit, Graphics		

		software.		

X. Technical Specifications of L3 Core Switch

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	L3 Switch with 24*10/100/1000T and 24*100/1000 Base X Slots combo, addition with min 4*SFP+ port to accommodate 1G or 10 G fiber module (single mode /multimode) for flexibility to choose. Should also have min 2 nos. QSFP+ ports.		
4	The Switch should support Active – Active Cluster switching technology using VSS or equivalent technology for high availability and quick resiliency. Minimum Virtual chassis bandwidth between the switches shall be of 160 Gbps locally or over geographically diversified locations (min 2KM) for high reliability. Vendors should offer required cables/modules from day-1.		
5	The proposed VSS or equivalent technology should support high availability for both Layer 2 and Layer 3 (RIP, RIPng, OSPF, OSPF v3,BGP) Including IP Multicasting optimized for Real time applications like Voice and Video IP traffic.		
6	The switch come with Dual Hot Swap Power supply from day 1 as well Switch can Support Open flow/SDN or equivalent.		

7	**Performance Specifications:** Min 280Gbps switching capacity and Min 210 Mpps switching throughput. Should support min. 60K MAC address.		
8	**L3 Feature :**The proposed L3 switch Support have layer 3 features like Static Routing, Policy based routing, RIP, RIPng, OSPF, OSPFv3, VRRPV3, PIM v4 SM, DM and SSM, PIMv6-SM, DHCP Server ,Q-in-Q etc.		
9	**Resiliency:** Should Support Rapid Ring protection / Resiliency technology providing the convergence of Sub 50ms, Loop Detection and Loop protection, Control Plane Prioritization (CPP), RSTP , MSTP.		
10	**VLAN:** VLAN creation based on protocol, Port and Subnet based, IEEE 802.1Q Virtual LAN (VLAN) bridges, IEEE 802.3ac VLAN tagging, Q In Q scalable, min. 4K configurable VLAN ' s or better		
11	**Security:** Should support ACLs, DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI), RADIUS and TACACS+ accounting and authentication ,MAC address filtering and MAC address lock-down, Tri-authentication: MAC-based, web-based and IEEE 802.1x, IEEE 802.3ac VLAN tagging, IEEE 802.1v, DoS attack blocking.		
12	Should also support Layer 1 monitoring of Fibre infrastructure to avoid eves dropping (Vendors should propose appropriate solution to meet this functional requirement of Layer 1 security)		
13	**Multicasting:** IGMP query solicitation and IGMP snooping v1 , v2 and v3, IGMP Querier, MLD snooping (v1 and v2), PIM neighbour filtering and PIM – SSM, PIM for IPv6 .		

14	**IPv6 Feature:** Should support DHCPv6 client and relay, DNSv6 client and relay, IPv4 and IPv6 dual stack, unicast and multicast routing, IPv6 aware storm protection and QoS, IPv6 hardware ACLs, Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6, Syslog v6, NTPv6 client and server.		
15	**Quality of Services:** IEE 802.1p compliance. DSCP Prioritization, Wire speed traffic classification with low latency essential for VOIP and real time streaming media applications. Policy-based QoS based classifying traffic based on MAC , Port , VLAN , Protocol , L3 Parameters.		
16	**Management:** CLI, GUI and USB or equivalent interface for taking backup of software release files configurations, LLDP-MED, digital optical monitoring(DDM) as per SFF-8472 or equivalent, UDLD/equivalent , sflow/SDN or equivalent, RMON, SNMPv2/v3, SSH, SSL V3, DHCPv4 (server, relay and client)		
17	Switch Should be RoHSCompliance, should support IEEE 802.3az Energy Efficient Ethernet (EEE) , UL, cUL and FCC class Aor equivalent certified.		
18	Switch Operating Temperature 0 to 50 degree		
19	All the switches should be offered with min 5 years replacement warranty with proper back-up on respective-OEM letter Head. The switches, FO Modules should be from the same OEM.		

XI. Technical Specifications of L3 POE switch Central Command

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	

3	24 * 10/100/1000 Base-T PoE Ports with Min 4 * SFP + Ports to accommodate 1G or 10 G fiber module (Min. 1 No single mode module Should be loaded) for flexibility to choose. Min simultaneous 28 nos. active port should be available. Switch should come with redundant Power supply from Day 1. Should support PoE / PoE+ as per IEEE 802.3af and 802.3at standards with min PoE budget of 370W or more.		
4	Should support Active – Active Clustering Virtual Chassis or equivalent technology for high availability and quick resiliency. Minimum Virtual chassis bandwidth between the switches shall be of 40Gbps locally or over geographically diversified locations for high reliability.		
5	Should support high availability for both Layer 2 and Layer 3 Including for IP Multicasting optimized for Real time applications like Voice and Video IP traffic.		
6	**Performance Specifications:** in 128Gbps of switching capacity and Min 95Mpps of switching throughput. Should support min. 16K MAC address and Should work on Eco-friendly mode.		
7	The proposed switch Support layer 3 features like Static Routing and RIP from Day 1, in future it can upgrade Policy based routing, RIPng, OSPF, OSPFv3, VRRPV3, PIM v4 SM, DM and SSM, PIMv6-SM, DHCP Server ,Q-in-Q etc.		
8	**Resiliency:** Should Support Rapid Ring protection / Resiliency technology providing the convergence of Sub 50ms, Loop Detection and Loop protection, Control Plane Prioritization (CPP), RSTP , MSTP.		
9	**VLAN:** VLAN creation based on protocol, Port and Subnet based, IEEE 802.1Q Virtual LAN (VLAN) bridges, IEEE 802.3ac VLAN tagging, Q In Q scalable, min. 4K configurable VLAN ' s or better		

10	**Security:** Should support ACLs, DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI), RADIUS and TACACS+ accounting and authentication,MAC address filtering and MAC address lock-down, Tri-authentication: MAC-based, web-based and IEEE 802.1x, IEEE 802.3ac VLAN tagging, IEEE 802.1v, DoS attack blocking, Should also support Layer 1 monitoring of Fibre infrastructure to avoid eves dropping (Vendors should propose appropriate solution to meet this functional requirement of Layer 1 security)		
11	**Multicasting:** IGMP query solicitation and IGMP snooping v1 , v2 and v3, MLD snooping (v1 and v2) , PIM neighbour filtering and PIM – SSM, PIM for IPv6.		
12	**IPv6 Feature:** Should support DHCPv6 client and relay, DNSv6 client and relay, IPv4 and IPv6 dual stack, IPv6 aware storm protection and QoS, IPv6 hardware ACLs, Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6, Syslog v6, NTPv6 client and server		
13	**Quality of Services:** IEE 802.1p compliance. DSCP Prioritization, Wire speed traffic classification with low latency essential for VOIP and real time streaming media applications.Policy-based QoS based classifying traffic based on MAC , Port , VLAN , Protocol , L3 Parameters.		
14	**Management:** CLI, GUI, LLDP, USB or equivalent interface for taking backup of software release files configurations, digital optical monitoring(DDM) as per SFF-8472 or equivalent, UDLD/equivalent,Time Domain Reflectometry/ equivalent, sflow or equivalent, RMON, SNMPv2/v3, SSH, SSL V3, DHCPv4 (server, relay and client)		
15	Switch Should be RoHSCompliance, should support IEEE 802.3az Energy Efficient Ethernet (EEE) , UL, cUL and EN55022 class A or		

	equivalent certified.		
16	The proposed model should not be End of Sale and End of Life and the latest datasheet of the proposed model should be available on the OEM's Global website.		

XII. Technical Specifications of Aggregation Switch

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	12 * 10/100/1000 BaseT Ports and 12 Nos 100/1000 Base-X port , addition with Min 4 * SFP + Ports to accommodate 1G or 10 G fiber module (Min. 1 No single mode module Should be loaded) for flexibility to choose. Min simultaneous 28 nos. active port should be available. Switch should come with redundant Power supply from Day 1.		
4	Should support Active – Active Clustering Virtual Chassis or equivalent technology for high availability and quick resiliency. Minimum Virtual chassis bandwidth between the switches shall be of 40Gbps locally or over geographically diversified locations for high reliability.		
5	Should support high availability for both Layer 2 and Layer 3 Including for IP Multicasting optimized for Real time applications like Voice and Video IP traffic.		
6	**Performance Specifications:** in 128Gbps of switching capacity and Min 95Mpps of switching throughput. Should support min. 16K MAC address and Should work on Eco-friendly mode.		

7	The proposed L3 switch Support layer 3 features like Static Routing, Policy based routing, RIP, RIPng, OSPF, OSPFv3, VRRPV3, PIM v4 SM, DM and SSM, PIMv6-SM, DHCP Server ,Q-in-Q etc.		
8	**Resiliency:** Should Support Rapid Ring protection / Resiliency technology providing the convergence of Sub 50ms , Loop Detection and Loop protection, Control Plane Prioritization (CPP), RSTP , MSTP.		
9	**VLAN:**VLAN creation based on protocol, Port and Subnet based, IEEE 802.1Q Virtual LAN (VLAN) bridges, IEEE 802.3ac VLAN tagging, Q In Q scalable, min. 4K configurable VLAN ' s or better		
10	**Security:** Should support ACLs, DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI), RADIUS and TACACS+ accounting and authentication, MAC address filtering and MAC address lock-down, Tri-authentication: MAC-based, web-based and IEEE 802.1x, IEEE 802.3ac VLAN tagging, IEEE 802.1v, DoS attack blocking, Should also support Layer 1 monitoring of Fiber infrastructure to avoid eves dropping (Vendors should propose appropriate solution to meet this functional requirement of Layer 1 security)		
11	**Multicasting:** IGMP query solicitation and IGMP snooping v1 , v2 and v3, MLD snooping (v1 and v2), PIM neighbour filtering and PIM – SSM, PIM for IPv6 .		
12	**IPv6 Feature:** Should support DHCPv6 client and relay, DNSv6 client and relay, IPv4 and IPv6 dual stack, IPv6 aware storm protection and QoS, IPv6 hardware ACLs, Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6, Syslog v6, NTPv6 client and server		
13	**Quality of Services:** IEE 802.1p compliance. DSCP Prioritization, Wire speed traffic classification with low latency essential for VOIP and real time streaming media applications.Policy-		

	based QoS based classifying traffic based on MAC, Port , VLAN , Protocol , L3 Parameters.		
14	**Management:** CLI, GUI, LLDP, USB or equivalent interface for taking backup of software release files configurations, digital optical monitoring(DDM) as per SFF-8472 or equivalent, UDLD/equivalent,Time Domain Reflectometer/ equivalent, sflow or equivalent, RMON, SNMPv2/v3, SSH, SSL V3, DHCPv4 (server, relay and client)		
15	Switch Should be RoHS Compliance, should support IEEE 802.3az Energy Efficient Ethernet (EEE) , UL, cUL and EN55022 class A or equivalent certified.		
16	The proposed model should not be End of Sale and End of Life and the latest datasheet of the proposed model should be available on the OEM's Global website.		

XIII. Technical Specifications of Industry Switch (8port POE+)

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Port Density & Redundancy	The switch should have 8 ports 10/100/1000TX PoE+ (All Port support 30W PoE+ or min 4 nos 60W Hi-PoE or equivalent) and addition 4 nos 100/1000x SFP ports and PoE Power budget will be min 240W or more		
4	System Capacity	16K MAC addresses		

5	Performance	The switch should have min. 24 Gbps of switching capacity & min. 17 Mpps of forwarding rate, Support min. 1K Multicast Group		
6	VLAN	Support for Port-based VLANs, 4096 VLANs (IEEE 802.1Q), GARP VLAN Registration Protocol (GVRP), MAC-based VLANs, Port-based Private VLANs,Dynamic VLAN assignment.		
7	Quality of Service	Support for Egress rate limiting, Eight egress queues per port, DSCP priority queuing, Policy-based QoS based on VLAN, port, MAC and general packet classifiers, Differentiated services architecture, IEEE 802.1p Class of Service with strict and weighted round Robin scheduling.		
8	Multicast	Support for IGMPv1 and IGMPv2 snooping, IGMPv2 snooping querie, MLD v1/v2Snooping, PIM-SM and SSM for IPv6, PIM- SM		
9	Management	Support for Telnet server, should have Console management port, Web GUI, HTTP, TFTP, SNMP V3, RMON 4 groups Stats, History, Alarms and Events, Event log, Auto config, MIB, SNTP, sFlow or equivalent, DDM – Optical digital diagnostic monitoring support as per SFF – 8472 or equivalent standards as well UDLD or equivalent, Should have USB port for ease of configuration backup/restore		

10	Security	The switch should support TACACS+, RADIUS accounting and RADIUS client, AAA Support, IEEE 802.1x port-based Network Access Control (NAC), IEEE 802.1x multiple supplicant mode, EAP, EAP-TLS, LEAP, PEAP, TTLS, Network Access and Control (NAC), Dynamic ARP Inspection (DAI), Per port MAC address filtering, Layer 2/3/4/ Access Control Lists (ACLs), SSLv3 for Web management, Per port MAC address limiting, MAC address security/lockdown, Guest VLANs and SSH session Time out.		
11	Resiliency	IEEE 802.1D Spanning-Tree Protocol, IEEE 802.1D-RapidSpanning-Tree Protocol and IEEE802.1q-Multiple Spanning-Tree Protocol, BPDU guard, Rapid Ring Protection /resiliency technology as per the IEEE 802.17 / RPR / ERPS or equivalent technology providing the convergence time less than/sub 50 millisecond , Loop protection and Root guard		
12	Other Essential Feature	Support for IPv6 host, ICMPv6, IPv6 ACL, Dual-stack IPv4/IPv6 management, IPv6 applications WEB/SSL, Static IPv4 routing , RIPv1,v2, Proxy ARP, IEEE 802.3ad, ICMP, LLDP-MED, LLDP, DHCP snooping, DHCP option 82, DHCPv4 (server, relay and client), ICMP, The switch should have ECO Friendly design and fan less operation		
13	Power Characteristics	48 VDC Redundant power inputs. Power supply should be industrial grade		
14	Protection	Operating temperature: -40°C to 75°C		
15	Safety & Certifications	Storage temperature: -40°C to 85°C		

16	OEM	Operating humidity: 5% to 90% non-condensing		
17		Switch Should have Min. IP 30/31 Metal Case , Switch enclosure should be with Aluminium Shell, DIN Rail / Wall mount support. Switch Should be keep on IP55/66 rating external JV.		

XIV. Technical Specifications of Industry Switch (4port POE+)

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	Industrial Grade Managed Switch		
4	**Port Density**: Switch with minimum 4x 10/100 TX: RJ-45 ports PoE and 2 x 100/1000X SFP ports (Min. 6 simultaneously active ports). All Fiber ports should support flexibility to choose multimode or single mode fiber module as per the requirement .(Switch Should be loaded with 2 Nos FO SM module from Day 1)		
5	Should support PoE / PoE+ as per IEEE 802.3af and 802.3at standards with min PoE budget of 120W or more . All Switch port should support PoE+(30W) ports		
6	**Performance :**Switching Bandwidth min. 4.8 Gbps, Console port : RJ45 x 1 or Equivalent , Should have non blocking architecture for all ports, Min 2K MAC address, Support min. 4K Simultaneous VLANs and min. 1K Multicast Group.		

7	**Resiliency Features:** Switch can support STP, RSTP, MSTP, Control Plane Prioritization (CPP), Rapid Ring Protection /resiliency technology as per the IEEE 802.17 / RPR / ERPS or equivalent technology providing the convergence time as per the standards specified above for less than/sub 50 millisecond convergence, Loop protection and loop detection etc.		
8	**Multicast Support**: IGMPv1,v2,v3 ,IGMP Snooping, MLD v1/v2Snooping		
9	**Quality of Service :** Policy-based QoS based on VLAN, port, MAC and general packet classifiers, 4 priority queues with a hierarchy of high priority queues for real-time traffic, and mixed scheduling for each switch port, Wirespeed traffic classification with low latency essential for VoIP and real-time streaming media applications. VLAN IEEE 802.1Q, double tagging (Q-in-Q) etc.		
10	**Security Features:** Switch can Support TACACS+,RADIUS, Tri-authentication: MAC-based, web-based and IEEE 802.1X, AAA support, BPDU Protection, DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI), Dynamic VLAN assignment, Network Access and Control (NAC), SSH remote login and SSLv3, IP Access security, port security, DHCP Server		
11	**IPv6 Features :** management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6, IPv6 hardware ACLs, DHCPv6, Neighbor discovery for IPv6 , ICMPv6, Ping polling and Trace Route for IPv4 and IPv6.		
12	**Management :** SNMP v1/v2c/v3, Web, Telnet, CLI, TFTP firmware update, system configure, restore and backup, Should have USB port for ease of configuration backup/restore, DDM – Optical digital diagnostic monitoring support as per SFF – 8472 or equivalent standards, UDLD or equivalent, Active Fiber Monitoring detects tampering on optical links as well cable fault locator , The switch should have ECO Friendly		

	design etc.		
13	**Protection:** should have Min. IP 30 Metal Case , Switch enclosure should be with Alluminium Shell, DIN Rail /Wall mount support. Switch Should be keep on IP55/66 rating external JV.		
14	Power Characteristics: 48 VDC Redundant power inputs. Power supply should be industrial grade Operating temperature: -40 °C to 75 °C		
15	Storage temperature: -40 °C to 85 °C		
16	Operating humidity: 5% to 90% non-condensing		

XV. Technical Specifications of Ambient Air Quality Monitoring (AAOMS) Sensors

- Ambient Air Analyzers

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	**a) Ambient sulphur dioxide (so2) analyzer conforming to USEPA automated federal equivalent method (fem)**		
4	Approval- USEPA/CPCB		
5	Principle - UV Fluorescence		
6	Range- 0 – 50ppb to 0 - 20ppm SO2 user selectable. Dual ranges &		
7	Auto ranging- supported		
8	Lower Detectable Limit- 0.4 ppb		

9	Zero Noise <0.2ppb		
10	Zero drift (24 hour) <0.5 ppb		
11	Span drift (24 hour) <0.5% of FS		
12	Linearity- 1% of full-scale		
13	Rise & Fall Time- <100 seconds to 95%		
14	Power Requirements 220V - 240V, 50/60 Hz		
15	Outputs- RS232 , Ethernet & USB port		
16	Operating Temp 5 to 40 °C		
17	Mounting 19" Rack		
18	**b) Ambient ozone (o3) analyzer conforming to USEPA automated federal reference method (frm)**		
19	Principle- UV Photometric		
20	Measurement : Ozone in Ambient Air		
21	Display : Digital		
22	Range : Auto ranging 0 - 500 PPB		
23	Minimum Detectable Limit : 2.0 PPB		
24	Noise : 1.0 PPB		
25	Zero Drift : < ½% per month		
26	Span Drift : < 1% per month		
27	Calibration : With built in Zero and span generator		
28	Linearity : Continuous + 1%		
29	Output Signals or Analog Output: 3 Analog output 0 – 1 V, 0 – 10 V, 0 -20mA		
30	or 4 – 20 mA		
31	Digital Output : Multiple drop RS 232		

