

BHOPAL SMART CITY DEVELOPMENT CORPORATION LIMITED

RFP Documents

for

**“Development of Polytechnic Junction to Bharatmata Square
Four Lane Smart Road with External Electrification and Cycle Track Corridor
at Bhopal City”**

2016 - 17

Bhopal Smart City Development Corporation Limited

Zone -14, Bhopal Municipal Corporation, BHEL. Govindpura, Bhopal –
462023

Contact us at: 0755—2477770, smartcitycell@bmconline.gov.in

www.smartcitybhopal.com

Bhopal Smart City Development Corporation Limited

E-Tender for

Development of Polytechnic Junction to Bharatmata Square Four Lane Smart Road with External Electrification and Cycle Track Corridor at Bhopal City

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Bhopal Smart City Development Corporation Limited

: e-Tender Notice ::

Bhopal Smart City Development Corporation Limited, Zone – 14, Bhopal Municipal Corporation, B.H.E.L., Govindpura, Bhopal – 462023 Madhya Pradesh, invites tenders in two bid system by e-tendering from the contractors registered in State Government / Central Government in appropriate class for work of road as detailed below:

Description	Development of Polytechnic Junction to Bharatmata Square Four Lane Smart Road with External Electrification and Cycle Track Corridor (2.205km long)
Estimated cost of the Work	Rs. 3175.79 Lacs (Rs. Three Thousand One hundred Seventy Five point Seventy Nine Lacs only)
Earnest Money (E.M.D.)	Rs. 15.88 Lacs (Rs. Fifteen point Eighty Eight Lacs only)
Cost of Bid Document (Non Refundable)	Rs. 50,000 (Rs. Fifty Thousand only)
Time limit for completion of work	15 months including Rainy Season
Announcement Date	22-Sept-2016
Pre Bid Meeting Date	15:00 Hrs on 03-Oct-2016
Clarification regarding Pre Bid	17.00 Hrs on 13-Oct-2016
Purchase of Tender End Date	23:59 Hrs on 27-Oct-2016
Online Bid Submission End Date	17:00 Hrs on 28-Oct-2016
Opening of 'Technical Proposal (Envelop A) <i>"Before Opening of 'Technical Proposal (Envelop A) Physical submission of EMD and attested or Notarized copies of other required documents shall be submitted at office of BSCDCL, Bhopal"</i>	15:00 Hrs on 29-Oct-2016
Opening of 'Financial Bid'	15:00 Hrs on 01-Nov-2016

1. The detailed terms and conditions are given in the Request for Proposal (RFP), which can be downloaded from the website www.mpeproc.gov.in under "Live Tender" and Department Name "Bhopal Municipal Corporation" for work of Development of Four Lane with Cycle Track Corridor (2.205km long) in Bhopal city (From Polytechnic Square to Depot Square) as per detail given here under.

2. All bidders must submit Online Cost of Bid Document (Non Refundable) and Earnest Money (E.M.D.) in the form of Demand Draft in favor of "Bhopal Smart City Development Corporation Limited", Bhopal, payable at Bhopal from any Scheduled or Nationalized Bank in India.
3. The required physical documents to be submitted below for verification should be duly self-certified along with the seal of company:
City Engineer
Bhopal Smart City Development Corporation Limited
Zone -14, Bhopal Municipal Corporation, B.H.E.L.
Govindpura,
Bhopal - 462023
4. Interested eligible applicants may obtain further information from BSCDCL office. The work consists of works as mentioned in the RFP document. A firm will be selected under the procedure as described in the detailed RFP. Conditional Tenders will not be accepted. BSCDCL has right to accept/reject any tender without assigning any reason. BCLL reserves all rights to reject whole or part of the Proposal, all or any proposal and to modify the terms and conditions.
5. **The pre-qualification requirement is as under:**
 - i) **Financial Criteria:**
 1. An average annual turnover of last three year should not be less than 100% of the Tender Amount.
 2. Net worth of the company should not be less than 50% of the estimated cost of the work.
 - ii) **Experience Criteria:**

The bidder should possess following minimum experience

 - (1) Bidder should have "A" Class Electrical License registered with MPMKVV Co Ltd. Bhopal, In case Bidder is not having Valid "A" Class License registered with MPMKVV Co Ltd. Bhopal, he may execute external electrification work through Electrical Contractor having valid "A" Class License registered with MPMKVV Co Ltd Bhopal whom successfully completed similar nature of single work.
 - (2) Bidder should have completed at last one work of similar nature of 80% cost or two work similar nature of 50% each or three work of similar nature of 40% each of either Government or Semi-government or Limited company as a main contractor in period of last Three years.
 - (3) Bidder should have enough machinery & plants with experienced personnel to supervise the work.

General Terms for Bidding

- a) No Bidder shall submit more than one Bid for the Project. A Bidder bidding individually or as a member of a Consortium shall not be entitled to submit another bid either individually or as a member of any Consortium, as the case may.
 - b) The Bidder may be a sole applicant (Single Entity) or a group of entities (hereinafter referred to as 'Consortium'), coming together to implement the Project. The term Bidder used hereinafter would therefore apply to both a Single Entity and a Consortium who have submitted the Bid. The Successful Bidder is the one selected by Authority to develop this Project and who has been issued LOA by the Authority.
 - c) Any condition or qualification or any other stipulation contained in the Bid shall render the Bid liable to rejection as a non-responsive Bid.
 - d) The Bid and all communications in relation to or concerning the Bidding Documents and the Bid shall be in English language.
 - e) The documents including this RFP and all attached documents, provided by the Authority are and shall remain or become the property of the Authority 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.
6. The bidder must enclose notarized affidavit for execution of Civil/ Electrical work from a contractor who have successfully completed the similar nature of work regarding experience criteria point-1.
 7. After the award of work, the successful bidder shall complete 100 meter length of Four Lane with Cycle Track in totality along with all the amenities mentioned in the BOQ as Pilot for approval on a particular stretch of existing road.
 8. The tenders of those bidders, who fail to submit the required documents physically within the prescribed date and time, will be treated as non-responsive and their Price Bid will not be opened.
 9. Executive Director, Bhopal Smart City Development Corporation Limited, Bhopal, reserves the right to accept / reject any or all e-tender(s) without assigning any reasons thereof.

City Engineer
Bhopal Smart City Development
Corporation Limited, Bhopal

**INSTRUCTIONS
TO
BIDDERS**

Bhopal Smart City Development Corporation Limited

:: INSTRUCTIONS TO TENDERER::

IT 1. GENERAL

The contract documents may be secured in accordance with the Notice Inviting e -Tender for the work called. The work shall include supply of materials necessary for construction of the work.

IT 2. INVITATION TO E - TENDER

Bhopal Smart City Development Corporation Limited herein after referred as the Corporation will receive e-Tenders for the work as per the specifications and schedule of prices in the e-Tender document. The e-Tenders shall be opened online as specified in the e-Tender notice in the presence of interested Tenderers or their representatives. The Corporation reserves the right to reject the lowest or any other or all e- Tenders or part of it which in the opinion of the Corporation does not appear to be in its best interest, and the Tenderer shall have no cause of action or claim against the Corporation or its officers, employees, successors or assignees for rejection of his e-Tender.

IT 3. LANGUAGE OF e - Tender

e-TENDERS shall be submitted in English, and all information in the e-Tender shall also be in English, Information in any other language shall be accompanied by its translation in English. Failure to comply with this may make the e-Tender liable to rejection.

IT 4. QUALIFICATIONS OF TENDERERS

- A. The Tenderers shall abide by the laws of the Union of India and of MP State and legal jurisdiction of the place where the works are located.
- B. The Tenderer shall furnish a written statement of financial and technical parameters with details and documents along with his e-Tender which contains namely as below:
 - i. The Tenderer's experience in the fields relevant to this contract.
 - ii. The Tenderer's financial capacity/resources and standing over at least 3 (Three) years.
 - iii. The Tenderer's present commitments (Jobs on hand).
 - iv. The Tenderer's capability and qualifications of himself and his regular staff etc.
 - v. Plants and Machinery available with the Tendererfor the workTendered.

IT 5. e - Tender DOCUMENTS

The e-Tender documents and drawings shall comprehensively be referred to as e -Tender document. The several sections form in the document are the essential parts of the contract and a requirement occurring in one shall be as

binding as though occurring in all, they are to be taken as mutually, explanatory and describe and provide for complete works.

IT 6. EXAMINATION BY TENDERERS

A. At this own expense and prior to submitting his e-Tender, each Tenderer shall (a) examine the Contract Documents, (b) visit the site and determine local conditions which may affect the work including the prevailing wages and other pertinent cost factors, (c) familiarize, himself with all central, state and local laws, ordinance, rules regulations and codes affecting the material supply including the cost of permits and licenses required for the work and (d) correlate his observations, investigations, and determinations with the requirements of the e-Tender Documents, site &subsoil investigation.

B. The works shall have to be completed in all respect as stated in the e-Tender document to the satisfaction of the Corporation.

C. The following comprises in Contract Documents:

e - Tender Document:

1. Notice inviting Tenders
2. Information to the Tenderer
3. Instructions to the Tenderer
4. Technical specifications
5. Price Bid

D. Copy of the e-Tender Document should be completed, checked in a responsible manner, digitally signed, and submitted. Security Bond shall be submitted in person up to the stipulate date, which shall be as per tender condition.

The e-Tender is required to be filled with necessary details in all the pages in which entries are required to be made by the Tenderer are contained in the e - Tender documents and the Tenderer shall not take out or add to or amend the text of any of the documents except in so far as may be necessary to comply with any addenda issued pursuant to Clause IT. 17 hereof.

IT 7. EARNEST MONEY DEPOSIT:

A. Each Tenderer must submit Earnest Money amounting to Rs.15.88 Lacs online through www.mpeproc.gov.in portal to Bhopal Smart City Development Corporation Ltd.

B. The Earnest Money Deposit will be refunded to the unsuccessful Tenderers after an award has been finalized.

- C. The Earnest Money Deposit (Tender Guarantee) will be forfeited in the event, the successful Tenderer fails to accept the contract and fails to submit the "Performance Guarantee Bonds to the Owner as stipulated in this e-Tender documents within ten days. (10) days after receipt of notice of award of contract and also the tenderer will be put into blacklist for three years for any works in BSCDCL.
- D. The Earnest Money Deposit of the successful Tenderer shall be returned after the performance guarantee bond, as required, is furnished by the contractor.
- E. No interest shall be paid by the owner on any e-Tender guarantee.

IT 8. INCOME TAX CLEARANCE CERTIFICATE: (NOT APPLICABLE) :

IT 9. PREPARATION OF e-TENDER DOCUMENTS

Tenderers are required to note the following while preparing the e-TENDER Documents:

- A. e-TENDER shall be submitted on the e-TENDER form bound here in English. All statements shall be properly filled in. Numbers shall be stated both in words and in figures where so indicated.
- B. All entries or prices and arithmetic shall be checked before submission of the e-TENDER. If there is discrepancy between the rates quoted in figures and in words, the rates expressed in words shall be considered as binding.
- C. Each e-Tender shall be accompanied by the prescribed e-Tender security bond and other required documents and drawings. All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signature.
- D. Variation to the contract Documents requested by the Tenderer may be affixed and duly signed and stamped. Such variations may be approved or refused by the Corporation is not obliged to give reason for his decisions.

IT 10. SUBMISSION OF e-TENDER DOCUMENTS

Tenderers are requested to submit the e-TENDER Documents on following lines.

Volume containing following documents:

- I. Earnest Money Deposit.
- II. Certificates as registered contractor in appropriate class with Government of Madhya Pradesh or appropriate authority.

- III. Tenderer's financial capability statement including last Three years Income tax returns, balance sheet, duly signed by registered chartered account.
- IV. Tenderer's experience in the field relevant to this contract.
- V. A list of the equipment the Tenderer possesses and that which he proposed to acquire and use for the purpose related to the work.

The time limit for receipt of e-Tender shall strictly apply in all cases. The Tenderers should therefore ensure that their e-Tender is received by **Bhopal Smart City Development Corporation Limited** at before expiry of the time limit. No delay on account of any cause for receipt of e-Tender shall be entertained.

The e-Tender must contain the name address of residence and place of business of the person or persons submitting the e-Tender and must be digitally signed.

e-TENDER by partnership firm must be furnished with the full names and addresses of all partners and be signed by one of the members of the partnership or by a legally authorized representative holding power of attorney followed by signature and designation of the person of person signing.

e-TENDER by Corporations/Companies must be signed with the legal name of the Corporation/Companies by the president/or by the secretary or other person or persons legally authorized to bind the Corporation/Company in the matter.

IT 11 TENDER VALIDITY PERIOD

The validity period of the e-Tender submitted for this work shall be of one hundred twenty (120) calendar days from the date of opening of the technical Bid and that the Tenderer shall not be allowed to withdraw or modify the e-Tender offer on his own during the validity period. The Tenderer will not be allowed to withdraw the e-Tender or make any modifications or additions in the terms and conditions on his own e-Tender. If this is done then the owner shall, without prejudice to any other right or remedy, be at liberty to reject the e-Tender and forfeit the earnest money deposit in full and also the tenderer will be put into blacklist for three years for any works in BSCDCL.

IT 12 GENERAL PERFORMANCE DATA

Tenderers shall present all the information which sought for in the e-Tender document in form of various schedules if given. e-TENDERS may not be considered if left blank or the schedules are not properly filled in.

IT 13 SIGNING OF e-TENDER DOCUMENTS

If the Tender is made by an individualist shall be signed with his full name above his current address. If the Tender is made by a proprietary firm, it shall be signed by the proprietor above his name and the name of his firm with his current address.

If the e-Tender is made by a firm in partnership, it shall be signed by all the partners of the firm above their full names and current address, or by a partner holding the power of attorney for the firm, in which case a certified copy of the power of attorney shall accompany the e-TENDER. A certified copy of the partnership deed, current addresses of all the partners of the firm shall also accompany the e-Tender.

If the e-Tender is made by a limited company or a limited corporation, it shall be signed by a duly authorized person holding the power of attorney, shall accompany the e-Tender. Such limited company or corporation may be required to furnish satisfactory evidence of its existence before the contract is awarded.

If the e-TENDER is made by a group of firms, the sponsoring firm shall submit complete information pertaining to each firms in the group and state along with the bid as to which of the firms shall have the responsibility for e-Tendering and for completion of the contract documents and furnish evidence admissible in law in respect of the authority to such firms on behalf of the group of firms for e-Tendering and for completion of contract documents. The full information and satisfactory evidence pertaining to the participation of each member of the group of firms in the e-Tender shall be furnished along with the e-Tender.

All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signatures. All the signatures in the e-Tender document shall be dated.

IT 14 WITHDRAWAL OF TENDERS

If, during the tender validity period, the Tenderer withdraws his Tender, Tender security (Earnest Money) shall be forfeited and Tenderer will be debarred for next three years to quote in B.S.C.D.C.L.

IT 15 INTERPRETATIONS OF e-TENDER DOCUMENTS

Tenderers shall carefully examine the e-TENDER Document and fully inform themselves as to all the conditions and matters which may in any way affect the work or the cost thereof. If a Tenderer finds discrepancies, or omission from the specifications or other documents or should be in doubt as to their meaning, he should at once address query to the Authority of BSCDCL. The result of interpretation of the e-TENDER will be issued to all Tenderers as addendum.

IT 16 ERRORS AND DISCREPANCIES IN e-TENDERS

In case of conflict between the figures and words in the rates the rate expressed in words shall prevail and apply in such cases.

IT 17 MODIFICATION OF DOCUMENTS

Modification of specifications and extension of the closing date of the e-Tender, if required will be made by an addendum. Each addendum will be made available online to all Tenderers. These shall form a part of e-Tender. The Tenderer shall not add to or amend the text of any of the documents except in so far as may be necessary to comply with any addendum.

ADDENDA

Addenda form part of the Contract Documents, and full consideration shall be given to all Addenda in the preparation of e-Tender. Tenderers shall verify the number of Addenda issued, if any and acknowledge the receipt of all Addenda in the e-TENDER Failure to so acknowledge may cause the e-Tender to be rejected.

- A. The Owner may issue Addenda to advise Tenderers of changed requirements. Such addenda may modify previously issued Addenda.
- B. No addendum may be issued after the time stated in the notice inviting e - Tenders.

IT 18 TAX AND DUTIES ON MATERIALS

All charge on account of excise duties, Central / State, sales tax, work contract tax and other duties etc. on materials obtained for the works from any source shall be borne by the contractors. No (P) or 'C' or 'D' form shall be supplied.

IT 19 EVALUATION OF E – TENDERS

While comparing e-Tenders, the Bhopal Smart City Development Corporation Limited shall consider factors like price offer is workable with the market price, efficiency and reliability of construction method proposed, compliance with the specifications, relative quality, work done in past with Bhopal Smart City Development Corporation Limited or other Government Organizations, litigation issues etc. Evaluation criteria specifically mentioned in the specification will also be taken into consideration in the evaluation of e- Tenders.

IT 20 TIME REQUIRED FOR COMPLETION

The completion period mentioned in this schedule is to be reckoned from the date of notice to proceed. Total completion period is 6 months from the date of issue of work order to proceed and contractor should adhere to this completion time.

IT 21 POLICY FOR TENDER UNDER CONSIDERATION

TENDER shall be termed to be under consideration from the opening of the e - Tender until such time any official announcement or award is made.

While e-Tenders are under consideration, Tenderers and their representative or other interested parties are advised to refrain from contacting by any means any corporations personnel or representatives on matters related to the e-Tenders under study. The Corporation's representatives if necessary will obtain clarification on e-Tenders by requesting such information from any or all the Tenderers, either in writing or through personal contact, as may be necessary. The Tenderer will not be permitted to change the substance of his e-Tender after e-Tenders have been opened. This includes any post Tender price revision. Non-compliance with his provision shall make the Tender liable for rejection.

IT 22 PRICES AND PAYMENTS

The Tenderer must understand clearly that the prices quoted are for the total works or the part of the total works quoted for and include all costs due to materials, labour, equipment, supervision, other services, royalties, taxes etc. and to include all extra to cover the cost. No claim for additional payment beyond the prices quoted will be entertained and the Tenderer will not be entitled subsequently to make any claim on any ground.

IT 23 PAYMENT TERMS

The terms of payment are defined in the General Conditions of Contract and Technical specifications. The Corporation shall not under any circumstances relax these terms of payment and will not consider any alternative payment terms. Tenderers should therefore in their own interest note this provision to avoid rejection of their e-Tenders.

IT 24 AWARD

Award of the contractor the rejection or e-TENDERS will be made during the Tender validity period. A separate Schedule-B (Price Schedule) is given. The contractors are requested to quote their price offer **in % below or equal or above (Words and figures) on the given price in the Schedule-B of Price Schedule only. For Non-SOR items rates (Words and figures) to be quoted in the Schedule of items in Annexure-I and Annexure-II.**

A. After all contract contingencies are satisfied and the Notice of Award is issued, the successful Tenderer shall execute the Contract Agreement

within the time stated and shall furnish the Bond as required herein. The contract Agreement shall be executed, in form stipulated by the Owner.

- B. If the Tenderer receiving the Notice of Award fails or refuses to execute the Contract Agreement within the stated time limit or fails or refuses to furnish the Bond as required herein. The Owner may annul his award and declare the e-Tender security forfeited and will take action as deemed fit and also the tenderer will be put into blacklist for three years for any works in BSCDCL.

- C. A corporation, partnership firm or other consortium acting as the Tenderer and receiving the award shall furnish evidence of its existence and evidence that the officer signing the contract agreement and Bonds for the corporation, partnership firm or other consortium acting as the Tenderer is duly authorized to do so.

IT 25 SIGNING OF CONTRACT

The successful Tenderer shall be required to execute the contract agreement within 10 days of receipt of intimation to execute the contract, failing which the Corporation will be entitled annul to the award and forfeit the Earnest Money Deposit. The person to sign the contract document shall be person as detailed in Article IT.13 (signing of e-Tender documents).

IT 26 DISQUALIFICATION

A e-Tender shall be disqualified and will not be taken for consideration if,

- (a) The Tender fee and Tender Earnest Money Deposit is not deposited in full and in the manner as specified as per Article IT. 7 i.e. Earnest Money Deposit.
- (b) The e-Tender is in a language other than English or does not contain its English Translation in case of other language adopted for e-Tender preparation.
- (c) The e-Tender documents are not signed by an authorized person (as per Article IT. 13 i.e. signing of e-Tender documents).
- (d) The general performance data for qualification is not submitted fully (as per Article IT 12 i.e. General performance Data).
- (e) Tenderer does not agree to payment terms defined as per Article IT. 23 i.e. payment terms.

A. A e-Tender may further be disqualified if,

- (a) Price variation is proposed by the Tenderer on any principle other than those provided in the e-TENDER Documents.
- (b) Completion schedule offered is not consistent with the completion schedule defined and specified in e-Tender document.

- (c) The validity of e-Tender bond is less than that mentioned in Article IT. 11 i.e. e - Tender validity period.
- (d) Any of the page or pages of e-Tender is/are removed or replaced.
- (e) Any conditional tender.

IT 27 PERFORMANCE GUARANTEE (SECURITY DEPOSIT)

As a contract security the Tenderer to whom the award is made shall furnish a performance guarantee (Security deposit) for the amount of **10%** of the contract price to guarantee the faithful performance, completion and maintenance of the works of the contract in accordance with all conditions and terms specified herein and to the satisfaction of the Engineer-in-charge and ensuring the discharge of all obligations arising from the execution of contract in the forms mentioned below:

A fixed deposit receipt of any Schedule Bank Nationalized Bank (except Co-operative Bank) duly endorsed in favor of the **Bhopal Smart City Development Corporation Limited, Bhopal.**

The performance guarantee shall be delivered to the Corporation within ten (10) days of the notice of award and at least three (3) days before the contract agreement is signed unless otherwise specified by the Engineer-in-charge. Alternatively, the contractor may at his option deposit an amount of 5% of the value of the contract price within ten days and the balance 5% to be recovered in installments through deduction from the running account bills.

On due performance and completion of the contract in all respects, **THE PERFORMANCE GUARANTEE WILL BE RETURNED TO THE CONTRACTOR WITHOUT ANY INTEREST AFTER THE DEFECT LIABILITY PERIOD IS OVER.**

IT 28 STAMP DUTY

The successful Tenderer shall have to enter into an agreement on a non-judicial stamp paper of Rs.100/- as per the form of the agreement approved by the Corporation. The cost of stamp paper and adhesive stamp shall be borne by the contractor.

IT 29 BRAND NAMES

Specific reference in the specifications to any material by manufacturer's name, or catalogue shall be constructed as establishing a standard or quality and performance and not as limiting competition and the Tenderer in such cases, may at his option freely use only other product, provided that it ensures an equal or higher quality than the standard mentioned and meets Corporation approval.

IT 30 NON TRANSFERABLE

e-TENDER documents are not transferable.

IT 31 COST OF e-Tendering

The owner will not defray expense incurred by Tenderers in e - Tendering.

IT 32 EFFECT OF e-Tender

The e-Tender for the work shall remain for a period of 60 calendar days from the date of opening of the e-Tenders for this work and that the Tenderer shall not be allowed to withdraw or modify the offer in his own during the period. If any Tenderer withdraws or makes any modification or additions in the terms and conditions of his own e-Tender, then the Corporation shall, without prejudice to any other right or remedy, be at liberty to reject the e-Tender and forfeit the earnest money in full.

IT 33 CHANGE IN QUANTITY

The Corporation reserves the right to waive any information in any e-Tender and to reject one or all e-Tenders without assigning any reasons for such rejection and also to vary the quantities of items or group as specified in the scheduled of prices as may be necessary.

IT 34 NEW EQUIPMENT AND MATERIAL

All materials, equipment and spare parts thereof shall be new, unused and originally coming from manufacturer's plant to the Corporation. The rebuilt or overhauled equipment/materials will not be allowed to be used on works.

IT 35 RIGHTS RESERVED

The owner reserves the right to reject any or all e-Tenders, to waive any informality or irregularity in any e-Tender without assigning any reason. The owner further reserves the right to withhold issuance of the notice to proceed, even after execution of the contract agreement. No payment will be made to the successful Tenderer on account of such withholding. The owner is not obliged to give reasons for any such action.

IT 36 ADDITIONAL RIGHTS RESERVED

The Commissioner, Bhopal Smart City Development Corporation Limited reserves right to reduce the scope of work & split the e-Tender on two or more parts without assigning any reason even after the awards of contract

IT 37(a) MOBILIZATION ADVANCE

No mobilization advance or advance on machinery will be given.

IT 37(b) JOINT VENTURE

Joint Venture not allowed.

IT 38 CONDITIONAL e-Tenders

The scope of work is clearly mentioned in the e-Tender documents. The contractor shall have to carry out the work in accordance with the details specifications. No condition will be accepted. The conditional e-Tender will liable to be rejected.

IT 39 CESS & REGISTRATION:

For the welfare of labor working under construction Industry, the agency shall have to take the registration with competent authority as Bhopal Smart City Development Corporation Limited will deduct prevailing CESS of the value of work and will deposit the same in Government.

IT 40 ESI REGISTRATION:

The contractors who are liable to registered under ESI Act must possess ESI registration number at the time of filling of tender.

IT 41 PROFESSIONAL TAX

The bidder shall have to pay the Professional Tax for current financial year imposed by Government of Madhya Pradesh, and also the bidder shall have to produce Enrollment Certificate for the same.

IT 42 FILLING OF e-TENDER

The bidder shall have to fill all the details required in on-line bidding form of e-Tender. Incomplete OR inappropriate OR wrong information filled may cause the e-Tender to be rejected.

**City Engineer
B.S.C.D.C.L.**

Signature of Contractor

DECLARATION

I/We here by declared that I/We am/are not partner(s) black listed or connected with firm blacklisted in any States, CPWD/MES/Railways or any Government, Semi-Government or Private body.

At present I/We am/are registered as approved contractor(s), firms in _____ State, CPWD/MES/Railways.

We, the partners/owners of this firm, hereby give an undertaking that we are jointly and severally responsible to meet all the liabilities over and above the business of this firm and make good the above financial loss sustained by the Bhopal Smart City Development Corporation Limited as a result of our abandoning the works entrusted to us.

Date

**Seal and Signature of
the Bidder**

**APPLICABILITY OF PROVIDENT FUND AND MISCELLANEOUS
PROVISIONS ACT 1952**

Successful bidder i.e. the agency whose tender is accepted by the BSCDCL shall have to comply the necessary formalities under the employees provident fund and Miscellaneous Provisions Act,1952 as Contributory Provident Fund Scheme is applicable to laborers engaged in construction activity and shall have to submit proofs regarding deduction of provident fund and other dues and depositing the same with government department under the act and the scheme regularly on monthly basis failing which no running / final bill payment will be made by the BSCDCL to the contractor in any circumstances.

A certificate to the above effect has to be given by the contractor as under.

**Declaration
of
Depositing Provident Fund Contribution**

This to certify that we have deducted the employees' P.F. and deposited the same along with employer's contribution towards provident fund on labor charges/wages paid by us to the laborers engaged for the work of development of Four Lane with Cycle Track Corridor at Bhopal with Provident Fund Authority under our Provident Fund Code No. __

We produce herewith the copies of the challans for the provident fund deduction and contribution deposited as mentioned above.

Date:

Seal and Signature of the Bidder

BIDDER'S FINANCIAL CAPACITY

Sr. No.	Financial Year	Annual Turn over in Engineering Project Rs.	Net-worth Rs.	Net-Cash Rs.	Working Capital Rs.
1	2015-2016				
2	2014-2015				
3	2013-2014				

Note:-

- 1) Figures to be taken from audited balance sheets.
- 2) Duly certified attested true copy Copies of the balance sheet to be attached..
- 3) Cash Plan /Cash flow Statement.

AVAILABLE BID CAPACITY

	2013-14	2014-15	2015-16
Value of works Executed in Rs. Crores.			

The available bid capacity will be worked out as follows.

Available bid capacity= (AxNx2) – B, where

A =Maximum of updated total amount of work executed in any one year of the last three financial years.

B =The amount of the existing commitments and ongoing works to be discharge during time interval of N years from the bid due date.