32	**c) Ambient Carbon Monoxide (co) Analyzer conforming to USEPA automated federal reference method (frm)**		
33	Approval –USEPA/CPCB		
34	Principle- Gas Filter Correlation		
35	Range- 0-1ppm to 0-1000 ppm, user selectable, Dual Ranges and		
36	Auto ranging supported		
37	Lower detectable limit- 0.04 ppm		
38	Zero Noise <0.02ppm		
39	Zero drift (24 hrs) <0.1 ppm		
40	Span drift (24hrs) <0.5% of reading		
41	Linearity 1% of FS		
42	Precision 0.5% of reading		
43	Rise & Fall Time <60 seconds to 95%		
44	Power supply 230 V AC, 50 Hz		
45	Outputs RS232 , Ethernet & USB port		
46	Operating Temp 5 to 40 °C		
47	Mounting 19” Rack		
48	**d) Carbon Dioxide (CO2) Analyzer**		
49	Principle- Gas Filter Correlation		
50	Range- 0-2ppm to 0-2000 ppm, user selectable		
51	Lower detectable limit- 0.2 ppm		
52	Zero Noise <0.1ppm		
53	Zero drift (24 hrs) <0.25 ppm		
54	Span drift (24hrs) <0.5% of reading		
55	Linearity 1% of FS		

56	Precision 0.5% of reading		
57	Rise & Fall Time <60 seconds to 95%		
58	Power supply 230 V AC, 50 Hz		
59	Outputs RS232 , Ethernet & USB port		
60	Operating Temp 5 to 40 °C		
61	Mounting 19” Rack		
62	**e) PM10 Monitor Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**		
63	Principle : Continuous measurement of PM10 in ambient air		
64	Particle Size Cut Off : 0 - 10 Microns		
65	Measuring Range : 0 to 2000 microg/m3		
66	Resolution : 1% of the concentration		
67	Minimum Detectable Limit: 2 microg /m3		
68	Detector : Plastic Scintillator / GM Counter, Silicon Semiconductor Beta Detector		
69	Air Flow Rate: At - least 1.5 m3 / hrs. (Adjustable to 1 m3/hr)		
70	Filter Material : Glass Fiber Filter		
71	Display : LED / LCD		
72	Sampling Head : Dynamic heated sampling head for measurement of PM10, with adjustable temperature 20 – 70 0C		
73	Calibration: Reference membrane facility should be provided for calibration of Analyser.		
74	Compatibility : Analyser should be compatible with protocols mentioned in DAS section		
75	Roll Length : Approximately 30 meters		
76			

77	Measurement Result : 1 hr average or shorter		
78	**f) PM2.5 Monitor Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation**		
79	Principle : Continuous measurement of PM2.5 in ambient air		
80	Particle Size Cut Off : 0 – 2.5 Microns		
81	Measuring Range : 0 to 1000 microg/m3		
82	Resolution : 1% of the concentration		
83	Minimum Detectable		
84	Limit: 2 microg/m3		
85	Detector: Plastic Scintillator / GM Counter, Silicon Semiconductor Beta detector		
86	Air Flow Rate: At - least 1.5 m3 / hrs. (Adjustable to 1 m3/hr)		
87	Filter Material : Glass Fibre Filter		
88	Display : LED / LCD		
89	Sampling Head : Dynamic heated sampling head for measurement of PM2.5 with adjustable temperature 20 – 70 deg.C		
90	Calibration: Reference membrane facility should be provided for calibration of analyser.		
91	**g) Ambient oxides of nitrogen (no-no2-nox) analyzer conforming to use pa automated federal reference method (frm).**		
92	USEPA/CPCB Approval		
93	Principle- Chemiluminescence		
94	Measurement- NO, NO2, NOx in Ambient Air		
95	Range- 0 – 50ppb to 0 - 20000ppb, user selectable, Dual ranges and		
96	Auto ranging supported		

97	Lower detectable limits- 0.4ppb		
98	Zero Noise <0.2 ppb (RMS)		
99	Zero drift (24 hrs) 0.5 ppb		
100	Span drift (24 hrs) <0.5% of FS		
101	Linearity 1% of full-scale		
102	Rise & Fall Time <60 seconds to 95%		
103	Power Requirements 220 – 240 VAC, 50/60 Hz		
104	Output RS232 , Ethernet & USB port		
105	Operating Temp 5 to 40 °C		
106	Mounting 19” Rack		
107	Ambient oxides of nitrogen (no-no2-nox) analyzer conforming to use pa automated federal reference method (frm).		
108	The measurement method for ambient NOX shall be based on the rapid Chemiluminescence Reaction of nitric oxide (NO) with excess ozone (O3). The reaction shall be made to take place in a light free chamber. Ambient NOx monitor shall be High sensitivity type employing dual cross-flow modulation method based on Chemiluminescence principle, and shall ensure long-term stability along with selectivity advancement of NO, NO2 and NOx (NO+NO2).		
109	Suitable racks cabinet shall be installed inside the station so that the analyzers are easily accessible from front and back for calibration and maintenance.		
110	230 V AC Power supply shall be provided in the analyzer room.		
111	A 300 mm Single phase (230 V AC) exhaust fan with safety grills shall be provided in the Shelters. Mounting brackets in 2 levels for fixing of gas bottles should be provided.		

112	The Station shall have the following as a minimum requirement. a. Standard racks of adequate numbers. b. Fire Extinguishers c. Furniture Material – Furniture made of water resistant laminated board		

- Gas calibration system

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	The calibration system for air monitoring equipment (listed above) should incorporate an automatic gas dilution calibrator, calibration gas standards and a higher performance zero air generator to calibrate all of the analyzers in the system. The calibration cycles should be able to be configured through the Data Acquisition System at any specific time during the day or night. It should be mounted on standard rack.		
4	These cylinders shall be designed at exact flow requirement by the analyzers and at appropriate ambient pressure		
5	Calibration shall be repeated every time (based on shelf life) the cylinders are replaced if it is non reusable type.		
6	The dilution calibrator should be able to perform mixing of source gas, from the calibration gas bottles, with zero air generators, in order to generate a wide range of calibration gas concentrations and minimizing the number of calibration gas standards required. All the calibration gases provided along with the system must be NIST traceable. It should also have facility for Gas Phase titration (GPT), having Ozone generator of 6 PPM/ltr and the converter efficiency should be 100% for conversion of NO2 concentration to NO. Calibration by using Gas cylinder shall also be acceptable.		
7	The Calibrator should be provided with inbuilt UV Photometer required for Ozone calibration.		

- Data Acquisition System

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	It should comprise of an Industrial PC running Windows latest version OS software.		
4	The data acquisition system should run on a windows latest version OS and be of client/server type. The user should be able to interface it with all kinds of analyzers (organic /inorganic) and meteorological sensors.		
5	The Data logging system should have an ability to log channels at different intervals and should have a capability of averaging and displaying real time data and averaged data over a period of 1 min, 10 min, ½ hr, 1 hr, 4 hr, 8, hr, 24 hr.		
6	Analyzer should be interfaced to Data acquisition system through Digital I/O ports such as RS 232 or USB port.		
7	Real time or averaged data can be viewed quickly and easily through a remote CLIENT interface on the central computer.		
8	Data acquisition system should be able to perform nested calculations vector averaging and rolling averages.		
9	DAS should be designed for unattended use and should support multi client environment i.e. it should be accessible from any computer through a remote login mechanism.		
10	It should have full control of zero span checks and should allow their scheduling either locally or from a remote client.		

11	It should have a feature for viewing instantaneous and historical data in the form of tables and graphs either locally or from a remote client.		
12	Data retrieval from DAS via USB and DVD should be possible.		
13	Generation of reports for pollution load, wind rose etc		
14	Alarm annunciation of analyzer/sensor in abnormal conditions		
15	The DAS should include following minimum features: a. “Industry Standard” RS 232 communication enabling digital/analog communication with all supported monitoring and meteorological equipment b. Data storage space for minimum 90 days of 5 minutes historical data c. Captures minimum, maximum, average values and standard deviations d. Lightning and surge protection facilities e. Full control over calibration cycle periods f. Password protection		
16	AAQMS and MMS shall be interfaced with DAS through serial interface. The communication protocol shall be of Modbus RTU or Modbus over TCP/IP.		

- Workstation

#	Parameter	Minimum Specifications or better	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Processor	Intel Core2 Duo, Minimum 3.6 GHz processor		
4	RAM	8GB RAM		
5	Hard Disk	1TB		
8	Other features:	DVD R/W Drive		
9	Monitor	DVD-RW used for installation of software and backing up of data/configuration files		
10	Port	Modem 9600 baud or greater		
11	Keyboard	Data averaging periods up to 4 independent data sets. Selected between 1 minute and 7 days.		
12	Mouse	Calibration control Automatic span and zero control. Calibration data is stored separately.		
13	Operating system	Mouse port USB port		
14	Display	22 " TFT color monitor		
15	Data storage	2 serial, 1 parallel & 2 USB with LAN		
16	Communication ports	104 keys keyboard Microsoft		
17	Modem Port	Optical Mouse + Pad		

- Analytical Software

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	Analysis and reporting software should possess following: minimum features:		
4	(i) Windows (latest version) compatible		
5	(ii) File format conversion		
6	(iii) Statistical analysis of data for maximum, minimum, average and standard deviation for various time intervals using the monitored data		
7	(iv) Tabular and graphical format for report production		
8	(v) Wind rose graphs		
9	(vi) File export facility		
10	(Vii) Windows based printer support		

- Central Monitoring Station

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	It should comprise of an Industrial PC running Windows latest version OS and compatible software.		

4	The Data logging with central Monitoring System will be through GPRS/TCP-IP from all the AAQMS system and should have an ability to program and log channels at different intervals and should have a capability of averaging and displaying real time data and averaged data over a period of 1 min, 10 min, ½ hr, 1 hr, 4 hr, 8, hr, 24 hr.		
5	Real time or averaged data can be viewed quickly and easily through a remote CLIENT interface on the central computer.		
6	The System should be able to perform nested calculations vector averaging and rolling averages.		
7	It should have a feature for viewing instantaneous and historical data in the form of tables and graphs either locally or from a remote client.		
8	Data retrieval from CMS via USB and DVD should be possible.		
9	Generation of reports for pollution load, wind rose etc		
10	Alarm annunciation of analyzer/sensor in abnormal conditions		

XVI. Technical Specifications of Single mode Optical fiber cable

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Type	Single Mode, 48 Core		
4	**Fiber properties**			
5	Core diameter	8-10 µm		
6	Cladding	125 µm ± 3 µm		

	diameter			
7	Primary coating material	Uv cured acrylate		
8	No of Cores	48		
9	Secondary buffer material	Hard electrometric		
10	Secondary buffer diameter	900 µm		
11	**Loose tube**			
12	Material	Pbt resin		
13	Diameter	Nominal 2.0 mm		
14	Filling material	Thixo jelly tropic compound		
15	Fiber color	#1 blue #2 orange #3 green #4 brown		
16	Tube color	Blue		
17	Dummy element	Polyethylene		
18	**Cable properties**			
19	Central strength member	Frp rod		
20	Water blocking material	Water swellable yarn		
21	Core wrapping tape	Water swellable tape		
22	Sheath strength	Glass yarns		

	member			
23	Inner sheath	Black pvc		
24	Armour	Corrugated steel tape		
25	Material	Thickness 2mm		
26	Thickness	Black		
27	Colour			
28	Operating temperature	-55° TO 85 °C		
29	**Optical parameters**			
30	Wavelength	1550nm		
31	Attenuation	0.4dB/km(@1550nm)		
32	Crush load	N/100mm		
33	Cable diameter	2-3mm		
34	Crush resistance	750N/cm		
35	Impact resistance	1000 cycles		
36	Water penetration	23º± 2ºC		

XVII. Technical Specifications of Variable Message Sign Board

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	Pixel	14,400 Per Sq.M		

	Density(Pixels/m^2)			
4	Resolution Per LED Cabinet	48x48		
5	Resolution of the Screen	Controller should be able to adjust the screen resolution		
6	LED Lifetime	50,000 hours to half brightness		
7	Contrast Ratio	3,000:1		
8	Pixel Configuration	Commercial Grade 3 in 1 Black SMD		
9	LED Configuration	1 Red 1 Green 1 Blue		
10	LED Surround	Black		
11	Brightness	6000 NITS		
12	Brightness, Uniformity	97~99%		
13	Optimal Viewing Angle	120 Degrees(@50% Brightness)		
14	Color Uniformity	97~99%		
15	Optimal Viewing Angle	120° Horizontally & 45°Vertically		
16	Color processing 16 bit	16 Bit Per Color		
17	Color Temperature	R.G.B brightness 256 level adjustable		
18	IP Rating	Outdoor IP 65		
19	Life Span	> 100000 Hours (After that 50 % Illumination)		
20	Operating Temperature	0 ° C to 55° C		

21	Operating Humidity	10 % RH to 90% RH		
22	OS Platform	Windows 7/ 10		
23	Communication Interface	RJ45 (if required, bidder needs to provide media convertor for direct fiber termination)		
24	Frame Rate 50,60 Hz	50,60Hz		
25	LED Refresh Rate	> 1000Hz		
26	Power Consumption Max / Display	800 Watt /Sq. Meter		
27	Power Supply Type	Integrated		
28	Optional redundant video cabling	1. In case of data link interruption, data signal will still feed modules/cabinets from other side		
29	Line Voltage	100-240 Volts AC, 50 & 60Hz		
30	Video input Type	HMDI IN / SDI IN / HMDI OUT / SDI OUT HDCP Compliant		
31	Control Input Type	Ethernet		
32	How Each Display Unit Interconnected	Power: Individual power cables Data daisy chained		
33	Display Weight(Per Display)	Weight / module: 40 kg (88 lbs) per square meter LED display. One module has an average weight of 6.4 kg (14.11 lbs)		
34	Cable Types Required for LED Panel Connectivity	CAT6 cable (RJ45) & Optical Fiber		

35	Layout management Details	Availability(Y/N)		
36	Text Overlay Over Video	Availability(Y/N)		
37	Serviceability Option	Front & Back		
38	Protection Grade	1. Quadruple water ingress protection 2. IP65 front, IP54 back 3. Humidity coated components (LED modules, controller, PSU) 4. Internal cover for internal electrical components 5. Drainage holes		
39	Lightproof Module with Air Hole Design helps to strgthen the wind resistance capability	To Be Complied		
40	Software Display Controller	Should be able to remotely configure and manage at least 100 LED Screen from a Central location - Should be able to play the selective contents at different LED Screens as per the requirement - Should provide an easy-to-use playlist format for scheduling of content, images, videos, live feeds such as weather forecasts or the news, social media, traffic conditions, etc. - Assign roles and permissions to allow multiple content creators and managers		

		- Should have an interface for content design with readymade/custom made templates - Should have options for importing video feeds, Images and contents from other sources such as inputs from Environmental Sensors, Social Media, Camera Feeds etc. - The Hardware for the central Display Controller has to be provided along with the proposed solution - From the scalability point of view, the software should be able to do so without any extra Licensing up to 200 LED Screens		

XVIII. Technical Specifications of Public Address System

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	PAS system	Should have the capability to control individual PAS i.e. to make an announcement at select location (1:1) and all locations (1: many) simultaneously. The PAS should also support both, Live and Recorded inputs		
4	Speaker	Should be provided with sufficient number of speakers to cover all the arms of each traffic junction, To be used for Public Address System		
5	Connectivity	IP Based		

6	Access Control	Access control mechanism would be also required to establish so that the usage is regulated.		
7	Integration	With VMS and Command and Control Center		
8	Battery	Internal Battery with different charging options (Solar/Mains)		
9	Power	Automatic on/off operation		
10	Casing	IP-55 rated for housing		
11	Operating conditions	0° to 50°C		

XIX. Technical Specifications of Emergency Call Box

#	**Parameter**	**Minimum Specifications or better**	**Bidder Compliance (Yes/No)**	**Product Documentation Reference**
1	**Make**	<to be provided by the bidder>		
2	**Model**	<to be provided by the bidder>		
3	General	The emergency box (or panic button) should enable citizens to establish a two way audio (microphone and speaker) & camera communication link with Police (or / and with Authority's Disaster Management Cell or Command and Communications Center) through a press of a button.		
4	CCTV Camera	Should have built in 2 MP HD IR Camera, IR Distance >10m, 25fps recording and able to view person who is using emergency call box Compression Ratio: H.264,H.265, FOV: Horizontal-128˚, Vertical - 75˚, Diagonal -		

		147˚		
5	Speaker and Microphone	Should have built in high sensitive omnidirectional audio i/p which is capable of sensing audio built in speaker, pickup distance: 5m & 3.5 mm audio interface for external audio output Shall have G.711U/G.726 audio compression with intelligent noise suppression technique and echo cancellation technique		
6	Call Button	Should have one panic button		
7	Alarm	Should have tampering alarm function, which allows to generate alarm to central VMS whenever the device is tampered from its installed area or the mount		
8	Interface	Should have one touched alarm & tampering alarm, alarm 2 I/O, Shall have inbuilt SD card slot supporting min 128 GB.		
9	Connectivity	10M/100M self-adaptive Ethernet interface, TCP/IP, SNMP, RTSP, SIP and ONVIF protocol should be supported		
10	Power supply and operating temperature	Should work on 100-240VAC supply consuming not more than 24W, operating temperature -40deg C to 90deg C, Working Humidity 10% to 90%		
11	Casing	Should be IP66 protected		

12	Mount type	Should be a wall mount device		
13	License	Should Provide the required software license		

XX. Technical Specification of Adaptive Traffic Control System

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	The system shall be used to monitor and control traffic signals, including signalized pedestrian crossings, using a traffic responsive strategy based on real-time detector data.		
4	The proposed system must have been successfully operated and should perform reliably in the harshest environments.		
5	The system must support a complete range of communications over optical fiber cable.		
6	This system shall achieve objectives as follows: 1) Reduction of fuel consumption 2) Improvement in the quality of life for the citizens 3) Reduction of air and noise pollution in the streets 4) Improvement in traffic flow and safety 5) Assist the economic growth by improving mobility 6) Provide technology and local traffic engineering skills to apply to critical traffic situations		
7	The ATCS application should determine optimal signal timings dynamically using near-real time detector data for a group of junctions using any suitable algorithm. The system should determine a common cycle time for a group of junctions, splits and offsets between adjacent signals.		

8	The application should support selective vehicle priority for movement of buses and other important vehicles such as ambulances, fire engines etc. To avoid queue build-ups, the system shall also provide compensated green to the other stages after the passage of a priority vehicle		
9	The application should allow specification of green corridors for movement of Emergency Response vehicles, such as ambulances, VIP vehicles, fire engines and police vehicles.		
10	The application should support interfacing with commonly used microscopic traffic simulation software for pre and post implementation analysis and study of the proposed ATCS control strategy.		
11	The application should optionally be able to estimate a common operational view of the network state by fusing data from multiple sources such as detectors as well as ANPR, GPS or any other such data collected from other third party sensors/detectors/cameras.		
12	The application should be capable of operating in the following four modes: 1) Fixed-time mode: This mode enables traffic police personnel to select and run fixed-time traffic signal timing plans using the ATCS interface available in the C4. The signal timing plans support fixed offsets between pairs of adjacent traffic signals. 2) VA mode: Individual signals should be able to run on stand-alone VA mode. 3) Fully adaptive mode - tactical: Signal timings for a group of junctions should be dynamically optimized using near-real-time detector data. 4) Remote operation: Traffic police personnel should be able to remotely control (change stages) using the ATCS interface from the control room.		

XXI. Technical Specifications of Traffic signal controller

#	Description	Bidder Compliance (Yes/No)	Product Documentation Reference
1	**Make**	<to be provided by the bidder>	
2	**Model**	<to be provided by the bidder>	
3	The controller should support the required number of phases and stage for 3-way, 4-way and 5-way junctions for operation during different times of the day and day of the week and for special day types.		
4	The ATCS controller can define common inter-green period formed by the clearance Amber and Red extension period. It should also be possible to program individual inter-green period from 3 Seconds to 10 Seconds.		
5	The controller should be in list of all conflicting phases at an intersection. After configuration, a traffic engineer should verify that the signal aspects are functioning as expected for all signal plans before go live.		
6	During power up the controller should initially execute the Flashing Amber / Flashing Red plan for a time period of 3 Seconds to 10 Seconds.		
7	Fault monitoring should be available for the traffic controller and the signal aspects under all modes of operations. The fault data should be communicated to the central ATCS server in near-real-time.		
8	A hardware failure leading to a conflict condition (due to faulty devices or short circuit in the output) shall force the signal into Flashing Amber/ Flashing Red. The conflict data should be communicated to the central ATCS server in near-real-time.		
9	The controller should be able to interface with a wide variety of detectors having industry standard open collector interface.		

10	The controller should support the following modes of operation: 1) Fixed time mode - the controller should execute a pre-set signal plan based on the time of the day and day of the week. Signal timings will not be modified dynamically using real-time traffic detector data under this mode. 2) Vehicle Actuated (VA) mode - the controller should execute a pre-set VA logic and not have fixed stage durations. The green time for each stage shall be bound by the constraints of specified minimum green and maximum green times. The actual green time is determined based on the vehicular demand obtained from the traffic detectors at the given approach and conflicting approaches using VA logic. 3) ATCS mode - the controller should execute optimized signal timings determined by the ATCS application in the control centre using inputs from traffic detectors, including cycle time, splits and offsets. The traffic signal controller can optionally or locally override the signal timings determined by the central ATCS.		
11	The controller should provide either a fixed operator console or support a portable one to allow traffic engineers to program the controller on-site.		
12	No proprietary protocols should be used for communication between the traffic signal controller and ATCS server.		

9 TECHNICAL SPECIFICATIONS OF ELECTRICAL COMPONENTS:

9.1 The general requirement include design, manufacture, testing at works, supply and delivery at site, unloading and storing the equipment at site, installation, testing and commissioning of the equipment at site of all electrical equipments are covered under this section of this Specification**.**

Contractor shall supply the equipment in accordance with the specification, data sheets.

For uniformity of appearance, all switchgear and control panels shall have a common appearance and colour.

In order to reduce the spares holding to a minimum electrical, control and instrumentation components of a similar type and purpose used throughout the Works

shall, unless it can be shown by the Contractor to be impractical, be of the same Manufacturer and type / series.

9.2 CPWD SPECIFICATIONS

The Electrical works shall also conform to following standards as amended up to date wherever relevant and applicable;

- CPWD General Specification for Electrical Works Part I-Internal (2013).
- CPWD General Specification for Electrical Works Part II-External (1994).
- CPWD General Specification for Electrical Works Part IV-Substation (2013).

9.3 L V PANELS

- The scope of supply covers design, manufacture, testing and supply of LT Panels.
- LT panel shall be (tested assembly - TTA) CPRI /Independent international test house tested for all the tests as per IEC61439-1 & 2 and internal arc tests as per IEC 61641 V3, 50kA (or as specified in BOQ/SLD) for 0.3 sec minimum at Horizontal bus bar, veridical bus bar and cable chamber.
- LT Panel shall also be tested of design as per Seismic Zone II of IEC 60068-3-3.
- Panel shall be rated for Impulse withstand capability equal to or greater than the switchgears inside the panel.
- The metal enclosed switchgear shall be designed to operate continuously with reference of ambient temperature of 50ºC without any de-ration.
- The equipment shall be designed and manufactured in accordance with the best engineering practice and shall be such that has been proved to be suitable for the intended purpose.
- Provision for interlocking of LV Incomer breaker with HV side breaker shall be provided such that if the HV breaker trips then the LV breaker will trip and it shall not be possible to close the LV breaker unless the HV side breaker is closed.
- The Panel shall be indoor type having incoming sectionalisation and outgoing switchgears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP 52 for indoor and IP55 for outdoor as per IS: 13947 (Part-I).

9.4 Constructional Requirements:

- All panel boards shall be free standing, metal enclosed, single front, fabricated with 2mm CRCA sheet steel for all doors, partitions and covers and 2 mm CRCA sheet steel for load bearing sections including all ACB feeders. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels.
- The gasket shall be suitable to withstand all weathers for long tenure of service. All hardware shall be HD Galvanized or stainless steel.
- Main PCC, APFC, DG panels shall conform to FORM 4B as per IS 61439 and metering, common services, street lighting panels shall conform to FORM 3B as per IS 61439.

- For operator safety IP2 X (touch proof) protection to be available even after opening the feeder compartment door. The compartmentalization to be achieved by using metal separators, use of PVC sheet / Hylem sheets shall not be allowed.
- Each door & cover shall have adequate reinforcement of suitable ribs & stiffeners. All such door shall open at min 1050. All feeders and cable alleys shall have hinged type door with panel locks. All bus-bar covers and other panel covers shall be screw fixed. Cable alleys and bus-bar chamber shall have minimum width of 300mm.
- All doors shall be with concealed type hinges and captive screws. Rear doors of panels requiring rear access shall be provided with removable hinged doors. Side covers of panels shall be with removable panels.
- All doors shall be provided with durable and easy fitting locks with special keys to ensure opening by authorized personnel. Rubber grommets shall be provided at the cable entry.
- All mounting accessories like base channels, cross angles if required, nuts, bolts etc. shall be supplied by the vendor.
- All the panels shall have uniform height. The operating height of all the panels shall not be less than 300mm and not more than 1900mm. Panel height should not be more than 2450mm.
- All the panel boards shall have cable entry from bottom. Split gland plate of 2mm thick shall be supplied for termination of power, control and instrumentation cables sized as per the required no. of cable mentioned in the SLDs and 20% spare space for future addition.

9.5 Bus-Bars:

a. Bus-bar of the panels shall be rated for Continuous current at site conditions.

b. All bus-bars shall be electrolytic grade copper or aluminum. BIDDER shall specify the purity and conductivity of the bus bar along with the BID.

c. All the bus bars shall be sleeved with heat shrinkable black color PVC sleeve or better insulation with colored polyester tapes for phase identification at regular intervals/ locations. Make and Type test reports carried out at accredited laboratory, of such sleeves shall be submitted during testing.

d. BIDDER shall submit all calculations & documental proof of the adequacy of the bus bar sizes to meet the continuous and short time current ratings specified for reference during procurement/ manufacturing.

e. Vertical bus-bars shall have S.C. rating same as main bus bar and shall be suitable for all connected load of vertical section.

f. BIDDER shall ensure that incoming feeder shall be suitably designed for terminating the required no. of runs of 1.1kV grade XLPE insulated armoured cables with 20% spare capacity. BIDDER shall consider the necessary arrangement (dummy panel, adapter panel, rear extension etc.) if required, for terminating the cables within the limits specified above.

g. The bus-bars shall be designed considering the following criteria:

- Current density of 0.8A/sq mm maximum for aluminium and 1.6A/Sq mm for copper.
- Sleeves made of insulating material on all bus bars.
- Bus bars carrying rated current continuously at Design Ambient Temperature shall be considered as 50ºC and temperature rise shall be considered as per latest relevant standard.
- Configuration of bus bars and Proximity effect
- Bus bars shall withstand the short time rating of the panel.

h. Bus bar supports shall only be SMC irrespective of bus bar size. The span between the two insulators shall be as per the approved TYPE TEST REPORT for short time rating. Joint positions and insulators shall be properly adjusted so that they don't interfere. Bus bar bending shall be carried out on appropriate machines designated for the same rather than doing manually.

i. Neutral bus-bars of the panel boards shall be rated equal to the size of phase bus.

j. All bus-bar shall be treated with anti-oxide paste wherever bi-metallic contact is required.

k. The material and spacing of the busbar support should be same as per the type tested assembly.

9.6 Earthing:

a. Earth bus bars of Aluminium material shall be run all along the panel, extended out at both ends of value equal to the rated symmetrical short circuit rating of the associated switchboard/ panel. The same shall be properly supported to withstand stresses induced by the rated symmetrical short circuit current.

b. Earthing bus-bar shall be terminated at both ends of the switchgear to suit the connections to earthing conductor. The locations where the bus are protruding out of the panel boards, CONTRACTOR shall ensure that proper ingress protections are provided at all such locations.

c. All doors and detachable components inside the feeder are required to be earthed individually with green (with yellow band) colour PVC insulated multi stranded copper conductor wire of size 4 sq.mm duly crimped with ring type lugs and are to be looped & connected to horizontal earth bus.

d. Earthing bus shall be run continuously in panel drawn out suitably considering respective cable entry inside the panel.

e. Separate Al earth bus shall be provided at each cable alley for all the panels.

9.7 Power Wiring (Inside The Feeder):

a. All power wiring for rating upto and including 63A shall be carried out with 1.1kV grade coloured HFFR/ FRLS PVC insulated, coloured for phase identification, multi stranded copper wires duly crimped with ring type lugs.

b. Power connections for rating above 63A shall be done with AL bus bars (machine bend for proper profile) insulated with black heat shrinkable sleeves with phase identification coloured tapes duly supported on SMC insulators and placed with required minimum clearance of 25mm between phases and between phase to ground/ neutral. Such bus when brought out of the feeder for cable connections shall be sufficient enough and profiled suitable for termination of the number of LT cables as indicated above.

9.8 Control Wiring (For Panel And Feeders):

a. All panel Control wiring shall be done by 1.1kV grade HFFR/FRLS PVC insulated multi-stranded copper wire. CT circuit wiring shall be done with minimum 2.5 Sq.mm size wire of above specification. Control and Potential circuits shall be wired with minimum 1.5 sq. mm size wires of above specifications. Wires shall be gray coloured with suitable crimp able copper lugs. CT's & PT's wiring shall be colour coded for multi-phase identifications (R-Y-B-N).

9.9 General Requirements:

a. DP MCB shall be provided for all control circuits where the fault level is less than 10kA. Else the control supply shall be tapped through a control transformer of adequate capacity supplied with MCCB/ MPCB/ SFU of adequate short time rating. Independent DP MCBs shall be provided for each circuit such that tripping due to fault in one circuit should not affect other functions adversely.

b. Self explanatory Wiring diagrams with terminal and wire numbers, component numbers shall be provided on the inner face of the door of each feeder. Drawing set in the panel shall be laminated.

c. All labels for identification of feeders as well as internal and external components as per legends provided By PURCHASER shall be on white acrylic sheet with black engraving. These labels shall be fixed by screws/rivets and shall not be pasted.

d. Aluminium etched 415V Caution boards written in two languages (English, Hindi) shall be riveted on the panel at locations where live bus bars are present and need isolation before any access to it. In case secondary covers have been provided inside the panel, then caution boards shall be also marked on these boards in addition to the external covers. Stickers are not acceptable.

e. Selector/control switches shall have an 'Off' position. The 'Off' position shall not be wired in any circuit and shall be utilised to disconnect (or bypass) power supply to control circuit for any maintenance work.

f. All electrical panels (internal components & arrangement) shall have finger touch protection, for human safety viz. working on one component shall not cause shock to the personnel due to any other live component in the panel. Also, the terminal live parts shall not be accessible by fingers (finger cannot come in contact with live parts of the terminals).

g. No openings/ holes meant for fixing hardware shall be left open. All the hardware (esp. screws, nuts, bolts, and washers) shall be in all appropriate positions & properly tightened.

h. Phase separators, shrouds, falling tool barriers shall be suitably provided. Any additional requirements as observed at any stage upto handing-over shall be provided (for safety and ease of maintenance) without any cost implication to the PURCHASER.

i. All PVC/engineering plastic based items (including but not limited to conduits, casing-capping, trough, trunk, enclosures, covers, plugs, etc) shall be with FR properties.

j. Lifting hooks/eyes shall be provided in each shipping section of the equipment and shall be removable type. The equipment shall be given tropical and fungicidal treatment.

k. Insulation mat of suitable standard width shall be provided in front of the HV and LV panels.

l. Atleast one 230V, 1Ph, Space heater shall be provided for each vertical section of the switchboard. Each Space heater shall be provided with an isolating switch, a thermostat and dedicated MCB protection of appropriate rating. Heater shall be mounted at bottom of the panel with cover to avoid accidental contact of heater with skin.

m. 230V 1Ph, Panel illumination (11W CFL/ LED fixture with lamp, limit switch and isolation switch) along with 1 no. 5/15A 5 pin socket with switch shall be provided for each vertical section. Bare holder with open lamp is not acceptable.

n. Adequate space shall be provided for terminating the outgoing cables.

9.10 Equipment Requirement:

a) MCCB:

- All the panels shall have MCCBs upto 630Amp. All MCCBs shall be rated for 415V, 3 Ph, 50Hz.
- All MCCB shall be microprocessor based. MCCB shall have O/C, S/C Protection. Wherever MCCBs are used as incomer these shall be provided with earth fault & time delay or as specified in SLD/BOQ. MCCBs of suitable Icu=Ics=100% ratings.
- There should be earth fault indication on panel door.
- Rated operational voltage will be 415V AC with +/-10% variation.
- All MCCBs shall be with Utilisation Category "A".
- All the MCCBs shall invariably be Current Limiting type, features like Double Break, Positive Isolation functions shall be Integral feature of the device and shall provide a cut off in, < 10 ms for prospective currents during faults. All MCCBs shall be provided with rotary handle with door interlock and extension links/ spreaders with proper shrouds. No live part accessible even after opening the front cover.

10 LED LIGHTING

10.1 General requirements

- The Lighting system includes the following items.
- Lighting fixtures complete with Lamps and accessories (lumen per watt shall be indicated)
- Lighting system equipment (ISI make)
- Light control switches, receptacle units with control Switch units, lighting wires, conduits and other similar items necessary to complete lighting system.
- Lighting fixture supports, street lighting poles and flood light towers
- Main Lighting distribution board, lighting panels.
- Multi core cables for street, boundary and flood lighting.
- PVC Conduits

- (b) Load balancing of lighting system shall be made.

10.2 Floodlight Luminaries:

Metal halide type luminaires shall be complete with accessories like lamps, ballasts, Driver, power factor improvement capacitors, starters etc. These shall be mounted as far as possible in the luminaire housing only. If these cannot be accommodated integral with the luminaire then a separate metal enclosed control gear box shall be included to accommodate the control accessories together with a terminal block suitable for loop-in, loop-out connections.

Flood Light Luminaries:

a) Flood light luminaries shall be of weather proof construction with high pressure die cast aluminum with cooling fins and graphite grey polyester powder coating, resistant to corrosive and saline environments with a separate internal high purity (99.85%) polished, anodised aluminium mirror polished reflector, heat resistant, toughened glass cover and necessary gaskets to prevent ingress of dust.

b) The housing shall be supported on a cast iron base and capable of being swivelled in both horizontal and vertical directions and locked in any desired position.

c) For focussing purposes, knobs, shall be provided along with sector plate indicating the angle in degrees between 0 and 90 deg. in vertical direction.

d) The Luminaries shall be suitable for single and dual Metal Halide (MH) lamps of 150W/ 250W/ 400 watts etc. as required. The same shall be mounted in a separate sheet metal enclosed/ cast aluminium weather proof control gear box.

e) The luminaries shall be provided with cable gland on the canopy in down ward direction for cable connection.

f) It shall be possible to adjust the lamp position to achieve wide beam, medium beam or narrow beam.

g) It shall be possible to replace the lamp from the canopy without opening the front glass.

h) The flood light shall be supplied with knife switch enabling safe lamp replacement from rear side.

i) Retained steel screws with special anticorrosion and anti-gripping treatment shall be provided.

j) Igniter box shall be thermally isolated from the housing.

k) Gasket made of silicone platinic material shall be provided.

l) The floodlights shall contain an internal baffle to improve efficiency and to reduce glare.

m) Access for re-lamping shall be from the rear of the floodlights with a provision of power cut-off switch to discontinue the lamp current when the rear door is opened.

n) Precision aiming arrangement by way of external telescope shall be provided in the luminaire.

Accessories for Luminaries:

a) Reflectors

i. The thickness of aluminium shall comply with relevant standards. Aluminium used for reflectors shall be anodized/ epoxy stove enamelled/ mirror polished.

ii. Reflectors shall be free from scratches or blisters and shall have a smooth and glossy surface having an optimum light reflecting coefficient so as to ensure the overall light output specified by the Contractor.

iii. Reflectors shall be readily removable from the housing for cleaning and maintenance without disturbing the lamps and without the use of tools. They shall be securely fixed to the housing by means of positive fastening device of captive type.

b) Lamp/ Starter Holders:

i. Lamp holders shall have low contact resistance, shall be resistant to wear and shall be suitable for operation at the specified temperature without deterioration in insulation value. They shall hold the lamps in position under normal condition of shock and vibration met with under normal installation and use.

ii. The starter holders shall be so designed that they are mechanically robust and free from any operational difficulties. They shall be capable of withstanding the shocks met within normal transit, installation and use.

c) Ballasts:

i. The ballasts shall be designed to have a long service life and low power loss. The ballasts shall be of the inductive, heavy duty type copper wire wound, filled with thermosetting, insulating, moisture repellent polyester compound filled under pressure or vacuum. Ballasts shall be provided with taps to set the voltage within the range of variation in supply voltage of ±10% of 240 V. End connections and taps shall be brought out to a suitable terminal block rigidly fixed to the ballast enclosure. Ballasts shall be free

from hum and such of those which produce hum shall be replaced by Contractor free of cost.

ii. Ballasts shall be mounted using self locking, anti-vibration fixings and shall be easy to remove without demounting the fittings. They shall be in dust tight, non combustible enclosures.

iii. All the luminaries other than Flood Light Fixtures shall have integral control gear.

iv. All gas discharge/ MH type lamps shall be provided with control gear, with Copper wound and polyester filled low loss ballast, igniter and PF correction capacitor.

v. Contractor to provide comprehensive technical details of the luminaries and the lamps being offered. The details must be sufficient to take in to consideration maximizing of energy efficiency and minimizing overall shop power consumption.

vi. All the outdoor purpose luminaries, including Street light luminaries shall be with ingress protection of IP 65 minimum.

d) Starters:

i. Starters shall have bimetal electrodes and high mechanical strength.

ii. Starters shall be replaceable without disturbing the reflector or lamps and without the use of any tool.

iii. Starters shall have brass contacts and radio interference capacitors.

e) Capacitors:

i. The capacitors shall have a constant value of capacitance and shall be connected across the supply of individual lamp circuits.

ii. The capacitors shall be suitable for operation at specified supply voltage conditions and shall have a value of capacitance so as to correct the power factor of their corresponding lamps circuit to the extent of 0.95 lag or better.

iii. The capacitors shall be hermetically sealed preferably in a metal enclosure to prevent seepage of impregnate and ingress of moisture.

f) Lamps:

i. Lamps shall be capable of withstanding small vibrations and the connections at lead in wires and filaments/ electrodes shall not break under

such circumstances.