N =Number of years prescribed for completion of the proposed works

:: GENERAL SPECIFICATION ::

(A) GENERAL

1. TENDER PRICE :

The rates quoted in the bill of quantities shall cover everything necessary for the due and complete execution of the work according to the drawings and other condition and stipulations of the contract including specifications of the evident, intend and meaning of all or either of them or according to customary usage and for periodical and final inspection and test and proof of the work in every respect and for measuring, numbering or weighing the same, including setting out and laying or fixing in position and the provision of all materials, power, tools, rammers, labour, tackle, platforms with impervious lapped joints for scaffolding, ranging roads, straight edged, cantering and boxing, wedges, moulds, templates, posts, straight rods, straight edged, cantering and boxing, wedges, moulds, templates, posts, straight rails, boning staves strutting, barriers, fencing lighting pumping apparatus, temporary arrangement for passage of traffic access to premises and continuance to drainage water supply and lighting (if interrupted by contractor's work) temporary sheds, painting, varnishing, polishing establishment for efficient supervision and stating arrangements for the efficient protective of life and property and all requisite plant and machinery of every kind.

The contractor shall keep every portion of the work clear of accumulation from time to time and shall leave every portion of the work clean, clear, perfect and at the conclusion of whole, providing at their own cost all such material implement, appliances and labor as the Engineer in charge may require to prove if it to be so.

2. COMPLETION SCHEDULE :

The contract period shall be **15 Months including rainy season** from the date of notice to proceed. The Contractor shall submit his completion schedule and the program of works together with this tender in conformity with completion schedule given in the documents.

3. GENERAL TECHNICAL GUIDELINE :

- 3.1** All the items occurring in the work and as found necessary during actual execution shall be carried out in the best workman like manner as per specifications and the written order of the Engineer in charge
- 3.2** Extra Claim in respect of extra work shall be allowed only if such work is ordered to be carried out in writing by the Engineer in charge
- 3.3** The contractor shall engage a qualified Engineer for the Execution of work who will remain present for all the time on site and will receive instructions and orders from the Engineer in charge or his authorized representative. The instruction and orders given to the contractor representative on site shall be considered as it given to the contractor himself.

- 3.4 The work order book as prescribed shall be maintained on the site of the work by the contactor and the contractor shall sign the orders given by the inspecting offers and shall carry out them properly.
- 3.5 Quantities specified in the tender may vary at the time of actual execution and the contractor shall have no claim for compensation on account of such variation
- 3.6 Unexcavated lengths shall be left wherever required and so directed by the Engineer in charge during the currency of the contract and shall be tackled. If required, before completion of work.
- 3.7 Diversion of road, if necessary, shall be provided and maintained during the currency of the contract by the contractor at his cost.
- 3.8 Figured Dimensions of drawing shall supersede measurements by scale, special dimensions or directions in the specifications shall supersede all other dimensions.
- 3.9 The contractor shall be responsible to take regular level on the approved alignment before actually starting the work The levels shall be commence to the G.T.S. levels and shall be got approved from the Engineer in charge
- 3.10 If the arrangement of temporary drainage is required to be made during any work of this Contract, this shall be made by the Contractor without claiming any extra cost.

Signature of contractor

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1. In the contract (as hereinafter defined) the following words and expressions shall, unless repugnant to the subject or context thereof, have the following means as signed to them.
 - 1.1 The "**Owner / Corporation**" shall mean Bhopal Smart City Development Corporation Limited and shall include its CEO BSCDCL or other Officers authorized by the Corporation and also include owner's successors and assignees.
 - 1.2 The "**Tenderer / Agency / Bidder**" shall mean the person or the persons, firm or Company who have submitted the tender in stipulated time frame as mentioned in tender.
 - 1.3 The "**Contractor / Successful Bidder**" shall mean the person or the persons, firm or Company whose tender has been accepted by the Owner and includes the Contractor's legal representative, his successors and permitted assignee.
 - 1.4 The "**Engineer-In-Charge**" shall mean the person designated as such by the owner from time to time and shall include those who are expressly authorized by the Corporation to act for and on its behalf for all functions pertaining to the operation of this contract.
 - 1.5 "**Engineer-In-Charge's Representative**" shall mean any resident Engineer or Assistant to the Engineer-In-Charge appointed from time to time by the owner to perform duties set forth in the Tender Document whose authority shall be notified in writing to the Contractor by the Engineer-In-Charge.
 - 1.6 "**Tender**" – the offer or proposal of the Tenderer submitted in the prescribed form setting for the prices for the work to be performed, and the details thereof.
 - 1.7 "**Contract Price**" shall mean total money payable to the Contractor under the contract.
 - 1.8 "**Addenda**" shall mean the written or graphic notices issued prior to submission of tender which modify or interpret the contract documents.
 - 1.9 "**Contract Time**" – the time specified for the completion of work.
 - 1.10 "**Contract**" shall mean agreement between the parties for the execution of works including therein all contract documents.
 - 1.11 "**Contract Document**" shall mean collectively the tender documents, designs, drawings, specifications, agreed variations, if any and such other documents constituting the tender and acceptance thereof.
 - 1.12 "**The Sub-Contractor**" shall mean any person, firm or company (other than the Contractor) to whom any part of the work has been entrusted by the Contractor with the written consent of the Engineer-In-Charge and the legal representative successors and permitted assignee of such person, firm or company.
 - 1.13 The "**Specifications**" shall mean all directions, the various Technical Specifications, provisions and requirements attached to the contract which pertain to the method and manner of performing the work, to the quantities and qualities of the work and the materials to be furnished under the contract for the work and any order(s) or instruction(s) there under. It shall also mean the latest Indian Standard Institute Specification relative to the particular work or part thereof, so far as they are not contrary to the Tender specifications and in

absence of any other Country applied in Indian as a matter of standard engineering practice and approved in writing by the Engineer-In-Charge with or without modification.

- 1.14 The "**Drawings**" shall include maps, plans, tracings, or prints thereof with any modification approved in writing by the Engineer-In-Charge and as such other drawings as may, from time to time, be furnished or approved in writing by the Engineer-In-Charge in connection with the work.
- 1.15 The "**Work**" shall mean the works to be executed in accordance with the contract or the part thereof as the case may be and shall include extra, additional, altered or substituted works as required for the purpose of the contract. It shall mean the totality of the work by expression or implication envisaged in the contract and shall include all materials, equipment and labour required for or relative or incidental to or in connection with the commencement, performance and completion of any work and / or incorporation in the work.
- 1.16 The "**Permanent Work**" shall mean works which will be incorporated in and form part of the work to be handed over to the owner by the Contractor on completion of the contract.
- 1.17 The "**Temporary Work**" shall mean all temporary works of every kind required in or about the execution, completion and maintenance of the work.
- 1.18 "**Site**" shall mean the land and other places, on, under, in or through which the permanent works are to be carried out and any other lands or places provided by the Corporation for the purpose of the contract together with any other places designated in the contract as forming part of the site.
- 1.19 The "**Construction Equipment**" shall mean all appliances / equipment of whatever nature required in or for execution, completion or maintenance of works or temporary works (as herein before defined) but does not include materials or other things intended to form or forming part of the permanent work.
- 1.20 "**Notice in writing or written Notice**" shall mean a notice written, typed or in printed form delivered personally or sent by Registered Post to the last known private or business address or Registered Office of the Contractor and shall be deemed to have been received in the ordinary course of post it would have been delivered.
- 1.21 The "**Alteration / variation order**" shall mean an order given in writing by the Engineer-In-Charge to effect additions or deletions from or alterations in the work.
- 1.22 "**Final Test Certificate**" shall mean the final test certificate issued by the owner within the provisions of the contract.
- 1.23 The "**Completion Certificate**" shall mean the certificate to be issued by the Engineer-In-Charge when the work has been completed and tested to his satisfaction.
- 1.24 The "**Final Certificate**" shall mean the final certificate issued by the Engineer-In-Charge after the period of defects liability is over and the work is finally accepted by the owner.
- 1.25 "**Defects Liability Period**" shall mean the specified period between the issue of Completion Certificate and the issue of final certificate during which the Contractor is responsible for rectifying all defects that may appear in the works.

- 1.26 **"Approved"** shall mean approved in writing including subsequent confirmation in writing of previous verbal approval and "Approval" means approved in writing including as aforesaid.
- 1.27 **"Letter of Acceptance"** shall mean an intimation by a letter to tenderer that his tender has been accepted in accordance with the provisions contained therein.
- 1.28 **"Order"** and **"Instructions"** shall respectively mean any written order or instruction given by the Engineer-In-Charge within the scope of his powers in terms of the contract.
- 1.29 **"Running Account Bill"** shall mean a bill for the payment of "On Account" money to the Contractor during the progress of work on the basis of work done and the supply of non-perishable materials to be incorporated in the work.
- 1.30 **"Security Deposit"** shall mean the deposit to be held by the owner as security for the due performance of the contractual obligations.
- 1.31 The **"Appointing Authority"** for the purpose of Arbitration shall be the Executive Director, Bhopal Smart City Development Corporation Limited.
- 1.32 **"Retention Money"** shall mean the money retained from R.A. Bills for the due completion of the "LET WORKS".
- 1.33 Unless otherwise specifically stated, the masculine gender shall include the feminine and neuter genders and vice-versa and the singular shall include the plural and vice-versa.

GC-02 LOCATION OF SITE AND ACCESSIBILITY :

The work is to be carried out in city limit. Non-availability of access roads shall in no case be the cause to condone delay in the execution of the work or be the cause for any claim or extra compensation.

GC-03 SCOPE OF WORK :

The scope of work is defined broadly in the special conditions of contract and specifications. The Contractor shall provide all necessary materials, equipment and labour etc. for the execution and maintenance of the work. All material that goes with the work shall be approved by the Engineer-In-Charge prior to procurement and use.

Power Supply :

The Contractor shall make his own arrangement for power supply.

Land for Contractor's Field Office, Godown Etc.:

Owner will not be in a position to provide land required for Contractor's field office, godown, etc. The Contractor shall have to make his own arrangement for the same.

GC-04 RULING LANGUAGE :

The language according to which the contract shall be construed and interpreted shall be English. All entries in the contract document and all correspondence between the contractor and the Corporation or the Engineer-In-Charge shall be in English. All dimensions for the materials shall be given in metric units only.

GC-05 INTERPRETATION OF CONTRACT DOCUMENT :

- 1) The provision of the General Conditions of Contract and Special Conditions of Contract shall prevail over those of any other documents of the contract unless specifically provided otherwise, should there be any discrepancy, inconsistency, error or omission in the several documents forming the contract, the matter may be referred to the Engineer-In-Charge for his instructions and decision. The Engineer-In-Charge's decision in such case shall be final and binding to the Contractor.
- 2) Works shown upon the drawings but not described in the specifications or described in the specifications without showing on the drawings shall be taken as described in the specifications and shown on the drawings.
- 3) The headings and the marginal notes to the clause of these General Conditions of Contract or to the specifications or to any other part of tender documents are solely for the purpose of giving a concise indication and not a summary of contents thereof. They shall never be deemed to be part thereof or be used in the interpretation or construction of the contract.
- 4) Unless otherwise states specifically, in this contract documents the singular shall include the plural and vice-versa wherever the context so requires. Works imparting persons shall include relevant Corporations / Body of individual / firm of partnership.

- 5) Notwithstanding the sub-division of the documents into separate section and volumes every part of each shall be supplementary to and complementary of every other part and shall be read with and into the context so far as it may be practicable to do so.
- 6) Where any portion of the General Conditions of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, then, unless a different intention appears, the provisions of the special conditions of contract shall be deemed to over ride the provisions of General Conditions of Contract to the extent of each repugnancy of variance.
- 7) The materials, design, and workmanship shall satisfy the relevant ISS, and codes referred to. If additional requirements are shown in the specifications, the same shall be satisfied over and above ISS and other codes.
- 8) If the specifications mention that the Contractor shall perform certain work or provide certain facilities, it shall mean that the Contractor shall do so at his own cost.

GC-06 CONTRACTOR TO UNDERSTAND HIMSELF FULLY :

The Contractor by tendering shall be deemed to have satisfied himself, as to all considerations and circumstances affecting the tender price, as to the possibility of executing the works as shown and described in the contract and to have fixed his prices according to his own view on these matters and to have understood that no additional allowances except as otherwise expressly provided, will afterwards be made beyond the contract price. The Contractor shall be responsible for any misunderstanding or incorrect information, however, obtained.

GC-07 ERRORS IN SUBMISSIONS :

The Contractor shall be responsible for any errors or omissions in the particulars supplied by him, whether such particulars have been approved by the Engineer-In-Charge or not.

GC-08 SUFFICIENCY OF TENDER :

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness of the tender rates which rates shall, except as otherwise provides for, cover all the Contractor's liabilities and obligations set forth or implied in the contract for the proper execution of the work for compliance with requirements of Article GC-19 thereof.

GC-09 DISCREPANCIES :

The drawings and specifications are to be considered as mutually explanatory of each other, detailed drawings being followed in preference to small-scale drawings and figured dimensions in preference to scale and special conditions in preference to General Conditions. The special directions or dimensions given in the specifications shall supersede all else. Should any discrepancies however, appear or should any misunderstanding arise as to the meaning and intent of the said specifications or drawings, or as to the dimensions or the quality of the materials or the due and proper execution of the works, or as to the measurement or quality and valuation of the work executed under this contract or as extra there upon, the same shall be explained by the Engineer-In-Charge and his explanation shall be subject to the final decision of BSCDCL in case reference be made to it, be binding upon the Contractor and the Contractor shall execute the work according to such explanation and without addition or to deduction from the contract price and shall also do all such works and things necessary for the proper completion of the works as implied by the drawings and specifications, even though such works and things are not specially shown and described in the said specifications. In cases where no particular specifications are given for any article to be used under the contract, the relevant specifications of the Indian Standard Institution shall apply.

GC-10 PERFORMANCE GUARANTEE (SECURITY DEPOSIT):

1. A sum of 10% of the accepted value of the tender shall be deposited by the tenderer (hereinafter called the contractor when tender is accepted) as security deposit with the owner for the faithful performance, completion and maintenance

of the works in accordance with the contract documents and to the satisfaction of the Engineer-In-Charge and assuring the payment of all obligations arising from the execution of the contract. This shall be deposited in one of the forms mentioned below :

- a. A Fixed Deposit Receipt of a Schedule Bank except Co-operative Bank or Nationalized Bank duly endorsed in favor of the "**BHOPAL SMART CITY DEVELOPMENT CORPORATION LIMITED**", Bhopal.
OR
 - b. The Contractor may pay 5% of the value of works as initial security deposit and the balance 5% shall be recovered in installments through deductions of each running account bill till the total security deposit amount is made up. However, if the value of the work as per actual execution exceeds the accepted value of tender because of allotment of further work, further recoveries towards security deposit shall be affected at 10% of the R.A. Bills to make up the Five percent security deposit of the revised value of contract. Alternatively, the contractor may at his option deposit the full amount of **ten (10) percent** of security deposit within ten days of receipt by him of the notification accepting the tender in the form as aforesaid.
2. If the Contractor, sub-contractor or their employees shall break, deface or destroy any property belonging to the owner or other agency during the execution of the contract, the same shall be made good by the contractor at his own expense and in default thereof, the Engineer-In-Charge may cause the same to be made good by other agencies and recover expense from the Contractor (for which the certificate of the Engineer-In-Charge shall be final). These expense can be recovered from the security deposit if recovery from other sources is not possible. The amount as reduced in security deposit will be made good by deduction from the next R A Bill of the Contractor.

GC-11 INSPECTION OF WORK :

1. The Engineer-In-Charge shall have full power and authority to inspect the work at any time wherever in progress either on the site or at the Contractor's or any other manufacturer's workshop or factories wherever situated and the Contractor shall afford to Engineer-In-Charge every facility and assistance to carry out such inspection, Contractor or his authorized representative shall, at all time during the usual working hours and all times when so notified, remain present to receive orders and instructions.
2. Orders given to Contractor's representative shall be considered to have the same force as if they had been given to the Contractor himself. Contractor shall give not less than ten (10) days notice in writing to the Engineer-In-Charge before covering up or otherwise placing beyond reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of the above, the same shall be uncovered at Contractor's expenses for carrying out such inspection or measurement.

3. No material shall be dispatched from Contractor's store on site of work before obtaining approval in writing of the Engineer-In-Charge. Contractor shall provide at all times during the progress of work and maintenance period of proper means of access with ladders, gangways, etc. and make necessary arrangement as directed for inspection or measurement of work by Engineer-In-Charge.

GC-12 DEFECT LIABILITY :

1. Contractor shall guarantee the work for a period of 3 year for all civil work & 5 year for all electrical works from the date of issue of Completion Certificate. Any damage or defect that may arise or that may remain undiscovered at the time of issue of Completion Certificate connected in any way with the equipment or materials supplied by him or in the workmanship shall be rectified or replaced by Contractor at his own expense as desired by Engineer-In-Charge or in default Engineer-In-Charge may cause the same to be made good by other agency and deduct expenses of which the certificate of Engineer-In-Charge shall be final from any sums that may then or any time thereafter become due to Contractor or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof.
2. From the commencement to completion of work Contractor shall take full responsibility for the care of the work including all temporary works and in case any damages, occur from any cause whatsoever he shall at his own cost, repair and make good the same so that on completion, work shall be in good order and in conformity, in every respect, with the requirements of contract and as per the instructions of the Engineer-In-Charge.
3. If at any time before the work is taken over, the Engineer-In-Charge shall -
 - a. Decide that any work done or materials used by the Contractor are defective or not in accordance with the contract or that work or any portion thereof is defective or do not fulfill the requirements of contract (all such materials being herein after called defects in this clause) he shall, as soon as reasonably practicably, give notice to Contractor in writing of the said defect specifying particulars of the same then Contractor shall at his own expense and with all speed make good the defects so specified.
 - b. In case Contractor fails to do so, owner may take, at the cost of the Contractor, such stops as may in all circumstances be responsible to make good such defects. The expenditure so incurred by owner will be recovered from the amount due to Contractor. The decision of Engineer-In-Charge with regard to the amount to be recovered from Contractor will be final and binding on the Contractor.
4. Performance Guarantee (Security Deposit) should be release
 - a. **Civil Works**
 - i. 5% after 18 months successfully completion from the date of issue of Completion Certificate.
 - ii. Remaining 5% after 36 months successfully completion from the date of issue of Completion Certificate.
 - b. **Electrical Works**

- iii. 5% after 30 months successfully completion from the date of issue of Completion Certificate.
- iv. Remaining 5% after 60 months successfully completion from the date of issue of Completion Certificate.

GC-13 POWER OF ENGINEER-IN-CHARGE TO GIVE FURTHER INSTRUCTIONS :

The Engineer-In-Charge shall have the power and authority from time to time and at all times to give further instructions and directions as may appear to him necessary or proper for the guidance of the Contractor and the works and efficient execution of the works according to the terms of the specifications, and the Contractor shall receive, execute, obey and be bound by the same, according to the true intent and meaning thereof, as fully and effectively as though the same had accompanied or had been mentioned or referred to in the specifications. No work which radically changes the original nature of the contract shall be ordered by the Engineer-In-Charge and in the event of any deviation being ordered, which in the opinion of the Contractor changes the original nature of the contract, he shall nevertheless carry it out and any disagreement as to the nature of the work and the rate to be paid to thereof shall be resolved.

The time of completion of works shall, in the event of any deviations being ordered resulting in additional cost or reduction in cost over the contract sum, be extended or reduced reasonably by the Engineer-In-Charge. The Engineer-In-Charge's decision in the case shall be final and binding.

GC-14 PROGRAM :

The time allowed for execution of works shall be the essence of the contract. The contract period shall commence from the date of notice of intimation to proceed. The tenderer at the time of submitting his tender shall indicate in the construction schedule his program of execution of work commencement with the total time specified. The Contractor shall provide the Engineer-In-Charge a detailed program of time schedule for execution of the works in accordance with the specifications and the completion date. The entire program to be finalized by the Contractor, has to conform to the execution period mentioned along with the Bill of Quantities in the tender documents. The Engineer-In-Charge upon scrutiny of such submitted program by Contractor, shall examine suitability of it to the requirement of contract and suggest modifications, if found necessary.

GC-15 SUB-LETTING OF WORK :

No part of the contract nor any share of interest thereon shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any person, firm or Corporation whosoever except as provided for in the succeeding sub-clause, without the consent in writing of the owner.

GC-16 SUB-CONTRACTS FOR TEMPORARY WORKS ETC. :

The owner may give written consent to sub-contractors for execution of any part of the works at the site, being entered upon the contractor provided each individual contract is submitted to the Engineer-In-Charge before being entered into and is approved by him. List of sub-contractors to be supplied.

Notwithstanding any subletting with such approval as aforesaid and notwithstanding the Engineer-In-Charge shall have received of any sub-contractors, the Contractor shall be and shall remain solely responsible for the quality and proper and expeditious execution of the works and the performance of all the conditions of contract in all respects as if such subletting or subcontracting had not taken place and as if such works had been done directly by the Contractor.

GC-17 TIME FOR COMPLETION :

1. The work covered under this contract shall be commenced from the date the Contractor is served with a notice to proceed with the work and shall be completed before the date as mentioned in the time schedule of work. The time is the essence of the contract and unless the same is extended as mentioned in Clause GC-18 "Extension of Time", the Contractor shall pay liquidated damages for the delay.
2. The general time schedule for construction is given in the tender document. Contractor shall prepare a detailed weekly or monthly construction program in consultation with the Engineer-In-Charge soon after the agreement and the work shall be strictly executed accordingly
3. The time for construction includes, the time required for testing, rectifications, if any, retesting and completion of the work in all respects to the entire satisfaction of the Engineer-In-Charge.

GC-18 EXTENSION OF TIME :

Time shall be considered as the essence of the contract. If, however, the failure of the Contractor to complete the work as per the stipulated dates referred to above arises from delays on the part of Corporation in supplying the materials or equipment, it has undertaken to supply under the contract or from delays on the quantity of work to be done under the contract, or force majeure an appropriate extension of time will be given by the Commissioner. The Contractor shall request for such extension within one month of the cause of such delay and in any case before expiry of the contract period.

GC-19 CONTRACT AGREEMENT :

The successful tenderer shall enter into and execute the contract agreement within 10 (ten) days of the notice of award, in the form shown in tender documents with such modifications as may be necessary in the opinion of the Corporation. It shall be incumbent on the Contractor to pay the stamp duty and the legal charges for the preparation of the contract agreement.

GC-20 LIQUIDATED DAMAGES :

If the Contractor fails to complete the work or designated part thereof within the stipulated completion date for the work or for the part, he shall pay liquidated

damages at 0.1 percent of contract value for each day of delay subject to maximum of 10% of the estimated amount put to tender or as decided by ED, BSCDCL.

The Contractor shall complete one-sixth quantum of work within one fourth period, four-tenth quantum of work within one-half period and eight-tenth quantum of work within three-fourth period, failing which, the Contractor shall be liable to pay liquidated damages an amount as specified above, or as decided ED, BSCDCL.

The amount of liquidated damages shall, however, be subjected to a maximum of 10 percent of the estimated amount put to tender. Delay in excess of one hundred days shall be a cause of termination of the contract and forfeiture of all security for performance.

GC-21 FORFEITURE OF SECURITY DEPOSIT :

Whenever any claim against the Contractor for the payment of a sum of money out of or under the contract arises, the Corporation shall be entitled to recover such sum by appropriating in part or whole, the security deposit of the Contractor. In case the security deposit is insufficient, the balance recoverable shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor. The Contractor shall pay to the owner on demand any balance remaining due.

GC-22 ACTION OF FORFEITURE OF SECURITY DEPOSIT :

In any case in which under any Clause or Clauses of the contract, the Contractor shall have forfeited the whole of his security deposit or have committed a breach of any of the terms contained in this contract, the owner shall have power to adopt any of the following courses as he may deem best suited to his interest.

- a. To rescind the contract (of which recession notice in writing to the contractor under the hand of the owner shall be conclusive evidence) in which case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the owner.
- b. To employ labour and to supply materials to carry out the balance work debiting Contractor with the cost of labour employed and the cost of materials supplied for which a certificate of the Engineer-In-Charge shall be final and conclusive against the Contractor and 10% of costs on above to cover all departmental charges and crediting him with the value of work done at the same rates as if it has been carried out by the Contractor under the terms of his contract. The certificate of Engineer-In-Charge as to the value of the work done shall be final and conclusive against the Contractor.
- c. To measure up the work of the contractor and to take such part thereof as shall be unexecuted out of his hand and give it to another Contractor to complete, the same. in this case the excess expenditure incurred than what would have been paid to the original Contractor, if the whole work had been executed by him, shall be borne and paid by the original Contractor and shall be deducted from any money due to him by the owner under the contract or otherwise and for the excess expenditure, the certificate of the Engineer-In-Charge shall be final and conclusive.
- d. In the event any of the above courses being adopted by the owner, the Contractor shall have no claims for compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any agreements or made any advance on account of or with a view to the execution of the work or the performance of the contract.
- e. In purchase the Contractor shall not be entitled to recover or be paid any sum for any work actually performed under this contract unless the Engineer-In-Charge will certify 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.
- f. In the event of the owner putting in force the powers as stated in a, b, c, above vested in him under the proceeding clause, he may, if he so desires, take

possession of all or any tools and plant, materials and stores in or upon the works or the site thereof belonging to the Contractor, or procured by him and intended to be used for the execution of the work or any part thereof paying or allowing for the same in account at the contract rates to be certified by the Engineer-In-Charge. The Engineer-In-Charge may give notice in writing to the Contractor or his representative requiring him to remove such tools, plant, materials or stores from the premises within the time specified in the notice and in the event of the Contractor failing to comply with any such notice, the Engineer-In-Charge may remove them at the Contractor's expenses or sell them by auction or private sale on account of the Contractor and his risks in all respects without any further notice as to the date, time or place of the sale and the certificate of Engineer-In-Charge as to the expense of any such removal and the amount of the proceeds and the expenses of any such sale shall be final and conclusive against the Contractor.

GC-23 COMPENSATION FOR ALTERATION IN OR RESTRICTION IN WORK :

If at any time from the commencement of the work, the owner shall for any reasons whatsoever not require the whole work or part 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 or 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 full amount of the work not having been carried out. He also shall not have any claim for compensation by reasons of any alterations having been made in original specifications, drawings, designs and instructions which shall involve any curtailment of the work as originally contemplated.

When the Contractor is a partnership firm, the prior approval in writing of the owner 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 or business concern, such approval as aforesaid shall, likewise be obtained before Contractor enters into an agreement with other parties where under, the reconstituted firm would have the right to carry out the work hereby undertaken by the Contractor. In either case, if prior approval as aforesaid is not obtained, the contract shall be deemed to have been allotted contravention of subletting clause hereof and the same action may be taken and the same consequence shall ensure as provided in the subletting clause.

GC-24 IN THE EVENT OF DEATH OF THE CONTRACTOR :

Without prejudice to any of the rights or remedies under the contract, if the Contractor dies, the owner shall have the option of terminating the contract without compensation to the Contractor.

GC-25 MEMBERS OF THE OWNER NOT INDIVIDUALLY LIABLE :

No official or employee of the owner shall in any way be personally bound or liable for the acts or obligation of the owner under the contract, or answerable for any

default or omission in the observance or performance of any acts, matters or things, which are herein, contained.

GC-26 OWNER NOT BOUND BY PERSONAL REPRESENTATIONS :

The Contractor shall not be entitled to any increase on the schedule of rates or any other rights or claims whatsoever by reason of representation, promise or guarantees given or alleged to have been given to him by any person.

GC-27 CONTRACTOR'S OFFICE AT SITE :

The Contractor shall provide and maintain an office at the site for the accommodation of his agent and staff and such office shall remain open at all reasonable hours to receive information, notices or other communications.