10.3 Applicable Standards

Sr.No.	Brief Title	IS/IEC Code
1.1	Testing procedure of photometric testing for LED luminaires	LM 79
1.2	Testing procedure on the lifespan of LEDs	LM 80
1.3	National Lighting Code	SP72
1.4	Method of Measurement of Lumen Maintenance of Solid State Light (LED) Sources	IS:16105
1.5	Method of Electrical and Photometric Measurements of Solid-State Lighting (LED) Products	IS:16106
1.6	Limits of Harmonic Current Emissions	IS 14700-3-2
1.7	DC or AC supplied electronic control gear for LED modules performance requirements	IEC 62384
1.8	Lamp control gear: particular requirements for DC or AC supplied electronic control gear for LED modules	IEC 61347-2-13
1.9	Environmental Testing: Test Z- AD: composite temperature/ humidity cyclic test	IEC 60068-2-38
1.10	Electro Magnetic compatibility (EMC)- Limits for Harmonic current emission-– (equipment input current ≤ 16 A per phase)	IEC 61000-3-2
1.11	EMC Immunity requirement	IEC 61547
1.12	LED modules for general Lighting-Safety requirements	IEC 62031
1.13	Classification of degree of protections provided by enclosures (IP Codes)	IEC 60529
1.14	Fixed general purpose luminaries	IEC 60598-2-1
1.15	General Lighting - LEDs and LED modules – Terms and Definitions	IS:16101 / IEC TS 62504
1.16	LED Modules for General Lighting Part 1 Safety Requirements	IS:16103(Part1)
1.17	LED Modules for General Lighting Part 2 Performance Requirements	IS:16103(Part2)
1.18	Safety of Lamp Control Gear, Part 2 Particular Requirements Section 13 D.C. or A.C. Supplied Electronic Control gear for Led Modules	IS:15885(Part2/Sec13)

The average atmospheric condition during the year is mentioned below. The equipment shall be designed to work in such environmental conditions:

(a) Maximum ambient air temperature: 50° C

(b) Max. Relative humidity: 100%

(c) Atmosphere: Dusty and Heavy chemical smoke at times in certain areas.

(d) The equipment shall be suitable to sustain and work in the humid and corrosive atmosphere of the city.

10.4 Luminaire Description

- The Luminaires shall work on single phase three wire system (phase, neutral & earth).
- The luminaire light output (lumen) shall be constant and shall be able to withstand allowable supply source voltage variations/ fluctuations, spikes and harmonics.
- The Luminaries shall have a sturdy and corrosion resistant high pressure Die cast Aluminium alloy housing with weatherproof gasket for lamp and control gear accessories .The housing shall be Epoxy coated, without any cracks or thorough holes, made in a single piece of die-cast LM6 Aluminium alloy. The luminaries shall be totally enclosed, dust tight and water proof.
- Heat sink used should be aluminium extrusion having high conductivity. The dimensions of luminaries shall be optimum and adequate to permit sufficient heat dissipation, through the body itself, so as to prevent abnormal temperature rise inside the lantern and consequential damage to the cover and gasket materials, LEDs, lenses and electronic drivers. Heat sink must be thermally connected to MCPCB/ LED light source.
- The Luminaries Housing shall be suitable for termination of 3C X 2.5 sqmm copper conductor PVC insulated flexible Cable with Double Compression Cable Glands
- The optical system shall consists of individual Poly Carbonate lenses on high power LEDs designed & tested to achieve typical street lighting distribution from the LED Luminaire. These lenses provided for individual LEDs are to be fixed on lens plate in order to have consistent light distribution from luminaries. Luminaries should conform to the Photometric Distribution / requirements of Cut-Off / Semi Cut – off light distribution and optics as classified in IS 1944 and NLC 2010.
- Suitable number of LED lamps shall be used in the luminaries. The manufacturer shall submit the proof of procurement of LEDs from OEMs at the time of testing along with the test reports.
- The Luminaries shall be provided with distortion free, clear, high tensile, heat resistant, toughened glass of minimum 0.8mm thickness or UV resistant polycarbonate cover fixed with corrosion free/ stainless Steel screws.
- An extruded silicon loop gasket shall be provided in the lantern body to ensure a weather proof seal between the cover and the metal housing to exclude the entry of dust, water, insects, etc. Luminaries should conform to degree of protection of IP 66 or above. Felt gasket will not be accepted. The test report from NABL accredited laboratory shall be submitted along with the technical proposal/ Bid.
- Luminaire shall be enclosed in an aesthetically designed housing with corrosion resistant polyester powder Coating after phosphor-chromate treatment.
- All Luminaires shall conform to RoHS/CE/ERTL/ERDI requirements.

- Name of the BSCDCL, Year of Manufacture, Batch No., Serial Number or Identification No. Luminaries Manufacturer's Name / Logo, Wattage and Frequency should be embossed on the housing.
- LED luminaries, should conform to the various National / International standards for safety & performance. Manufacturer should provide test reports as per LM 79 & LM80. The test report from NABL accredited laboratory shall be submitted along with the technical proposal/ Bid for LED as well as Luminaires.All test reports not older than 5 years.
- Luminaries should conform to the National / International standards for Safety & Performance and test certificates as per IS 16103/ IS 16107 should be provided by the manufacturer. In case of luminaries are imported, the CONTRACTOR shall conform to test parameters as per UL or equivalent standards.
- The electrical component of the LED and LED driver must be suitably enclosed in separate sealed unit to function in environment conditions mentioned above.
- All the connecting wires inside the Luminaries shall be Low Smoke Halogen Free, fire retardant cable.
- Adequate protection against Overloading, Short Circuit, Over Voltage, Over temperature, Under Voltage, String Open, Surge Protection shall be provided within the Luminaries.
- Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.
- All the material used in the luminaries shall not contain any toxic material/ metal like mercury; shall be halogen free and fire retardant conforming to relevant standards.
- The Manufacturer shall have all the relevant testing facilities certified by an accredited laboratory and shall be offered for inspection to the BSCDCL for verification of the required parameters and tests. CONTRACTOR shall confirm the same in the BID.
- The control gear shall comply with the provisions of IEC 61347-2-13, IEC 62031 and IEC 62384 as appropriate.
- Appropriate surge protection shall be provided by the CONTRACTOR for all the Luminaires offered by it as well as external arrangements shall be provided for the existing fittings if they donot have such protections inbuilt.
- Additionally, as per ANSI C 136.2-2014/ UL-1449, External Surge protection device (SPD) with Thermal Protection (TMOVs) of minimum 10 kV/ 10 kA to be separately installed with each fixture while an additional surge arrestor of 20kV/10kA can be installed inside Feeder Pillar / CCMS panel. The same shall be certified from independent lab and follow IEC 62305 & IEC 61643-11-2011. No claim for failure of Luminaires, on account of voltage surges other than Lightning surges, will be considered.In case of voltage surges due to lightning, it is expected that lights, in the affected circuit, will fail in a group and not in an isolated manner. Hence, any such failure of lights in a group on account of Lightning surges, may be reported to the BSCDCL, along with circumstantial evidence preferably within 48 hours of such

occurrence. The responsibility for submission of supporting documentation rests with the CONTRACTOR.

- The Luminaires shall be suitable for operation within the input supply voltage range specified. The driver of the light should be able to sense and cut-off power to the light in case of phase-to-phase/ 440 V fault. No claim in this regard shall be considered.
- The complete luminaire assembly shall have a warranty period of 5 years
- Protection against any type of mischief/ pilferage should be ensured.

10.5 Testing of Luminaire

The Routine test on each of the offered Luminaries shall be carried out by the CONTRACTOR before dispatch. Following tests shall be carried out as Routine tests by the CONTRACTOR for the offered Luminaries;

- Visual and Dimensional check
- Checking of documents of purchase of LED
- Insulation resistance test
- HV test
- Reverse polarity

The Acceptance test shall be carried out by BSCDCL or BSCDCL's Representative on a sample of the lot offered for Acceptance. The Lot shall be different from the lot from which the Type test samples have been drawn. The cost of the testing shall be borne by the CONTRACTOR. Following tests shall be carried out as Acceptance tests by the CONTRACTOR for the offered Luminaries;

- Visual and Dimensional check
- Checking of documents of purchase of LED
- Insulation resistance test
- HV test
- Over voltage protection
- Surge protection
- Reverse polarity
- Lux measurement
- Test for IP 66 protection

Following Type tests reports shall be provided by the CONTRACTOR for the offered Luminaries along with the BID;

- Resistance to humidity
- Insulation resistance test
- HV test
- Over voltage protection
- Surge protection
- Reverse polarity
- Temperature rise Test
- Ra (Colour Rendering Index) measurement test
- Lux measurement
- Fire retardant Test
- Test for IP 66 protection
- Endurance Test
- Life Test
- Photometric Measurements Test Report (IES LM 79)
- LED Lumen Maintenance Test Report (IES LM 80)
- Vibration test as per ANSI
- Drop Test

10.6 Detailed Minimum Technical Specifications for LED Luminaires

Sr. No.	Parameters	Requirements / Value
1.	Type	LED Luminaries complete with all accessories including driver, internal wiring with flameproof wires, etc., for Street Lighting
2.	LED chip make	Nichia, Philip Lumiled, Osram, CREE

3.	Rated Voltage	230-240V
4.	Operating Voltage Range	Single phase 140-280 volt AC. But luminaries shall be tested for 100V to 300 V AC
5.	Frequency	50 Hz +/- 3%
6.	Power Factor	> 0.95
7.	LED wattage	1-3 Watt
8.	LED chip Efficacy	>170 Lm/Watt system lumen output at 25 degree C, supported by LM80 report, to be submitted.
9.	LED Drive current	>=350 mA<750 mA
10.	LED Beam Angle	CONTRACTOR to decide
11.	Colour Temperature	≥5500K.
12.	Rated Minimum LED Life (L90)	100000 Burning Hours **(same should be supported by LM80 report)**
13.	Rated Minimum LED Life (L85)	50000 Burning Hours **(same should be supported by LM80 report)**
14.	System efficacy	≥ 125 Lm/Watt
15.	Total Lumen Output	CONTRACTOR to offer
16.	Colour Rendering Index of Luminaires	>70
17.	System Power Efficiency	≥ 90%
18.	Driver Type	Constant Current based Electronic Driver

19.	Driver Efficiency	> 90%
20.	Maximum temperature rise for Driver	<30 Deg C at 45 Deg C ambient
21.	Operating Temperature Range	-20 Deg C to + 50 Deg C
22.	Luminaries body temperature after 12 hours of continuous operation	≤ 30 Deg C from ambient
23.	Junction temperature	< 85 Deg C - self certified by Manufacturer
24.	Heat Sink Temperature	≤ 15 C from ambient
25.	Solder point temperature	< 70 Deg C
26.	Operating Humidity	10% to 95% RH
27.	Control Gear	Prewired with low smoke halogen free, fire retardant e beam cable up to terminal block. Fuse protection shall be provided inside.
28.	Operating Hours	Dusk to Dawn (max 12 Hrs.)
29.	Total Harmonics Distortion (THD)	<10%
30.	Construction	High power SMD and LED must be mounted on Copper MCPCB for high thermal conductivity and fastest heat transfer from the LED junction
31.	IP Protection	IP66 or more; no water stagnation anywhere

32.	Luminary Housing	Pressure Die Cast Aluminum (grade 5000 or similar) housing with corrosion resistant polyster powder coating & safety as per IEC 60598 / IS 10322. Mounting bracket with aiming & locking facilities. Large surface area with fins to dissipate the heat to ambient air
33.	Heat Sink	Well-designed thermal management system with defined heat sink - Aluminium extrusion
34.	Clip / Fastners	Corrosion free/ Stainless steel.
35.	Wire	The connecting wires used inside the luminaries, shall be Low Smoke Halogen Free, fire retardant e-beam cable and fuse protection shall be provided in input side.
36.	Materials	Halogen free and fire retardant confirming to UL94.
37.	Optics	Secondary lens array should be provided for optimized roadway photometric distribution. Lens material should be optical high grade PMMA with more than 90% light transmittance.
38.	IK protection for Optic Cover	>IK07
39.	Photometric measurements	LM-79/IS16105.
40.	Minimum Surge Protection	>10 kV
41.	Protection Required in Driver Module	
a.	Short Circuit	Yes; Constant current limit mode.

b.	Open Circuit	Yes
c.	Over Voltage	Yes; Auto Isolation
d.	Over Temperature	Yes; Auto Shut Off.
e.	String Open Protection	Yes;

10.7 TECHNICAL SPECIFICATION OF STREETLIGHT FEEDER PILLAR/ SWITCHING POINT

- All Feeder Pillars (FP) shall be Outdoor type, Wall/ Column/ Steel Support mounting, Weatherproof, double door, single front, non-compartmentalized enclosure with locking facilities.

- The OFP (Outdoor Feeder Pillar) shall be made of Galvanised sheet steel enclosure or powder coated with minimum seven tank process (certification confirming to the same shall be submitted). All the feeder pillars shall be Outdoor type with permanent rain canopy and shall be dust, damp and vermin proof. All feeder pillars shall conform impact resistance of IK10 and shall be minimum IP54 certified.

- The GI feeder Pillar shall be fabricated from 3 mm CRCA sheet and shall be Hot Dipped Galvanized as per relevant latest standards after entire fabrication. The enclosure shall be powder coated with Epoxy paint as per desired colour of BSCDCL. The gland plate shall be 3mm thick.

- The fabricated enclosure shall not have any welds or bolt heads apparent from outside. All fabrication work like cutting, drilling, punching, shearing & welding etc. related to the enclosure shall be complete before proceeding to 7 tank process. The fabricated body shall be thoroughly cleaned and treated by chemical agents as required to produce a smooth surface free of scales, grease and rust.

- Sheet metal components shall be pre-treated using the seven tank phosphating process consisting of de-greasing, acid pickling, de-rusting, phosphating and passivation including repeated rinsing in between each process. On completion of passivation of the components they shall be preheated and then epoxy powder coated with selected shade for exterior as well as interior and Glossy White shade for the gland plates (Inside the panel) and component mounting plate.

- All interiors and exteriors of the enclosure shall be finished and painted to prevent rusting and corrosion. The paint should be carefully selected to withstand tropical heat, rain and environmental effects. The paint shall not scale off or crinkle or be removed by abrasion due to normal handling. Thickness of all painting shall be minimum 80 - 100

microns DFT Average. The final colour of Feeder pillar shall be as per BSCDCL requirements.

- The gasket shall be of neoprene rubber suitable to withstand all weathers for long tenure of service. All hardware shall be made of non corrosive material either HD Galvanized or stainless steel. Door shall be with concealed type hinges & captive screws.

- Both the doors shall have an Inspection/ View Window for monitoring the energy meter reading without opening the door. The window on the external door shall be provided with a metal flip cover with small canopy which can be moved up and down for viewing the meter.

- Both the doors shall have panel type lock with keys in duplicate as per the requirements of the BSCDCL.

- Panels should be provided with hooter for door open.

- All the feeder pillars shall be of uniform height and shall be mounted with the bottom of the panel at minimum 500mm above the Finished Ground or Floor level as the case may be.

- A danger notice board written in English and Hindi shall be made of 2mm thick GI plate and shall be provided on the front door of the feeder pillar.

- The details of max load in KW, Rating of Incomer, no of phase, voltage, frequency, controller no., Meter No., road name, Pillar no. name of the agency and year of erection shall be labelled using radium sticker/radium paint.

- The feeder pillar shall consist of Incoming Four Pole (FP) RCBO or MCB with ELCB, 3 Phase smart Digital Energy Meter, FP Contactor for each outgoing circuit, Astronomical Timer, Outgoing FP MCB apart from all the smart control components like Gateway controller, Power Supply Unit for the Gateway unit, Battery for Back up etc. It shall also consist of FP Isolator for isolating the smart lighting control equipment without discontinuing supply to the light pole during the outage of the smart control system.

- The feeder pillar shall have cable entry at the bottom suitable for terminating double compression glands for 2 Runs of 3.5 C 50sqmmAluminiumconductor, XLPE insulated armoured cable at the incoming terminal and minimum 4 Runs of 4 core 16 sqmm Aluminium conductor, XLPE insulated armoured cable at the outgoing terminal.

- All MCBs/ RCBOs/RCCBs shall be comply with the relevant IS and IEC standards. It shall be current limiting type and shall provide a cut off in, < 10 ms for prospective currents during faults. It shall be provided with fixed thermal overload, short circuit and earth fault release as appropriate. The breaking capacity of the MCB shall be 16A for 1 sec.

- The Outgoing and Incoming breakers shall be discriminated based on Current.

- The other power and control components are as listed below;

  a) The minimum rating of the incomer shall be 32A, 100mA sensitivity, Current limiting type, Characteristic Curve C, Breaking capacity 10 kA for 1 sec.

  b) All the contactors shall have high rupturing capacity rated for 3 phase 440 V, 50 Hz, Four Pole, AC 3 duty.

  c) Astronomical timer having Single channel and capable of Auto resetting when power resumes, provision of manual over ride, switching ON / OFF the circuit as per the Sun set and Sun rise timings along the year.

  d) Min 25X3 mm insulated tinned Copper bus bar with SMC support insulators shall be provided for power distribution within the feeder pillar. The size of phase and neutral shall be equal.

  e) Outgoing FP RCBOs – 30mA sensitivity, Current limiting type, Characteristic Curve C, Breaking capacity 10 kA for 1 sec.

  f) Terminal connectors suitable for terminating the above mentioned cables. Min 12 nos. 25 sqmm terminals for incoming cable and Separate 5 nos. terminals shall be provided for tapping power for the luminaire with 2.5 sqmm Copper conductor PVC insulated Un-armoured cable. Twenty percent spare terminals shall be provided.

  g) Under voltage and Over voltage Monitoring Relay for connection and disconnection of the power during off band abnormal voltage within a time band.

  h) All connecting power & control wiring shall be carried out with stranded copper conductor PVC insulted LSHF wires. Minimum size of control wiring shall be 1.5 sqmm and power wiring shall be 4 sqmm.

  i) Space Heater with MCB and Thermostat and 7W LED Luminaries with lamp shall be provided inside with a door limit switch. The lamp and the heater shall be tapped from the outgoing of the meter with separate DP MCB circuits.

  j) An Aluminium / GI Earth bus shall be run at the bottom of the Feeder Pillar which shall be connected to the earth leads at the two extreme ends for connecting the GI earthing strip from the electrode.

  k) Cast Resin CT of appropriate rating (---/5A) shall be provided at the incomer of each phase for measurement of the current.

  l) Multifunction meter with RS 485 and RJ 45 connectivity for measuring, Line and Phase Voltage/ Current; kW, KVAR, KVA; kWh kVAh, kVARh (L & C); Frequency, Phase wise Voltage and Current Harmonics upto min 7th order; Maximum demand.

  m) Energy meters should be capable of logging parameters for each 15 minute time block with stamping of date and time. Such data logs should be retained in the

energy meters for a period of 60 days or more. These data logs can also be communicated to CCMC through street light controller installed in feeder panel.

n) Note: The following additional requirements to be applicable for switching points where the meters installed in the feeder panels shall act as the energy billing meters for DISCOM;

o) Energy meter specification should be as per DISCOM and a sign off from DISCOM on the design and specification of the compartment in the feeder panel where the meters are to be housed is also recommended.

p) CONTRACTOR shall provide provision for connection through SIM, Ethernet, RS 485 and OFC to connect with server through whatever mode is available at site. Presently the communication of the Feeder pillar shall be carried out through GSM network however after the city OFC network is laid the communication shall be carried out through the OFC network.

- Two nos. Pipe Earthing electrode shall be provided for each Feeder pillar and connected with 25X6 mm GI earth strip. The pipe electrode shall be as per the latest version of IS 3043.

- HDPE/ DWC pipe of suitable size (minimum 40 mm ID) for conveniently accommodating the above incoming and outgoing cables shall be laid upto the feeder pillar for carrying the buried cables upto the feeder pillar for termination. The GI strip for earthing shall be laid with proper dressing.

- The feeder pillar shall be mounted on prefabricated Galvanised Steel Support structure duly fastened with a concrete foundation with M20 concrete suitable to sustain the local geological conditions, seismic conditions and max wind speed requirements.

- All the material/equipment/accessories must confirm to the relevant IS with its latest amendments. All the material/equipment/accessories shall be supplied with manufacturer's test certificates.

- Insulation resistance between live parts and earth terminal shall be 5 MΩ minimum. All power equipment shall be able to withstand high voltage (HV) test at 1.5 kV for 1 minute between live parts (current carrying parts) and earth terminal without breakdown of insulation.

- Following documents needs to be submitted for approval at the time of Bid

a) General Arrangements drawing.

b) Support and foundation drawings

c) Wiring diagram.

d) QAP (Quality assurance Plan).

e) Datasheet for each component.

Routine test shall be conducted as per relevant IS/IEC and shall be carried out at manufacturer place and same shall be witnessed by BSCDCL/BSCDCL's representative. Following shall be minimum check

a) Visual inspection Check

b) Bill of material.

c) Electrical Continuity check.

d) Functional Check.

e) HV insulation check.

f) Type Test certificate shall be submitted for review.

10.8 TECHNICAL SPECIFICATIONS OF CENTRALISED CONTROL AND MONITORING SYSTEM (CCMS)

- Scope of Works for Smart Street Lighting shall include design, supply, installation, testing at site, commissioning, Operation and maintenance of lighting controls through Centralized Control & Monitoring System – (CCMS) for LED streetlights installed under the scope of this RFP. Operation and Maintenance of CCMS shall be as per the terms and conditions of the RFP.

- The CCMS system shall be provided for the total no. of lights that is offered based on the design by the CONTRACTOR and shall be Scalable upto two times as many numbers of luminaries within short period.

- The CCMS System shall consist of the following components;

- In the Field enclosed within the Feeder Pillar (FP)

  a) Controller

  b) Communication Module/ Gateway

  c) Antenna

- Server for storage of data - preferably dedicated server set-up or cloud based arrangement to ensure 100% guarantee of the data transmission, and real time data storage and archived data for the contract period.

- Web Based Application Software

10.9 CONCEPT OF SMART STREET LIGHTING TO BE IMPLEMENTED AT BHOPAL

- CCMS shall consist of Street Light Controllers and its accessories installed within each Feeder Pillar with a gateway to communicate with Server.

- The Maximum quantity of luminaries controlled by each Controller shall be decided by CONTRACTOR however, it shall not be less than 50 lamps per Controller.

- All the LED Luminaires shall be Remotely/ Automatically/ Manually Switched ON-OFF in GROUP / Individual through Web Based Applications based on

  a) Sunrise/ sunset timing depending on geographical locations of the Switching Point / Feeder Pillar

  b) Based on preprogrammed/ Scheduled timings

- Dimming should be possible from 10 to 100% however, dimming shall be carried out in steps as follows;

  a) From 10 PM to 1AM – 25% Dimmed

  b) From 1 AM till 3 AM – 50% Dimmed

  c) From 3 AM till Dawn – 75% Dimmed

- The setting shall be adjustable / programmable at site as per the Sun rise/ sun set time.

- Moreover, the dimmable Luminaires shall be switched ON and switched Off via stepless dimming and in synch with the natural light during Sun rise and Sun Set time.

10.10 The CCMS shall provide the following features;

- Offer Web-based solution for Remote management on Real Time basis of the Outdoor Lighting System through wired or wireless GPRS/ 3G/ 4G/ Fibre/ LAN/ Wifi communication networks securely.

- Capturing and monitoring the all the data from Multifunction meter (MFM) to check the status of all the electrical parameters available at the FP. Calibration of the MFM shall be ensured.

- Monitoring of ON and OFF period; Provide On/Off control based on Sunrise and Sunset timings for burn hour optimization, Energy optimization and simplify maintenance.

- Shall facilitate easy and remote configuration/ programming of the system from a web based interface that can be changed as per requirement.

- Shall facilitate Fault Monitoring and Automatic Fault detection; Event Logging and Report generation.

- Alarm Generation and Alert Notifications through emails & SMSs to desired number of users.

- The system shall be modular and easily scalable. Presently the system shall be designed for 2000 luminaires and should be expandable upto 3500 luminaires as and when required in steps.

- Battery Backup for Minimum 1/2 Hrs shall be provided for the controller to store the data in case of power failure.

- Emergency Override - Locally & Remotely.

- Facilitate Asset mapping through GPS coordinates of each FP on existing maps

- The controller shall have inbuilt memory storage in each controller to store data in case of Communication network failure and transfer it as soon as the link is resumed

- Shall have protection logic to operate the hardware to automatically isolate the system during abnormal conditions and restart the system as soon as the system normalizes

- Server uptime should be minimum 99.99% with disaster backup and sufficient storage capacity and processing power to ensure stable operation of CCMS throughout the contract period

- Minimum 60 Days data shall be stored in the CLOUD. Data Older than 60 days shall be backed up on Editable tapes/ Discs

- Should be easy to integrate with City Operation Centre (COC).

- CCMS shall ensure Data authenticity, Cyber security, safe database management, data retrieval and trouble free operation of software and allied systems. It shall have a self diagnostic and self healing feature to identify fault and resume the system by isolating it within shortest possible time.

FEATURES OF CONTROLLER

- The Controller shall consist of CPU with minimum 32 bit processor, shall have inbuilt three phase power inputs, interface ports – USB, GPRS & Ethernet; internal health monitoring and logging facility; inbuilt flash memory for data storage; and shall support minimum 2 Analogue and 2 Digital inputs.

- Controller shall have the provision to store last 30 days data at one hour interval. All these data is accessible for reading, recording by downloading through HHT (Hand Held Unit) through optical port or USB/Bluetooth given on controller front. For HHT, a smart phone-based solution for collecting /accessing data is also acceptable

- The controller shall have a built-in calendar and a local Real Time Clock (RTC) having an accuracy of +/- 1 minute per year or better, synchronized with remote time server, to enable functionality even in case of communication network failure. A separate internal Lithium battery back-up shall be provided for continuous operation of controller RTC for at least two years under controller un-powered conditions.

- Controller shall be able to carry out switching operations based on Astronomical calendar of the location.

- Controller shall facilitate local operation in case of emergency or during maintenance with proper security verification.

- Controller shall be able to detect switch weld condition and generate alarm.

- Controller shall be able to log minimum last 25 scheduled and unscheduled events including scheduled switching events, faults, abnormal power conditions and maintenance.

- Controller shall additionally be able to log minimum last 25 the power availability events.

- The controller shall have protection logic to monitor the abnormal conditions like overload & over voltage conditions, against the benchmark/ threshold limits configured in it and carry out auto switching to disconnect the system if the abnormal condition prevails over predefined period. The controller shall reconnect after the normal system conditions are resumed. All such unscheduled switching activities shall be logged in the system.

- Controller shall be provided with a 6 digit LCD to display the controller parameters/ data. Proper universal interface port (USB, Optical etc.) or device shall be provided to access all the stored data within the controller as well as to configure the controller locally either by a Hand Held Unit or by connecting to a laptop in a secured manner. Configuration allows user to set operating modes, ON/OFF timings, RTC configuration, Updating GPS locations, Astronomical Clock etc.

- The CPU of the controller shall be well protected against overvoltage and surges upto 10 kV as per EN 61000-4-5; Burst pulses up to 4 kV as per EN 61000-4-4.

- All the controllers shall be traceable when mapped through GPS coordinate.

- The controller shall support digital and analogue measurements.

- Controller shall have following constructional specifications

    a) Controller case and terminal blocks shall be made of fire resistant material

    b) Sealing arrangement - As per IS 13779 and CEA Metering regulations 2006

    c) Insulation shall withstand an insulation test of 4 KV and impulse test at 6 KV

d) Latching Relay/Bi-Stable Switch/Isolation device should conform to IEC - 61036/ 61037

10.11 Communication Module of the Controller in the FP

- The module shall operate on 240 V AC single phase power supply
- Ability to communicate with remote central server/ CLOUD securely via cellular networks (GSM / GPRS) and/ or RF networks. All data shall be secured by encrypting them by 128 bit encryption.
- Communication network between CCMS unit and central server should be GSM/GPRS: Quad band 850/900/1800/1900 MHz4G, and communication method shall be TCP – IP via GPRS / 3G and/ or RF SMS
- The module shall be a Two-way communicator
- The Module shall be able to send data regarding energy usage, ON/OFF status etc. from controller as well as give commands from a central server/ CLOUD for switching ON/OFF scheduling etc.
- Ability to remotely upgrade the CCMS device firmware from central server

10.12 Battery Module

- The Controller (CPU), Communication module etc. shall be provided with battery backup for 12 Hrs to function during failure of grid power.
- The battery shall help CPU to store all the data and send a main power failure alarm to the remote server/ Cloud before it shuts down safely.

10.13 Software Application Features

- The web application shall be offered through the BSCDCL web site or as may be decided by the BSCDCL at the time of execution.
- The application shall enable receipt & storage of all the field data with a time stamp in Cloud or in-house local server.
- The application shall facilitate to communicate, control and configure the each Switching point FP controllers remotely. The application shall be suitable to manage the data traffic from the field to the Cloud or Server.
- Operation Time - It should be able to record LED luminaires glowing and non-glowing hours of a particular FP (Group).
- The System should be suitable for third party integration if required.

- Report Generation – shall enable Users to generate various reports related to the system performance parameters such as energy consumed report, lamp and system failure report, actual hours of operation, uptime (%), etc. as well as based on historical data on daily, monthly, quarterly or annually basis as the case may be from the data/readings received from the units. The reports shall be generated in Xcel as well as Graphical format.

- The application should facilitate Roles and Permissions requirements at different level of user hierarchy. It should manage system access for different levels with multiple privileges for different purpose, including Administrator access to configure, work flow access for operations, and public access for viewing and uploading status.

- Web application shall ensure system security and safety for users at different levels with security password for various users.

- It should be possible to configure Switching point remotely through web application. Remote configuration includes setting new ON/OFF timings, setting RTC time, viewing the Real time data of each switching point, Energy meter parameters, Resetting of the any unit, time synchronization of controller with that of Server and GPS clock etc.

- The minimum interval for the update of data should be 15 minute but programmable up to 1 minute.

10.14 Asset Management –

- Application shall provide a map application that gives an overview of all Feeder Pillars on a street map or GIS map or a satellite image.

- Web application software shall offer asset management feature and allow user to locate SPC through GPS coordinates. It also enables user to identify each SPC with unique/Asset ID with additional information like Wattage, Make, Installation date, replacement date, Replacement defect tracking. It is also possible to link details of every street light with reference to particular switching point.

- Dashboard – Web application shall provide a comprehensive dashboard with real time status of switching point, real time faults of various switching points, system uptime %, power consumption, power consumption, graphical representation of cumulative data etc.

- The application software should be flexible to cater to customized requirement which are not foreseen at this point of time but are deemed necessary during the execution and O&M. Separate tabs shall lead to details regarding monitoring & control parameters like, Alerts, Maps, Configuration, Reports, uptime, fault penalty, history, energy savings, power failure, operational hour, lamp failure etc.

- Each Switching Point FP shall be represented by a separate Tab on the dashboard to show the switch point summary indicating the FP details, rating, location, meter parameters, history of alerts, active alerts, link to the map page, etc.

- The application shall generate alarm and alerts through SMSs for any type of abnormal system conditions and faults as listed below to designated users which should not be less than six in numbers.

- It should describe the abnormality or fault in short as well as highlight the same with different colours to indicate the status with respect to time – within 12 hrs, in next 12 hrs, beyond a day etc. It shall provide monthly reports on the faults through email. Penalty as indicated in the Service Benchmark for the CONTRACTOR shall be calculated based on these reports.

- Application should be able to track the failure of lamps in a particular switching point by triggering alarm due to significant drop in power consumption. The application should display the no. of faulty lights for each phase separately instead of giving a total figure of faulty lights for all the 3 phases together.

- Application shall protect and report Jamming/ hacking attempts and maintain status-quo in cases of such attempts i.e. if lights are ON, they should remain ON till the default OFF time recorded in the system. In case lights are OFF at the time of Jamming / hacking attempt, lights should remain OFF till default ON time recorded in the system

- Software to have complaint handling system for light failures, with citizen interface and means of communicating repair update to complaining citizen through SMS. The complaint handling system software shall be implemented for handling and resolution of complaints during O&M period. The access for the complaint handling system shall be given to general public either through web portal of BSCDCL or through dedicated app for lodging complaints.

- Ability to remotely upgrade the CCMS device firmware from central server.

- The system shall display the following minimum faults in alarms

  a) Phase-wise currents on crossing threshold values

  b) Phase-wise voltages on crossing threshold values - Under/over voltage detection

  c) Main breaker error

  d) Contactor fault

  e) Circuit breaker off

  f) Circuit phase errors (fuse, breaker, etc.)

  g) Main power failure

  h) Leakage to ground

i) Manual switch activated

j) Control cabinet door open

k) Low Power Factor

l) Communication failure with server

m) Theft Alert

n) Group failure of Lights

- The software shall enable to divide the city lights in certain zones as per BSCDCL requirement and assign access to the concern authorities for control and monitoring from their mobile or laptop.

- All alarms shall be notified in near real-time via SMS and email to responsible maintenance team.

- The system shall support auto switching of street light according to light sensor input.

- The system shall support auto switching of street light according to input. Graphical view of the electrical consumption readings shall be available online for monitoring of the hourly, daily and monthly electricity consumption

- All Software's License shall be in the name of BSCDCL. All costs shall be perpetual cost or onetime cost. CONTRACTOR shall provide all the upgrades to the system software and system security during the contract period without any additional cost.

- The Software Application shall be supported by the CONTRACTOR even after the contract period.

- In case of CLOUD server, the CLOUD registration shall be done in the name of Client/ Owner. Only Administrative rights shall be provided to the CONTRACTOR during the contract period. The CLOUD services shall be intact upon renewal every year after the contract period. The CLOUD shall not be OEM specific and shall be independent of OEM so that after the completion of contract period there should be no dependence on OEM for cloud services.

10.15 Civil Design

- All the civil foundation design shall be suitable for the Seismic requirement of Bhopal as per latest IS as the city of Bhopal falls in the Seismic Zone-II.

- The design shall also consider the maximum wind speed of min 180 kmph as per IS 875, 1987 (Reaffirmed in 2013).

- Grade of concrete to be used shall be M20 (1:1.5:3) and grade of reinforcement steel shall be Fe 500 or Fe415.

- 40NB Flexible HDPE/ DWC Pipe of 1m length shall be embedded to draw the cable from the power cable.

- Minimum requirement for Civil Foundations for Lighting poles upto a height of 6m are as follows;

  a) Depth of the foundation should be 1100 mm minimum.
  b) Plan dimensions of footing should be 900mm x 900mm having depth D=200 mm Minimum.
  c) Reinforcement in foundation in both directions -
  d) Bottom reinforcement -T 10 @ 150 mm c/c.
  e) Top Reinforcement to be as per IS 456,2000 (Reaffirmed in 2016)
  f) Four anchor bolts of 16mm Dia and 500 mm total length are required.
  g) Grade of concrete to be used shall be M20 (1:1.5:3) and grade of reinforcement steel shall be Fe 500 or Fe415.
  h) Concrete pedestal -
     a. Size -300 mm x 300 mm
     b. Main vertical reinforcement in shall be 4 nos. bars of 12mm dia bars
     c. Shear reinforcement (stirrups) shall be 8 mm dia bars at 200 mm c/c.
     d. This foundation design of pole will be applicable for all types of soils i.e. soft soil, medium soil and hard soil.