GC-28 CONTRACTOR'S SUBORDINATE STAFF AND THEIR CONDUCT :

1. The Contractor on award of the work shall name and depute a qualified Engineer having experience of carrying out work of similar nature, whom equipment's, materials, if any, shall be issued and instructions for work given. the Contractor shall also provide to the satisfaction of Engineer-In-Charge sufficient and qualified staff, competent sub-agents, foreman and loading hands including those specially qualified by previous experience to supervise the type of works comprised in the contract in such manner as will ensure work of the best quality and expeditious working. If the contractor required sub contract, sub-contractor fulfill all technical qualification and pre approval from BSCDCL, and proper agreement contract between contractor and subcontractor, but work are not sublet more than 20% (Except external Electrification Work). If, in the opinion of the Engineer-In-Charge additional properly qualified supervision staff is considered necessary, it shall be employed by the Contractor, without additional charge on account thereof. The Contractor shall ensure to the satisfaction of the Engineer-In-Charge that sub-contractors, if any, shall provide competent and efficient supervision over the work entrusted to them.
2. If and whenever any of the Contractor's or sub-contractor's agents, sub-agents, assistants, foreman or other employees shall, in the opinion of the Engineer-In-Charge, be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance of their duties or that in the opinion of the owner or Engineer-In-Charge, it is undesirable for administrative or any other reason for person or persons to be employed in the works, the Contractor if so directed by the Engineer-In-Charge, shall at once remove such person or persons from employment thereon. Any person or persons so removed shall not again be re-employed in connection with the works without the written permission of the Engineer-In-Charge. Any person, so removed from the works shall be immediately replaced at the expense of the Contractor by a qualified and competent substitute. Should the Contractor be required to repatriate any person removed from the works he shall do so after approval of Engineer-In-Charge and shall bear all costs in connection therewith.
3. The Contractor shall be responsible for the proper behavior of all the staff, foreman, workmen and others and shall exercise proper control over them and in particular and without prejudice to the said generality, the Contractor shall be bound to

prohibit and prevent any employee from trespassing or acting in any way detrimental or prejudicial to the interest of the community or of the properties or occupiers of land and properties in the neighborhood and in the event of such employees so trespassing, the Contractor shall be responsible therefore and relieve the owner of all consequent claims, actions for damages or injury or any other ground whatsoever. The decision of the Engineer-In-Charge upon any matter arising under this claim shall be final.

4. If and when required by the owner, the Contractor's personnel entering upon the owner's premises shall be properly identified by badges of a type acceptable to the owner which must be worn at all times on owner's premises.

GC-29 TERMINATION OF SUB-CONTRACT BY OWNER :

If any sub-contractor engaged upon the works at the site execute any work which in the opinion of Engineer-In-Charge is not accordance with the contract documents, the owner may by written notice to the Contractor request him to terminate such sub-contract and the Contractor upon the receipt of such notice shall terminate such sub-contracts and the latter shall forthwith leave the works, failing which, the owner shall have the right to remove such sub-contractors from the site.

No action taken by the owner under the above clause shall relieve the Contractor of his liabilities under the contract or give rise to any right to compensation, extension of time or otherwise.

GC-30 POWER OF ENTRY :

If the Contractor shall not commence the work in the manner previously described in the contract documents or if he shall at any time, in the opinion of Engineer-In-Charge –

- i. Fail to carry out works in conformity with the contract documents, or
- ii. Fail to carry out the works in accordance with the time schedule, or
- iii. Substantially suspend work or the works for a period of seven days without authority from Engineer-In-Charge, or
- iv. Fail to carry out and execute the work to the satisfaction of the Engineer-In-Charge, or
- v. Fail to supply sufficient or suitable construction plant, temporary works, labour, materials or things, or
- vi. Commit breach of any other provisions of the contract on his part to be performed or observed or persists in any of the above mentioned breaches of the contract for seven days after notice in writing shall have been given to the Contractor by the Engineer-In-Charge requiring such breach to be remedied, or
- vii. Abandon the work, or
- viii. During the continuance of the contract becomes bankrupt, make any arrangement or compromise with his creditors, or permit any execution to be levied or go into liquidation whether compulsory or voluntary not being merely a voluntary liquidation for the purpose of amalgamation or reconstruction then in any such case.

The owner shall have the power to enter upon the works and take possession thereof and of the materials, temporary works, constructional plant and stores therein and to revoke the Contractor's license to use the same and to complete the works by his agents, other Contractor or workmen, to relate the same upon any terms to such other person firm or Corporation as the owner in his absolute discretion may think proper to employ, and for the purpose aforesaid to use or authorize the use of any materials, temporary works, constructional plant, and stores as aforesaid with making payments or allowance to the Contractor for the said materials other than such as may be certified in writing by the Engineer-In-Charge to be reasonable and without making any payment or allowance to the Contractor for the use of said temporary works, constructional plant and stock or being liable for loss or damage thereto. If the owner shall be reason of his taking possession of the works or of the work being got completed by other Contractor incurred excess expenditure be deducted from any money which may be due for the work done by the Contractor under the contract and not paid for. Any deficiency shall forthwith be made good and paid to the owner by the Contractor and the owner shall have power to sell in such manner and for such price as he may think fit all or any of the constructional plant, materials etc., consist constructed by or belonging to and to recoup and retain the said deficiency or any part thereof out of the proceeds of the sale.

GC-31 CONTRACTOR'S RESPONSIBILITY WITH THE OTHER CONTRACTOR AND AGENCIES :

Without repugnance to any other conditions, it shall be the responsibility of the Contractor executing the work, to work in close co-operation and co-ordination with other Contractors or their authorized representatives and the Contractor will put a joint scheme with the concurrence of other contractors or their authorized representatives showing the arrangements for carrying his portion of the work to the Engineer-In-Charge and get the approval. The Engineer-In-Charge before approving the joint scheme will call the parties concerned and modify the scheme if required. No claim will be entertained on account of the above. The Contractor shall conform in all respects with the provisions of any statutory regulations, ordinances or bylaws of any local or duly constituted authorities or public bodies which may be applicable from time to time to works or any temporary works. The Contractor s shall keep the owner indemnified against all penalties and liabilities of every kind arising out of non-adherence to such statutes, ordinance, laws, rules, regulations etc.

GC-32 OTHER AGENCIES AT SITE :

The Contractor shall have to execute the work in such place and condition where other agencies will also be engaged for other works, such as site grading, filling and leveling, electrical and mechanical engineering works etc. No claim shall be entertained for works being executed in the above circumstances.

GC-33 NOTICES :

Any notice under this contract may be served on the Contractor or his duly authorized representative at the job site or may be served by Registered Post direct

to the official address of the Contractor. Proof of issue of any such notice could be conclusive of the Contractor having been duly informed of all contents therein.

GC-34 RIGHTS OF VARIOUS INTERESTS :

The owner reserves the right to distribute the work between more than one Contractors. All Contractors shall co-operate and afford reasonable opportunity to other Contractor s for access to the works, for the carriage and storage of materials and execution of their works. Whenever the work being done by department of the owner or by other Contractor employed by the owner is contingent upon work covered by this contract, the respective rights of the various interests shall be determined by the Engineer-In-Charge to secure the completion of various portions of the work in general harmony.

GC-35 PRICE ADJUSTMENTS & ESCALATION:

No adjustment in price shall be allowed and no price escalation will be allowed within 18 months from issue work order/date of agreement, after 18 months price escalation will be allowed if time extensions without penalty issue by BSCDCL.

GC-36 TERMS OF PAYMENT :

The payment of bills shall be made progressively according to the rules and practices followed by the Corporation. The progressive payment unless otherwise provided in the contract agreement or subsequently agreed to by the parties shall be made generally monthly on submission of a bill by the Contractor in prescribed form of an amount according to the value of the work performed less the price of materials supplied by owner aggregate of previous progressive payments and as required by Clause GC-37 (Retention of Money) herein. All such progressive payments shall be regarded as payments by way of advance against final payment. Payment for the work done by the Contractor will be based on the measurement at various stages of the work, in accordance with the condition at clause GC-81 (measurement of work in progress).

GC-37 RETENTION MONEY :

- v. Pursuance to clause GC-36 (Terms of Payment) on at money due to the Contractor for work done, Corporation will retain five (5) percent of the gross R.A. Bill amount as retention amount as mentioned in Clause GC-82 (Running account payments) and same will be paid with the final bill.

GC-38 PAYMENTS DUE FROM THE CONTRACTOR :

All costs, damages or expenses, for which under the contract, Contractor is liable to the Corporation, may be deducted by the Corporation from any money due or becoming due to the Contractor under the contract or from any other contract with the Corporation or may be recovered by action at law or otherwise from the Contractor.

GC-39 CONTINGENT FEE :

- i. The Contractor warrants that he has not employed a person to solicit or secure the contract upon any agreement for a commission, percentage, and brokerage contingent fee. Breach of this warranty shall give the Corporation the right to cancel the contract or to take any drastic measure as the Corporation may deem fit. The warranty does not apply to commissions' payable by the Contractor to establish commercial or selling agent for the purpose of securing business.
- ii. No officer, employer or agent of the Corporation shall be admitted to any share or part of this contract or to any benefit that may rise there from.

GC-40 BREACH OF CONTRACT BY CONTRACTOR :

If the Contractor fails to perform the work under the contract with due diligence or shall refuse or neglect to comply with instructions given to him in writing by the Engineer-In-Charge in accordance with the contract, or shall contravene the provisions of the contract, the Corporation may give notice in writing to the Contractor to make good such failure, neglect, or contravention. Should the Contractor fail to comply with such written notice within 10 (Ten) days of receipt, it shall be lawful for the Corporation, without prejudice to any other rights the Corporation may have under the contract, to terminate the contract for all or part of the works, and make any other arrangements it shall deem necessary to complete the work outstanding under the contract at the time of termination. In this event, the performance Bond shall immediately become due and payable to the Corporation. The value of the work done on the date of termination and not paid for shall be kept as deposit for adjustment of excess expenditure incurred in getting the remaining work completed and the Corporation shall have free use of any works which the Contractor may have at the site at the time of termination of the contract.

GC-41 DEFAULT OF CONTRACTOR :

- i. The Corporation may upon written notice of default to the Contractor terminate the contract circumstances detailed as under :
 - a. If in the opinion of the Corporation, the Contractor fails to make completion of works within the time specified in the completion schedule or within the period for which extension has been granted by the Corporation to the Contractor.
 - b. If in the opinion of the Corporation, the Contractor fails to comply with any of the other provisions of this contract.
- ii. In the event, the Corporation terminates the contract in whole or in part as provided in Article GC-50 (Termination of the Contract) the Corporation reserves the right to purchase upon such terms and in such manner as it may be deemed appropriate, plant similar to one which is not supplied by the Contractor and the Contractor will be liable to the Corporation for any additional costs for such similar plant and / or for liquidated damages for delay until such time as may be required for the final completion of works.
- iii. If this contract is terminated as provided in this paragraph GC-30 (Power of Entry) (1) the Corporation in addition to any other rights provided in this clause, may require the Contractor to transfer title and deliver to the Corporation.

- a. Any completed works
 - b. Such partially completed information and contract rights as the Contractor has specifically produced or acquired for the performance of the contract so terminated.
- iv. In the event, the Corporation does not terminate the contract as provided in the paragraph GC-50 (Termination of Contract) the Contractor shall continue performance of the contract, in which case, he shall be liable to the Corporation for liquidated damages for delay until the works are completed and accepted.

GC-42 BANKRUPTCY :

If the Contractor shall become bankrupt or insolvent or has a receiving order made against him, or compound with his creditors, or being the Corporation commence to be wound up not being a member voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a receiver for the benefit of his creditors or any of them, the Corporation shall be at liberty to either (a) terminate the contract forthwith by giving notice in writing to the Contractor or to the receiver or liquidator or to any person or Organization in whom the contract may become vested and to act in the manner provided in Article GC-41 (Default of Contractor) as though the last mentioned notice had been the notice referred to in such article or (b) to give such receiver, liquidator or other persons in whom the contract may become vested the option of carrying out the contract subject to his providing a satisfactory guarantee for the due and faithful, performance of the contract up to an amount to be agreed. In the event that the Corporation terminates the contract in accordance with this article, the performance bond shall immediately become due and payable on demand to Corporation.

GC-43 OWNERSHIP :

Works hand over pursuant to the contract shall become the property of the BSCDCL from whichever is the earlier of the following times, namely;

- a. When the works are completed pursuant to the contract.
- b. When the contractor has been paid any sum to which he may become entitled in respect thereof pursuant to Clause GC-36 (Terms of Payment).

GC-44 DECLARATION AGAINST WAIVER :

The condemnation by the Corporation of any breach or breaches by the Contractor or an authorized sub-contractor of any of the stipulations and conditions contained in the contract, shall in no way prejudice or affect or be construed as a waiver of the Corporation's rights, powers and remedies under the contract in respect of any breach or breaches.

GC-45 LAWS GOVERNING THE CONTRACT :

This contract shall be construed according to and subject to the laws of India and the State of Madhya Pradesh and under the jurisdiction of the Courts of Madhya Pradesh at Bhopal.

GC-46 OVER PAYMENT AND UNDER PAYMENT :

Whenever any claim for the payment of a sum to the Corporation arises out of or under this contract against the Contractor, the same may be deducted by the Corporation from any sum then due or which at any time thereafter may become due to the Contractor under this contract and failing that under any other contract with the Corporation (which may be available with the Corporation), or from his retention money or he shall pay the claim on demand. The Corporation reserves the right to carry out post payment audit and technical examinations of the final bill including all supporting vouchers, abstracts etc. The Corporation further reserves the right to enforce recovery of any payment when detected, notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before an Arbitrator, appointed under Article GC-49 (Arbitration) of this contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award. If as a result of such audit and technical examinations any over payment is discovered in respect of any work done by the Contractor or alleged to have been done by him under the contract, it shall be recovered by the Corporation from the Contractor as prescribed above. If any under payment is discovered by the Corporation, the amount due to the Contractor under this contract, may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the Contractor.

GC-47 SETTLEMENT OF DISPUTES :

Except as otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the Engineer-In-Charge subject to a written appeal by the Contractor to the Engineer-In-Charge and those decisions shall be final and binding on the parties hereto. Any disputes or differences including those considered as such by only one of the parties arising out of or in connection with this contract shall be to the extent possible settled amicably between the parties. If amicable settlement cannot be reached then all disputed issues shall be settled as provided in Article GC-48 (Disputes or differences to be referred to) and Article No.GC-49 (Arbitration).

GC-48 DISPUTES OF DIFFERENCES TO BE REFERRED TO :

If at any time, any question, disputes or differences of any kind whatsoever shall arise between the Engineer-In-Charge and the contractor upon or in relation to or in connection with this contract either party may forthwith give to the other, notice in writing of the existence of such question, dispute or difference as to any decision, opinion, instruction, direction, certificate or evaluation of the Engineer-In-Charge. The question, dispute or differences shall be settled by the Executive Director, Bhopal Smart City Development Corporation Limited, who shall state his decision in writing and give notice of same to the Engineer-In-Charge and to the Contractor. Such decision shall be final and binding upon both parties. The contract and work on contract if not already breached or abandoned shall proceed normally unless and until the same shall be revised (or uphold) by any arbitration proceedings as hereinafter provided. Such decisions shall be final and binding on the Engineer-In-Charge and the Contractor unless the Contractor shall require the matter to be referred to an Arbitration panel as hereinafter provided.

GC-49 ARBITRATION :

In case of any dispute arising during the course of execution, the matter should be referred to Executive Director, BSCDCL who will be sole Arbitrator whose decisions will be final and binding to the Contractor. The jurisdiction of the Court for dispute, if any, shall be Bhopal City.

GC-50 TERMINATION OF THE CONTRACT :

- i. If the Contractor finds it impracticable to continue operation owing to force majeure reasons or for any reasons beyond his control and/or the Corporation find it impossible to continue operation, then prompt notification in writing shall be given by the party affected to the other.
- ii. If the delay or difficulties so caused cannot be expected to cease or become unavoidable or if operations cannot be resumed within two (2) months then either party shall have the right to terminate the contract upon ten (10) days written notice to the other. In the event of such termination of the contract, payment to the Contractor will be made as follows :
 - a. The Contractor shall be paid for all works approved by the Engineer-In-Charge and for any other legitimate expenses due to him.
 - b. If the Corporation terminates the contract owing to Force Majeure or due to any cause beyond its control, the Contractor shall additionally be paid for any work done during the said two (2) months period including any financial commitment made for the proper performance of the contract and which are not reasonably defrayed by payments under (a) above.
 - c. The Corporation shall also release all bonds and guarantees at its disposal except in cases where the total amount of payment made to the Contractor exceeds the final amount due to him in which case the Contractor shall refund the excess amount within thirty (30) days after the termination and the Corporation thereafter shall release all bonds and guarantees. Should the Contractor fail to refund the amounts received in excess within the said period such amounts shall be deducted from the bonds or guarantees provided.
- iii. On termination of the contract for any cause the Contractor shall see the orderly suspension and termination of operations, with due consideration to the interests of the Corporation with respect to completion safeguarding of storing materials procured for the performance of the contract and the salvage and resale thereof.

GC-51 SPECIAL RISKS :

If during the contract, there shall be an outbreak of war (whether war is declared or not), major epidemic, earthquake or similar occurrence in any part of the world beyond the control of either party to the contract which financially or otherwise materially affects the execution of the contract, the Contractor shall unless and until, the contract is terminated under the provisions of this article use his best endeavors to complete the execution of the contract, provided always that the Corporation shall be entitled at any time after the onset of such special risks, to terminate the contract by giving written notice to the contractor and upon such

notice being given this contract shall terminate but without prejudice to the rights of either party in respect of any antecedent breach thereof.

The Contractor shall not be liable for payment of compensation for delay or for failure to perform the contract for reasons of Force Majeure such as acts of public enemy, acts of Government, fires, floods, cyclones, epidemics, quarantine restrictions, lockouts, strikes, freight embargoes and provided that the Contractor shall within 10 (ten) days from the beginning of such delay notify the Engineer-In-Charge in writing, of the cause of delay, the Corporation shall verify the facts and grant such extension as the facts justify.

GC-52 CHANGE IN CONSTITUTION :

Where the Contractor is a partnership firm, the prior approval in writing of the owner shall be obtained before any change is made in the constitution of the firm. Where the Contractor is an individual or 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 of contract.

GC-53 SUB-CONTRACTUAL RELATIONS :

All works performed for the contract by a sub-contractor shall be pursuant to an appropriate agreement between the Contractor and the sub-contractor, which shall contain provision to –

- a. Protect and preserve the rights of the Corporation and the Engineer-In-Charge with respect to the works to be performed under the sub-contracting party will not prejudice such rights.
- b. Require that such work be performed in accordance with the requirements of contract documents.
- c. Require under such contract to which the contractor is a party, the submission to the Contractor of application for payment and claims for additional costs, extension of time, damages for delay or otherwise with respect to the sub-contracted portions of the work in sufficient time, that the Contractor may apply for payment comply in accordance with the contract documents for like claims by the Contractor upon the Corporation.
- d. Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance except such rights as they may have to the proceeds of such insurance held by the Corporation as trustee and,
- e. Obligate each sub-contractor specifically to consent to the provisions of this Article.

GC-54 PATENTS AND ROYALTIES :

- i. Contractor, if licensed under any patent covering equipment, machinery, materials or composition of matter to be used or supplied or methods and process to be practiced or employed in the performance of this contract agrees to pay all royalties and license fees, which may be due with respect thereto. If any equipment, machinery, materials, composition matters, to be used or supplied or methods practiced or employed in the performance of this contract, is covered by a patent under which Contractor is not licensed, then the Contractor before supplying / using the equipment, machinery, materials, compositions, methods of process shall obtain such license and pay such royalties and license fees as may be necessary for performance of this contract. In the event Contractor fails to pay such royalty or to obtain any such license, any suit for infringement of such patents which is brought against the Contractor or the owner as a result of such failure will be defended by the Contractor at his own expenses and the Contractor will pay any damages and costs awarded in such suit. The Contractor shall promptly notify the owner if the Contractor has acquired knowledge of any plant under which a suit for infringement could be reasonably brought because of the use by the owner of any equipment machinery, materials, process methods to be supplied in hereunder. Contractor agrees to and does hereby grant to owner together with the right to extend the same to any of the subsidiaries of the owner an irrevocable royalty fee license to use in any Country, any invention made by the Contractor or his employees in or as a result of the performance of work under contract.
- ii. With respect to any sub-contract entered into by Contractor pursuant to the provisions of the relevant clause hereof, the Contractor shall obtain from the sub-contractor an understanding to provide the owner with the same patent protection that contracts is required to provide under the provisions of the clause.
- iii. The Contractor shall indemnify and save harmless the owner from any loss on account of claims against owner for the contributory infringement of patent rights arising out of and based upon the claim that the use by the Corporation of the process included in the design prepared by the Contractor and used in the operation of the plant infringes on any patent rights.

GC-55 LIEN :

If, at any time, there should be evidence of any lien or claim for which owner might have become liable and which is chargeable to the Contractor, the owner shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify the owner against such lien or claim or if such lien or claim be valid the owner may pay and discharge the same and deduct the amount as paid from any money which may be due or become due and payable to the Contractor. If any lien or claims remaining unsettled after all payments are made, the Contractor shall refund or pay to the owner all money that the latter may be compelled to pay in discharging such lien or claim including all costs and reasonable expenses.

GC-56 EXECUTION OF WORK :

The whole work shall be carried out in strict conformity with the provisions of the contract document, detailed drawings, specifications and the instructions of the Engineer-In-Charge from time to time. The Contractor shall ensure that the whole

work is executed in the most substantial, and proper manner with best workmanship using materials of best quality in strict accordance with the specifications to the entire satisfaction of the Engineer-In-Charge.

GC-57WORK IN MONSOON :

The work largely related to paints work and hence it is not desirable to work during monsoon, however, when the work continues in monsoon, the Contractor shall maintain minimum labour force required for the work and plan and execute the construction and erection work according to the prescribed schedule. No extra rate will be considered for such work in monsoon. During monsoon and entire construction period, the Contractor shall keep the site free from water at his own cost.

GC-58WORK ON SUNDAYS AND HOLIDAYS :

No work except curing shall be carried out on Sunday and holidays. However, if the exigencies of the work need continuation of work on Sundays and Holidays, written permission of the Engineer-In-Charge shall be obtained in advance.

GC-59GENERAL CONDITIONS FOR CONSTRUCTION WORK :

Working hours shall be eight every day. The over time work in two shifts could be carried out with the written permission of the Engineer-In-Charge but no compensation shall be paid for the same. The rate quoted shall include this. The Contractor shall plan his work in such a way that his laborers do not remain idle. The owner will not be responsible for idle labour of the Contractor. The Contractor shall submit to the owner progress report every week. The details and proforma of the report will be as per mutual agreement.

GC-60DRAWINGS TO BE SUPPLIED BY THE OWNER :

The drawings attached with the tender documents shall be for general guidance of the Contractor to enable him to visualize the type of work contemplated and scope of work involved. Detail working drawings according to which the work is to be done shall be prepared by the Contractor for executing the work.

GC-61DRAWINGS TO BE SUPPLIED BY THE CONTRACTOR:

Where drawings, data are to be furnished by the Contractor they shall be as enumerated in special conditions of contract and shall be furnished within the specified time. Where approval of drawings has been specified it shall be Contractor's responsibility to have these drawings got approved before any work is taken up with regard to the same. Any changes becoming necessary in those drawings during the execution of the work shall have to be carried out by the Contractor at no extra cost. All final drawings shall bear the certification stamp as indicated below duly signed by both the Contractor and Engineer-In-Charge.

Certified true forProject Agreement No.....

Signed

Contractor

Engineer-In-Charge

Drawings will be approved within three (3) weeks of the receipt of the same by the Engineer-In-Charge.

GC-62 SETTING OUT WORK :

The Contractor shall set out the work on the site handed over by the Engineer-In-Charge and shall be responsible for the correctness of the same. The work shall be carried out to the entire satisfaction of Engineer-In-Charge. The approval thereof or partaking by Engineer-In-Charge or setting out work shall not relieve Contractor of any of his responsibilities. The Contractor shall provide at his own cost all necessary level posts, pegs, bamboos, flags, ranging rods, strings and other materials and labourers required for proper setting out of the work. The Contractor shall provide fix and be responsible for the maintenance of all stakes, templates, level markets, profiles and similar other things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequences for such removal or disturbance. The Contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, and distance marks and centerline marks either existing or face lines or cross lines shall be marked by small masonry pillars. Each pillar shall have distance mark at the center for setting up the theodolite. The work shall not be started unless the setting out is choked and approved by Engineer-In-Charge in writing but such approval shall not relieve the Contractor of his responsibilities about the correctness of setting out. The Contractor shall provide all materials, labour and other facilities necessary for checking at his own cost. Pillars bearing geodetic marks on site shall be protected by the Contractor. On completion of the work, the Contractor shall submit the geodetic documents according to which the work has been carried out.

GC-63 RESPONSIBILITIES OF CONTRACTOR FOR CORRECTNESS OF THE WORK :

The Contractor shall be entirely and exclusively responsible for the correctness of every part of the work and shall rectify completely any errors therein at his own cost when so instructed by Engineer-In-Charge. If any error has crept in the work due to non-observance of this clause, the Contractor will be responsible for the error and bear the cost of corrective work.

1. **Materials to be supplied by the Contractor:** Contractor shall procure and provide all the material required for the execution and maintenance of work including M S rods; all tools, tackles, construction plant and equipment except, the materials to be supplied by the owner detailed in the contract documents. Owner, shall make recommendations for procurement of materials to the respective authorities if desired by the Contractor but assumes no responsibility of any nature. Owner shall insist for procurement of materials with ISI marks supplied by reputed firms of the DGS & D list.
2. If however, the Engineer-In-Charge feels that the work is likely to be delayed due to Contractor's inability to procure materials, the Engineer-In-Charge shall have the right to procure materials, from the market and the Contractor will accept these materials at the rates decided by Engineer-In-Charge.

GC-64 MATERIALS TO BE SUPPLIED BY THE OWNER :

1. If the contract provided certain materials or stores to be supplied by the owner, such materials and stores transported by the Contractor at his cost from owner's stores or Railway Station. The cost from Contractor for the value of materials supplied by the owner will be recovered from the R.A. Bill on the basis of actual consumption of materials in the work covered and for which R A Bill has been prepared. After completion of the work, the Contractor has to account for the full quantity of materials supplied to him.
2. The value of store materials supplied by owner to the Contractor shall be charged at rates shown in the contract document and in case any other material not listed in the schedule of materials is supplied by the owner, the same shall be charged at cost price including carting and other expenses incurred in procuring the same. All materials so supplied shall remain the property of the owner and shall not be removed from the site on any account. Any material remaining unused at the time of completion of work or termination of contracts shall be returned to owner's store or any other place as directed by the Engineer-In-Charge in perfectly good condition at Contractor's cost. When materials are supplied free of cost for use in work and surplus and unaccounted balance thereof are not returned to the owner, recovery in respect of such balance will be effected at double the applicable issue rate of the material or the market rates whichever is higher.

GC-65 CONDITIONS OF ISSUE OF MATERIALS BY THE OWNER:

The materials specified to be issued by the owner to the Contractor shall be issue by the owner at his store and all expenses for it carting site shall be borne by the Contractor will be issued during working hours and as per rules of owner from time to time.

Contractor shall bear all expenses for storage and safe custody at site of materials issued to him before use in work.

Material shall be issued by the owner in standard / non-standard sizes as obtained from manufacturer.

Contractor shall construct suitable godowns at site for storing the materials to protect the same from damage due to rain, dampness, fire, theft etc.

The Contractor should take the delivery of the materials issued by the owner after satisfying himself that they are in good condition. Once the materials are issued, it will be the responsibility of the Contractor to keep them in good condition and in safe custody. If the materials get damaged or if they are stolen, it shall be the responsibility of the Contractor to replace them at his cost according to the instructions of the Engineer-In-Charge.

For delay in supply or for non-supply of materials to be supplied by the owner, on account of natural calamities, act of enemies, other difficulties beyond the control of

the owner, the owner carries no responsibilities. In no case the Contractor shall be entitled to claim any compensation for loss suffered by him on this account.

None of the materials issued to the contractor, shall be used by the Contractor for manufacturing items which can be obtained from the manufacturer's. The materials issued by the owner shall be used for the work only and no other purpose.

Contractor shall be required to execute indemnity bond in the prescribed form for the safe custody and account of materials issued by the owner.

Contractor shall furnish sufficiently in advance a statement of his requirements of quantities of materials to be supplied by the owner and the time when the same will be required for the work, so as to enable Engineer-In-Charge to make arrangements to procure and supply the materials.

A daily account of materials issued by the owner shall be maintained by the contractor showing receipt, consumption and balance on hand in the form laid down by Engineer-In-Charge with all connected paper and shall be always available for inspection in the site office.

Contractor shall see that only the required quantities of materials are got issued and no more. The Contractor shall be responsible to return the surplus materials at owner's store at his own cost.