- Minimum requirement for Civil Foundations for Lighting poles up to a height of 12m are as follows;

  a) Depth of the foundation should be 1600 mm minimum.
  b) Plan dimensions of footing should be 1200mm x 1200mm having depth D=300 mm Minimum.
  c) Reinforcement in foundation in both directions -
  d) Bottom reinforcement -T 10 @ 150 mm c/c.
  e) Top Reinforcement to be as per IS 456,2000 (Reaffirmed in 2016)
  f) Four anchor bolts of 16mm Dia and 500 mm total length are required.
  g) Grade of concrete to be used shall be M20 (1:1.5:3) and grade of reinforcement steel shall be Fe 500 or Fe415.
  h) Concrete pedestal -
     a. `Size -350 mm x 350 mm
     b. Main vertical reinforcement in shall be 8 nos. bars of 12mm dia bars
     c. Shear reinforcement (stirrups) shall be 8 mm dia bars at 200 mm c/c.
     d. This foundation design of pole will be applicable for all types of soils i.e. soft soil, medium soil and hard soil.

- The above requirements are minimum requirement. Bidder may offer better design based on site conditions subject to approval from BSCDCL.

11 DETAIL DESIGN REPORT

CONTRACTOR shall carry out a detailed design of the identified Roads;

- Design Report for each road
- Summary of all the roads including road width with carriage way/ footpath/ drains; proposed wattage; height of poles; distance between the poles; calculated lux level, uniformity etc.
- Detail description of CCMS system with proposed technology, data sheets, architecture, server details, software applications, features offered, communication technology, list of alerts and alarms, list of parameters offered for monitoring and control, system efficiency, bandwidth requirement
- Data sheets of proposed Luminaire, Poles, Feeder Pillar, controller, battery, communication module, server etc.
- Details of Helpdesk set up and Complain Management System
- O&M SOP
- Resource deployment
- Micro Project schedule on weekly basis
- Milestones for completion of illumination in terms of road length (km)

12 TECHNICAL SPECIFICATIONS OF MS POLE

- The product should be designed for the specific climatic and environmental conditions of the region to ensure full durability and safety throughout its designed life.
- All MS poles shall be designed to withstand the maximum wind speed of 150 kmph 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 en 40-3-3:2013.
- The pole shall also be designed to with stand the earthquake as per the provisions of the relevant bis/other standards related to the urban location in the state of Madhya Pradesh.
- The materials of the pole as follows:
    i. Pole - Conforming to grade S355J0,
    ii. Base Plate: - Fe 410 Conforming to IS 226/ IS 2062,
    iii. Foundation Bolts: - 6.8 Gr. as per IS 1367,

iv. Pole Sections: - The Poles shall be in single piece with single longitudinal welding joint,

v. Galvanization: - The poles shall be hot dip galvanized as per IS 2629 / IS 2633 / IS 4759 standards with average coating thickness of 100 micron. The galvanizing shall be done in single dipping. The zinc Ingot raw material shall be 99.99% pure and procured from reliable sources with Quality Test Certificates.

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

- The poles shall have integrated junction box with openable door of adequate size (approximate 500mm length) at the elevation of 750 mm from the base plate. The door shall be hinged type with mechanical interlock, dust proof, weather proof and vandal resistance and shall ensure safety of inside connections and components. The door shall be flush with the exterior surface and shall have suitable locking arrangement. The pole shall be adequately strengthened at the location of the door to compensate for the loss in section.

- The door of the junction box shall permit clear access to the components inside viz., termination strips, connectors, mcbs, cables etc. There shall also be suitable arrangement for the purpose of earthing.

- Electrical connections - four way connectors shall be provided along with slide lock suitable for connecting 1.1 kv grade, 4 core x16 sqmm al cable. It shall also house 1 no. 6 amps dp mcb,2.5 sqmm connectors for looping with 2.5 sqmm copper wires for connecting to the luminaries through 0.6 kv grade, 3 core x 2.5 mm^2 pvc insulated copper conductor flexible un-armoured cable from the terminal block to the fixture within the pole. All the cables laid through the pipe shall be without any joint.

- Two nos. Earth boss shall be provided at the bottom of the pole (diagonally opposite) suitable for connecting 25x6 mm gi/ cu earth strip or SWG wire for earthing of the poles. Similar earth boss suitable for connecting 4 sqmm copper wire shall be provided on the control plate inside the junction box for earthing of the electrical components.

- Two nos. 50 mm nb hdpe sleeves of suitable length shall be provided through the foundation upto the junction box for entry of power cable.

- Earthing of each pole shall be carried out with one dedicated coil earthing. The coil earthing shall be gi wire as recommended in the latest version of is 3043 the earth electrode shall be connected with two 25x6 sqmm gi strips to the two distinct earth boss on the pole.

- Aesthetic appearance - all the grooves and carvings of the pole unit shall be free from any kind of distortion for a pleasing aesthetic appearance.

- Top mountings -the galvanized decorative mounting bracket as selected by the bscdcl shall be supplied along with the poles for installation of the luminaries.
- The poles shall be bolted on a pre-cast foundation with a set of foundation bolts for greater rigidity.
- The contractor shall carry out all the relevant tests and inspection in the presence of the bscdcl or third party agency, as may be selected by the bscdcl, before the dispatch of the poles at no extra cost to the bscdcl.
- The contractor shall inform the bscdcl at least fifteen (15) days in advance, about the manufacturing programmed so that arrangement can be made for inspection. Bscdcl reserves the right to waive the inspection at any stage.
- All the material/equipment/accessories shall be supplied with manufacturer's test certificates.
- Contractor shall submit the proposed product catalogue, detail data sheet, spare parts list and drawing of pole & bracket along with the bid for each product quoted.
- Contractor shall arrange for all the tools and equipment's including
- M20 concrete foundations shall be provided for all the poles. Approx. Dimension of the foundation for evaluation purpose is 600x600x1700 mm. However, contractors shall design as per the stability requirement and soil bearing capacity of each location. The poles shall be bolted on a pre-cast foundation with minimum four foundation bolts for greater rigidity.
- Galvanized poles dimensions – these are the minimum dimensions. Contractor may offer as per their design for a particular height.

MINIMUM REQUIREMENTS OF THE GI POLES

HEIGHT	TOP DIA (A/F)	BOTTOM DIA (A/F)	SHEET THICKNESS	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)
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	750	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	4	275 x 275 x 16	4 x 24 Dia	270	750	125
11	90	210	4	300 x 300 x 20	4 x 24 Dia	300	750	125
12	90	240	4	320 x 320 x 20	4 x 24 Dia	325	850	125
14	90	240	4	As per manufacturer Recommendations				

13 EARTHING SYSTEM

13.1 Scope

- This specification covers supply, design, installation, commissioning & testing of items required for earthing system including grounding conductors, rods, fittings, accessories and hardware to permanently and effectively ground the neutral points of transformers/ DG Sets, electrical apparatus, electrical equipment frames, conduit, cable trays and all non-current-carrying metal parts, including structural steel and fences.

- The equipment shall be complete with all necessary accessories and components as required as per IS standard and PWD requirements.

13.2 Grounding System

GENERAL REQUIREMENTS

- The design of the equipment shall meet the following requirements:

- It should provide means to dissipate the current into the earth during normal and fault conditions without exceeding the operating and substation equipment limits and connections.

- The ground grid shall provide least resistance path for grounded neutral circuits.

- The ground grid shall provide means of discharging current carrying parts which are to be handled by personnel.
- Grounding consists of all conductors, ground rods, connectors and all other necessary items to make a complete grounding system.
- The Contractor shall finalize the layout of the grounding system as required for the final equipment dimensions and locations.
- The ground grid shall be designed so as to provide a maximum ground resistance of 1.0 ohm or less.
- Ground grid shall be installed at a minimum depth of 600 mm from ground level.
- Earthing of transformers will be done separately through plate electrodes & further connected to the main collector network using connectors/ risers.
- Where the ground conductor crosses the cable/ pipe trenches, the conductor shall be suitably lowered so as to cross cable trench at least 150 mm below its bottom surface.
- Risers shall be brought out above the ground level for further extension and connection to equipment.
- All conductors in the ground grid shall be welded together at every crossing and at every point where from risers emanate. Continuous lap welding shall be done instead of tack welding.
- The risers from the grid shall be laid to avoid contact with reinforcement to guard against false grounding during resistance tests.
- All non carrying current metal parts of electrical equipment and apparatus shall be earthed with two separate diametrically/ diagonally opposite connectors. The apparatus shall include:
- Bodies of electrical machinery, transformers etc.
- Frames of panels and cubicles
- Metallic structures of switchgear, casing of cable boxes
- Shielding of cables and electrical wiring conduits

13.3 Design Criteria

a) Fault Current & Duration

b) The earthing system will be designed for fault current of 20kA for 1 sec or as per actual fault current.

c) Soil Resistivity

d) The Contractor shall undertake the soil resistivity measurements at site and select suitable type of conductors.

14 LV CABLES AND TERMINATION

- All the lv power cables shall be 1100v grade, multi-stranded, al / copper conductor, xlpe insulated, extruded inner & outer pvc sheath compound type st2 and galvanised steel strip armoured cables.

- All cables shall conform to is 7098 –part i and all armouring shall confirm to latest version of is: 3975.

- For all lt power and control cables, double compression glands with aluminium lugs for aluminium cables and tinned copper lugs for copper cables shall be used in indoor and outdoor application.

- The termination shall be inclusive of miscellaneous items such as clamps, cleats, cable tags, cable markers etc.

- In general cable installation works shall be carried out in accordance with is 1255 – 1983, latest version. At road crossings, the depth of the pipe shall be minimum 1m else proper concrete encasing shall be provided.

- For underground cables, all cables shall be laid in minimum 63mm id hdpe/ dwc pipes either laid by excavation or through horizontal directional drilling (hdd) or micro-tunneling. The top of the pipe shall be atleast 750mm below the finished ground level. There should not be any joints between two pole distance. The roads shall be made good as before by following standard procedure for preparation of roads and with standard quality material.

- All railway crossings shall be carried out as per the prevailing standards of railway or as specified by the concerned authority in writing.

- Cable markers shall be provided in the vicinity or on the top of the corridor such that it should not obstruct the pedestrian/ parked or traffic vehicles. Cable markers shall project 150mm above ground and shall be spaced at an interval of 20 metres, and at every change in direction. Top of cable marker/joint marker shall be sloped, to avoid accumulation of water/dust on marker. On finished surface like foot path etc. The marking shall be accomplished with a separate colour tiles/ paver block for highlighting the route of the cable.

- Cable tags shall be provided on all cables both at feeder pillar end as well as on each pole jb (just before entering the equipment enclosure).

14.1 Cable Glands

e) Double compression type cable glands with rubber hoods shall be used for the termination of all the power and control cables. Cable glands shall be brass casting, machine finished and Nickel-plated to avoid corrosion and oxidation. Rubber components used in cable gland shall be of neoprene.

f) For single core cables, gland shall be with brass ring.

g) Cable glands shall be with metric threads.

h) Cable glands shall be conical (& not flange type).

14.2 Cable Lugs

- Cable lugs shall be of tinned copper, solder less crimping type for Cu cables & Al lugs for the Al cables.
- The current rating of the lugs shall be same as that of the respective cable conductors.
- Ring type cable terminations shall be used.
- Insulated lugs are not acceptable for any cable terminations.
- Bi-metal strip/ Bi-metallic lug shall be used whenever two different metals are to be connected together.
- Double hole extended neck (long barrel neck) type lugs shall be used in case of cables above 185 sq. mm.
- Fork terminals shall be used for luminaries& decorative switch/ socket. Pin terminals may be acceptable during execution only in case other terminals/ lugs cannot be accommodated.
- Reducer / wire pin terminals shall be avoided for MCB terminations. MCB terminations shall be with ‘long palm terminals.
- All terminations in Feeder Pillars / enclosure for earthing& neutral busbars / terminals shall be with ring type terminals.
- All earthing terminations shall be with ring type lugs only.
- All control & interlock cable terminations shall be with ring type lugs.

- Anticorrosion/ anti-oxidation compounds shall be used for crimping lugs [This shall especially be ensured for Al cable terminations & any bimetallic terminations (Cu cable termination using tinned Copper lugs)].

- If termination is done with crimping tool employing crimping die then forming dies shall be used to make the sector shaped conductor into a round conductor before crimping the lugs on the conductor. The lug must not be crimped directly on the sector conductor. Before crimping the lug, the conductor shall be thoroughly cleaned and special jelly applied over it to prevent further oxidation.

15 SAFETY REQUIREMENTS

- Refer CPWD General Specification for Electrical Works Part IV-Substation (2013).

16 OPERATION & MAINTENANCE

- O&M shall be initiated after completion of installation and commissioning of street lighting system on all the specified roads and issue of completion certificate by BSCDCL after due inspection and testing.

- Contractor shall install a help desk minimum 30 days in advance before the initiation of the O&M period.

- The contractor shall be responsible for maintaining/ repair/ replacement, comprehensively, of all the luminaires, switching point controller panels, cable and earthing systems along with the cloud or in-house server installed by it in the allocated area during the tenure of the contract.

- Contractor may maintain a service team/s with vehicle/ s to address the complaints/ accidents on sos basis and take action immediately.

- The payment for the O&M shall be per agreed in the contract for the entire tenure.

- The manpower and accessories required for O&M shall be provided by contractor during relevant contract period. Minimum one 8 years experienced electrical technician and one assistant shall be provided for every 1500 luminaires right at the beginning of the contract and shall be augmented if found insufficient during the course of the contract. Replacement for the teams shall be well planned during the scheduled offs and leaves.

- BSCDCL shall ensure availability of power. Electricity charges and connectivity charges shall be paid by BSCDCL.

- Availability of communication network through the selected mode shall be ensured by the contractor for data and smss. The contractor shall bear the cost of connectivity of all such network charges and pay monthly/ annually as the case may to the telecom service provider.

- The non -availability of incoming power supply from BSCDCL shall be intimated by contractor within 24 hours.

- Any complaint for failure of luminaire due to lack of earthing, SPD, connector and loose connections shall be to contractor's account.

- The contractor shall upgrade the software application from time to time during the contract period in terms of features, performance & security of the system.

- The contractor shall take adequate insurance to cover themselves for the cost of O&M during the tenure of the contract including the ones due to theft.

- The contractor shall make provision for adequate number of ladder mounted vehicles self sufficient with all the required tools and instruments, duly calibrated, to meet the maintenance requirements as per service benchmark.

- All the electrical parameters and illuminance level of all the roads shall be monitored with calibrated power analyzer and lux meter and documented for records and analysis at regular interval of quarter as specified.

- All the necessary modifications that are required to be carried out for the efficient working of the system including network and luminaires and minimise the breakdowns and issues shall be carried out by contractor from time to time at its own cost.

- Contractor shall develop training material for the BSCDCL technicians; impart them training from time to time as may be decided by the BSCDCL.

- All the responsibilities related to replacement of led lamps / cables / other accessories shall be borne by contractor in respect of cost, managing the technical barrier and other related aspect during the tenure of the project.

- The maintenance work will be carried out without disturbing the street traffic and with proper work permit.

17 HELPDESK SETUP

- The CONTRACTOR shall set up a centralized helpdesk to address the O&M for the project for entire Contract period with the following;

  i) A web based Complaint Management System shall be installed which should enable users to log complains and monitor its status & closure. The CMS shall be updated regularly with new updates/ patches to improve the performance during the contract period.

  j) A Toll Free Number exclusively for the Street lighting shall be finalized in consultation with the BSCDCL. Language Capabilities: Hindi and English;

k) The help desk shall operate 24X7 to assist and guide the users.

l) The help desk will handle user queries and issues relating to implemented solution

m) The helpdesk shall ensure that users can log calls and complaints for any technical issues they face while accessing the system.

n) The helpdesk shall have Interactive Voice Response (IVR) system for first level of call segregation;

o) A Standard Operating Procedures (SOP) for O&M process shall be created by the CONTRACTOR from logging of request to closure of the request. The SOP shall address call prioritization guidelines, problem security codes and escalation procedures etc. in consultation with BSCDCL ;

p) It shall be also possible to log requests by user through other channels like email and web interface;

q) All the complaints and work carried out by the CONTRACTOR shall be logged in the system with a unique service request.

r) The application shall be accessible to all users including general public through the BSCDCL portal for logging issues;

s) CONTRACTOR shall allocate Serial No to the Pole- Lamp combination and maintain records of each one of them during the Contract period.

t) A Report containing the operational Status of each light pole, complaints received and resolved; Preventive maintenance schedule and status, Stock of spares, man power update, etc shall be submitted to the BSCDCL on a weekly basis.

u) The call statistics will be analyzed every quarter after Go-Live and the number of Customer Care Executives may be ramped up or down accordingly on a week's notice;

v) The space required for setting up of Helpdesk shall be provided by BSCDCL.

18 SERVICE LEVEL BENCHMARK

- A service Level Benchmark for evaluating the performance of the CONTRACTOR shall consist of the following;

- Resources - CONTRACTOR shall maintain O&M team, tools and calibrated measuring and verification instruments as specified above from the day one of the contract. In case the required resources are not deployed on time, a penalty of Rs.5000 per day shall be imposed for the first week and the same shall be doubled in the subsequent weeks till adequate resources are deployed.

- System Uptime - CONTRACTOR shall maintain sufficient resources and achieve minimum uptime of 95% on yearly basis (year period to be decided by BSCDCL) for the entire system, excluding the period of non-availability of power supply.

- Energy Consumption – The energy consumed by the lamp shall not exceed more than as committed in the design report. CONTRACTOR shall guarantee the total energy consumption of the system for each road with respect to its design offered in the DPR. The same shall be monitored on daily basis and reported to the BSCDCL. Any excess energy more than the guaranteed consumption shall be recovered from the CONTRACTOR. Any action required for mitigating the excess energy consumption may be immediately taken up by the CONTRACTOR with the information to the BSCDCL.

Electricity charges shall be paid by BSCDCL.

- Lux Level – CONTRACTOR shall guarantee the Lux level based on Design output and offered Luminaire for each road. There shall not be any reduction of the Lux level during the entire tenure of the contract period. Illuminance of each road shall be checked every fortnightly and reported to BSCDCL. Any reduction in the lux level shall be immediately investigated and corrective action shall be taken with information to BSCDCL.

- In case a reduction in the lux levels are found due to reduction in the output/ performance of the Luminaires, all the Luminaires of the same wattage and same batch offered in the project shall be investigated and rectified/ replaced if found faulty by the CONTRACTOR at its own cost within a period of time as may be agreed by BSCDCL.

- Complain Resolution - All the complaints shall be redressed within 8 working hrs. In case the service provider fails to comply with the same a penalty of Rs. 100/- per day per complaint shall be imposed for a period of 7 days after which the amount will be doubled for the next subsequent weeks till the complaint is resolve to the satisfaction of the owner.

- At any given time the CONTRACTOR shall maintain spares equivalent to minimum 1% of the total number of lights installed. Failing to maintain spares and causing delay in resolution of the complaint shall be penalized as indicated above.

- Cleaning of the luminiare cover shall be taken up once in half year and record shall be maintained and reported to BSCDCL.

19 QUALITY CONTROL PLANS

- The quality control plan shall list and define in sequential order all process control activities, inspection and tests proposed to be performed on the equipment/ material starting from component procurement and from testing stages to product dispatch. The quality control plan shall indicate and identify the applicable standards, detailed

description with diagram the procedure, acceptance criteria, extent of check and record to be generated.

- The contractor shall within fifteen (15) days of placement of order submit the following information to the bscdcl.

  a) Quality Assurance Plan (QAP) with holds points for BSCDCL's inspection. The QAP and hold points shall be discussed between the BSCDCL and the CONTRACTOR before the QAP is finalized.

20 INSPECTION

- The inspection may be carried out by the bscdcl or his representative at any stage of manufacturing. The successful contractor shall grant free access to the bscdcl/ its representative/s at a reasonable notice when the work is in progress. Inspection and acceptance of any equipment under this specification by the bscdcl shall not relieve the contractor of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

- The contractor shall keep the BSCDCL informed in advance regarding the time of starting and progress of manufacture of all the equipment in its various stages so that arrangements could be made for stage inspection, if desired by BSCDCL.

- No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested and approved by BSCDCL or an inspection waival is given.

- Contractor shall, during inspection/ at any stage as sought by BSCDCL, will furnish test certificates for all equipment including bought out items as included in this bid. However, the BSCDCL reserves the right to insist for witnessing the acceptance/routine testing of bought out items.

- The contractor shall communicate to the bscdcl the details of all testing programme at least three (3) weeks in advance. Bscdcl reserves the right to waive the inspection at any stage.

- Contractor shall keep all his testing instruments duly calibrated against standard meters at designated accredited laboratory not earlier than 6 months from the date of test of the equipment, covered under this specification. Calibration certificates shall be made available during inspection. The calibrating instruments used as standard shall be traceable to national/ international standards.

- A joint inspection of bscdcl authority; technical officer, project manager and team of contractor shall be carried out before commencing for operation.

- Following field test shall be carried out on the system

a) Visual Inspection of quality of work,

b) Insulation resistance of the system including cable

c) Power consumption of individual Luminaire, each feeder pillar System for a particular road.

d) Lux level available with and without the other façade and vehicular lights. The lux level shall be tested in accordance with NLC.

e) Operational demonstration with CCMS

f) Earth resistance of each pole and feeder pillar

21 CAPACITY BUILDING

- The contractor needs to provide training to BSCDCL employees and other stakeholders as directed by BSCDCL for capacity building;

- The contractor shall prepare all the requisite audio/visual training aids that are required for successful completion of the training for all stakeholders. These include the following for all the stakeholders:

  a) Training manuals for BSCDCL employees / stakeholder departments;

  b) Computer based training modules;

  c) Presentations;

  d) User manuals;

  e) Operational and maintenance manuals for Smart Components implemented;

  f) Regular updates to the training aids prepared under this project.

- The contractor shall maintain a copy of all the training material on the portal and the access will be provided to relevant stakeholders depending on their need and role. The access to training on the portal would be finalized with BSCDCL. Contractor has to ensure the following points:

- For each training session, the CONTRACTOR has to provide the relevant training material copies to all the attendees.

- The contents developed shall be the property of BSCDCL with all rights.

- The contractor has to ensure that the training sessions held are effective and that the attendees would be able to carry on with their work efficiently. For this purpose, it is necessary that the effectiveness of training sessions is measured. The contractor will prepare a comprehensive feedback form that will capture necessary parameters on

measuring effectiveness of the training sessions. This form will be discussed and finalized with bscdcl.

- After each training session, feedback will be sought from each of the attendees on either printed feedback forms or through a link available on the web portal. One member of the stakeholder group would be involved in the feedback process and he/she has to vet the feedback process. The feedback received would be reported to bscdcl for each training session.

22 HAND-OVER OF THE SYSTEM DURING EXIT PERIOD

- The contractor shall hand over to the BSCDCL the following before the expiry of the contract or in the case of termination of contract by BSCDCL with justifiable reason as specified elsewhere in the RFP:

    a) A complete list of Hard and Soft Assets with its records over the past period.

    b) All the assets in good working condition as per tech specification or its upgraded version. Incase any asset is not in working condition, CONTRACTOR shall ensure that the same is made good as per required standard and performance and handed over within the Exit period.

    c) All software along with the confidential information related to it like user name and passwords and hardware keys if any. It shall also hand over all the rate contract if any signed with the software company for continuity of services.

    d) Information relating to the current services rendered and technology and technical data relating to the performance of the services; Entire documentation relating to various components of the Project, any other data and confidential information related to the Project;

    e) All other information (including but not limited to documents, records and agreements) relating to the products & services related to the project to enable BSCDCL and its nominated agencies, or its replacing CONTRACTOR to carry out due diligence in order to transition the provision of the Project Services to BSCDCL or its nominated agencies, or its replacing CONTRACTOR (as the case may be).

- The duration of 60 working days after completion of the contract period shall be considered as handover/ exit period during which contractor shall give full access to its premises, records, data base and assets related to this project.

- All the information as indicated above which is handed over to bscdcl should not be copied, sold or reused by contractor under any circumstances without any written approval from bscdcl.

- In case this handover happens within dl period, the contractor shall ensure that the technology provider shall continue to support the assets and systems till the end of the dl period.

- The contractor shall not retain any data, security codes, and other confidential documents including any type of customer survey data with them.

- During the exit period contractor shall not reduce any manpower or replace any manpower willfully as available on the day of issue of notice. In case the contractor reduce the manpower then bscdcl shall charge rs. 1000/- per person per day as penalty for the remaining duration of the exit period.

23 DOCUMENTS REQUIRED TO SUBMIT BY CONTRACTOR DURING TECHNICAL BID

- Offered Solution for Smart Lighting with details of the technology

- Typical Design report highlighting the solution & calculations for the each category of road as specified in the RFP above

- Summary statement of Road, Road width, Height of pole, Mounting arrangement, Wattage of LED Luminaire offered, Calculated Lux level

- LED Data sheet and Type test reports as specified above

- Guaranteed Energy consumption for each Luminaire and its system including the losses.

- Luminaire Data sheet mentioned in the BOQ and their respective type test reports as specified above

- Detail write up on the CCMS including proposed system, features offered, technology and components offered, System Architecture, data sheets of the components.

- Approach methodology for carrying out the scope of work for Project implementation and Operation and Maintenance phases

- Earthing and Surge suppression solutions offered

- Sustainability of the System offered

- Makes of component and systems offered

- Exit management plan

24 COMPLETION AND POST COMPLETION ACTIVITIES

- Mechanical completion is said to occur, when all erection/installation and commissioning of all electrical works and minor civil works under the scope of the Contractor are completed to the satisfaction of the Project Manager's Representative with,
    a) All installation alignment checks.
    b) All panels and equipment erected, grouted, with all cabling and wiring, terminations, routing, clamping, dressing, tagging, ferruling duly completed including continuity and megger testing, and all installation checks.

- At the stage of Mechanical completion, the Contractor shall ensure that all physical, aesthetic and workmanship aspects are totally completed, and the plant is fit and sound for undertaking pre-commissioning checks followed by commissioning.

- Upon achieving mechanical completion, the Contractor shall notify the Project Manager of such mechanical completion upon which the Project Manager shall proceed with the checking of the works.

- The Project Manager may inform the Contractor regarding deficiencies for rectification by the Contractor within a jointly agreed period before the pre-commissioning checks could be undertaken. Alternately the Project Manager, when the defects are of minor nature may undertake the pre-commissioning checks, permitting the Contractor to concurrently undertake rectification of such defects. Rectification of all defects, so notified by the Project Manager, to his satisfaction shall be a prerequisite to issue of Taking Over Certificate.

25 TESTING AND COMMISSIONING

The Contractor shall carry out commissioning tests in the presence of the Project Manager's representative. The evaluation of test results and decision passed by the Project Manager's representative regarding the test results will be final and binding on the Contractor. Any additional tests or repetition of tests to establish satisfactory operation of any equipment shall be carried out by the Contractor, if so desired by the Project Manager's representative at no extra cost.

The completion checks and commissioning tests to be carried out shall include, but not be limited to, those described in subsequent paragraphs, as applicable to the individual equipment/system.

All checks and tests shall be as per the Manufacturer's drawing manuals, relevant codes of installation and commissioning checklists described in subsequent paragraphs.

Among other commissioning tests, the following shall be carried out at site after completion of installation. Contractor shall ensure to use calibrated test equipment having valid calibration test certificates from standard laboratories traceable to National Standards / International Standards. All tests to be carried out in the presence of Project Manager's representatives.

a) Switchboard: Power frequency high voltage test, IR test, operation tests

b) Relays: Check internal wiring, relay settings

c) Cables

    - All 11kV cables shall be megger tested before terminating / jointing. After terminations / joints shall be megger tested by 5000V megger.
    - All new LT cables shall be megger tested before terminating / jointing. After terminations / joints shall be megger tested by 1000V megger.

- Cable core shall be tested for
  - Continuity
  - Absence of cross phasing
  - Insulation resistance to earth
  - Insulation resistance between conductors

d) Earthing System

Continuity of all conductors and joints. The Project Manager's representatives may ask for earth continuity tests, earth resistance measurements and other tests, which in his opinion are necessary, to prove that the system is in accordance with design, specification, code of practice and CEA Regulations 2010. Earth resistance value should be not greater than one (1) ohm.

e) Lighting System

Commissioning tests stipulated in applicable standards and code of practice covering all lighting system equipment

The Contractor shall carry out insulation resistance tests by a megger of following rating

Control circuits up to 220 V 500 V megger

Power circuits up to 1.1 kV 1000 V megger

In general, the following checks shall be carried out on all the equipment/systems, as applicable.

a) Name plate details according to approved drawings/ specifications

b) Any physical damage or defect and cleanliness

c) Tightness of all bolts, clamps and connections

d) Oil leakages and oil level

e) Condition of accessories and their completeness

f) Clearances

g) Earthing connections

h) Correctness of installation with respect to approved drawings/specifications

i) Lubrication of moving parts

j) Alignment

k) Correctness and condition of connections

26 COMMISSIONING TESTS

The following commissioning tests are to be carried out on all the equipment/systems, as applicable and as desired by Employer/ Statutory requirements.

a) Insulation resistance measurement of equipment, accessories, cabling/wiring etc.

b) Dielectric tests on equipment, accessories, cabling/ wires etc.

c) Phase sequence and polarity

d) Voltage and current ratios

e) Vector group

f) Resistance measurement of winding, contacts etc.

g) Continuity tests

h) Calibration of indicators, meters, relays, etc.

i) Control and interlock checks

j) Settings of equipment and accessories

k) Checking of accuracy/error

l) Checking of operating characteristics, pick-up voltages and currents, etc.

m) Operational and functional tests on equipment, accessories, control schemes, alarm/trip/indication circuits, etc.

o) Measurement of guaranteed/approved design values including lighting levels, earth resistance measurement, etc.

p) Complete commissioning checks of the system

27 SPECIFIC TESTS TO BE CARRIED OUT EQUIPMENTS ARE AS FOLLOWS;

Control Circuit

a) Operational test of control circuits to be tested as per schematic drawing.
b) Indications/Alarm/Annunciation circuit to be tested as per control schematic drawing.
c) Check for panel space heater and illumination circuits.

LT Switchgear Panels

a) Check of electrical wiring.
b) IR Values of power circuits & control circuits
c) Tests on auxiliary and control circuits.

d) Check of electrical operation of safety (interlocking, automatic changeover, Remote closing / Tripping circuits etc…).

e) Check of mechanical operations (insertion and withdrawal of removable parts, locks and interlocks system, operation of safety shutters, charging - closing - tripping of breaker etc..).

f) Power center communication interface tests.

g) Check of setting of all protective and measurement devices (e.g. protection relays, smart devices, Secondary injection testing of protective relays/releases, Trip circuit healthiness and tripping through relays/ release etc...).

h) Indication / Annunciation / Panel space heater circuit / Space contacts for customer use

i) CT testing for polarity, ratio, IR values and magnetization for class PS characteristics

j) PT testing for ratio, IR values

k) Testing of modules for DOL/ Star-Delta/ATS/ Soft Starter starting or any other starting method as per the schematic drawings applicable.

HV, LV power cable, control cable & cable accessories

a) IR Values before Hipot

b) Hi Pot test for MV & HV cables.

c) IR Values after Hipot

Earthing System

a) Earthing resistance of each electrode

b) Earth continuity check.

c) Overall resistance of earthing installation.

Lighting system

a) Check of electrical wiring.

b) Functional tests.

c) Lux level measurement for each plant area.

28 EMPLOYER'S REQUIREMENT

Service Level Agreements

Service Level Agreement (SLA) shall become the part of Agreement between BSCDCL and the Successful Bidder. SLA defines the terms of the Successful Bidder's responsibility in ensuring the timely delivery of the deliverables and the correctness of the same based on the agreed Performance Indicators as detailed in this section. The Successful Bidder has to comply with

Service Levels requirements to ensure adherence to Project timelines, quality and availability of services.

The Successful Bidder (refer as System Integrator, SI) has to supply software/automated tools to monitor all the SLAs mentioned below.

Note: Penalties shall not be levied on the Successful Bidder in the following cases:

a. There is a Force Majeure event effecting the SLA which is beyond the control of the Successful Bidder
b. The non-compliance to the SLA has been due to reasons beyond the control of the Bidder.
c. Theft cases by default would not be considered as “beyond the control of Bidder”. However, certain cases, based on circumstances & certain locations, BSCDCL may agree to qualify as “beyond the control of Bidder”. Damages due to any accident / mishap shall be considered as “beyond the control of Bidder”. However, Power shut down or deliberate damage to field devices such as Cameras, Audio Systems etc. would not be considered as “beyond the control of Bidder”.

The purpose of this Service Level Agreement (hereinafter referred to as SLA) is to clearly define the levels of service which shall be provided by the System Integrator to BSCDCL for the duration of this Agreement.

1.1 Definitions

For the purposes of this service level agreement, the definitions and terms are specified in the contract along with the following terms shall have the meanings set forth below :

a. “Uptime” shall mean the time period for the specified services / components with the specified technical service standards are available to the user department. Uptime, in percentage, of any component (Non IT & IT) can be calculated as:

   Uptime = {1- [(Downtime) / (Total Time – Maintenance Time)]} * 100

b. “Downtime” shall mean the time period for which the specified services / components with specified technical and service standards are not available to the user department and excludes downtime owing to Force Majeure & Reasons beyond control of SI.

c. “Incident” refers to any event / abnormalities in the functioning of the Services specified as part of the Scope of Work of the Systems Integrator that may lead to disruption in normal operations of the ITMS System.

d. “Resolution Time” shall mean the time taken (after the incident has been reported at the helpdesk), in resolving (diagnosing, troubleshooting and fixing) or escalating (to the second level or to respective vendors, getting the confirmatory details about the same from the vendor and conveying the same to the end user), the services related troubles during the first level escalation.

1.2 Measurement of SLA

The SLA metrics provided specifies performance parameters as baseline performance, lower performance and breach. All SLA calculations will be done on quarterly basis. The SLA also specifies the liquidated damages for lower performance and breach conditions.

Payment to the SI is linked to the compliance with the SLA metrics. The matrix specifies three levels of performance, namely,

a. The SI will get 100% of the Contracted value if all the baseline performance metrics are compiled and the cumulative credit points are 100.
b. The SI will get lesser payment in case of the lower performance. (For e.g. if SLA point score is 80 then the SI will get 20% less on the quarterly payment – The formula calculating the deductions is “(100 – SLA Point Score)%”)
c. If the performance of the Agency in respect of any parameter falls below the prescribed lower performance limit, debit points are imposed for the breach.

The credit (+) points earned during the quarter will be considered for computing penalty. The quarterly payment shall be made after deducting the liquidated damages as mentioned above.

The aforementioned SLA parameters shall be measured as per the individual SLA parameter requirements and measurement methods, through appropriate SLA Measurement tools to be provided by the SI and audited by BSCDCL or its appointed Consultant for accuracy and reliability.

BSCDCL shall also have the right to conduct, either itself or through any other agency as it may deem fit, an audit / revision of the SLA parameters. The SLAs defined, shall be reviewed by BSCDCL on an annual basis after consulting the SI, Project Management Consultants and other experts. All the changes would be made by BSCDCL after consultation with the SI and might include some corrections to reduce undue relaxation in Service levels or some corrections to avoid unrealistic imposition of liquidated damages, which are noticed after project has gone live.

Total liquidated damages to be levied on the SI shall be capped at 10% of the total contract value. However, BSCDCL would have right to invoke termination of the contract in case the overall liquidated damages equals 10% of total contract value. Liquidated damages to be levied during Post Implementation period shall be capped at 10% of the OPEX value. BSCDCL would also have right to invoke termination of contract in case cumulative debit point (breach points) are above 30 in 2 consecutive quarters.