GC-66 MATERIALS PROCURED WITH ASSISTANCE OF THE OWNER :

Notwithstanding anything contained to the contrary in any of the clauses of this contract, where any materials for the execution of the contract are procured with the assistance of the owner either by issue from owner's stock or purchase made under orders or permits or licenses issued materials as trustees for owner, and use such materials not disposed them off without the permission of owner and unserviceable materials that may be left with him after completion of the contract or at its termination for any reason whatsoever on his being paid or credited such price as Engineer-In-Charge shall determine having due regard to the conditions of the materials. The price allowed to Contractor shall not exceed the amount charged to him excluding the storage of breach of the aforesaid condition, the Contractor shall in terms of license or permits and/or for criminal breach of trust be liable to compensate owner at double the rate or any higher rates. In the event of these materials at that time having higher rate or not being available in the market then any other rate to be determined by the Engineer-In-Charge at his decision shall be final and conclusive.

GC-67 MATERIALS OBTAINED FROM DISMANTLING :

If the Contractor, in the course of execution of work, is called upon to dismantle any part of work for reasons other than on account of bad or imperfect work, the materials obtained from dismantling will be property of the owner and will be disposed off as per instructions of Engineer-In-Charge in the best interest of the owner.

GC-68 ARTICLE OF VALUE OF TREASURE FOUND DURING CONSTRUCTION :

All gold, silver and other minerals of any description and all precious stones, coins, treasures, relics, antiques and other similar things which shall be found in, under or upon site shall be the property of the owner and the Contractor shall properly preserve the same to the satisfaction of the Engineer-In-Charge and shall hand over the same to the owner.

GC-69 DISCREPANCIES BETWEEN INSTRUCTIONS:

If there is any discrepancy between various stipulations of the contract documents or instructions to the Contractor or his authorized representative or if any doubt arises as to the meaning of such stipulation or instructions, the Contractor shall immediately refer in writing to the Engineer-In-Charge and shall hand over the same to the owner.

GC-70 ALTERATIONS IN SPECIFICATIONS & DESIGNS & EXTRA WORK :

The Engineer-In-Charge shall have power to make any alterations in, omission from, addition to substitution for, the schedule of rates, the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of work and the Contractor shall be bound to carry out such altered / extra / new items of work in accordance with any instructions which may be given to him in writing signed by Engineer-In-Charge and such alteration omissions, additions or substitutions, shall not invalidate contract and any altered, additional or substituted work shall be carried out by the Contractor on the same conditions of contract. The time of completion may be extended by Architect as may be considered just and reasonable by him. The rates for such additional, altered or substitute work shall be worked out as under :

- a. If the rates for additional, altered or substitutes work are specified in the contract for work, the Contractor is bound to carry out such work at the same rates as specified in the contract.
- b. If the rates for additional, altered or substituted work are not specifically provided in the contract for the work, the rates will be derived from the rates of similar items of work in the contract work. The opinion of Engineer-In-Charge as to whether the rates can be reasonably so derived the items of contract will be final and binding to the Contractors.
- c. If the rates of altered, additional or substitute work cannot be determined as specified in (a) or (b) above, the rate shall be paid as per S.O.R. of GWSSB.
- d. If the rates of altered, additional or substitute work cannot be determined as specified in (a) or (b) or (c) above, the Contractor shall within seven days of the receipt of order to carry out the work inform the Architect / Engineer-In-Charge of the rate which he intends to charge for such work supported by rate analysis and the Architect / Engineer-In-Charge will determine the rate on the basis of prevailing market rates of materials, labour cost at schedule of labour plus 15% there on as Contractor's supervision overheads and profit. The opinion of Architect / Engineer-In-Charge as to the market rates of materials and the quantity of labour involved per unit of measurement will be final and binding on Contractor.

But under no circumstances, the Contractor suspends work or the plea of non-settlement of items falling under this clause.

GC-71 ACTION WHEN NO SPECIFICATIONS ARE ISSUED :

In case of any class of work for which no specifications is supplied by the owner in the tender documents, such work shall be carried out in accordance with relevant latest ISS and if ISS do not cover the same, the work shall be carried out as per General Technical Specification for building work; and if not covered in then it is to be with standard Engineering Practice subject to the approval of Engineer-In-Charge.

GC-72 ABNORMAL RATES :

Contractor is expected to quote rate for each item after careful analysis of cost involved for the performance of the completed item considering all specifications and conditions of contract.

GC-73 ASSISTANCE TO ENGINEER-IN-CHARGE:

Contractor shall make available to Engineer-In-Charge free of cost all necessary instruments and assistance in checking of any work made by the Contractor setting out for taking measurement of work etc.

GC-74 TESTS FOR QUALITY OF WORK :

The Contractor shall be required to give satisfactory relevant test where required and shall rectify the defects, if any, free of cost. The necessary water power, labour etc., required for the hydraulic test shall also be arranged by the Contractor at his own cost.

All workmanship shall be of the best kind described in the contract documents and in accordance with the instructions of Engineer-In-Charge and shall be subjected from time to time to such tests at Contractor's cost as the Engineer-In-Charge may direct at the place of manufacture of fabrication or on the site or at any such place. Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing of any work of workmanship as may be selected and required by Engineer-In-Charge.

All tests necessary in connection with the execution of work as decided by Engineer-In-Charge shall be carried out at an approved laboratory at Contractor's cost.

Contractor shall furnish the Engineer-In-Charge for approval when requested or if required by the specification, adequate samples of all materials and finished goods to be used in work sufficiently in advance to permit tests and examination thereof. All materials furnished and finished goods applied in work shall be exactly as per the approved samples.

GC-75 ACTION AND COMPENSATION IN CASE OF BAD WORKMANSHIP:

If it shall appear to the Engineer-In-Charge that any work has been executed with materials of inferior description, or quality or are unsound or with unsound, imperfect or unskilled workmanship or otherwise not in accordance with the contract, the Contractor shall, on demand in writing from Engineer-In-Charge or his authorized representative specifying the work, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the work, so specified. In the event of failure to do so within a period to be specified by the Engineer-In-Charge in his aforesaid demand, Contractor shall be liable to pay compensation at the rate of half a percent of the estimated cost of work for every work limited to a maximum of ten (10%) percent of the value of work while his failure to do so continues and in the case of any such failure, the Engineer-In-Charge may on expiry of the notice period rectify and remove and re-execute the work or remove and replace with others at the risk and cost of the Contractor. The decision of the Engineer-In-Charge as to any question arising under this clause shall be final and conclusive.

GC-76 SUSPENSION WORK :

Contractor shall, if ordered in writing by Engineer-In-Charge or his representative temporarily suspended the work or any part thereof for such time (not exceeding one month) as ordered and shall not after receiving such written notice proceed with the work until he shall have received a written order to proceed therewith. The Contractor shall not be entitled to claim compensation for any loss or damage sustained by him by reason of temporary suspension of work as aforesaid. An extension of time for completion of work will be granted to the Contractor corresponding to the delay caused by such suspension of work if he applies for the same provided the suspension was not consequent upon any default or failure on the part of the Contractor.

GC-77 OWNER MAY DO PART OF THE WORK :

When the Contractor fails to comply with any instructions given in accordance with the provisions of this contract, the owner has the right to carry out such parts of work as the owner may designate whether by purchasing materials and engaging labour or by the agency of another Contractor. In such case the owner shall deduct from the amount which otherwise might become due to Contractor, the cost of such work and materials with then (10) percent added to cover all departmental charges and should the total amount thereof exceed the amount due to contract, Contractor shall pay the difference to owner.

GC-78 POSSESSION PRIOR TO COMPLETION :

The Engineer-In-Charge shall have the right to take possession of or to use any completed or partly completed work or part of work. Such possession or use shall not be deemed to be an acceptance of any work completed in accordance with the contract. If such prior possession or use by Engineer-In-Charge delays the process of work, equitable adjustment in the time of completion will be made and the contract shall be deemed to be modified accordingly.

GC-79 COMPLETION CERTIFICATE :

As soon as the work has been completed in accordance with contract (except in minor respects that do not effect their use for the purpose for which they are intended and except for maintenance thereof) as per General Conditions of Contract the Engineer-In-Charge shall issue a certificate (hereinafter called completion certificate) in which shall certify the date on which work has been completed and has passed the said tests and owner shall be deemed to have taken over work on the date so certified. If work has been divided in various groups in contract, owner shall be entitled to take over any group or groups before the other or others and there upon the Engineer-In-Charge will issue a completion certificate, which will, however, be for such group or groups so taken over only.

In order that Contractor could get a completion certificate, he shall make good will all speed any defect arising from the defective materials supplied by Contractor of workmanship or any act or omission of Contractor that may have been discovered or developed after the work or groups of works has been taken over. The period allowed for carrying out such work will be normally, one month. If any defect be not remedied within the time specified, owner may proceed to do work at Contractor's (Agency, or Firm) risk and expenses and deduct from the final bill such amount as may be decided by owner. If by reason of any default on the part of the Contractor, a completion certificate has not been issued in respect of every portion of work within one month after the date fixed by contract for completion of work, owner shall be at liberty to use work or any portion thereof in respect of which a completion certificate has been issued, provided that work or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completion of that work or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completion of that work for the issue of completion certificate.

GC-80 SCHEDULE OF RATES :

- i. The rates quoted by the Contractor shall remain firm till the completion of the work and shall not be subject to escalation. Schedule of rates shall be deemed to include and cover all costs, expenses and liabilities of every description and risks or every kind to be taken in executing, completing and handing over the work to owner by Contractor. The contractor shall be deemed to have known the nature, scope, magnitude and the extent of work and materials required though contract documents may not fully and precisely furnish them. He shall make such provision in the Schedule of Rates as he may consider necessary to cover the cost of such items of work and materials as may be reasonable and necessary to complete the work. The opinion of Engineer-In-Charge as to the item of work which are necessary and reasonable for completion of the work shall be final and binding on Contractor although the same may be not shown on drawings or described specifically in contract documents.
- ii. The Schedule of Rates shall be deemed to include and cover the cost of all constructional plant, temporary work, materials, labour and all other matters in connection with each item in Schedule of Rates and the execution of work or any portion thereof finished complete in every respect and maintained as shown or

described in the contract document or as may be ordered in writing during the continuance of the contract.

- iii. The Schedule of Rates shall be deemed to include and cover the cost of all royalties and fees for the articles and processes, protected by letters patent or otherwise incorporated in or used in connection with work, also all royalties, rents and other payments in connection with obtaining material of whatsoever kind for work and shall include an indemnity to owner which Contractor hereby gives against all action, proceedings, claims, damages, costs and expenses arising from the incorporation in or use on the works of any such articles, processes or materials. Octroi or other Municipal or local Board charges if levied on material, equipment or machineries to be brought to site for use on work shall be borne by the Contractor.
- iv. No exemption or reduction of custom duties, excise duties, sales tax or any other taxes or charges of the Central or State Government or of any Local Body whatsoever will be granted or obtained and all such expenses shall be deemed to have been included in and covered by Schedule of Rates. Contractor shall also obtain and pay for all permits or other privileges necessary to complete the work.
- v. The Schedule of Rates shall be deemed to include and cover risk on account of delay and interference with Contractor's conduct of work which may occur from any cause including orders of owner in the exercise of his powers and on account of extension of time granted due to various reasons.
- vi. For work under unit rate basis, no alteration will be allowed in the Schedule of Rates by reasons of work or any part of them being modified, altered, extended, diminished or omitted.

GC-81 PROCEDURE FOR MEASUREMENT OF WORK IN PROGRESS:

- i. All measurements shall be in metric system. All the work in progress will be jointly measured by the representative of Engineer-In-Charge and Contractor's authorized agent. Such measurements will be got recorded in the Measurement Book by the Engineer-In-Charge or his authorized representative and signed by the Contractor or his authorized agent in token of acceptance. If the Contractor or his authorized agent fails to be present whenever required by the Engineer-In-Charge for taking measures for every reasons whatsoever, the measurement will be taken by the Engineer-In-Charge or his authorized representative notwithstanding the absence of Contractor and these measurements will be deemed to be correct and binding on the Contractor.
- ii. Contractor will submit a bill in approved proforma in quadruplicate to the Engineer-In-Charge of the work giving abstract and detailed measurements of various items executed during a month as mutually agreed. The Engineer-In-Charge shall verify the bill and the claim, as far as admissible, adjusted if possible, within 10 days of presentation of the bills.

GC-82 RUNNING ACCOUNT PAYMENTS TO BE REGARDED AS ADVANCES :

- i. All running account payments shall be regarded as payments by way of advance against the final payment only and not as payment for work actually done and

completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or rejected or to be considered as an admission of the due performance of contract or any part thereof.

- ii. Five (5) percent of the gross R A Bill amount shall be retained from each bill as retention amount and the same will be paid with the final bill.

GC-83 NOTICE FOR CLAIM FOR ADDITIONAL PAYMENT :

If the Contractor considers that he is entitled to extra payment or compensation or any claim whatsoever in respect of work, he shall forthwith give notice in writing to the Engineer-In-Charge about his extra payment and / or compensation. Such notice shall be given to the Engineer-In-Charge within ten (10) days from the happening of any event upon which Contractor basis such claims and such notice shall contain full particulars of the nature of such claim with full details and amount claimed. Failure on the part of the Contractor to put forward any claim with the necessary particulars as above, within the time above specified shall be an absolute waiver thereof. No omission by owner to reject any such claim and no delay in dealing therewith shall waiver by owner or any rights in respect thereof.

GC-84 PAYMENT OF CONTRACTOR'S BILL :

- i. The price to be paid by the owner to Contractor for the work to be done and for the performance of all the obligations undertaken by the Contractor under contract shall be based on the contract price and payment to be made accordingly for the work actually executed and approved by the Engineer-In-Charge.
- ii. No payment shall be made for work costing less than 5% of Contract amount till the work is completed and a certificate of completion given. But in case of work estimated to cost more than 5% of contract amount. Contractor on submitting the bill thereof will be entitled to receive a monthly payment proportionate to the part thereof, approved and passed by Engineer-In-Charge, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against contractor. This payment shall be made after necessary deductions as stipulated elsewhere in the contract documents for materials, security deposit etc. The payment shall be released to the Contractor within two (2) months of submission of the bill duly pre-occupied on proper revenue stamp. Payment due to Contractor shall be made by the owner through ECS mode in Indian currency in the Account of Contractor. Owner shall not be responsible if the Account Number is mislaid or misappropriated by unauthorized persons.

GC-85 FINAL BILL :

The final bill shall be submitted by Contractor within one (1) month of the date of physical completion of work, otherwise the Engineer-In-Charge's certificate of the measurement and of total amount payable for work shall be final and binding on all parties.

C-86 RECEIPT FOR PAYMENT :

Receipt for payment made on account of work when executed by a firm must be signed by a person holding Power of Attorney in this respect on behalf of

Contractor except when described in the tender as a limited company in which case the receipt must be signed in the name of the Company by one of its principal officers or by some person having authority to give effectual receipt for the Company.

GC-87 COMPLETION CERTIFICATE :

- i. When the Contractor fulfils his obligation as per terms of contract, he shall be eligible to apply for Completion Certificate. Contractor may apply for separate Completion Certificate in respect of each such portion of work by submitting the completion documents along with such application for Completion Certificate.
- ii. The Engineer-In-Charge shall normally issue to Contractor the Completion Certificate within one (1) month after receiving an application thereof from Contractor after verifying, from the completion documents and satisfying himself that work has been completed in accordance with and as set out in the construction and erection drawings and the contract documents. Contractor after obtaining the Completion Certificate is eligible to present the final bill for work executed by him under the terms of contract.
- iii. Within one month of completion of work in all respects Contractor shall be furnished with a certificate by the Engineer-In-Charge of such completion but no certificate shall be given nor shall work be deemed to have been executed until all (i) scaffolding, surplus materials and rubbish is cleaned off site completely, (ii) until work shall have been measured by the Engineer-In-Charge whose measurement shall be binding and conclusive and, (iii) until all the temporary works, labour and staff colonies etc. constructed are removed and the work site cleaned to the satisfaction of the Engineer-In-Charge. If Contractor shall fail to comply with the requirements as aforesaid or before date fixed for the completion of work, the Engineer-In-Charge may at the expense of Contractor remove such scaffolding, surplus materials and rubbish and dispose off the same as he thinks fit.
- iv. The following documents will form the completion documents:-
 - a) Technical documents according to which the work has been carried out.
 - b) Three sets of construction drawings showing therein the modifications and corrections made during the course of execution signed by the Engineer-In-Charge.
 - c) Completion Certificate for "Embedded" or "Covered" up work.
 - d) Certificate of final levels as set out for various works.
 - e) Certificate of test performed for various work.
 - f) Material appropriation statement for the materials issued by owner for work and list of surplus materials returned to owner's store duly supported by necessary documents.
 - g) Operation and maintenance manual (if necessary).
- v. Upon expiry of the period of defect liability and subject to Engineer-In-Charge being satisfied that work has been duly maintained by Contractor during the defect liability

period of fixed originally or as extended subsequently and that Contractor has in all respects made up any subsidence and performed all his obligations under contract, the Engineer-In-Charge (without prejudice to the rights of owner in any way) give final certificate to that effect. The Contractor shall not be considered to have fulfilled the whole of his obligation until final certificate shall have been given by the Engineer-In-Charge.

- vi. **Final Certificate only evidence of completion:** Except the final certificate, no other certificate of payment against a certificate or on general account shall be taken to be an admission by owner of the due performance of contract or any part thereof of occupancy or validity or any claim by the Contractor.

GC-88 TAXES, DUTIES, OCTROI ETC. :

- i. Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and all taxes including Sales Tax, GST, Duties, Octroi etc., now or hereinafter imposed, increased or modified from time to time in respect of work and materials and all contributions and taxes for unemployment, compensation, insurance and old age pension or annuities now or hereinafter imposed by the Central or State Government authorities with respect to or covered by the wages, salaries or other compensation paid to the persons employed by Contractor. If the Contractor is not liable to Sales Tax assessment, VAT, a certificate to that effect from the Competent Authority shall be produced without which final payment to the Contractor shall not be made No.IP, 'C' and 'D' Form shall be supplied by the owner, and the Contractor shall be required to pay full tax as applicable.
- ii. Contractor shall be responsible for compliance with all obligations and restrictions imposed by the labour law or any other law affecting employer-employee relationship.
- iii. Contractor further agrees to comply and to secure the compliance of all sub contractors with applicable Central, State, Municipal and local laws and regulations and requirement. Contractor also agrees to defend, indemnify the hold harmless the owner from any liability or penalty which may be imposed by Central, State or local authority by reasons of any violation by Contractor or sub Contractor of such laws, regulations or requirements and also from all claims, suits or proceedings that may be brought against owner arising under, growing out of or by reasons or work provided for by this Contract by third parties or by Central or State Government authority or any administrative Sub-Division thereof.
- iv. The Sales Tax on work contract will be borne by Contractor.

GC-89 INSURANCE :

Contractor shall at his own expenses carry and maintain the reputable Insurance Companies to the satisfaction of owner as follows :

- i. Contractor agrees to and uses hereby accept full and exclusive liability for compliance with all obligations imposed by the Employer's State Insurance Act, 1948 and Contractor further agrees to defend, indemnify and hold owner hardness from any liability or penalty which may be imposed by the Central or State Government or local authority by reasons of any assorted violation by Contractor or

Sub-Contractor or the Employees State Insurance Act, 1948 and also from all claims, suits or proceedings that may be brought against owner arising under, growing out of or by reasons of the work provided for by this contract whether brought by employees of Contractor by third parties or by Central or State Government authority or any administrative Sub-division thereof.

- ii. Contractor agrees to fill in with the Employees State Insurance Corporation, the declaration form and all forms which may be required in respect of Contractor's or sub-Contractor's employees whose aggregate remuneration is Rs.400/- p.m. or less and who are employed in work provided for or those covered by ESI from time to time under the agreement. The Contractor shall deduct and secure the agreement of the sub-Contractor to deduct the employees contribution as per the first schedule of the Employees State Insurance Act from wages. Contractor shall remit and secure the agreement of sub-contractor to remit to the State Bank of Indian Employees State Insurance Accounts, the employee's contribution as required by the Act. Contractor agrees to maintain all cards and records as required under the Act in respect of employees and payments and Contractor shall secure the agreements of the sub contractors to maintain in such records, any expenses incurred for the contributions, making contributions or maintaining records shall be to Contractors or sub-contractors own account. owner shall retain such sum as may be necessary from the contract value until Contractor shall furnish satisfactory proof that all contribution as required by the Employees State Insurance Act, 1948 have been paid.
- iii. **Workman's compensation and employees liability insurance:** Insurance shall be effected for all Contractors employees engaged in the performance of this contract. If any part of work is sublet, Contractor shall require the sub-Contractor to provide workman's compensation and employer's liability insurance, which may be required by owner.
- iv. Other Insurance required under law of regulations or by owner Contractor shall also carry and maintain any and all other insurance which may be required under any law or regulation from time to time. He shall also carry and maintain any other insurance, which may be required by owner.

GC-90 DAMAGE TO PROPERTY :

- i. Contractor shall be responsible for making good to the satisfaction of owner any loss of and any damage to all structures and properties belonging to owner or being executed or procured or being procured by owner or of other agencies within the premises of all work of owner, if such loss or damage is due to fault and / or the negligence of willful act or omission of Contractor, his employees, agent, representatives or sub-Contractor s.
- ii. Contractor shall indemnify and keep owner harmless of all claims for damage to properties other than property arising under by reasons of this agreement, such claims result from the fault and / or negligence or willful act or omission of Contractor, his employees, agents representative or sub-contractor.

GC-91 CONTRACTOR TO INDEMNIFY OWNER :

- i. The Contractor shall indemnify and keep indemnified the owner and every member, officer and employee of owner from and against all actions, claims, demands and

liabilities whatsoever under the in respect of the breach of any of the above clauses and / or against any claim, action or demand by any workman / employee of the Contractor or any sub-contractor under any laws, rules or regulations having force of laws, including but not limited to claims against the owner under the workman compensation Act, 1923, the Employee's Provident Funds Act, 1952 and / or the contract labour (Abolition and Regulations) Act, 1970.

- ii. **PAYMENTS OF CLAIMS AND DAMAGES** : If owner has to pay any money in respect of such claims or demands aforesaid, the amount so paid and the cost incurred by the owner shall be charged to and paid by Contractor without any dispute notwithstanding the same may have been paid without the consent or authority of the Contractor.
- iii. In every case in which by virtue of any provision applicable in the workman's Compensation Act, 1923 or any other Act, owner be obliged to pay compensation to workmen employed by Contractor the amount of compensation so paid, and without prejudice to the rights of owner under Section-(12) Sub-section-(2) of the said Act, owner shall be at liberty to recover such amount from any surplus due to on to become due to the Contractor or from the security deposit. Owner will not be bound to contest any claim made under Section-(12) Sub-section-(2) of the said act except on written request of Contractor and giving full security for all costs consequent upon the contesting of such claim.
- iv. The Contractor shall protect adjoining sites against structural, decorative and other damages that could be caused to adjoining premises by the execution of these works and make good at his cost, any such damage, so caused.

GC-92 IMPLEMENTATION OF APPRENTICE ACT 1954 :

Contractor shall comply with the provisions of the apprentice Act 1954 and the orders issued there under from time to time. If he fails to do so, it will be a breach of contract.

GC-93 HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS:

Contractor shall comply with all the rules and regulations of the local Sanitary Authorities or as framed by owner from time to time for the protection of health and provide sanitary arrangements of all labour directly or indirectly employed on the work of this contract.

GC-94 SAFETY CODE :

First Aid and Industrial Injuries: Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with owner's rules as set forth herein.

- i. Contractor shall maintain First-Aid facilities for its employees and those of his sub-contractors.
- ii. Contractor shall make outside arrangements for ambulance service and for the treatment of industrial injuries.
- iii. Name of those providing these services shall be furnished to Engineer-In-Charge prior to start of construction, and their telephone numbers shall be prominently posted in Contractor's field office.

- iv. All injuries shall be reported promptly to Engineer-In-Charge and a copy of Contractor's report covering each personal injury requiring the attention of a physician shall be furnished to owner.
- v. To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangement made by the Contractor shall be open to inspection by the Welfare Officer, Engineer-In-Charge or Safety Engineer of the owner or their representatives.
- vi. In addition to the above, the Contractor shall abide by the safety code provisions as per C.P.W.D. safety code framed from time to time.

GC-95 ACCIDENTS:

It shall be Contractor's responsibility to protect against accidents on the works. He shall indemnify the owner against any claim for damage or for injury to person or property resulting from, and in the course of work and also under the provisions of the workman's compensation Act. On the occurrence of an accident arising out of the works which results in death or which is so serious as to be likely to result in death, the Contractor shall within twenty-four hours of such accident, report in writing to the Engineer-In-Charge, the facts stating clearly and in sufficient details the circumstances of such accident and the subsequent action. All other accidents on the works involving injuries to person or damage to property other than that of the Contractor shall be promptly reported to the Engineer-In-Charge, stating clearly and in sufficient details the facts and circumstances of the accidents and the action taken. In all cases, the Contractor shall indemnify the owner against all loss or damage resulting directly or indirectly from the Contractor's failure to report in the manner aforesaid. This includes penalties or fines, if any, payable by the owner as a consequence of failure to give notice under the Workman's Compensation Act, or failure to conform to the provisions of the said act in regard to such accidents.

In the event of an accident in respect of which compensation may become payable under the Workman's Compensation Act VIII of 1923 including all modification thereof, the Engineer-In-Charge may retain out of money due and payable to the Contractor such sum of sums of money as may in the opinion of Engineer-In-Charge be sufficient to meet such liability. On receipt of award from the Labour Commissioner in regard to quantum of compensation, the difference in amount will be adjusted.

City Engineer
BSCDCL

Signature of Contractor

Bhopal Smart City Development Corporation Limited

:: SPECIAL CONDITIONS ::

- i. The Royalty of each and every material, required to be paid is to be borne by the contractor.
- ii. Testing of each material as and when required by Bhopal Smart City Development Corporation Limited, is to be carried out by the contractor at his own cost.

Signature of Contractor

Bhopal Smart City Development Corporation Limited

:: TECHNICAL SPECIFICATIONS ::

Item No-1: Embankment and Sub Grade Construction

Materials for use in Embankment shall not contain particles larger than 75mm. However in the 500mm below sub-grade top level in both embankments and cuttings shall not contain particles larger than 50mm.

In-situ materials in the 500mm below sub-grade top level in cutting that does not meet these requirements, shall either be spoiled or if suitable, placed in the embankment and replaced with material from cutting or borrow pits that do meet the requirements for use in the 500mm below sub-grade top level.

The Contractor shall ensure that earthworks (Embankment / sub-grade) proceed towards completion in orderly and continuous manner. The Contractor shall submit a written request for approval of any layer at least 3 working days in advance before he intends to cover a completed layer. Fill material for subsequent layer shall be placed immediately after approval of the previous layer to ensure retention of moisture.

TABLE 300-1

Density Requirements of Embankment and Subgrade Materials

Type of Work	Maximum laboratory dry unit Weight when tested as per IS:2720 (Part 8)
Embankments up to 3 meters Height, not subjected to Extensive flooding	not less than 1.52 gm/cc.
• Embankments exceeding 3 meters height or embankments of any height subjected to long periods of inundation	not less than 1.60 gm/cc.
• Sub grade and earthen Shoulders/backfill	Not less than 1.75 gm/cc.

The moisture content of fill material shall be adjusted immediately prior to the compaction by either uniformly mixing water or drying out the materials so that the moisture content during compaction shall be in accordance with the Optimum Moisture Content determined in the laboratory.

Each layer shall be compacted at the Optimum Moisture Content to a dry density equal to the percentage of Maximum Dry Density (MDD) Specified below (AS PER MORTH Table No.-3.02):

- All fill materials in embankment : 95% of MDD (Modified Proctor Density)
- Materials in 500mm. below sub-Grade top level in embankment : 97% of MDD (Modified Proctor Density)
- Materials in 500mm. below sub-grade top level in cutting and shoulder : 97% of MDD (Modified Proctor Density)

Compaction of embankment layers, and the layers, 500mm. below the sub grade top level, shall be completed to the procedures proposed by the Contractor in accordance with the clauses of Specification. The materials, 500mm. below sub grade top level in both fill areas and in cuttings, shall be completed in three compacted layers.

The specification shall apply to the construction of embankment including Sub-grade and earthen shoulders with approved materials obtained from roadway and drain Excavation or borrow pits. All embankments shall be constructed as per specification and as per drawings.

CONTROL TEST ON BORROW MATERIALS:

- Sand content - Two test per 3000m³ (as per IS-2720 Part iv).
- Plasticity - Two test for each type of soil (as per IS-2720 Part -v)
- Proctor Test - Two test of each type of soil (as per IS-2720 Part-ix)
- Deleterious content- As Required (as per IS-2720 Part xxiiv)
- Natural moisture content - Two test of each type of soil (as per IS-2720 Part-ii)
- Field density test:
 - For embankment- One test for 1000m² of compacted area (Minimum 6nos. in a set)
 - For sub-grade- One Set of two test for 500m² of compacted Area (Minimum 6 no. in a set)

- CBR Test - One test per for each kind of soil or closer & when required by the engineer (as per IS-2720 Part xvi (for sub-grade only)

Sand Replacement method as approved by Engineer shall be used at site.

Item No-2: Granular Sub Base

The material used for the work shall be confirming to MORTH Table-400-1 Grading IV.

The sub-base material of grading specified in the contract shall be spread on the prepared Sub-grade with the help of motor grader of adequate capacity. Moisture content of the loose material shall be checked and suitable adjusted by sprinkling additional water from the water tanker suitable for applying water uniformly and at controlled quantities to variable widths. At the time of the compaction, the moisture content shall be 1% above or 2% below the optimum moisture content. Immediately thereafter, rolling shall start. Vibratory roller of minimum 8 to 10 tones capacity shall be used for compaction. Rolling shall start at the lower edge and proceed toward the upper edge. Each pass of the roller shall uniformly overlap not less then 1/3 of the track made in the preceding pass. The speed of the roller shall not exceed 5km per hour. The required compaction shall be 98% of maximum dry density achieved with Modified Proctor Test.

TESTE FOR GRANULAR SUB-BASE

- Gradation- As require by MORTH specification one test per 400m³
- Alterberg Limits(LL.,PL,PI.) - One test per 400m³ (L.L.-25 Max.,P.I.-6Max)
- Field Density - One test per 1000m² (minimum 6nos.in a set)
98% minimum.
- Moisture content
Before compaction - One test per 400m²
(+) 1% to (-) 2% of OMC
- Deleterious Constituent - As Required
- C.B.R.(96 Hour soaked) - As Required
- Minimum 30% at 98% compaction
- Water Absorption value
of course aggregate - 2% maximum
As per IS : 2386, Part III
- AIV - As per IS : 2386 Part IV (MAX-40%)
Required if water absorption is more than 2%

Item No-3: Wet Mix Macadam

The work shall consist of laying compacting clean, crushed, graded aggregates and granular materials pre mixed water to a dense mass on a prepared sub-base in accordance with the requirements of the specification. If crushed gravel/ single is used, not less than 90 per cent by weight of the gravel/ single pieces retained on 4.75 mm sieve shall have at least two fractured faces. The thickness of a single compacted wet mix macadam layer shall not be less than 75mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the sub- base course may be increased to 200mm upon approval of the Engineer.

Wet mix macadam shall be prepared in an approved mixing plant having provision for controlled addition of water or a batching plant. The mix shall be spread by a paver finisher / Grader having compacted thickness should not be more than 125 mm each layer. The surface to the layer shall be carefully checked with the templates and all height and low spots remedied by removing or adding aggregates as may be required. After the mix has been laid to the required thickness, the same shall be uniformly compacted to the full depth with suitable roller. Compaction shall be done by a vibratory roller with a maximum speed of not more than 5 km per hour. Rolling shall be continued till the density achieved is at least 98% of the Maximum Dry Density. When tested with a straight edge, 3m long, the irregularities must not exceed more than 12mm on the surface. After final compaction of wet mix macadam course, the surface shall be allowed to dry for maximum 24 hour. Traffic shall not be allowed on the road till the surface is primed and overlaid with the next layer.

The material to be used for work shall confirm to clause 410.2 of MORT&H specifications.

TEST FOR WET MIX MACADAM:

- Minimum compacted layer thickness - 75 mm
- Maximum compacted layer thickness - 200 mm
- Aggregate Impact Value - As per IS : 2386 Part IV
Maximum 30% one test
per 1000 Cum.
- Los Angeles Abrasion Value - Maximum 40%
- Grading - As per Table No.400-13 of
MORTH Specification
One test per 100m³
- Combined Flakiness and Elongation - One test per 500Cum.
Maximum 35%
- Alterberg Limits (LL, PL,PI.)
of portion aggregate. Passing
425mm micron sieve - One test per 200 Cum. of
Aggregate
- Field Density of
Compacted layer - One set of 3 tests per 1000Sqm.
- Minimum 98%
- Water absorption of Aggregates - Maximum 2%
- Minimum One per source of
aggregate
- Soundness - As per IS 383/ IS2386Part V
Required only when Water
Absorption is more than 2%

Item No4: Prime Coat

The work shall consist of an application of a single coat of slow setting bituminous emulsion to a porous granular surface.

The primer shall be conforming to IS-8887 with Kinematic viscosity in the range of 30 to 60 centistokes at 60 °C and also confirming IS-217 spread at the rate of 7.0 to 10.0 Kg for per 10 Sqm.

The surface to be primed shall be carefully swept clean of dust and loose particles with mechanical brooms. The surface shall be sprayed lightly with water and shall be allowed to dry. Primer shall not be sprayed when the whether is foggy, rainy or windy or when the temperature in shade is less than 10 °C.

The surface to be primed shall be checked for line, camber and level, and the surface corrected, made good as necessary and approved by the Engineer before any bituminous spray is applied.

As soon as possible after the surface to be sprayed has been prepared as specified and approved by the Engineer, the prime or tack coat shall be sprayed on to it at the specified rate.

The rate of application of Primer shall be 7.0 to 10.0 kg per 10 sqm, as per MORTH Specifications. And it shall be sprayed uniformly all over the surface to be primed to seal the surface pores and make the surface of the base course water resistant and also to harden and toughen the base course layer. The surface shall be allowed to cure for at least 24 hours or more after priming and no traffic shall be allowed on it. Any unabsorbed primer shall be blotted with an application of minimum quantity of sand.

Bitumen distributor shall be used for spraying prime coat and tack coat. It shall be truck mounted and shall have sufficient power to maintain uniform speed for the proper application of the binder. The truck shall be equipped with an accurate tachometer showing to the driver the speed in meters per minute.

The truck shall be fitted with a gauge bar and chain or any other acceptable device clearly visible to the driver to enable him to follow the required edge. The distributor tank shall have the capacity of at least 4,000 liters and shall be fitted with a derive for indicating the quantity in the tank at any time. It shall be equipped with heaters capable of maintaining temperature and be fitted with an accurate thermometer.

Spray bars shall be available for spraying in widths varying from 2.5 m to 4 m and shall be adjustable transversely so that the operator can follow the required edge independently. The spray nozzles shall be arranged to give a uniform spray and the shut off shall be quick acting with an anti- drip device. The pressure in the spray bar shall be sufficient to give a good distribution and spraying of the binder.

Distributors shall be checked and calibrated before starting any work or when required by the Engineer. This shall include the calibration of all the metering devices and checking the uniformity of the transverse distribution of spray.

All distributors shall be furnished with a “rate of / machine speed” chart.

No had spraying shall be permitted except in small areas, inaccessible to the distributor or in narrow strips or to make good a defective area caused by a blocked nozzle. Primer shall not be applied on a wet surface.

TEST FOR PRIME COAT:

- | | | |
|------------------------------|---|---|
| ● Quality of primer | - | No. of Samples per lot and test as per IS-73 , IS-217 and IS-8887 AS applicable |
| ● Temperature at application | - | At regular close intervals |
| ● Rate of spread of primer | - | Three Test per day |

Item No5 Tack Coat

The work shall consist of application of a single coat rapid setting bituminous emulsion to an existing bituminous road surface or granular surface treated with

primer, preparatory to the superimposition of a bituminous mix. The rate of application shall be 0.20 to .25 Kg. per square meter for bituminous surfaces and 0.25 to 0.30 Kg. per square meter for granular surfaces treated with primer. Tack coat may not be essential between each and every bituminous layers and shall be applied as directed by the Engineer.

The material used for tack coat shall be bituminous emulsion complying with IS: 8887. It shall not be applied when weather is foggy or windy or rainy and when the temperature is less than 10⁰ c.

The tack coat shall be carefully swept clean of dust and loose particles with brooms. The surface should be dry. Tack coat shall not be sprayed when the weather is foggy, rainy or windy or when the temperature in shade is less than 10⁰C.

The surface to be primed shall be checked for line, camber and level, and the surface corrected, made good as necessary and approved by the Engineer before any bituminous spray is applied.

As soon as possible after the surface to be sprayed has been prepared as specified and approved by the Engineer, the tack coat shall be sprayed on to it at the specified rate i.e. (0.2 to 0.25 Kg. & 0.25 to 0.30 kg. for non hungry & hungry surface respectively). As per MORTH Specifications and it shall be sprayed uniformly all over the primed surface and make the surface of the base course water resistant and also to harden and toughen the base course layer. The surface shall be allowed to cure for at least 3 hours.

Bitumen distributor shall be used for spraying tack coat. It shall be truck mounted and shall have sufficient power to maintain uniform speed for the proper application of the binder. The truck shall be equipped with an accurate tachometer showing to the driver the speed in meters per minute.

The truck shall be fitted with a gauge bar and chain or any other acceptable device clearly visible to the driver to enable him to follow the required edge. The distributor tank shall have the capacity of at least 4,000 liters and shall be fitted with a derive for indicating the quantity in the tank at any time. It shall be equipped with heaters capable of maintaining temperature and be fitted with an accurate thermometer.

Spray bars shall be available for spraying in widths varying from 2.5 m to 4 m and shall be adjustable transversely so that the operator can follow the required edge independently. The spray nozzles shall be arranged to give a uniform spray and the shut off shall be quick acting with an anti- drip device. The pressure in the spray bar shall be sufficient to give a good distribution and spraying of the binder.

Distributors shall be checked and calibrated before starting any work or when required by the Engineer. This shall include the calibration of all the metering devices and checking the uniformity of the transverse distribution of spray.

All distributors shall be furnished with a "rate of / machine speed" chart.

No had spraying shall be permitted except in small areas, inaccessible to the distributor or in narrow strips or to make good a defective area caused by a blocked nozzle. Primer shall not be applied on a wet surface.

TEST FOR TACK COAT:

- Quantity of binder - No. of sample per lot/400Mt as per IS-73, IS-217 as applicable
- Temperature at application - At regular close intervals
- Rate of spread - Three test per day

Item No6 Dense Graded Bituminous Macadam

Dense Graded Bituminous Macadam (DBM) shall be a hot- laid plant mixture of well-graded aggregate and VG-30 grade bitumen.

The Dense Graded Bituminous Macadam shall mainly but exclusively, be used in base/binder and profile corrective courses. DBM shall also be used as road base material. The thickness of a single layer shall be 75 mm to 100 mm (Grade -1).

- **Bitumen** - Shall be paving Bitumen of VG-30 grade Complying with IS- 73
- **Coarse Aggregate** - As per MORTH Specification
- **Fine Aggregate** - As per MORTH Specification
- **Filler** - Shall consist of finely grounded particles such as Rock dust, per article 505.2.4(MORTH specification)

The combined grading of the coarse and fine aggregate and added filler for the particular mixture shall fall within the limits shown in MORTH Specifications (Table500-10 Grade- 1 , having minimum bitumen content 4.0%).

Physical requirements for Coarse Aggregate

Property	Test	Specification
• Cleanliness (dust)	Grain Size Analysis	Max 5% passing 75 micron sieve
• Particle Shape	Flakiness and Elongation Index (combined)	Max 35%
• Strength	Los Angeles Abrasion Value Aggregate Impact Value	Max 35% Max 27%

• Durability	Soundness Sodium Sulphate Magnesium Sulphate	Max 12% Max 18%
• Water Absorption		Max 2%
• Striping	Coating and Stripping of Bitumen – Aggregate	Minimum retained coating 95%
• Water Sensitivity	Retained Tensile Strength	Minimum 80%

• **Filler** - As per Table 5.9 MORTH Specification

• **Mix design** - AS per MORTH Specification 505.3 & MS-2

The base on which Dense Graded Bituminous Macadam is to be laid shall be prepared in according with the specification. The surface shall be thoroughly swept clean by a mechanical broom and the dust be removed by compressed air. After the application of tack coat, DBM mix produced as per the Job mix Formula shall be laid by pavers and rolled in accordance with the specification requirements till the specified density is achieved.

Job mix formula shall be submitted for the approval of the engineer at least 21 days before the start of work at site. The plant and laying trial shall be carried out satisfactorily before the actual start of the work, test for job mix formula design in presence of authority engineer's representative & all tests should be conducted in presence of authorized representative.

TABLE 500-11

REQUIRMENTS FOR DENSE GRADED BITUMINOUS MACADAM

Minimum Stability (KN at 60 ⁰ C)	20.25
Minimum flow (mm)	2.00
Maximum flow (mm)	4.00
Compaction level (Number of Blows)	112 blow on each of the two faces of the Specimen
Marshall Quotient	2-5 as per MS-2
% air voids	3-5
Percent air voids in Mineral aggregate (VMA)	As per Table 500-12 of MORTH
Percent air voids filled with bitumen (VFB)	65- 75

TESTS FOR DENSE GRADED BITUMINOUS MACADAM

- i) Quality of Binder - Number of Samples per lot and tests as per 1S:73 or IRC-Sp-53
- ii) AIV/ Los Angeles Abrasion value - One test per 350 M³ of aggregate for each source & whenever there is

			change in the quality of aggregate
iii)	FI & EI	-	One test per 350 M ³ of aggregate for each source & whenever there is change in the quality of aggregate
iv)	Stripping Value	-	Initially one set 3 representative specimens for each source of supply
v)	Soundness (Magnesium and (Sodium Sulphate)	-	Initially, one determination by each method for each source of supply
vi)	Water absorption of aggregates	-	One test set of 3 representatives specimens for each source of supply
vii)	Sand equivalent	-	One test set of 3 representatives specimens for each source of supply
viii)	Plasticity Index	-	One test set of 3 representatives specimens for each source of supply
ix)	Polished Stone Value	-	One test for each source of supply
x)	Percentage of fractured faces	-	When gravel is used, one test per 350 M ³ of aggregate
xi)	Mix grading	-	One set of tests on individual Constituents and mixed aggregate From the dryer for each 400 tons of mix subject to a minimum of two tests per plant per day.
xii)	Stability of Mix	-	For each 400 tones of mix produced, a set of 3 Marshall specimens to be prepared and tested for stability, flow value, density and void content subject to a minimum of two sets being tested per day.
xiii)	Water sensitivity off Mix (Retained Tensile Strength)	-	Initially one set of 3 representative specimens for each source of supply. subsequently when warranted by changes in the quantity at aggregate. (if required)
xiv)	Binder content	-	One set for each 400 tones of mix subjected to minimum of two testes per

			day
xv)	Control of temperature of Binder in Boiler, aggregate in the dryer and mix at the time of laying and rolling	-	At regular close intervals
xvi)	Rate of spread of mixed material	-	After every 5 th truck load and layer thickness.
xvii)	Density of compacted layer	-	One test per 700 Sqm. area.
xviii)	Moisture Susceptibility of Mix	-	One test for each mix type whenever there is change in the quality of coarse aggregate or fine aggregate

Item No7 Bituminous Concrete

This work shall consist of construction of Bituminous Concrete for use in wearing course in a single layer on a previously prepared Bituminous Bound surface. The single layer thickness shall be 40mm as required by the contract drawing and specifications.

- **Bitumen** - Shall be paving Bitumen of VG-30 Grade Complying with IS 73
- **Coarse Aggregate** - Shall be Conforming to MORTH Specifications-2013
- **Fine aggregate** - Shall be Conforming to MORTH Specifications-2013
- **Filler** - Shall be Conforming to MORTH Specifications-2013

The mix shall be designed and approved under pursuance of MORTH Fifth revision 2013

The surface where the wearing course is to be laid shall be thoroughly swept clean by mechanical broom and dust be removed by compressed air. Tack coat shall be applied if directed by the engineer. Asphalt mix shall be transported in tipper trucks, covered while in transit & laying of wearing course should not done in bad weather or while raining. The wearing course shall not be laid when the temperature is less than 10⁰ C and the wind speed exceeds 40 Km. per hours. The rate of delivery of material to paving site shall be regulated to enable the pavers to operate continuously .Mix shall be laid and compacted before the temperature falls below the specified temperature. The compaction shall be continued till the specified density is achieved. Rollers shall not have a speed of more than 5 Km per hours.

Job mix formula shall be submitted for the approval of the engineer at least 21 days before the start of work at site. The plant and laying trails shall be carried out satisfactorily before the actual start of the work.

Adequate quantity control at every stage of the work shall be maintained and fully equipped laboratory shall be setup to ensure the quantity of the work.

Periodic sieve analysis of each type or aggregates from the cold bins shall be done to ensure the gradation of the mix as per Job Mix Formula. Three Marshall Specimens shall be prepared and tested for stability, flow value, voids content and density and the obtained value shall be as per the design values.

The longitudinal profile of the finished surface shall be tested with the straight edge 3 meter long parallel to the center line and the transverse profile with camber plate. Any irregularities greater than 6mm shall be corrected. The longitudinal profile of the finished surface shall also be tested with a rough meter / project meter and the value shall be according to the Specification.

TEST FOR BITUMINOUS CONCRETE:.

- | | | | |
|-------|---|---|--|
| i) | Quality of Binder | - | Number of Samples per lot and tests as per 1S:73 or IRC-SP-53 |
| ii) | AIV/ Los Angeles Abrasion value | - | One test per 350 M ³ of aggregate for each source & whenever there is change in the quality of aggregate |
| iii) | FI & EI | - | One test per 350 M ³ of aggregate for each source & whenever there is change in the quality of aggregate |
| iv) | Stripping Value | - | Initially one set 3 representative specimens for each source of supply |
| v) | Soundness (Magnesium and Sodium Sulphate) | - | Initially, one determination by each method for each source of supply |
| vi) | Water absorption of aggregates | - | One test set of 3 representatives specimens for each source of supply |
| vii) | Sand equivalent | - | One test set of 3 representatives specimens for each source of supply |
| viii) | Plasticity Index | - | One test set of 3 representatives specimens for each source of supply |
| ix) | Polished Stone Value | - | One test for each source of supply |
| x) | Percentage of fractured faces | - | When gravel is used, one test per 350 M ³ of aggregate |
| xi) | Mix grading | - | One set of tests on individual Constituents and mixed aggregate From the dryer for each 400 tons of mix subject to a minimum of two tests per plant per day. |

- xii) Stability of Mix - For each 400 tones of mix produced, a set of 3 Marshall specimens to be prepared and tested for stability, flow value, density and void content subject to a minimum of two sets being tested per day.
- xiii) Water sensitivity off Mix (Retained Tensile Strength) - Initially one set of 3 representative specimens for each source of supply. subsequently when warranted by changes in the quantity at aggregate. (if required)
- xiv) Binder content - One set for each 400 tones of mix subjected to minimum of two testes per day
- xv) Control of temperature of Binder in Boiler, aggregate in the dryer and mix at the time of laying and rolling - At regular close intervals
- xvi) Rate of spread of mixed Material - After every 5th truck load and layer thickness.
- xvii) Density of compacted layer - One test per 700 Sqm. area.
- xviii) Moisture Susceptibility of Mix - One test for each mix type whenever there is change in the quality of coarse aggregate or fine aggregate

REQUIREMENTS MIX DESIGN FOR BITUMINOUS CONCRETE

TABLE 500- 11

Minimum Stability (KN at 60 ⁰ C)	9.0
Minimum flow (mm)	2.00
Maximum flow (mm)	4.00
Compaction level (Number of Blows)	75 blow on each of the two faces of the Specimen
Marshall Quotient	2-5 as per MS-2
% air voids	3-5
Percent air voids in Mineral aggregate (VMA)	As per Table 500-12 of MORTH
Percent air voids filled with bitumen (VFB)	65- 75

ROLLING:

- Initial Rolling - 8 to 10 tons capacity static weight smooth roller
- Intermediate Rolling- 8 to 10 tones capacity static weight Vibratory roller or 12 to 15 tons capacity P.T.R.
- Finish Rolling - 6 to 10 tones capacity static weight tandem roller

Rolling shall be continued till the required density with respect to the laboratory Marshall Density is achieved. All the activities shall be done as per the contract specifications. The mix shall be prepared in an approved hot mix plant.

- Minimum two test per plants per day

Item No8 Concrete For Structures

All materials shall conform to the MORTH Specifications & relevant IS Codes for cement (OPC-43), aggregate, water, admixture and Steel etc.

GRADING OF CONCRETE

GRADE DESIGNATION	Specified characteristic compressive strength of 150 mmx150mmx150mm cubes at 28 days, in M Pa tested as per IS-512	Minimum Cement Content	Maximum Water Cement Ratio
M 15	15	250	.045
M 20	20	310	0.45
M 25	25	360	0.45
M 30	30	360	0.45
M 35	35	380	0.45
M 40	40	380	0.45

Please refer table no.-1700-2 MORTH

Minimum cement content and maximum water cement ratio shall be as per MORTH table 1700.2 / IS-10262

COARSE AGGREGATE

Table No-1000-1 of MORTH specification 2013 & IS 383

Sl. No.	Test	Test Method	Min frequency	Acceptance rage			
1	Flakiness Index	IS – 2386 PART – I	At every 100 M ³ or part thereof	Not more than 35%			
2	Grading Requirement	IS – 2386 PART – I	- DO-	IS – SIEVE SIZE	% by wt. passing the sieve		
					40 mm	20 mm	12.5 mm
				63 mm	100	-	-
				40 mm	95-100	100	-
				20 mm	30-70	95-100	100
12.5 mm	-	-	90-100				
10 mm	10-35	25-55	40-85				
4.75 mm	0-5	0-10	0-10				
3	Impact value Or Los Angeles abrasion value	IS – 2386 PART – IV	-DO-	A.I.V. – MAX 45% L.A.A.V. – MAX 40%			
4	Specific gravity & void content	IS – 2386 PART – II	-DO-				
5	Water absorption	IS-2386 PART – II	-DO-	MAX 2%			
6	Moisture content	IS-456 & 383	One per stack of 100 m ³ or part thereof and in monsoon time every day before starting of work	Water content of concrete will be decided accordingly.			
7	Soundness	IS-2386 PART V	One per source	Sodium Sulphate – 12% Max. Magnesium Sulphate – 18% Max.			
8	Deleterious materials	IS – 2386 PART – II	-DO-	As per IS – 383			
9	Acid & alkali reactivity	IS – 2386 PART-VII	-DO-	As per IS – 383			
10	Petrographic	IS-2386	-DO-	As per IS – 383			

	Examination	PART-VIII		
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SAND/FINE AGGREGATE

Shall conform to table 1000-2 of MORTH specifications-2013 & IS-383

Sl. No.	Test	Test Method	Min frequency	Acceptance rage
1	Fineness Modulus	IS-2386 Part-I	Before every Concrete	Not less than 2.0 Not more than 3.5
2	Grading Requirements	IS-2386 Part-I	-DO-	As per Table 1000-2 of MORTH Specification
3	Silt Content	IS-2386 Part-II & IS 383	-DO-	As per IS code
4	Moisture Content	-	Every day before start of work	Water quantity to be adjusted accordingly in the design mix.

TEST FOR MATERIALS WATER

Sl. No.	Test	Test Method	Min frequency	Acceptance rage
1	PH Value	Section 1010 of MORTH Specifications and IS-3025-1964	Every Source/	Not less than 6
2	Chlorides	-Do-	For every source	Max. 250 mg/lit. In case of structures of length 30 m and below, this may be increased upto 1000 mg/lit.
3	Sulphates	-Do-	-Do-	Max 500 mg/lit
4	Organic solids	-Do-	-Do-	Max 200 mg/lit
5	Inorganic Solids	-Do-	-Do-	Max 3000 mg / lit
6	Suspended Solids	-Do-	-Do-	Max 2000 mg/lit
7	Qty. of 0.1 normal N ₂ OH to neutralize 200 ml sample of Water	MORTH clause 1010	-Do-	Not more than 2 ml.
8	Qty. of 0.1 normal HCL to neutralize 200 ml sample of Water	-Do-	-Do-	Not more than 10 ml

CEMENT ORDINARY PORTLAND CEMENT

Sl. No	Test	Test Method	Min Frequency	Acceptance Range
1	Fineness, by Blaine's air permeability method	IS-4031 Part 2	For every consigned	Not less than 225
2	Compressive strength	IS-4031 Part 6	"	As per the provision of IS codes
3	Setting time I) Initial II) Final	IS-4031 Part 5	" "	Not less than 30 Minutes Not more than 600 Minutes
4	Total chloride content (%) by mass of cement	IS-12423 – 1988	For each source	Not more than 0.05%

Steel Reinforcement Bars

Shall be Thermo mechanically Treated Bars (Fe 500) conforming to IS-1786

Sl. No.	Test	Test Method	Min frequency	Acceptance rage
1	Wt In kg/m	IS-1786	For every consignment	As per IS-1786
2	0.2% proof stress/yield stress	IS-1608-1972	-Do-	Min 500 Mpa
3	Tensile strength	IS-1608-1972	-Do-	8% more than the actual 0.2% proof stress but not less than 545 Mpa
4	% elongation on a gauge length of 5.65 A where A=sectional Area of test pieces	-Do-	-Do-	12.0% Min
5	Bend & Re-bend Test	IS-1599-1974	-Do-	Should be Satisfactory

The cement content (OPC alone) shall be as less as possible but not less than the quantities specified in the MORTH Specifications. In no case shall it exceed 450 kg/cum & minimum 340 Kg. /Cum.

Prior to the start of construction the mix design shall be submitted to Authority Engineer for their review. The mix design shall be verified with Trial batches in the concrete batching plant. No concrete shall be placed in the work until the Engineer approves the materials and the mix design of which it is composed. The Sub Contractor shall design all the concrete mixes called for on the drawing, making use of the ingredients, which have been approved by the Engineer.

The Mix shall have the consistency, which shall allow proper placement and consolidation in the required position. Every attempt shall be made to obtain uniform consistency.

Additional Requirements

Total chloride content as percentage of mass of cement shall be limited to values given below:

- Pre-stressed concrete - 0.06%
- Reinforced concrete exposed to sea water- 0.06%
- Other Reinforced concrete - 0.01%

The total sulphuric anhydride (SO₃) content in the concrete is to be limited to 4% of cement. Use of admixtures in concrete may be required under the contract to promote special properties in the finished concrete or may be proposed by the Contractor to assist him in compliance with the Specification.

The maximum size of coarse Aggregate for concrete to be used in various components shall be as per Table no. 1700-7 of MORTH Specifications.

When it is necessary to deposit concrete under water concrete it shall contain 10% more cement than that required for the same mix placed in the dry. Concrete shall not be placed in water having temperature below 5 °C. All under water concreting shall be carried out by tremie method only. The temperature of concrete, when deposited shall not be less than 16 degree Celsius or not more than 33 °C.

Concrete shall be protected during the first stage of hardening from loss of moisture and from the development of temperature differential within the concrete sufficient to cause cracking.

The methods used for curing shall not cause damage of any kind to the concrete. Curing shall be continued for as long as may be necessary to achieve the above objectives but in any case for at least 14 days or until the concrete is covered by later construction whichever is the shorter period.

The curing process shall commence as soon as the concrete is hard enough to resist damage from the process, and in the case of large area or continuous pours, shall commence on the completed section of the pour before the rest of the pour is finished.

Water used for curing shall be of the same quality as that used for mixing. Curing compound shall become stable and impervious to the evaporation of water from the concrete surface within 60 minutes of application. The material shall not react chemically with the concrete and shall not crack, peel or disintegrate within 3 weeks after the application.

Immediately after removing the forms, exposed bars shall be cut to a depth of at least 50 mm below the surface of concrete and the resulting holes shall be filled with cement mortar. All fins caused by form joints, all cavities, honeycomb spots, broken edges etc. shall be thoroughly cleaned and rectified by mortar of cement and fine aggregates. All construction and expansion joints in the concrete work shall be tooled and free from any mortar or concrete.