1.3 Pre Implementation SLA

Timely delivery of the Scope of Work

<table>
<tr><td>Definition</td><td>Timely delivery of deliverables would comprise entire bill of material and the application systems, and as per successful UAT of the same.</td></tr>
<tr><td>Service Level Requirement</td><td>All the deliverables defined in the contract has to be submitted On-time on the date as mentioned in the contract with no delay.</td></tr>
<tr><td>Measurement of Service Level Parameter</td><td>To be measured in Number of weeks of delay from the timelines mentioned in the section “Project Timelines”</td></tr>
<tr><td>Penalty for non-achievement of SLA Requirement</td><td>Any delay in the delivery of the project deliverables (solely attributable to vendor) would attract a liquidated damage per week of 0.2% of the CAPEX of contract per week for first 8 weeks and 0.3% per week for every subsequent week. If the liquidated damage reaches 10% of the total contract value, Authority may invoke termination clause. Liquidated damage will be computed on Capex value of contract value</td></tr>
<tr><td>Penalty for replacement of resources during implementation phase</td><td>
<table>
<tr><th>Team Member</th><th>Penalty</th></tr>
<tr><td>Project Manager</td><td>• Penalty of Rs.2,00,000 for every replacement</td></tr>
</table>
</td></tr>
</table>

1.4 SLA Matrix for Post Implementation SLAs

#	Performance Area	Baseline		Lower Performance		Breach		Penalty
		Metric	Points	Metric	Points	Metric	Points	
1. Field devices- Surveillance Cameras, ANPR system, Speed Detection system, RLVD system, Face Recognition system, Public Address System, variable Message sign Board, Adaptive Traffic Control System, Traffic Signal Controller, Environmental Sensors, Emergency Call Box								
1	Uptime per Surveillance Cameras (live feed available irrespective of network/ power/ etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
2	Uptime of Automatic Number Plate Recognition system (Irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
3	Uptime of Speed Detection system (Irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
4	Uptime of RLVD system (Irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
5	Uptime of Face Recognition system (Irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
6	Uptime per PA system (live/ recorded announcements available irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
7	Uptime of Variable Message Sign Board system (Irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
8	Uptime of Adaptive Traffic Control System (Irrespective of network/ power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	

#	Performance Area	Baseline		Lower Performance		Breach		Penalty
		Metric	Points	Metric	Points	Metric	Points	
9	Uptime of Environmental Sensors (live Environmental Condition Irrespective of network/power/etc. issues)	98%	5	>= 96% to <98%	2.5	<96%	0	
10	Uptime of Emergency Response System (Immediate/ Emergency Response Irrespective of network/power/etc. issues)	98%	4	>= 96% to <98%	2	<96%	0	
2. Application Performance (includes any user/system application related to the project)								
1	Overall application(s) availability	99%	5	>= 96.5 % to <99%	2.5	< 96.5 %	0	
2	Reports Generation Response Time (Alerts/MIS/Logs etc.)	Simple query - < 5secs Medium complexity query - <30 secs High Complexity query - < 1min	5	Simple complexity Query = 5.01 – 10 secs Medium complexity query = 30.01 – 60 secs High Complexity query = < 60.1 sec – 2 min	2.5	Simple complexity Query = > 10 secs Medium complexity query = > 60 secs High Complexity query = > 2 min	0	
3. **Video Analytics Performance**								
1	ANPR for Standard Roman Number plates (3 wheelers & above)	80%	3	<80% & up to 60%	1.5	< 60 %	0	

#	Performance Area	Baseline		Lower Performance		Breach		Penalty
		Metric	Points	Metric	Points	Metric	Points	
2	ANPR for Non-Standard Roman Number plates (3 wheelers & above) please define non standard	50%	2	<50% & up to 40%	1	< 40 %	0	
3	ANPR for Standard Roman Number plates (2 wheelers)	70%	3	<70% to 50%	1.5	< 50 %	0	
4	ANPR for Non-Standard Roman Number plates (2 wheelers) Please define non standard	50%	2	<50% to 40%	1	< 40%	0	
5	Any other analytics (SLA to be defined in discussion with Successful Bidder)	80%	2	<80% & up to 60%	1	< 60 %	0	
4.	**End-User Equipment Uptime**							
1	Video wall Controller System at Command Center	98%	2	>= 96 % to <98%	1	< 96 %	0	
2	Monitoring workstations at Command Centers	98%	2	>= 96 % to <98%	1	< 96 %	0	
3	IP Phones	98%	2	>= 96 % to <98%	1	< 96 %	0	
5.	**Underlying IT Infrastructure Uptime/Availability at Data Centres**							
1	CCTV Servers Uptime	99.95%	5	>= 99.5 % to <99.94%	2.5	< 99.5%	0	
2	Storage System Uptime	99.95%	5	>= 99.5 % to <99.94%	2.5	< 99.5%	0	

#	Performance Area	Baseline		Lower Performance		Breach		Penalty
		Metric	Points	Metric	Points	Metric	Points	
6. Security /Patch Services for IT Infrastructure								
1	Firewall and any other security appliance Uptime	99.95%	3	>= 99.5 % to <99.94%	1.5	< 99.5%	0	
2	Security rules update within 2 hours of approved change management request	0 violations of service parameters	2	1 – 4 violations	1	> 4 violations	0	
3	Anti-virus, Anti-spyware, Anti-spam updates within 24 hrs. of request	0 violations of service parameters	2	1 – 4 violations	1	> 4 violations	0	
4	Critical Patches – within 48 hours of patch release.	0 violations of service parameters	2	1 – 4 violations	1	> 4 violations	0	
5	Non Critical Patches – within 15 days of patch release.	Up-to 1 violations of service parameters	2	2 – 5 violations	1	> 5 violations	0	
6	Resolution of low level Issue (upgrade, shifting and preventive maintenance (of non-production items))	2 days	2	>=2 to 3 days	1	> 3 days	0	
	Total Score		**100**		**50**		**0**	

1.4.1 General Instructions related to SLAs mentioned above

a. Theft cases by default would not be considered as “beyond the control of Bidder”. However, certain cases, based on circumstances & certain locations, BSCDCL/ End user department may agree to qualify as “beyond the control of Bidder”.
b. Power shut down would not be considered as “beyond the control of Bidder”.
c. Damages due to Road Accident / Mishap shall be considered as “beyond the control of Bidder”.
d. Deliberate damage to field devices: camera, Pole etc. would not be considered as “beyond the control of Bidder”
e. Bidder is advised to have stronger poles & proper housing to protect from such damages.
f. Bidder is also required to note that in case of SLAs not being made applicable for cases considered as “beyond the control of bidders”, Bidder would still need to replace the component (if it is not functional as per SLA) within the SLA defined for Resolution of Critical Level / Medium Level / Low level issues. In case bidder doesn’t adhere to the Issue Resolution SLA timelines, the original SLA shall be made applicable.

1.4.2 Security Breach SLA

Note – This SLA for Security Breach is applicable over and above the SLAs mentioned in above table.

Definition	Security of the video feeds and the overall system is quite important and Successful Bidder shall be required to ensure no compromise is done on the same. Security Breach types considered for this SLA are– • Availability of Video feeds to any other user than those authorized by BSCDCL/ End user department and provided passwords • Availability of any report / data to any other user than those authorized by BSCDCL/ End user department, and provided passwords • Successful hacking of any active component on the network by any unauthorized user Or any other privacy rule is broken as per Govt. of India guidelines
Service Level Requirement	Security compliance of the system should be 100%

Measurement of Level Service Para **Meter**	Any reported security breach shall be logged into the SLA Management solution as a security breach
Penalty for non-achievement of SLA Requirement	For every security breach reported and proved, there shall be a penalty of INR 2,00,000/- or lead to termination of contract

1.4.3 Breach in supply of Technical Manpower

Note – This SLA for supply of Technical Manpower is applicable over and above the SLAs mentioned in the above table.

Definition	Bidder is required to propose the CVs of the required technical manpower (as mentioned in this RFP). It is vital that such manpower is available to BSCDCL/ End user department and performs to the expected levels. The current SLA breach shall specify penalty amount for non-availability of these man-power.
Service Level Requirement	Availability of the required man-power should be 100%. SI to implement the biometric attendance system and share the attendance report of each person proposed as part of team on monthly basis with BSCDCL **Note:** Project team shall require to take the approval from the BSCDCL or concerned authority. The penalty shall be waived off for that approved leaves. In case of absence of approval the penalty shall be levied.
Measurement of Service Level Parameter	Following instances would be considered as SLA non-compliances: • Replacement of a profile by the Bidder (only one replacement per profile – with equal or higher qualification and experience – would be permitted per year) • Non-deployment of the profile for more than 1 month. Authority reserves the right to ask SI to replace (with equal or higher qualification and experience) the profile if the performance / commitment are not up to the mark **Note:** Replacement due to reasons not in control of SI (like resignation of the resource, accident, etc.) would not be counted in the permissible 1 replacement.

<table>
<tr>
<td>Penalty for non-achievement of SLA Requirement</td>
<td>For every SLA non-compliance reported and proved, there shall be a penalty as given below:
<table>
<tr><th>Team Member</th><th>Penalty</th></tr>
<tr><td>Project Manager</td><td>• Penalty of Rs 5,000 for the 1st week of non-availability at Project site
• Penalty of Rs. 10,000 for the 2nd week of non-availability at Project site
• Penalty of Rs. 50,000 thereafter(3rd week onwards) per week of non-availability</td></tr>
<tr><td>For all other team members</td><td>• Penalty of Rs 1,000 per day of non-availability for 7 days at Project site
• Penalty of Rs. 2,000 per day of non-availability after 7 days at Project site</td></tr>
</table>
</td>
</tr>
</table>

1.4.4 Explanation Notes for SLA Matrix

A) Field Sensors (Surveillance Cameras, RLVD, ANPR, Speed violation detection, Face Recognition, PA systems, variable Message sign Board, Adaptive Traffic Control System, Traffic Signal Controller, Enviornment Sensors, Emergency call Box etc.) Availability

Definition	"Field Sensors (Surveillance Cameras, RLVD, ANPR, Speed violation detection, PA systems, Face Recognition, PA systems, variable Message sign Board, Adaptive Traffic Control System, Traffic Signal Controller, Enviornment Sensors, Emergency call Box etc.) Availability" means availability of the sensor data to the Traffic Command Centre.
Measurement of Service level Parameter	[(Total average Uptime of all the respective field sensors in a quarter)/(Total Time in a quarter)]*100

B) Application Availability

Definition	Application availability refers to the total time when the Application is available to the users for performing all activities and tasks.
Measurement of Service level Parameter	[(Total Uptime of the Application in a quarter) / (Total Time in a quarter)]*100

C) Issue Resolution

Explanation	Issue Resolution SLA shall monitor the time taken to resolve a complaint / query after it has been reported by BSCDCL /End user department to the Successful Bidder.
Service Level Requirement	Different Issues/Queries shall be classified as in following three categories as defined above. **Critical** : Issue that impacts more than one production services / is raised by higher management / is impacting high importance areas **Medium**: Issue that doesn't impact more than one production services but has a potential to impact or may get escalated to top management if not resolved quickly **Low**: Upgrades, shifting, preventive maintenance. Issues which don't have impact on services.

SECTION-8

DRAWINGS

SECTION-10

ENVIRONMENT

HEALTH AND SAFETY REQUIREMENTS

(EHS POLICY)

ENVIRONMENT, HEALTH & SAFETY POLICY

SPECIFICATION FOR ENVIRONMENT, HEALTH & SAFETY POLICY (EHS) MANAGEMENT

CONTENTS

1.0 **SCOPE**: This specification established the Environment, Health and Safety (EHS) management requirement to be complied with by the Contractors during construction. Requirements stipulated in this specification shall supplement the requirements of EHS Management given in relevant Act (s) / legislations. General Conditions of Contract (GCC), Special Conditions of Contract (SCC) and Job Specifications. Where different documents stipulate different requirements, the most stringent shall be adopted.

2.0 REFERENCES: This document should be read in conjunction with following:

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Job specifications

3.0 REQUIREMENTS OF ENVIRONMENT, HEALTH & SAFETY (EHS) MANAGEMENT SYSTEM TO BE COMPLIED BY BIDDERS

3.1MANAGEMENT RESPONSIBILITY

3.1.1The Contractor should have a documented EHS policy to cover commitment of their organization to ensure health, safety and environment aspects in their line of operations.

3.1.2The EHS management system of the Contractor shall cover the EHS requirements including but not limited to what is specified under Para 1.0 and para 2.0 above.

3.1.3Contractor shall be fully responsible for planning and implementing EHS requirements. Contractor as a minimum requirement shall designate / deploy the following to co-ordinate the above:

No. of workers deployed

Up to 250 - Designate one safety supervisor

Above 250 & up to 500 - Deploy one qualified and experienced safety Engineer /officer

Above 500-One additional safety (for every 500 or less) engineer/officer as above.

Contractor shall indemnify & hold harmless Owner / BSCDCL & either

representatives free from any and all liabilities arising out of non – fulfillments of EHS requirements.

3.1.4 The Contractor shall ensure that the Environment, Health & Safety (EHS) requirements are clearly understood & faithfully implemented at all levels at site.

3.1.5 The Contractor shall promote and develop consciousness for Safety , Health and Environment among all personnel working for the Contractor. Regular awareness, program site meetings shall be arranged on EHS activities to cover hazards involved in various operations during construction.

3.1.6 Arrange suitable first aid measures such as First Aid Box, trained personnel to give First Aid, Stand by Ambulance or Vehicle and install fire protection measures such as : adequate number of steel buckets with sand and adequate fire extinguishers to the satisfaction of BSCDCL/Owner.

3.1.7 The Contractor shall evolve a comprehensive planned and documented system for implementation and monitoring of the EHS requirements. This shall be submitted to BSCDCL/Owner for approval. The monitoring for implementation shall be done by regular inspections and compliance to the observations thereof. The Contractor shall get similar EHS requirements implemented at his sub-contractor(s) work site/office. However, compliance of EHS requirements shall be the sole responsibility of the Contractor. Any review / approval by BSCDCL/Owner shall not absolve contractor of his responsibility / liability in relation to all HSE requirements.

3.1.8Non-Conformance on EHS by Contractor (including his Sub-contractors) as brought out during review/audit by BSCDCL/Owner representatives shall be resolved forthwith by Contractor. Compliance report shall be provided to BSCDCL/Owner.

3.1.9The Contractor shall ensure participation of his Resident Engineer / Site-in-Charge in the Safety Committee / EHS Committees meetings arranged by BSCDCL/Owner. The compliance of any observations shall be arranged urgently. He shall assist BSCDCL/Owner to achieve the targets set by them on EHS during the project implementation.

3.1.10 The Contractor shall adhere consistently to all provisions of EHS requirements. In case of non-compliance or continuous failure in implementation of any of EHS provisions; BSCDCL/Owner may impose stoppage of work without any Cost & Time implication to Owner and/or impose a suitable penalty for non-compliance with a notice of suitable period, up to a cumulative limit of

1.0% (one percent) of Contract Value with a maximum limit of Rs. 10 lakhs. This penalty shall be in addition to all other penalties specified else where in the contract. The decision of imposing stoppage work, its extent & monitory penalty shall rest with BSCDCL/Owner & binding on the Contractor.

3.1.11 All fatal accidents and other personnel accidents shall be investigated by a team of Contractor‟s senior personnel for root cause & recommend corrective and preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to BSCDCL/Owner. Owner / BSCDCL shall have the liberty to independently investigate such occurrences and Contractor shall extend all necessary help and co-operation in this regard.

3.2 HOUSE KEEPING

3.2.1Contractor shall ensure that a high degree of house keeping is maintained and shall ensure inter alia the followings wherever applicable:

a. All surplus earth and debris are removed/disposed off from the working areas to identified location(s).

b. Unused/Surplus Cables, Steel items and steel scrap lying scattered at different places within the working areas are removed to identified location(s).

c All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).

d. Roads shall be kept clear and materials like: pipes, steel, sand boulders, concrete, chips and bricks etc. shall not be allowed on the roads to obstruct free movement of men & machineries.

e. Fabricated steel structural, pipes & piping materials shall be stacked properly for erection.

f. Water logging on roads shall not be allowed.

g. No parking of trucks / trolleys, cranes and trailers etc. shall be allowed on roads which may obstruct the traffic movement.

h. Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.

i. Trucks carrying sand, earth and pulverised materials etc. shall be covered while moving within the premises.

j. Only properly designed steel scaffolding materials to be used for working at heights more than 3.0M . Double scaffolding using wooden ballis may be allowed for working at height less than 3.0M

3.3 ENVIRONMENT, HEALTH AND SAFETY

3.3.1 The Contractor shall provide safe means of access to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen, and, BSCDCL/Owner. Contractor shall ensure deployment of appropriate equipment and appliances for adequate safety and health of the workmen and protection of surrounding areas.

3.3.2 The Contractor shall ensure that all their staff and workers including their sub-contractor(s) shall wear Safety Helmet and Safety shoes. Contractor shall also ensure use of safety belt, protective goggles, gloves etc. by the personnel as per job requirements. All these gadgets shall conform to relevant IS specifications or equivalent.

3.3.3 Contractor shall ensure that a proper Safety Net System shall be used at appropriate locations. The safety net shall be located not more than 30 feet (9.0 metres) below the working surface at site to arrest or to reduce the consequences of a possible fall of persons working at different heights.

3.3.4 Contractor shall ensure that flash back arrester shall be used while using

Gas Cylinders at site. Cylinders shall be mounted on trolleys.

3.3.5 The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health for driving of vehicles, handling and erection of materials and equipments. All lifting equipments shall be tested certified for its capacity before use. Adequate and suitable lighting at every work place and approach there to, shall be provided by the Contractor before starting the actual operations at night.

3.3.6 Hazardous and/or toxic materials such as solvent coating, or thinners shall be stored in appropriate containers.

3.3.7 All hazardous materials shall be labelled with the name of the materials, the hazards associated with its use and necessary precautions to be taken.

3.3.8 Contractor shall ensure that during the performance of the work, all hazards to be health of personnel, have been identified, assessed and eliminated.

3.3.9 Chemical spills shall be contained & cleaned up immediately to prevent further contamination.

3.3.10All personnel exposed to physical agents such as ionizing radiation, ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.

3.3.11 Where contact or exposure of hazardous materials could exceed limits or could otherwise have harmful affects, appropriate personal protective equipments such as gloves, goggles, aprons, chemical resistant clothing and respirator shall be used.

A Crèche where 10 or more female workers are having children below the age of 6 years.

Reasonable Canteen facilities are made available at appropriate location depending upon site conditions.

3.3.13 Suitable facilities for toilet, drinking water, proper lighting shall be provided at site and labour camps, commensurate with applicable Laws / Legislation.

3.3.14 Contractor shall ensure storage and utilization methodology of materials that are not detrimental to the environment. Where required Contractor shall ensure that only the environment friendly materials are selected.

3.3.15All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials substances and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the express authorization of BSCDCL/Owner.

4.0 DETAILS OF EHS MANAGEMENT SYSTEM BY CONTRACTOR

4.1 On Award of Contract

The Contractor shall prior to start of work submit his Safety Health and

Environment Manual or procedure and EHS Plans for approval by BSCDCL/Owner. The Contractor shall participate in the pre-start meeting with BSCDCL/Owner to finalise EHS Plans including the following :

1. Job procedure to be followed by Contractor for activities covering. Handling of equipment, Scaffolding, Electric Installation, describing the risks involved, actions to be taken and methodology for monitoring each activity.
2. BSCDCL/Owner review / audit requirement.

3. Organization structure along with responsibility and authority records / reports etc. on
   EHS activities.

4.2 During job execution

4.2.1 Implement approved Environment, Health & Safety management procedure including but not limited to as brought out under para 3.0. Contractor shall also ensure to:

1. Arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc., as applicable.
2. Arrange all HSE permits before start of activities (as applicable) like hot work, confined space, work at heights, storage of chemical / explosive materials and its use and implement all precautions mentioned therein.
3. Submit timely the completed checklist on EHS activities, Monthly EHS report, accident reports, investigation reports etc. as per BSCDCL/Owner requirements. Compliance of instructions on EHS shall be done by Contractor and informed urgently to BSCDCL/Owner.
4. Ensure that Resident Engineer / Site-in-Charge of the Contractor shall attend all the Safety Committee / EHS meetings arranged by BSCDCL/Owner. Only in case of his absence from site that a second senior most person shall be nominated by him in advance and communicated to BSCDCL/Owner.
5. Display at site office and work locations caution boards, list of hospitals, emergency services available.
6. Provide posters, banners for safe working to promote safety consciousness.
7. Carryout audits / inspection at sub contractor works as per approved EHS
8. Document and submit the reports for BSCDCL/Owner review.
9. Assist in EHS audits by BSCDCL/Owner, and submit compliance report.
10. Generate & submit HSE records / report as per EHS Plan
11. Appraise BSCDCL/Owner on EHS activity