CONCRETE: QUALITY OF WORK

Check	Method	Frequency	Accepted range
I. Prior to concreting 1. Mix design 2. Weigh batching 3. Line & level 4. Formwork 5. Placing of reinforcement 6. Plant & Equipment 7. Adequate man power 8. Curing Arrangement 9. Walk-way for inspection 10. Safety arrangement 11. Lighting, if night work		For every change of source For every concreting operation	To conform to the respective specifications To be Satisfactory
II. Batching and pouring of concrete 1. Mixing 2. Transportation, placing and compacting of Concrete 3. Construction of Joint 4. Collection of Test cubes		-Do-	-Do-
III. Post – Concreting 1. Curing 2. Stripping side shutters 3. Stripping soffit shutters 4. Removal of props		-Do-	-Do-
IV. Quality of workmanship (Clause 1700 OF MORTH specification)			-Do-

Sl. No.	Check	Method	Frequency	Acceptance Range	
1	Min Strength of concrete	IS-512	For every concrete Operation	As per approved design and drawing	
2	Minimum cement content and Max. w/c ratio		-Do-	-Do-	
3.	Maximum Cement Content		-Do-	450 kg/cum(OPC)	
4	Consistency by slump test	IS-516	-Do-	Type of Structure	Slump in mm

				RCC with widely spaced reinforcement RCC with fairly spaced reinforcement RCC & PSC with highly congested reinforcement. Underwater concrete through tremie e.g. butto plug, cast in situ pilling	40-50 50-75 75-125 100-200
5	Compressive strength of working cubes (28 days)		As per Table 1700-9 of MORTH - 2013	1) Mean strength determined from any group of 3 consecutive samples should exceed the specified characteristic strength 2) Strength of any sample is not less than specified characteristic strength minus 3.5 MPa	

FREQUENCY

Quantity of Concrete in m ³	No. of Samples
1-5	1
6-15	2
16 – 30	3
31-50	4
51 & above	4 plus one addl. For each addl. 50 m ³ or part thereof

MORTAR

Mortar shall be composed of fine aggregate and ordinary Portland cement. The mix proportions shall be as stated on the drawings or elsewhere in the specification.

The mixing shall be done in a mechanical mixer. Hand mixing can be restored to as long as uniform density of mix and its strength are assured subject to prior approval of the Engineer.

Mortar shall be mixed only in such quantity as required for immediate use.

Check List

- 1) Working benchmarks shall be established with reference to B.M. given by the Client
- 2) Levels of working B.M. to be got approved by the Client
- 3) Survey instruments
 - i. Leveling Instruments : Precision automatic levels having standard deviation of 5 mm/km .
 - ii. Measurement of Angle: Total Station having an accuracy of Two Second
 - iii. Measurement of distance: Distomate (Electronic distance meter)
- 4) A proper record of all benchmarks, survey control points and setting out points with suitable supporting sketches should be maintained.

SUB STRUCTURE

Sl. No.	Test	Specification	Frequency	Specified Value
1	Material	Most specification-2013 Section 1000	As specified	
2	Form Work	Section 1500 of MORTH Specification- 2013	For each member	
3	Concreting	As per specification	For each concreting	
4	Tolerance in Concrete elements	Clause 2208 of MORTH specification	Each Member	

Variation in c/s dimensions	+ 10 mm, - 5 mm
Misplacement from specified position in plan	10 mm
Variation of level at Top	\pm 10 mm
Variation of R.L. of bearing Area	\pm 5 mm
Variation from plumb over full height	\pm 10 mm
Surface irregularities measured with 3m straight edge <ul style="list-style-type: none"> • All surfaces except bearing areas • Bearing area 	5 mm 3 mm

SUPERSTRUCTURE

Sl. No.	Test	Specification	Frequency	Specified Value
1	Materials	To conform to section 1000 of MORTH Specification test as indicated in the manual	As indicated	As indicated
2	Dimensions line and level	As approved Drawing	Each Member	As per approved drawing
3	Form Work	Section 1500 of MORTH specification	Each Member	
4	Steel reinforcement	Section 1600 of MORTH Specification	-Do-	
5	Structural Conc.	Section 1700 of MORTH specification	-Do-	
6	Prestressing	Section 1800 of MORTH specification	-Do-	
7	Quality and workmanship	Section 2300 of MORTH specification	-Do-	
8	Tolerance for cast-in-situ super-structure	CI2306.2 of MORTH specification	-Do-	

TOLERANCE IN VARIATIONS

1	Thickness of top and bottom slab for box girder and bottom flange for T girder or slab	- 5 mm to + 10mm
2	Web Thickness	- 5 mm to + 10 mm
3	Overall width or depth	± 5 mm
4	Length overall and length between bearing	Not more than ± 10 mm or $\pm 0.1\%$ of span which ever is lesser
5	Surface irregularities on 3m straight edge	5 mm

Item No9 Filter Media, Backfilling behind Abutment & Wing Wall

This item of work deals with activities of Filter media, Backfilling behind Abutments and Wing Wall with approved materials as per the terms of contract conditions, approved Drawings. This item of work shall conform to the clause 2504.2.2, 305 & 309.3.2 and IRC – 78 of the Technical specifications.

Filter Media is proposed from the tests conducted in the laboratory and checked for its suitability as per Clause 2504.2.2 of MORTH Specification.

Back filling will be done with the material from approved borrow areas.

Procedure

- a) Initially filter media is laid with coarse filter towards weep hole of Abutment and finer material towards earthen side layer by layer as per the technical requirement.
- b) After completion of each filter media layer to the required suitable height back filling will be done simultaneously in layers matching the height with the filter media layer till it reaches the existing ground level behind Abutment and compacted as per requirement.
- c) Embankment construction will also be taken up either separately or simultaneously along with filter media and back filling layers.

Item No10 Stone Pitching

This work consists of covering the slopes of road embankments with stones over a layer of granular material (Filter).

As per approved drawings and MORTH Specifications.

The stone will be sound, hard, durable and fairly regular in shape. Quarry stone would be used. The round boulders and the stones subjected to the marked deterioration by water or weather will not be accepted.

The material for filter will be sand, gravel, stone or coarse sand and it will prevent escape of the embankment material through the voids of the stone pitching and as well as to allow free movement of water without creating any uplift head on the pitching.

Item No11 Road Marking

Hot applied thermoplastic road marking paint will be carried as per section -800.3 of MORTH Specification 2013 and as approved by engineer in charge.

This work consists of marking traffic strips using thermoplastic compound meeting the requirements of section -800 of MORTH.

As per the contract drawings and MORTH article 800.3, IRC-35 & IRC-54

Thermoplastic Material

The Thermoplastic material should meet the requirement of table 800-9 of MORTH specification and reflectorizing glass beads confirming the requirement of table 800-10

Composition

The pigment, beads and aggregate will be uniformly dispersed in the resin. The material will be free from all skins, dirt and foreign objects and will comply with requirements given in Table 800-3 of MORTH.

Properties

The properties of thermoplastic material, when tested in accordance with ASTM D 36 / BS – 3262 will be as follows.

- a) Luminance : For white, daylight luminance at 45 degrees – 65% min as per AASHTO M 249
- b) Drying Time : When applied at a temperature specified by the manufacturer and to the required thickness, the material will set to bear traffic in not more than 15 minutes.
- c) Skid Resistance : Not less than 45 as per BS – 6044.
- d) Cracking resistance at low temperature : The material shall show no cracks on application to concrete blocks.
- e) Softening Point : 102.5 +/- 9.5 deg⁰.C as per ASTM D 36.
- f) Flow resistance : Not more than 25% as per AASHTO M 249.
- g) Yellowness Index : For white thermoplastic paint not more than 0.12 as per AASHTO M 249.

Reflectoring Glass Beads

Reflectoring glass beads are two types. Type 1 beads are those, which are a constituent of the basic thermoplastic compound vide Table 800-3 and Type 2 beads are those, which are sprayed on the surface of hot paint line vide clause 803.6.3. The glass beads shall be transparent, colorless and free from milkiest color , dark particles and excessive air inclusions and these will conform to the requirements given in Table 800.10 of MOST.

Graduation Requirements of Glass Beads

Sieve Size	Type - 1 (% Retained)	Type - 2 (% Retained)
1.18 mm	0 - 3	-
850 μ	5 - 20	0 - 5
600 μ	-	5 - 20
425 μ	65 - 95	-
300 μ	-	30 - 75
180 μ	0 - 10	10 - 30
180 μ Below	-	0 - 15

Roundness

The glass beads will have a minimum of 70% true spheres.

Refractive Index

The glass beads will have a minimum refractive index of 1.50.

Free Flowing properties

The glass beads shall be free of hard lumps and clusters and shall dispense readily under any conditions suitable for paint striping. They shall pass the free flow-test.

Surface Preparation and Application

- a) The surface will be cleaned by broom / wire brush and the surface are free from dirt, grit and all other foreign matter.
- b) In case the paint is to be laid over cement concrete pavement, a coat of primer will be applied on the surface to ensure proper bonding of paint with the surface.
- c) The pavement temperature will not be less than 10°C during application.
- d) Marking will be done before lying of paint thermoplastic Road Marking Paint will be heated in mechanically agitated pre-heater. The normal workable temperature of thermoplastic road marking paint will be between 150°C – 200° C (as per recommendation of manufacturer)
- e) Thermoplastic road marking paint thereafter will be transferred in paint applicator. The paint will thereafter be applied with paint applicator on the pre marked lines.
- f) Thermoplastic paint will be applied in intermittent or continuous lines of uniform thickness of atleast 2.5 mm. Where arrow or letters are to be provided, thermoplastic compound may be hand-sprayed. In addition to the beads included in the material, a further quantity of glass beads of Type – 2, conforming to the specification will be sprayed uniformly into a mono-layer on to the hot paint line in quick succession of the paint spraying operation. The glass beads will be applied at the rate of 250 gms per square meter area.
- g) The finished lines will be free from ruggedness on sides and ends and be parallel to the general alignment of the carriageway. The upper surface of the lines will be level, uniform and free from streaks.

- h) Though the drying time of paint is 15 minutes, yet considering the temperature, the traffic will be allowed after 30 minutes.

Item No12 Traffic Signs

Traffic signs will be installed as per Clauses given in the MORTH specification 2013 section 8000 for regulating traffic movement.

As per the contract drawings and technical specification Clause No: 800 & IRC-54.

Necessary manpower and display boards will be placed to regulate the flow of traffic without causing congestion or traffic jam.

The various materials and fabrication of traffic signs will be conform as per technical specification Clause No: 801.2 of MORT&H.

Traffic Signs Having Retro-reflective Sheeting

The retro-reflective sheeting used on the sign will be conforming as per technical specification Clause No: 801.3 of MORT&H.

High intensity grade sheeting

High intensity grade sheeting used on the sign shall be conform as per technical specification Clause No: 801.3.2 of MORT&H, and dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM Standard E : 810) will be conform to the requirements given in Table 800-1 of MORT&H.

Messages/borders

The messages (legends, letters, numerals etc.) and borders will be conform to the requirements as per technical specification Clause No: 801.3.4 of MORT&H.

For screen-printed transparent colored areas on white sheeting, the co-efficient of retro-reflection shall not be less than 50 percent of the values of corresponding colour in Tables 800-1 and 800-2, as applicable.

Cut-out messages and borders, wherever used, shall be made out of retro-reflective sheeting (as per Clause 801.3.2 or 801.3.3 as applicable), except those in black which shall be of non-reflective sheeting.275

Colour The Colors used on the sign will be conforming as per technical specification Clause No: 801.3.7 of MORT&H.

Adhesives The sheeting will either have a pressure sensitive adhesive of the aggressive-tack type will be conforming as per technical specification Clause No: 801.3.8 of MORT&H.

Fabrication The Fabrications will be conforming as per technical specification Clause No: 801.3.10 of MORT&H.

Item No-13 : Providing and Laying of PLASTITRAK/Roll-on Surfacing Material :A Solvent Free, High Build, Two pack, Seamless, Tough, skid resistant 1.0-1.5 mm thick red (or as required) based on Gloss and color retaining Acrylic Cross Linking Resin System for Cycle track and similar applications including surface cleaning and cost of all material etc. complete.

General:

The following documents are required to be furnished along with the application of PLASTITRAK/Roll on surfacing material as an essential condition of the tender:

1. A current dated Authorization certificate issued by the Cold Plastic manufacturer. Certificate issued by distributor dealer/ power of attorney holder shall be disqualified.
2. The Indian Cold Plastics manufacturer shall have an International collaboration / tie up with a company of repute having a manufacturing & supply experience for supply of two component Cold plastic Road surfacing materials.
3. The Indian Cold Plastics manufacturer shall supply a third party test certificate from the Principal International Collaborator / tie up company for Two component Cold plastic Road surfacing material
4. The Indian Cold Plastics manufacturer shall be an ISO 9001 certified company for manufacturing and supply of two component Cold plastic Road surfacing material.
5. The Indian manufacturer shall have a testing facility / laboratory for a) wear resistance b) Spectro -photometer for color matching.
6. The Indian Cold Plastics manufacturer shall provide a warranty certificate for performance for a period of 2 years
7. The bidder shall provide an authorization certificate for specific tender from the Indian manufacturer qualifying the above criteria's for the tender
8. The Bidder shall produce the original Batch Test Certificate for the Cold Plastics materials from the Indian manufacturer
9. Product Specification for Roll-On Surfacing material : PLASTITRAKHIGH BUILD ROLL-ON ROAD SURFACING MATERIAL
 - i. TYPE: 2-PACK COLDCURING SOLVENT FREE COMPOUND, ACRYLIC RESINS FOR HAND APPLICATION
 - ii. Viscosity:-Thick fluid compound
 - iii. Density :Approx 1.8 gram/ cm³
 - iv. Skid Resistance :-> 45 S.R.T.
 - v. Hardening Time:-Approx.20 minutes by 30 degree C
 - vi. Flashpoint :Approx 10 degree C
 - vii. Storage Stability:-At Least 6 months if stored in a cool place
 - viii. Mixing ratio:-2 sachets of hardener to 20 kg plastittrak Roll on base
 - ix. Potlife (mixed):-10 minutes by 20 degreeC.

Application: In one coat (single application) with requirement of primer on smooth surface

Laying / Painting shall be done by machine. For locations where painting cannot be done by machine, approved manual methods shall be used with prior approval of the Engineer.

The Contractor shall maintain control over traffic while painting operations are in progress so as to cause minimum inconvenience to traffic compatible with protecting the workmen. The material shall be applied in fresh condition. After transfer to the laying apparatus, the material shall be laid at a temperature within the range specified by the manufacturer the particular method of lying being used. The paint shall be applied using a screed or extrusion machine.

The pavement temperature shall not be less than 10°C during application. All surfaces to be marked shall be thoroughly cleaned of all dust, dirt/grease, oil and all other foreign matter before application of the paint.

The material, when formed into traffic stripes, must be readily by placing an overlay of new material directly over an old' line of compatible material. Such new material shall so bond itself to the old line that no splitting or separation takes place.

Mode of Measurement: Per Sq.mts basis

Item No. 14 &15 : Pavement marking for showing symbol of CYCLE on White/ yellow/ Blue or Suitable colored as directed by engineer in charge for cycle track , at junctions (and at c/c 50 m t inside for item no,3) with hot applied thermoplastic paints of 2.5 mm thickness including reflectorising glass beads @ 250 gms per sqm area as per IRC:35 .

Item No 16 : Thermoplastic Road Marking of Cycle track: Providing & laying hot applied thermoplastic Compound in white/yellow colour in marking of edge lines(15cm wide) etc.2.5mm minimum thickness as directed including cost of marking compound, making arrangement for heating and its application with requisite machine, making arrangement for spraying of drop-on glass beads etc. @ 250 gms. per sqm area, thickness of 2.5mm is exclusive of surface applied glass beads as per IRC 35-1997 & Clause 803 of MORT&H specification. The finished surface to be level, uniform and free from streaks and holes and also including cost of all material, labor, machinery etc. required for proper completion

General : The thermoplastic material shall be homogeneously composed of aggregate, pigment, resins and glass reflectorizing beads.

Requirements:

1. Composition: The pigment, beads, and aggregate shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt and foreign objects and shall comply with requirements indicated in Table 800 3.

TABLE 900 3. PROPORTIONS OF CONSTITUENTS OF MARKING MATERIAL
(Percentage by weight)

Component	White	Yellow
Binder	18.0 min.	18.0 min.
Glass Beads	30 40	30 40
Titanium Dioxide	10.0 min.	
Calcium Carbonate and Inert Fillers	42.0 max.	See

2. Properties: The properties of thermoplastic material, when tested in accordance with ASTM D36/BS 3262 (Part 1), shall be as below:
 - a. Luminance : White: Daylight luminance at 45 degrees 65 per cent min. as per AASHTO M 249; Yellow: Daylight luminance it 45 degien 45 per cent min. as per AASHTO M 249
 - b. Drying time: When applied at a temperature specified by the manufacturer and to the required thickness, the material shall set to ben traffic in not more than 15 minutes.
 - c. Skid resistance: not less than 45 as per BS 6044.
 - d. Cracking resistance at low temperature: The material shall show no cracks on application to concrete blocks.
 - e. Softening point 102.5 :t 9.50 C as per ASTM D 36.
 - f. Flow resistance Not more than 25 per cent as per AASHTO M 249.
 - g. Yellowness Index (for white thermoplastic paint): not more than 0.12 as per AASHTO M 249
3. Storage Life : The material shall meet the requirements of these Specifications for a period of one year. The thermoplastic material must also melt uniformly with no evidence of skins or un-melted particles for the one year storage period. Any material not meeting the above requirements to be replaced by the manufacturer/ supplier/Contractor.
4. Reflectorisation : Shall be achieved by incorporation of beads. the grading and other properties of the bonds shall be as specified in Clause 803.4.3.
5. Marking : Each container of the thermoplastic material shall be clearly and indelibly marked with the following information:
 - The name, trade mark or other means of identification of manufacturer
 - Batch number
 - Date of manufacture
 - Colour (white or yellow)
 - Maximum application temperature and maximum safe beating temperature.
6. Sampling and testing: The thermoplastic material shall be sampled and tested in accordance with the appropriate ASTM/BS method. The Contractor shall furnish to the Employer a copy of certified test reports from the manufacturers of the thermoplastic material showing results of all tests specified herein and shall certify that the material meets all requirements of this Specification.

Reflectorized glass beads

General : This Specification covers two types of glass beads to be used for the production of reflectorized pavement markings

- Type I beads are those which are a constituent of the basic thermoplastic compound vide Table 800 3 and Type 2 beads are those which are to be sprayed on the surface vide Clause 803.6.3.
- The glass beads shall be transparent, colourless and free from milkiness, dark particles and excessive air inclusions.
- These shall conform to the requirements spelt out in Clause 803.4.3.3.

Specific requirements

- a. **Gradation:** lle glass beads shall meet the Gradation requirements for the two types as given in Table 8W 4.

TABLE 800 4. GRADATION REQUIREMENTS FOR GLASS BEAD

Per cent retained	Type I	Type II
Sieve size		
1.18 mm	0 to 3	
850 micron	5 to 20	0 to 5
600 do	5 to 20	
425 do	65 to 95	
300 do	30 to 75	
180 do	0 to 10	10 to 30
below 180 micron	0 to 15	

- b. **Roundness:** The glass beads shall have a minimum of 70 per cent true spheres.
- c. **Refractive index:** The glass beads. shall have a minimum reflective index of 1.50.
- d. **Free flowing properties:** The glass beads shall be free of hard lumps and clusters and shall dispense readily under any conditions suitable for paint striping. They shall pass the free flow test.
- e. **Test methods:** The specific requirements shall be tested with the following methods:
- Free flow test: Spread 100 grams of beads evenly in a 100 mm diameter glass dish. Place the (fish in a 250 nun inside diameter desiccator which is filled within 25 mm of the top of a desiccator plate with sulphuric acid water solution (specific gravity 1. 10). Cover the desiccator and lot it stud for 4 hours at 20 to 29 degree C. Remove sample from desiccator, transfer beads to a pan and inspect for lumps or clusters. Then pour beads into a clean, dry glass funnel having a 100 nun stem and 6 nun orifice. If necessary, initiate flow by lightly tapping the funnel. 1"he glass spheres shall be essentially free of lumps and clusters and shall flow freely through the funnel.
 - The requirements of gradation, roundness and refractive index of glass beads and the amount of glass beads in the compound shall be tested as per BS 6088 and BS 3262 (Part 1).
 - The Contractor shall furnish to the Employer a copy of certified test reports from the manufacturer of glass beads obtained from a reputed laboratory showing results of all tests' specified herein and shall certify that the material meets all requirements of this Specification. However, if so required. these tests may be carried out as directed by the Engineer.

Application properties of thermoplastic material

The thermoplastic material shall readily get screeded/ extruded at temperatures specified by the manufacturers for respective method of application to produce a line of specified thickness which shall be continuous and uniform in shape having clear and sharp edges.

The material upon heating to application temperatures shall not exude fumes, which are toxic, obnoxious or injurious to persons or property.

Preparation:

- (i) The material shall be melted in accordance with the manufacturer's instructions in a heater fitted with a mechanical stirrer to give a smooth consistency to the

thermoplastic material to avoid local overheating. The temperature of the mass shall be within the range specified by the manufacturer, and shall on no account be allowed to exceed the maximum temperature stated by the manufacturer. The molten material should be used as expeditiously as possible and for thermoplastic material which has natural binders or is otherwise sensitive to prolonged heating, the material shall not be maintained in a molten condition not more than 4 hours.

- (ii) After transfer to the laying equipment, the material shall be maintained within the temperature range specified by the manufacturer for achieving the desired consistency for laying.

Properties of finished road marking

- The stripe shall not be slippery when wet.
- The marking shall not lift from the pavement in Freezing weather.
- After application and proper drying, the stripe shall show no appreciable deformation or discolouration under traffic and under road temperatures up to 600C
- The marking shall not deteriorate by contact with sodium chloride, calcium chloride or oil drippings from traffic.
- The stripe or marking shall maintain its original dimensions and position. Cold ductility of the material shall be such as to permit normal. movement with the road surface without chopping Or cracking.
- The colour of yellow. Marking shall conform to IS Colour No. 356 as given in IS: 164.

Reflectorised Paint: If used, shall conform to the Specification by the manufacturers and approved by the Engineer. Reflectorising glass beads for reflectorising paints where used shall conform to the requirement of Clause 803.4.3.

Application: Marking shall be done by machine. For locations where painting cannot be done by machine, approved manual methods shall be used with prior approval of the Engineer. The Contractor shall maintain control over traffic while painting operations are in progress so as to cause minimum inconvenience to traffic compatible with protecting the workmen.

The thermoplastic material shall be applied hot either by screeding or extrusion process. After transfer to the laying apparatus, the material shall be laid at a temperature within the range specified by the manufacturer the particular method of lying being used. The paint shall be applied using a screed or extrusion machine.

The pavement temperature shall not be less than 10'C during application. All surfaces to be marked shall be thoroughly cleaned of all dust, dirt/grease, oil and all other foreign matter before application of the paint.

The material, when formed into traffic stripes, must be readily renewable by placing an overlay of new material directly over an old' line of compatible material. Such new material shall so bond itself to the old line that no splitting or separation takes place.

Thermoplastic paint shall be applied in intermittent or continuous lines of uniform thickness of at least 2.5 mm unless specified otherwise. Where arrows or letters are to be provided, thermoplastic compound may be hand sprayed. In addition to the beads included in the material, a further quantity of glass beads of Type 2, conforming to the above noted

Specification shall be sprayed uniformly into a mono layer on to the hot paint line in quick succession of the paint spraying operation. The glass beads shall be applied at the rate of 250 grams per square meter area.

The minimum thickness specified is exclusive of surface applied glass beads. The method of thickness measurement shall be in accordance with Appendices B and C of BS 3262 (Part 3).

The finished lines shall be free from ruggedness on sides and ends and be parallel to the general alignment of the carriageway. The upper surface of the lines shall be level, uniform and free from streaks.

USAGE CONFORMANCE CERTIFICATE

CLIENT

NAME _____

CONVERTER

NAME _____

CONTRACTOR

NAME _____

WORK

ORDER

DETAILS _____

Details of the thermoplastic painting work is carried out using Name of Manufacturer

sr no. Type of work with location size Qty Remarks

Certified that the above Hot Applied Thermoplastic Road Marking have been manufactured using Brand Name of thermoplastic material and Glass bid (according to ASTM D 36/BS3262) and are covered by

the Warranty No.....Dated.....

Which will expire on dated.....

Name of Thermoplastic Material Manufacturer

Name of Converter

Authorized Signatory

Authorized Signatory

Measurements for Payment

- The painted markings shall be measured in sq. metres of actual area marked (excluding the gaps, if any).
- In respect of markings like directional arrows and lettering, etc., the measurement shall be by numbers.

- Contractor shall have to Submit the manufacture test certificate before Starting the work at no Extra cost
- Contractor Shall have to Submit the test report of Both thermoplastic paint and glass beads from approved Laboratory for paint & glass beads at no extra cost before producing bill and then after on end when asked by BSCDCL.
- Contractor shall have to submit the filled form as mentioned above in Soft (Signed & scanned) and two hard copies.

Rate

- The Contract unit rate for road markings shall be payment in full compensation for furnishing a labour, materials, tools, equipment, including all incidental costs necessary for carrying out the work at the site conforming to these Specifications complete as per the approved drawing(s) or as directed by the Engineer and all other incidental costs necessary to complete the work to these Specifications.

Item No. 17 &18 : Supplying and fixing at site retroreflectorised CYCLE TRACK / ONLY FOR CYCLE type sign boards/signs made of encapsulated lense type of reflective sheeting fixed over aluminum sheeting 2.0 mm thick complete including vertical pipes/ angles/ posts etc. all complete as per drawing as per direction of Engineer in Charge .

Item No. 19 : Providing and fixing Bollard (Swiss Type) at cycle track entry point to prevent othe vehicles at distance of 0.50 m c/c/, made out of 1.5mm CRC sheet ,height 140cms,bottom dia 23cm,top dia 12cm with direction plate of 30 cm dia fabricated necessary anchors as directed and also provide throughout length pipe of 25 NB for the strenthing of bollard and reflectorised Micro Prismatic Grade Sheet (Type XI)and three yellow strip 6 Inches wide of Type XI Retro reflective Sheeting, fixing with P.C.C M25 grade concrete(Foundation size 30cm×30cm×35cm)

The Swiss type bollard shall be approved from the Engineer-In charge before commencement of work.

1. Retro Reflective Sheeting

The retro reflective sheeting used on the signs shall consist of white or coloured sheeting having a smooth outer surface which has the property of retro reflection over its entire surface. It shall be weather resistant and exhibit colour fastness. It shall be new and unused and show no evidence of cracking, scaling, and pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having the sheeting tested for coefficient of retro reflection, daytime colour and luminance, shrinkage, flexibility, liner removal, adhesion, impact resistance, specular gloss and fungus resistance, 3 years outdoor weathering and its having passed these tests shall be obtained from International/Government Laboratory/Institute by the manufacturer of the sheeting and in case the certificate is obtained from international agency, it should also be obtained from Indian agency within 3 years of launching of product by the manufacture in abroad. Alternatively, a certificate conforming to ASTM Specification (D 4956-09) on artificial accelerated weathering requirements from a reputed laboratory in India can be

accepted provisionally. In such a situation, the Employer/Client, if so desires, could seek for a performance guarantee which would be released after receipt of certificate meeting the requirement of three years outdoor weathering of the sheeting.

1.1 Description of sheet:

Type XI Micro prismatic grade sheeting

Retro-reflective sheeting typically manufactured as a cube corner. The reflective sheeting shall be retro-reflective sheeting made of micro prismatic retro-reflective material. The retro-reflective surface, after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM D 4956-09) as indicated in **Table**

When totally wet, the sheeting shall show not less than 90 percent of the values, of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80 percent of its original retro-reflectance.

Table Acceptable Minimum Coefficient of Retro-reflection for Type XI Prismatic Grade Sheetin^A (Candelas per Lux per Square Metre)

Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown	Florescent	Florescent yellow	Florescent
0.1 ^B	-4°	830	620	290	83	125	37	25	660	500	250
0.1 ^B	+30°	325	245	115	33	50	15	10	260	200	100
0.2°	-4°	580	435	200	58	87	26	17	460	350	175
0.2°	+30°	220	165	77	22	33	10	7	180	130	66
0.5°	-4°	420	315	150	42	63	19	13	340	250	125
0.5°	+30°	150	110	53	15	23	7	5	120	90	45
1.0°	-4°	120	90	42	12	18	5	4	96	72	36
1.0°	+30°	45	34	16	5	7	2	1	36	27	14

A Minimum Co-efficient of Retro-reflection (R_A) ($\text{cd.lx}^{-1} \cdot \text{m}^{-2}$).

B Values for 0.1° observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

1.2 Adhesives

The sheeting shall have a pressure-sensitive adhesive of the aggressive-tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface, in a manner recommended by the sheeting manufacturer. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign.

The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting from

the sign base in one piece by use of sharp instrument. The sheeting shall be applied in accordance with the manufacturers' specifications.

1.3 Fabrication

Surface to be reflectorised shall be effectively prepared to receive the retro-reflective sheeting. The aluminum sheeting shall be de-greased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application

of retro-reflective sheeting. If the surface is rough, approved surface primer may be used.

After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease,

oil or other contaminants prior to the application of retro-reflective sheeting. Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure-sensitive adhesives shall be overlapped not less than 5 mm.

Where screen printing with transparent colours is proposed, only butt joint shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

1.4 Messages/Borders

The messages (legends, letters, numerals, etc.) and borders shall either be screen-printed or of cut out from durable transparent overlay or cut-out from the same type of reflective sheeting for the cautionary and mandatory sign boards. Screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. For the informatory and other sign boards, the messages (legends, letters, numerals etc.) and borders shall be cut-out from durable transparent overlay film or cut-out from the same reflective sheeting only. Cut-outs shall be from durable transparent overlay materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer. Whenever transparent overlay film is used for making any type of sign, the coloured portion of sign shall have coefficient of reflectivity not less than the reflectivity of type and colour of sheeting normally used, as per table. Cut-out messages and borders, wherever used, shall be either made out of retro-reflective sheeting or made out of durable transparent overlay except those in black which shall be of non-reflective sheeting or opaque in case of durable transparent overlay. Creating coloured areas by means of screen-printing with ink shall not be permitted.

Special Note:

(1) Contractor shall have to submit the manufacture test certificate of retro reflective sheet before Starting the work at no Extra cost

(1) Contractor Shall have to Submit the test report of retro reflective sheet from Govt. approved Laboratory testing of sheeting at no extra cost before producing First R.A bill and then after on end when asked by BSCDCL. The contractor shall not be paid extra for same.

(2) Contractor shall have to submit the filled form as mentioned below in Soft (Signed & Scanned) and two hard copies

Mode of payment:-

Item shall be paid in Number of bollard fixed at site shown by the Engineer in charge. Nothing Extra shall be paid for transportation of Bollards from manufacturing place to any site of work within BSCDCL limit.

Rate

The Contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site and incidentals to complete the work in accordance with the Specifications.

PART-III
SCHEDULE OF “B”
(On Separate Sheet)

Bhopal Smart City Development Corporation Limited
Name of Work: Development of Polytechnic Junction to Bharatmata Square Four
Lane Smart Road with External Electrification and Cycle Track
Corridor at Bhopal City

Schedule: B

a) Bill of Quantities As per UADD ISSR 2012 for Road Work

Sr. No.	SOR No.	Description	Unit	Quantity	Rate	Amount
1	2.3	Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead 1000 meter.				
(a)		Prestressed / Reinforced cement concrete grade M-20 & above	Cum	72.45	655.00	47,454.75
(b)		Rubble stone masonry in cement mortar.	Cum	1,524.90	150.00	2,28,735.00
(c)		Removing all type of hume pipes and stacking within a lead of 1000 metres including earthwork and dismantling of masonry works.				
		i) Diameter up to 600 mm	Meter	6.90	109.00	752.10
2	3.1	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto 1000 meters and as per relevant clauses of section-300.	Cum	9,604.40	98.00	9,41,231.46
3	3.2	Excavation for road way in ordinary rock including loading in a truck and carrying of excavated material to	Cum	11,738.71	142.00	16,66,897.44

		embankment site with in all lifts and leads upto 1000 meters and as per relevant clauses of section-300.				
4	3.8	Scarifying the existing bituminous road surface by mechanical means to a depth of 50 mm and disposal of scarified material with in all lifts and lead upto 1000 meters.	sqm	17,685.0 0	15.00	2,65,275.00
5	3.10	Construction of Embankment/Sub grade/ earth shoulders, as per clause 305.1.1 inclusive of operation necessary as per clause 305 & its sub-clauses, Where required but with approved materials obtained from excavation for road construction (vide clause 301.3.11) i/c consolidating the original ground by rolling as directed by the Engineer-in-charge but with a maximum of 6 passes of 8-10 tonne roller & i/c compaction and maintenance of surface during construction to ensure shedding & preventing ponding of water (clause 305.3.7), finishing i/c all lifts but excluding scarifying existing granular/bituminous road surface vide clause 305.6.	Cum	7,683.52	234.00	17,97,944.18
6	3.11	Construction of Embankment/Sub grade/ earth shoulders, as per clause 305 & its sub-clauses, Where required but with approved materials/soil like morrum CBR value not less then 7% i/c all lead & lifts i/c excavation, cost of watering, compaction and maintenance of surface during construction to ensure shedding & preventing ponding of water (clause 305.3.6)	Cum	29,892.8 4	272.00	81,30,851.63

		shaping & dressing (clause 305.3.7), finishing etc. complete but excluding scarifying existing granular/bituminous road surface vide clause 305.6.				
7	3.18	Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement: 2 fine sand) including testing of joints etc. complete.	meter			
	a)	Size 300 mm dia meter		4,890.00	445.00	21,76,050.00
8	4.1	Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with on prepared surface, mixing by mix in place method at OMC, and compacting with vibratory roller to achieve the desired density, complete in all respect and as per relevant clauses of section-400.				
	i)	for grading- II Material	Cum	11,580.66	614.00	71,10,525.24
9	4.5	Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density and as per relevant clauses of section-400.	Cum	12,499.59	951.00	118,87,113.66
10	4.7	Filling of existing median and Island above road level with	Cum	3,512.13	151.00	5,30,331.63

		approved material brought from borrow pits including excavation and all leads, spread, sloped and compacted and as per relevant clauses of section-400.				
11	5.1	Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.75 kg/sqm using mechanical/Manual means and as per relevant clauses of section-502.	sqm	49,998.38	26.00	12,99,957.75
12	5.2	Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor on the prepared bituminous/granular surface cleaned with mechanical broom and as per relevant clauses of section-503.				
	i)	.@ 0.25 kg per sqm (normal bituminous surfaces)	sqm	49,998.38	9.00	4,49,985.38
	ii)	.@ 0.30 kg per sqm (dry & hungry bituminous surfaces/granular surfaces treated with primer)	sqm	49,998.38	11.00	5,49,982.13
13	5.6	Providing and laying dense bituminous macadam with hot mix plant batch using crushed aggregates of specified grading, premixed with bituminous binder, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction complete in all respects and as per relevant clauses of section-507. (Only cement will be used as filler)				
	i)	for Grading I (80-100mm	Cum	2,889.65	7161.00	206,92,801.5

		thickness)				5
14	5.8	Providing and laying bituminous concrete with hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder, transporting the hot mix to work site, laying with a mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction in all respects and as per relevant clauses of section-509.(Only cement will be used as filler).				
	i)	for Grading I (50-65 mm thickness) with 60/70 bitumen	Cum	1,889.69	8223.00	155,38,879.76
15	8.1	Construction of cement concrete kerb with top and bottom width 115 and 165 mm respectively, 250 mm high in M 20 grade PCC on M-10 grade foundation 150 mm thick, foundation having 50 mm projection beyond kerb stone, kerb stone laid with kerb laying machine, foundation concrete laid manually, all complete and as per clause 408 of specifications.				
	i)	Using Concrete Batching and Mixing Plant	Meter	16,253.20	189.00	30,71,854.80
16	8.3	Providing and fixing of retro-reflectorised cautionary, mandatory and inforatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm (height from crown level of the road and bottom of the sign board shall not be less				

		than 1.5 m.) firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing including painting of vertical post as per specification.				
	i)	90 cm equilateral triangle	Each	6.00	3715.00	22,290.00
	ii)	80 cm x 60 cm rectangular	Each	10.00	4537.00	45,370.00
17	8.4	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75x75x6 mm (height from crown level of the road and bottom of the sign board shall not be less than 1.5 m.) firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing including painting of vertical post as per specification.	Sqm	4.50	7983.00	35,923.50
18	8.6	Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces and as per relevant clauses of section-800 & I.R.C.-67 including cost of paint etc. complete.	Sqm	5,308.64	44.00	2,33,580.16
19	8.10	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on	Sqm	3,562.50	900.00	32,06,250.00

		Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes and as per relevant clauses of section-800.				
20	13.1	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material etc. and as per relevant clauses of section 300 & 2100 in				
	i)	Ordinary rock/ Large boulder each more than 0.03 cum. Volume (Depth upto 3 m from av. Ground level)	Cum	11,950.1 2	371.00	44,33,496.00
21	13.5	Providing Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification and as per relevant clauses of sections 1400 with.				
	i)	Coursed rubble masonry(first sort)	Cum	514.80	2895.00	14,90,346.00
22	13.6	Providing and laying Plain/Reinforced cement concrete (mixed in concrete mixture) in open foundation including form work shuttering etc. complete as per drawing and technical specifications and as per relevant clauses of				

		sections 1500, 1700 & 2100 with .				
	i)	PCC Grade M15 with 40 mm maximum size of aggregate	Cum	1,748.00	3692.00	64,53,619.69
	ii)	PCC Grade M20 with 20 mm maximum size of aggregate	Cum	1,593.08	4259.00	67,84,919.20
	iii)	RCC Grade M25 with 20 mm maximum size of aggregate	Cum	7,315.13	4300.00	314,55,037.50
23	13.26	Supplying, fitting and placing un-coated HYSD bar reinforcement in foundation complete as per drawing and technical specifications and as per relevant clauses of sections 1600.	MT	489.97	56994.00	279,25,521.16
24	14.3	Providing Plastering with cement mortar (1:3) on brick work in sub-structure as per Technical specifications and as per relevant clauses of sections 1300.	sqm	3,432.00	84.00	2,88,288.00
25	14.4	Providing Stone masonry work in cement mortar 1:3 for substructure complete as per drawing and Technical Specifications and as per relevant clauses of sections 1400 in.	Cum			
	i)	Coursed rubble masonry(first sort)	Cum	374.40	2702.00	10,11,628.80
26	14.5	Providing and laying Plain/Reinforced cement concrete (mixed in concrete mixture) in sub-structure or complete RCC Box section as per drawing and technical specifications and as per relevant clauses of sections 1500, 1700 & 2200 in (Height above average ground level)	Cum			
	i)	PCC Grade M20 with 20 mm maximum size of aggregate		1,305.43	4317.00	56,35,524.04
	ii)	RCC Grade M25 with 20 mm maximum size of aggregate		1,975.95	4371.00	86,36,877.45
27	14.6	Supplying, fitting and placing HYSD bar reinforcement in	MT	166.63	57086.00	95,12,468.52

		sub-structure complete as per drawing and technical specifications and as per relevant clauses of sections 1600.				
28	14.8	Providing weep holes in Brick masonry/Plain/Reinforced concrete abutment, wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing face. Complete as per drawing and Technical specifications and as per clause 2706 of specifications.	Meter	2,050.45	131.00	2,68,608.95
29	14.9	Providing Back filling behind abutment, wing wall & return wall with Granular Material complete as per drawing and Technical specification and as per relevant clauses 305 of specifications & as per appendix 6 of IRC-78	Cum	2,511.44	529.00	1328550.70
30	14.10	Providing and laying of Filter media with granular materials/stone crushed aggregates satisfying the requirements laid down in clause 2504.2.2. of MORTH specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and technical specification.	Cum	215.27	753.00	162095.30
31	14.14	Providing and Laying Reinforced cement concrete pipe NP4/prestressed concrete pipe for culverts on first class bedding of granular material in single row including fixing				

		collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets and as per relevant clauses of section-2900.				
	i)	600 mm dia	meter	30.00	1604.00	48120.00
	ii)	1000 mm dia	meter	60.00	2448.00	146880.00
32	15.1	Providing and laying Reinforced/Prestressed cement concrete (mixed in concrete mixture) in super-structure as per drawing and Technical Specification and as per relevant clauses of sections 1500, 1700 and 2300 in				
	i)	RCC Grade M25 with 20 mm maximum size of aggregate (For solid slab super-structure)	Cum	158.15	4883.00	772222.04
33	15.2	Supplying, fitting and placing HYSD bar reinforcement in super-structure complete as per drawing and technical specifications as per relevant clauses of section 1600 of specifications.	MT	12.56	57776.00	725377.68
34	15.4	Providing and laying Cement concrete (mixed in concrete mixture) wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications and as per relevant clauses of sections 1500, 1700 and Clause 2702 of specifications.	Cum	29.32	8324.00	244043.03
35	15.7	Construction of RCC railing of M30 Grade (mixed in concrete mixture) in-situ with 12 mm nominal size aggregate, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to	RM	38.00	1393.00	52934.00

		centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications and as per relevant clauses of sections 1500, 1600, 1700 and clause 2703 of specifications (as per MoST specification drawing SD/201 or SD/304)				
36	15.9	Providing Drainage Spouts complete as per drawing and Technical specification and as per clause 2705 of specifications.	No	10.00	979.00	9790.00
37	15.10	Providing PCC M15 (with 40 mm maximum size of aggregate) Grade leveling course below approach slab complete as per drawing and Technical specification and as per relevant clauses of section 1700.	Cum	126.00	3418.00	430668.00
38	15.11	Providing and laying Reinforced cement concrete approach slab in M-25 grade concrete including reinforcement and formwork complete as per drawing and Technical specification and as per relevant clauses of section 1500, 1600, 1700 and clause 2704 of specifications.	Cum	252.00	7244.00	1825488.00
39	15.14	Filler joint				
		Providing and fixing in position 20 mm thick & 300mm deep premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications and as per relevant clauses of section	meter	42.08	177.00	7448.51

		2600.				
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I/We agree to carry out the above said work at (rate to be quoted online in figure and words both) % Below / Equal / Above on the tendered rates shown in Schedule.

b) Bill of Quantities As per UADD ISSR 2012 for Building Work-

Sr. No.	SOR No.	Description	Unit	Quantity	Rate	Amount
1	11.20	Chequerred precast cement concrete tiles 18-20mm thick in footpath & courtyard jointed with neat cement slurry mixed with pigment to match the shade of tiles including rubbing and cleaning etc. complete on 20 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand).				
	11.20.3	Dark shade using ordinary cement.	sqm	8,820.00	616.00	54,33,120.00

I/We agree to carry out the above said work at (rate to be quoted online in figure and words both) % Below / Equal / Above on the tendered rates shown in Schedule.

c) Bill of Quantities As per UADD Electrical SOR 2012 -

1	Supply of XLPE Insulated power cable (conforming IS- 7098) 1100 Volt grade/Heavy duty power cable conforming to IS 1554-1100 Volts grade , 2 core /3½ core/4 coreISI MARKED with Alu. Stranded /solid conductor	0	0.0	0	0
2	ARMOURED 3½ CORE				
3	50 Sq.mm(XLPE) V4_14.1.6.3	M	500.0	452	226000
4	70 Sq.mm(XLPE) V4_14.1.6.4	M	1500.0	597	895500
5	150 Sq.mm.(XLPE) V4_14.1.7.10	M	2000.0	1084	2168000
6	300 Sq.mm.(XLPE) V4_14.1.6.10	M	1000.0	2097	2097000
7	ARMOURED 4 CORE				0
8	16 Sq.mm.(XLPE) V4_14.1.8.3	M	4000.0	229	916000

9	Supply of support for overhead line RS joist / H-beam of I.S. standard including welding, drilling of required hole etc. complete as required. H-Beam 152x152mm , Std weight 37.1 kg per meter V4_13.2.6	M	260.0	1977	514020
10	Erection of steel tubular or steel rail pole or H-Beam of length exceeding 10 meters but not exceeding 13 meters in cement concrete 1:3:6 (1 cement :3 coarse sand: 6 graded stone aggregate 40mm nominal size) foundation , base padding & muffing including excavation and refilling etc. as required.(4.55 bags of cement/cmt.) V4_13.14	EA	100.0	2563	256300
11	Supplying and drawing All Aluminium Alloy conductor (AAAC) of approved make confirming to IS 398-1979 Pt. IV, including binding at existing insulator, jointing, jumpering, tearing off, connecting etc. as required including clearing of obstacles (if any) 0.075 sq.inch / 48 sq.mm Alloy Aluminium Conductor V4_13.5.4	Km.	0.5	59138	29569
12	Supplying of angle/channel flat iron fitting for overhead lines such as cross arms, clamps, brackets, welding and other necessary materials as per specifications. V4_13.58	Kg.	5000.0	54	270000
13	Supplying and erection of stay set complete (Galvanized) with 19mm.dia 1.8 meter long stay rod, anchor plate of size 300mm x 300mm x 6.4mm thimble stay clamps, bow tightener, 7/4.00 dia G.I. stay wire and strain insulator etc. in cement concrete 1:3:6 (1 Cement : 3 Coarse and : 6 graded stone aggregate 40mm nominal size) foundation including excavation and refilling etc. as required. V4_13.23	EA	10.0	2818	28180

14	Providing and fixing earthing arrangement with 38.1mm dia 2.5 meter long galvanized iron pipe electrode including packing of charcoal powder and salt as per specification watering pipe 19mm dia G.I. Connection etc. complete with refilling the pit as required, but excluding the excavation of earth pit. V4_11.35	EA	60.0	1002	60120
15	Supplying and laying 25mm X 5mm G.I. strip at 0.5 meter below ground level as strip earth electrode including soldering etc. as required. V4_11.8	M	400.0	65	26000
16	Supplying, installing, testing of earth Coil (coil of 115 turns of 50mm dia, and 2.5 Mtrs. Lead of 4 mm G.I wire.	EA	108.0	219	23652
17	Supplying and fixing heavy duty cable gland for P.V.C. insulated armoured cable with brass washer, Rubber ring complete erected with cable and lead connection etc. as per specification complete.				0
18	Gland Size 22mm suitable for cable 2,3, 3½, 4 x 10 Sq.mm or 2x 16 Sq.mm	EA	50.0	44	2200
19	Gland size 28mm for 3,4 x 16 Sq.mm	EA	100.0	66	6600
20	Gland size 32mm for 2,3, 3½, 4 x 25 Sq.mm OR 2,3, 3½ x 35 Sq.mm OR 2,3 x 50 Sq.mm.	EA	100.0	76	7600
21	Gland Size 45mm 3/3½ x 120 Sq.mm 3½ x 95 Sq.mm 3 x 150 Sq.mm.	EA	50.0	149	7450
22	Gland Size 50 mm 3½ x 150 Sq.mm 3 x 185 Sq.mm	EA	100.0	191	19100
23	Gland Size 57mm 3 x 225 Sq.mm 3 ½ x 185 Sq.mm	EA	50.0	248	12400
24	Gland Size 70mm 3 x 240 Sq.mm 3½ x 300 Sq.mm	EA	50.0	353	17650
25	Gland Size 82mm 3½ x 400 Sq.mm	EA	50.0	501	25050

26	LUGS:- Supplying and fixing cramping type Alum. lugs as per I.S.S. Specification suitable for following size of cable with Alu. /Copper solid/stranded conductor evenly cramped with high/pressure tool and connected to switch gear/Bus/M.C.C.B./ M.C.B. etc. as required complete.For Conductor Size-				0
27	6mm to 16 Sq.mm	EA	1000.0	5	5000
28	35 Sq.mm	EA	100.0	9	900
29	50 Sq.mm	EA	500.0	14	7000
30	70 Sq.mm	EA	500.0	22	11000
31	150 Sq.mm.	EA	500.0	44	22000
32	300 Sq.mm.	EA	500.0	129	64500
33	Erection of steel tubular or steel rail pole or H-Beam of length exceeding 8 meters but not exceeding 10 meters in cement concrete 1:3:6 (1 cement : 3 coarse sand: 6 graded stone aggregate 40mm nominal size) foundation, base padding & muffing including excavation and refilling etc. as required.(4.55 bags of cement/cmt.)	EA	10.0	2163	21630
34	Erection of steel tubular or steel rail pole or H-Beam of length exceeding 10 meters but not exceeding 13 meters in cement concrete 1:3:6 (1 cement :3 coarse sand: 6 graded stone aggregate 40mm nominal size) foundation , base padding & muffing including excavation and refilling etc. as required.(4.55 bags of cement/cmt.)	EA	10.0	2563	25630
35	Supply of steel tubular pole swaged type as per IS:2713- 1980 Complete with baseplate and top Canopy 410 SP-65 - 12.00 meter	EA	90.0	26824	2414160

36	Laying of underground cable armoured./ unarmoured as per specification in air with approved type of iron clamps complete. 2 / 3 / 4 Core cable upto 16 Sq.mm V4_14.12.1	M	3000.0	20	60000
37	3 / 3½ / 4 Core cable 25 Sq.mm to 120 Sq.mm V4_14.12.2	M	3000.0	28	84000
38	3 / 3½ / 4 Core cable 150 Sq.mm and above V4_14.12.3	M	3000.0	36	108000

I/We agree to carry out the above said work at (rate to be quoted online in figure and words both) % Below / Equal / Above on the tendered rates shown in Schedule.

d) Bill of Quantities As per PWD Electrical SOR-01 AUG 2014

1	Suppling and laying G I pipe 150 mm dia B Class	meter	2000	1425	2850000
2	Suppling and laying G I pipe 150 mm dia A Class	meter	1000	1197	1197000
3	Suppling and laying G I pipe 100 mm dia B Class	meter	1000	800	800000
4	Suppling and laying G I pipe 100 mm dia A Class	meter	1000	750	750000
5	Providing and fixing for feeder pillers for telephone/electrical cables as per design fixing over on concrete base (750x450x100) using nut and bolts. With all leads and lifts under the supervision of engineer in charge	nos	10	15000	150000
6	providing and laying of 3 core 2.5 sqmm flexible coper cable	km	2.4	50000	120000
7	Supplying and drawing All Aluminium Alloy conductor (AAAC) of approved make confirming to IS 398-1979 Pt. IV, including binding at existing insulator, jointing, jumpering, tearing off, connecting etc. as required including clearing of obstacles (if any)			0	0
8	0.1 sq.inch / 100 sq.mm Alloy	Km.	0.5	77891	38946

	Aluminium Conductor (Dog)				
9	Supplying and laying 50mm X 5mm G.I. strip at 0.5 meter below ground level as strip earth electrode including soldering etc. as required.	M	400	110	44000
10	supply and installation of disk insulators polymer type 11 kv	EA	12	458	5496
11	supply and installation of pin insulators polymer type 33 kv	EA	3	1374	4122
12	supply and installation of AB switch polymer type 11 kv	EA	2	6500	13000
13	supply and installation of AB switch polymer type 33 kv	EA	2	28000	56000

I/We agree to carry out the above said work at (rate to be quoted online in figure and words both) % Below / Equal / Above on the tendered rates shown

e. Bill of Quantities As per Non SOR For Electrical Materials (Annexure-I)

s no	items/particulars	unit	qnty	Bid Rate (Fig & Words)	Bid Amt (Fig & Words)
1	Providing laying and testing of 11 KV Under-Ground XLPE Cable : (insulation level shall be in Delta format) 3x185 Sqmm	Km	3		
2	Providing laying and testing of 11 KV Under-Ground XLPE Cable : (insulation level shall be in Delta format) 3x240 Sqmm	Km	2		
3	Providing laying and testing of 11 KV Under-Ground XLPE Cable : (insulation level shall be in Delta format) 3x300 Sqmm	Km	3		
4	Providing laying and testing of 33 KV under ground XLPE Cable (insulation level shall be in Delta format) 3x240Sqmm	Km	3		
5	Providing laying and testing of 33 KV under ground XLPE Cable (insulation level shall be in Delta format) 3x300Sqmm	Km	5		

6	Providing laying and testing of 33 KV under ground XLPE Cable (insulation level shall be in Delta format) 3x400 Sqmm	Km	2		
7	Supply and erecting 11 KV heat shrinkable cable END jointing kit (A) Indoor Type Indoor heat shrinkable cable jointing kit with lugs for 11 kV grade XLPE cable for 3 core 185 sq mm	Set	20		
8	Indoor heat shrinkable cable jointing kit with lugs for 11 kV grade XLPE cable for 3 core 240 sq mm	Set	10		
9	Indoor heat shrinkable cable jointing kit with lugs for 11 kV grade XLPE cable for 3 core 300 sq mm Set 4310	Set	16		
10	Outdoor heat shrinkable cable jointing kit with lugs for 11 kV grade XLPE cable for 3 core 185sq mm	Set	4		
11	Outdoor heat shrinkable cable jointing kit with lugs for 11 kV grade XLPE cable for 3 core 240 sq mm	Set	10		
12	Outdoor heat shrinkable cable jointing kit with lugs for 11 kV grade XLPE cable for 3 core 300 sq mm	Set	2		
13	Supply and erecting 11 KV heat shrinkable cable STRAIGHT THROUGH jointing kit i) 3x185 Sqmm	Set	1		
14	ii)3x240 Sqmm	Set	1		
15	iii) 3x300 Sqmm	Set	1		
16	Supply and erecting 33 KV heat shrinkable cable END jointing kit (a) Indoor type i) 3x240 Sqmm	Set	10		
17	ii)3x300 Sqmm	Set	10		
18	iii) 3x400 Sqmm	Set	18		
19	Outdoor type i) 3x240 Sqmm	Set	4		
20	ii)3x300 Sqmm	Set	8		
21	iii) 3x400 Sqmm	Set	2		
22	Supply and erecting 33 KV heat shrinkable cable STRAIGHT THROUGH jointing kit				

23	(i) Straight through heat shrinkable cable jointing kit with lugs for 33 kV grade XLPE cable for 3 core 240 sq mm	Set	1		
24	(ii) Straight through heat shrinkable cable jointing kit with lugs for 33 kV grade XLPE cable for 3 core 300 sq mm	Set	1		
25	(iii) Straight through heat shrinkable cable jointing kit with lugs for 33 kV grade XLPE cable for 3 core 400Sqmm	Set	1		
26	Suppling installation testing and commissioning of SCADA competable Ring Main Unit(RMU) 11 KV				
27	11 KV Ring main unit(RMU) SF-6 type 1 ckt breaker 3isolator	Each	8		
28	11 KV Ring main unit(RMU) SF-6 type 2 ckt breaker 3isolator	Each	2		
29	Suppling installation testing and commissioning of SCADA competable Ring Main Unit(RMU) 33 KV 33 KV Ring main unit(RMU) with 3isolator	Each	5		
30	33 KV Ring main unit(RMU) with 4isolator	Each	2		
31	Suppling installation testing and commissioning of FEEDER PILLERS (a) Out door type cubical feeder pillar (i) 1 no.-125 amp,16 kA b.c at 415 volts TP MCCB with copper neutral link 1 set-200 amp,rating TPN aluminium busbar,8 no 32 amp,10 kA b.c. TP MCB complete	Each	10		
32	(ii)1 no.-160 amp,16 kA b.c at 415 volts TP MCCB with copper neutral link 1 set-250 amp,rating TPN aluminium busbar,8 no 63 amp,10 kA b.c. TP MCB complete	Each	10		

33	(iii) 1 no.-125 amp,16 kA b.c at 415 volts TP MCCB with copper neutral link 1 set-200 amp, rating TPN aluminium busbar,24 no 32 amp,500 V Porcelain/DMC/bakelite rewirable type fuse carrier and base complete	Each	10		
34	Suppling installation testing and commissioning of SCADA competable surface transformer PSS 11/0.4 kv, 500 KVA complete in all respect with civil work	each	4		
35	Suppling and installtion of GSM modem	nos	5		
36	Suppling and installtion of LTCT operated 3 phase 4 W static energy meter with ct and modem	nos	5		
37	Designing & casting with M-20 cement concrete foundation suitable for 12 mtrs. Octagonal/tubular poles considering the safe soil bearing capacity at site as 10 T/sqm at 2 mtrs. Depth including excavation, foundation nut bolts in an approved manner.	EA	90		
38	Supply and installation of 150 watt LED street light complete with accesaries such as suitable bracket with technical specification enclosed with tender docment	nos	200		

f. Bill of Quantities As per Non SOR For Civil Materials-(Annexure-II)

Sr. No.	Description	Quantity	Unit	Bid Rate (Fig & Words)	Bid Amount (Fig & Words)
1	Providing and Laying of PLASTITRAK, Roll-on Surfacing Material :A Solvent Free, High Build, Two pack, Seamless, Tough, skid resistant 1.0-1.5 mm thick red (or as required) based on Gloss and color retaining Acrylic Cross Linking Resin System for Cycle track and similar applications including surface cleaning and cost of all material etc. complete.	40000	Sq. mts		
2	Pavement marking for showing symbol of CYCLE on White/ yellow/ Blue or Suitable colored as directed by engineer in charge for cycle track, at junctions with hot applied thermoplastic paints of 2.5 mm thickness including reflectorising glass beads @ 250 gms per sqm area as per IRC:35 .	34.00	No.		
3	Pavement marking for showing symbol of CYCLE on White/ yellow/ Blue or Suitable colored as directed by engineer in charge for colored cycle track, at every 50m with hot applied thermoplastic paints of 2.5 mm thickness including reflectorising glass beads	152.00	No.		

	@ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads at 50 meter center to center distance as per IRC:35 .				
4	Thermoplastic Road Marking of Cycle track: Providing & laying hot applied thermoplastic Compound in white/yellow colour in marking of edge lines(15cm wide) etc.2.5mm minimum thickness as directed including cost of marking compound, making arrangement for heating and its application with requisite machine, making arrangement for spraying of drop-on glass beads etc.@ 250 gms.per sqm area, thickness of 2.5mm is exclusive of surface applied glass beads as per IRC 35-1997 & Clause 803 of MORT&H specification. The finished surface to be level, uniform and free from streaks and holes and also including cost of all material, labor, machinery etc. required for proper completion	1200.00	Sq. mts		
5	Providing and fixing cat eye to be fixed in between white road marking strip at distance of 20 meter c/c. The cat eye should be high quality polymer shank one way yellow and one way white body, to be fixed with high	400.00	No.		

	quality road adhesive based on specialized epoxy system (resin & hardener 6:1) to provide excellent adhesion of cat eye to the base to the road surface concrete/bituminous.				
6	Supplying and fixing at site retroreflectorised CYCLE TRACK / ONLY FOR CYCLE type sign boards/signs made of encapsulated lense type of reflective sheeting fixed over aluminum sheeting 2.0 mm thick complete including vertical pipes/ angles/ posts etc. all complete as per drawing as per direction of Engineer in Charge .	24.00	No.		
7	Supplying and fixing at site retroreflectorised Direction sign boards/signs made of encapsulated lense type of reflective sheeting fixed over aluminum sheeting 2.0 mm thick complete including vertical pipes/ angles/ posts etc. all complete as per drawing as per direction of Engineer in Charge .	40.00	No.		
8	Providing and fixing Bollard (Swiss Type) at cycle track entry point to prevent other vehicles at distance of 0.50 m c/c/, made out of 1.5mm CRC sheet ,height 140cms,bottom dia 23cm,top dia 12cm with direction plate of 30 cm dia fabricated necessary anchors as directed and	102.00	No.		

	also provide throughout length pipe of 25 NB for the strengthening of bollard and reflectorised Micro Prismatic Grade Sheet (Type XI) and three yellow strip 6 Inches wide of Type XI Retro reflective Sheeting, fixing with P.C.C M25 grade concrete (Foundation size 30cm×30cm×35cm)				
	Total				

I/We agree to carry out the above said work at total amount (Each rate to be quoted online in figure and words both) on the tendered rates shown in non SOR Schedule.

Signature of Contractor:

ADDITIONAL CONDITIONS

1. Work is required to be carried out in residential / outside area where all the services like water supply, sullage water pipeline, telephone / electric cable are existing. Under the circumstances, all the services shall have to be maintained by the agency and any damage to any services or property, the agency shall have to get it repair at their cost.
2. After entering into an agreement, the agency shall have to finalize the agency for supply of the materials and the name of manufacturer / supplier should immediately be informed to Bhopal Smart City Development Corporation Limited so that Bhopal Smart City Development Corporation Limited can also expedite the manufacturer / supplier for the material. If necessary, Bhopal Smart City Development Corporation Limited will visit and inspect the factory. During the inspection, if Bhopal Smart City Development Corporation Limited is not satisfied then the contractor shall have to procure the material from other manufacturer(s).
3. While the work in progress, there is possibility of change in location line according to the site conditions. Under these circumstances, the contractor shall have to carry out the work accordingly, for which, no extra payment shall be made in such situations. Over and above, the decision of Engineer-in-charge for change in drainage line routes shall be final and binding to the contractor.
4. The quantity of various items mentioned in the schedule-B is liable to increase or decrease. Under the circumstances, the contractor shall have to carry out the work

accordingly. Bhopal Smart City Development Corporation Limited will not entertain any dispute in this regard.

5. In case of any ambiguity found in inspections / drawings etc, the decision of engineer-in-charge shall be final and binding to the contractor.
6. Rates quoted in Bill of Quantities to cover everything necessary for complete Execution of work :
7. The rates quoted will be held to cover everything necessary of the due and complete execution of the work according to the drawings and the several conditions and the stipulations of the contract, including specification, or the evident intent and meaning of all or either of them or according to customary usage and for the periodical and final inspection and test and proof of the work in every respect and for measuring, numbering or weighing the same including setting out and laying or fixing in position and the provision of all materials,
8. Power, tool rammers, beaters, labour, tackle platforms with impervious lapped joints for scaffolding ranging rods, straight edges, centering and boxes, wedges, moulds, templates, post straight rails, boning-staves, measuring rods, page boards, shores, barriers, fencing, lighting, pumping apparatus, temporary arrangements of passage of traffic, access to premises and continuance of drainage, water supply and lighting (if interrupted by the work) lard temporary sheds and buildings nahanis roofed in or otherwise haulage, painting, varnishing, polishing, establishments for efficient supervision and watching arrangements for the efficient protection of life and property and all requisite plant, implements and appliances every kind, except only such matter and things as it may be distinctly stated here in are to be supplied by the contractors.
9. A rate for anyone description of work is to be held to include such items of other classes of and for these on separate specific charge will be admitted. The contractors shall keep every portion of the work clear of accumulation from time to time and shall leave every portion of the work clean, clear, perfect and at the conclusion of whole, providing at their own cost all such material implement appliances and labour as the Engineer may require to prove if it is to be so.
10. The contractors are particularly directed to observe from the Articles of Agreement and the specifications, what is to be included in their rates for the several portions of the work and also under what conditions payments are to be made.
11. The contractor shall have to avail P F Code as per the prevailing Circular of Government for the employees on work. The process for preparation of bill will be taken up only after submission of the Challan for the amount of P.F. deposited every month for the employees on work, which will binding to the contractor. The required documents shall have to be submitted every month by the contractor to the competent authority.
12. The contractor shall have to get registered under ESI (Employer's State Insurance) Act and obtain ESI Registration number if the number of workers are 10 Nos. or more. Also, the agency shall have to give all the benefits to the workers as available under the ESI Act. The agency should follow all the rules and regulations of ESI Act as per prevailing norms.

Schedule-D-

Specifications of Smart LED Lights

Technical Specifications of the Project

Energy efficient LED based luminaires unit for street lighting

I. SCOPE

The scope includes design, development, manufacturing, testing and supply of energy efficient luminaire complete with all accessories, LED lamps with suitable current control driver circuit including mounting bracket for street light and High mast light. The luminaire shall be suitable for rugged service under the operational and environmental conditions encountered during service.

II. PRINCIPLES DECIDING FACTORS FOR SELECTION/ PROCUREMENT OF LED LIGHTS

- Height of luminaire fitting as specified in table below
- Minimum Lux level required as specified in table below
- Minimum working hours (50000 hrs) of LEDs
- Minimum warranty shall not be less than 5 years for LED & Driver
- LED make as specified in document, and complete street light fitting can be of any manufacturer
- Additional cost towards high price of the LED light to be compensated by energy saving and zero maintenance.
- No specific make shall be criteria for selection and procurement of LED luminaires during any tender.

CONSTRUCTION

- a. Extruded aluminium and pressure die cast aluminium (sand/gravity casting not to be considered). Aluminium grade LM 6063 or LM 6 as applicable or above high conductivity heat sink material. Heat sink must be made of extruded Al or pressure die cast Al only. Efforts shall be made to keep the overall outer dimensions and weight as minimum as possible.
- b. All light fittings shall be provided with toughened glass of sufficient strength under the LED chamber to protect the LED and luminaires.
- c. Suitable number of LED Lamps shall be used in the luminaires.
- d. Suitable reflector/lenses shall be provided to modify the illumination angle.
- e. The connecting wires used inside the luminaires, shall be low smoke halogen free, fire retardant e-beam/PTFE cable and fuse protection shall be provided in input side.
- f. The control gear shall be designed in such a way that the junction temperature of LED should not be more than 25 °C with respect to ambient temperature.
- g. The luminaires shall be such that the glare from individual LED is restricted and shall not cause inconvenience to the public.
- h. All the material used in the (luminaires) shall be halogen free and fire retardant conforming to UL 94.
- i. The fixture should be impact resistant with suitable protection by cover for driver and LED's.

- j. The fixture should have designed for IP65 ingress protection or above.
- k.

VI. HIGH POWER AND HIGH LUMEN EFFICIENT LEDS SUITABLE FOR FOLLOWING FEATURES SHALL BE USED:

- a. LED Chips of Cree/ Osram/ Philips/ Nichia make shall be used for the purpose. No other make shall be accepted. The manufacturer shall submit the proof of procurement of LEDs from above OMMs at the time of supply.
- b. The efficiency of the LED lamps at 110°C junction temperature shall be more than 80%
- c. LED junction temperature should not cross more than 90 °C for longevity of luminaries
- d. Solder point temp should not cross 75°C
- e. The working life of the lamp at junction temperature of 90°C for 350mA current shall be more than 50,000 hours of accumulative operation and shall be suitable for continuous operation of 24 hours per day these shall be supported with the suitable section of the LM80 report from the manufacturer of LED.
- f. Colour temperature of the proposed white colour LED shall be 5000K-6500K.
- g. The output of LED shall be more than 110 lumen (+5%) per watt at 350mA operating current
- h. The colour rendering index (CRI) shall be of nominal 65 with cool white light output.

VII. ILLUMINATION LEVEL (Lux Measurement):

Lux measurement with the help of lux meter shall be done at distance as shown in table below. Value obtained shall not be less than the lux specified in the table there in considering 10% lumen is absorbed by the reflector.

The fitting shall be so designed that the illumination level shall be evenly distributed and shall be free from glare.

VIII. ELECTRICAL/TECHNICAL SPECIFICATIONS

Supply of LED streetlight luminaire complete with pressure die cast/extruded aluminum housing and adhering to the following specifications and lighting design requirements will be as per the actual application:

- i. The driver card shall cut off at 270V and shall resume normal working when nominal voltage is applied again. This is to ensure protection of luminaires from neutral faults and error in connection at sites.
- ii. Efficiency of driver electronics shall be more than 85%.
- iii. The LEDs should be driven at the suitable current and within the permissible limits specified by the LED chip/lamp manufacturer.
- iv. The fixture shall be designed so as to have lumen maintenance of at least 70% at the end of 50,000 hours.
- v. The luminaire should be operable with auto adjustable 100-270V supply Voltage using the same driver.
- vi. Power Factor of the electronic driver should be at least > 0.95 with THD < 10%.
- vii. The luminaire should throw the perfect amount of uniform light with exactly the desired intensity, and offer best pole spacing, along with better light control. For this

purpose, spacing to height ratio calculations must be attached for all installations where the poles are to be newly installed. The Luminaire shall employ individual optical lens for each of the LED to ensure better uniformity of light distribution.

IX. ABSTRACT OF KEY SPECIFICATIONS

Electrical specifications	18W/25W/35W/45 W	60W/75 W	120W/150W/200 W
i) Voltage range or rating: [130 volt – 270volt AC] on single phase	100-270V	100-270V	100-270V
ii) LED Output (lumen per watt)	>115 (+5%)	>115 (+5%)	>115 (+5%)
iii) Frequency range (+/-5)	50Hz	50Hz	50Hz
iv) Power factor:	>/=0.95	>/= 0.95	>/= 0.95
vi) Colour temperature	5000K-6500K	5000K-6500K	5000K-6500K
vii) CRI (Colour Rendering Index)	>=65	>=65	>=65
viii) LED Life Expectancy	50,000 hrs with 70% Lumens	50,000 hrs with 70% Lumens	50,000 hrs with 70% Lumens
x) Protection level	IP65 minimum	IP65 min	IP65 minimum
xi) Total Harmonic Distortion (THD)	<10%	< 10%	< 10%

X. CONFORMANCE STANDARDS:

Product Certification should be obtained from UL or CPRI or any other NABL certified lab. The following test reports should be provided:

LM-79	Luminaire efficacy (Photometry data)
LM-80	LED chip data
IP 67	Luminaire Ingress Protection
Luminaire Endurance Test EN 60929	Practical testing of luminaire through 20,000 cycles Performance
IEC 60598-1	General requirement and tests
IEC 61000-3-2	Limits for Harmonic current emission - THD < 10%

Feeder Pillars

The design and operation of feeder panels shall comply with SP 72 Part 8 of National Lighting Code 2010.

The typical specifications for the power conditioning panels shall be as follows:

- Principle equipment should be designed on the basis of 'Lossless Series Reactance with Secondary Compensation' technology (Auto-transformer)
- The efficiency of such principle equipment should not be less than 99.4% between 50% - 110% of loading
- Other than basic switching components, no other moving parts are allowed to be installed in the feeder panel

- 240 VAC 50 Hz Single Phase Two Wire / 415 VAC 50 Hz Three Phase Four Wire Input
- Three Taps of Single / Three Phase Four Wire Outputs
- Standard Output Taps in each Phase at 200/205/210 VAC @ 240 VAC Nominal Input
- Feeder panels should have GPRS/GSM based remote streetlight monitoring system with capacity for self-protection from short-circuit, over voltage and anti-theft alert
- The rating of the Streetlight controller should be at least 1.3 times the lighting load as measured during the initial studies
- Energy Meters to be installed in separately sealable and open able compartment within the Feeder Panels as per the following specifications:
 - Energy Meters should have Accuracy class of Class 1 or better;
 - Meters could be either three phase whole current or CT operated for LT as may be required based on the load connected to the feeder panel. The space to be created in the feeder panel for housing the meters should consider the same.
 - 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.
 - Such Energy Meters should record the following minimum parameters:
 - Phase to neutral voltages
 - Phase-wise current
 - Phase-wise power factor and frequency
 - Total active power
 - Total reactive power
 - Total active energy
 - Total reactive energy
 - Total KVAH energy
 - Meters should have requisite port (Serial port communication – RS232 or RS485) for enabling remote reading and for connection of Modem for the same;
 - Energy Meter specifications should meet the minimum specifications specified by DISCOM and a sign-off on the same shall be obtained from DISCOM prior to finalizing the specifications;
 - Energy Meters shall be tested, installed and sealed in accordance with procedures specified by DISCOM;
 - A signoff from DISCOM on the design and specifications of the compartment in the Feeder Panel where the meters are to be housed is also recommended;
- Bidder has to install appropriate power conditioning devices to protect the new EE technologies and components of feeder panels from damage. Poor power quality is not allowed as an excuse for non-functioning of the new technologies installed under the project
- Fixed capacitor with appropriate capacity shall be introduced in each feeder panel to always maintain a power factor above 0.90

- In case of Single phase controller unit, 1 pole contactor or multiple parallel pole contactors should be used and in case of 3 phases, appropriate duty 3 pole contactor should be used. The number of contactors used should be suitable for ON/OFF and for changeover between full voltage to various voltage taps and interchanging between taps. The panels should be equipped with a microprocessor based Dual Channel Almanac Timer controller which should be user programmable to enable setting of ON/OFF times and also switching over to savings mode/bypass mode when required
- All the principle equipment's along with input output switchgears, metering, switches (bye pass and tap changers), contactors, fuses, auto transformer coils etc. should be of reputed manufacturers and should meet best engineering practices and norms as applicable in relevant standards
 - Auto transformer coil should have full current operating efficiency of better than 99%
 - The total heat dissipation from single coil should not exceed 6 watts-sec/kVA under fully loaded condition
 - The rated current of the auto transformer should be for continuous 120% that of input rated current
 - The switched fuse units should be of 32 Amp continuous AC current capacities. Fuses used should be of 20 Amp. Rating of high rupturing capacity (S/c current at least 50 kA)
- The bidders should always ensure that the System is capable to capture live data and record it at variable time-intervals. Following parameters should be recorded for every 60-120 minutes time interval:
 - Voltages
 - Current
 - Power Factor
 - Active Power (kW)
 - Apparent Power (kVA)
 - Metering kWh cumulative
 - Metering kVAh cumulative
 - Number of hours the lamps were glowing
 - Special emergency on/off facility with wireless control.
 - Benchmarking capacity so as to generate alert SMS for:
 - Phase-wise currents on crossing threshold values
 - Phase-wise voltages on crossing threshold values
 - BSCDCLB trips
 - Theft alerts
 - Group failure of lights
 - Contactor failure
 - No output supply
 - Alert SMS shall be forwarded to five (5) phone numbers.
 - GPRS/GSM modem should be used
- Enclosure Box of feeder panels shall be IP-56 compliant and should be fabricated out of MS sheet SWG 16 / 14 duly powder coated for corrosion resistance and long life.

- It should have Single Phase power socket for connecting utility tools like drill machine etc. (capacity 1phase 240Vac / 5Amp socket)
- Utility Service Lamp inside Panel for use during maintenance work
- Gland Plates for Cable Entry at Incomer and Outgoing
- Auto Bypass / Tap Changing in lieu of Manual. The tap changing should be automatic between the full voltage and lower voltage for minimum two numbers selected taps.
- The bidder shall have to get the control panels fabricated from the vendor having type test certificate from CPRI for 31 MVA short-circuit rating up to 400 amp for cubical panels. The copy of the type test certificate shall also have to be produced failing which feeder panels shall not be accepted
- Design life of the control panel should be mentioned in form of MTBF (mean time between failures) and it should be minimum 10 years.

Remotely Controlled Power conditioning requirement for Feeder Panels

Voltage Control:

- 240 VAC 50 Hz Single Phase Two Wire / 415 VAC 50 Hz Three Phase Four Wire Input
- Three Taps of Single / Three Phase Four Wire Outputs
- Standard Output Taps In Each Phase at 200/205/210 VAC @ 240 VAC Nominal Input
- Real time clock
- Three independent channels / output relays (desirable up to 4) with independent ON and OFF programming possibility remotely (User settable)
- System losses should be less than 1% so as to achieve high efficiency.
- Should not introduce any harmonics into the system but should reduce it.
- Other than basic switching components, no other moving parts should be there.
- During voltage tap changing, lights should not be momentarily disconnected which will lead to re-ignition of lights. It is mandatory for supplier to make gapless changeover arrangement when changing from by-pass mode to & from lower voltage energy saving mode and interchanging between the taps. This should be achieved by supplier by any specialized arrangements. The user is expected to produce the Performance assessment certificate for minimum continuous 100 such changeover operations without any lamps going off in any of the three phases at minimum and Maximum supply voltage conditions. This certificate should be received from reputed Laboratory organisations like CPRI, ETDC, ERTL, IDEMI, SAMEER etc.
- Voltage Rating: 170V to 290V.
- Over-ride for local operation time settings from the central PC on every individual device for user definable time frame with a specific display on the particular device where such override is implemented
- Almanac sunrise and sunset table operation (User selectable option)
- User settable selection between GSM / GPRS operation and manual local operation
- Control of operation times settings from the central PC (in case of GSM)

- Specific data request whenever user desires from control PC
- Fault reporting to central PC and user definable Cell Phone number
- 3 No's Auxiliary Output NO/NC contacts with 5 Amp rating at 240 VAC and 2 no's Auxiliary input terminals (12Vdc or 240Vac) should be provided

Data monitoring:

- Class I (Minimum) accuracy of measurement of data
- All load parameters like Individual phase voltage, current, power factor, VA, Watts. In addition, WH (energy) also should be logged on a continual basis
- Data monitoring interval – One hour (desirable programmable from 1 min to 120 min)
- Serial port communication (RS232) AND (RS485- Desirable)
- Minimum data storage for 12 months (if data logged at 1 hour intervals)
- All data stored in the device regardless of whether the data has been transmitted to the central PC via GSM or not. Such data can then be later downloaded by the user on to a HHU

Other:

- Individual device ID user settable
- Password protected access to control functions
- Operating temperatures up to 55 deg. centigrade continuous
- Humidity up to 98% (Non condensing)
- Software for data monitoring, control, communication and analysis
- GPRS software for live viewing & controlling of functions of every individual unit on a static IP address
- Providing automatic controller compatible with GPRS / GSM or suitable protocol at individual panel level. Controller would perform meter reading, switching, data logging, communication and control.
- Individual meters / controllers operating in given protocol to communicate with individual unaccounted lamps in a given area
- Control cabinet fault monitoring

Central Control Unit (BSCDCLU – Master) should provide additional features and daily user defined report. These features should include:

- Support to export reports on website to other application formats like MS Access, DB, SQL, Oracle etc.
- Printout facility available on web pages
- Inbuilt scalability to support large lighting network. Upton 250 no's of RTUs should be possible to be controlled from one Central Control Unit
- High up-time and immediate fault rectification through SMS intimation to maintenance team.
- Simplified maintenance
- Real-time control

Faults Monitoring:

- Under/over voltage detection
- Main breaker error
- Contactor fault
- Circuit breaker off
- Circuit phase errors (fuse, breaker, etc.)
- Main power failure
- Leakage to ground
- Manual switch activated
- Phase current out of range
- Control cabinet door open
- Lamp failures

Complete monitoring on image of the entire geographic area at the screen and with projector attachment – on back wall, where the operators monitor the streetlight and dispatch maintenance teams. Any alarms and their exact location should be shown on the map for easy and fast overview. System should incorporate hardware modules in the control cabinets and enable communication from the central server location to the control cabinets via wireless (e.g. GSM/GPRS).

Specifications of central server

The central server for web based solutions should have following minimal features:

- The data collection server should work on open protocol having mechanism for assured delivery of data sent by hardware device
- The application software should be based on Service Oriented Architecture
- Backup: The System should have automated back-up facility to have regular back up of the data to ensure availability of the data and information; this should be achieved through mirror imaging of two HDDs
- The Central Server should be adequately back up by 2hrs UPS system for operational reliability
- All the software used on the PC should be licensed softwares
- The right capacity GSM/GPRS modem should be connected to Central server for speedy communication
- Speed of communication between Central control Unit (Master) and Remote unit should be such that maximum time required for acquiring the data should not be more than 30 minutes for 250 no's RTUs

The Power conditioning and Energy Management Panels to be installed for the Street lighting system of _____city shall adhere to the following technical specifications:

General Operating Features:

1. The panel should have provision for 'Auto-Switching' of the street light feeder pillar based on ALMANAC timer which shall ensure that the lights switch on and off at the desired time according to the variations in sunrise and sunset timings throughout the year.
2. The panel shall comprise of fixed capacitor banks of suitable ratings as required to maintain the power factor of the street light feeder between 0.99 lagging and unity
3. The panel shall have a provision of voltage based dimming for energy saving at user selectable time intervals. Selectable choice of Energy Saving mode /Bypass Mode shall be provided.
4. A 3 phase programmable multifunction meter (energy meter) conforming to relevant standards with accuracy of class 1 installed in a separate lockable compartment with window shall be provided which shall display relevant electrical parameters like Voltage, Current, Power, Power Factor and Energy consumption for all 3 phases.
5. 3 nos separate R , Y and B indicating lamps for corresponding phases shall be provided
6. The incoming switchgear shall be Moulded Case Circuit Breaker (BSCDCLCB) of suitable rating. Rating of switchgear, cables, bus-bars etc. shall be selected based on detailed analysis of load on respective feeder pillar.
7. The panel shall have provision of bypassing the complete power and control circuit of the feeder pillar in case of failure or for maintenance. The indicating lamps and the energy meter shall not be bypassed and shall remain in circuit under all conditions.
8. Suitable Earth leakage protection shall be provided in the panel.
(Note: It is usually observed that there is always some leakage currents in street lights circuits. If Earth Leakage Circuit Breaker (ELCB) is provided, this leakage current will keep on tripping the ELCB thus operating the panel continuously in bypass mode. UDED and ULBs shall confirm in this regard.)
9. The Bypass Circuit (Refer Circuit 'A' as per Doc No: ECPL/2248/ES/SCHEMA/01) and Energy Saver Circuit (Refer Circuit 'B' as per Doc No: ECPL/2248/ES/SCHEMA/01) shall be rated same as full rated capacity of the panel and this rating shall be the nameplate rating.
10. The panel shall be designed in such a way that the load shifting from one phase to the other phase on outgoing BSCDCLBs shall not be possible, as in such case the entire load of other phase will get shifted to one phase causing overloading of switchgear, bus bars and cables and reactor coil. Therefore on the outgoing side only BSCDCLBs switching mechanism shall be accessible to the operators.

OR

In case single phasing is common in some areas then the switchgear, cable and busbar rating inside the panel must be rated 3 times of rated capacity however this load shifting shall bypass reactor coil and timer circuit to prevent overloading.

ALMANAC TIMER

Detailed specification:

1. Supply voltage: 110V to 240 V AC
2. Supply Variation: -20% to 10%
3. Frequency: 50 Hz
4. Operating temperature: -10 deg to 55 deg C.
5. The timer shall conform to relevant IS standards.

6. The timer shall have programmable latitude/longitude precise to the minute along with time zone.
7. The timer shall have sunrise/sunset or twilight rise/set trigger modes
8. 12/24 hour display format shall be available
9. The timer shall have at least 6 years of battery reserve
10. Manual override and keypad lock feature shall be provided
11. The timer shall be easy to program and navigate

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
1	<p>Certification CE</p> <ul style="list-style-type: none"> • Metering: EN 61326-1 • Safety: EN 60950-1 • Lighting: EN 61000 • EMC: ETSI EN 301 489-3 • Radio & RF Spectrum Efficiency: ETSI EN 300 220-1 • RoHS • R&TTE 1999/5/EC • Applicable FCC Title 47 part 15 classes <p>The wireless transmission system needs to comply with the European maximum transmission power of 10mW (+10dBm) or 500mW (+27dBm), and a receive sensibility of -110dBm</p> <p>IP 55 (integrated controller, IP68 for external enclosure) and RoHS approved.</p> <p>The system needs to be based on the IETF open standard.</p>	Vital		
2	Power: 110-256 VAC 50/60Hz.	Essential		
3	Optional backup power for external mounting: NiMh 600mAh battery (with an average 10 years expected life).	Desirable		
4	Low power consumption: The Luminaire Controller should consume less than 2watts.	Essential		
5	<p>Integrated in the fixture: The Luminaire Controller should be Internal mounting in the fixture. Node dimensions (Max) 110 x 77 x 36 mm (for internal mounting).</p> <p>For the non-integrated option for ad-hoc basis. Dimensions (Max) would</p>	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
	<p>then be: 150 x 108 x 55 mm. Operating temperature: -30°C et +70°C. The antenna could be integrated in the fixture (which would reduce the transmission/reception power) or external (TNC/SMA or via an RF coax cable)</p>			
6	<p>Autonomous clock: The Luminaire Controller must store scheduled ON, OFF and stepless dimming command that it received from the Central Management Software and execute them with the light point. The Luminaire Controller should have an astronomical clock to define lighting schedules based on seasons. Those schedules could be defined from relative and absolute commands. The Luminaire Controller should manage the luminaire even in case of a network outage (i.e. the stored lighting schedule should apply even if the controller can't communicate with the Central Management System).</p>	Vital		
7	<p>Control of the luminaire and Manual override: The Luminaire Controller must be able to receive and execute real time ON/OFF (via mechanical 8A relay) and stepless dimming commands that it receives from the Central Management Software. The controller's schedule table should support up to 16 programmable commands, in an integrated non-volatile method. A local override port on the controller should be available for future use.</p>	Vital		
8	Any type of Dimming is not allowed.	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
9	Communicate using a wireless mesh protocol: The Luminaire Controllers must communicate using a wireless mesh protocol. This protocol should be open, based on the 6LoWPAN standard (802.15.4), with an IPv6 addressing scheme, on the ISM band (433MHz, 868MHz and 915MHz) or any other free band	Essential		
10	Broadcast communication: The wireless mesh protocol shall support broadcast (one command to target a group of Luminaire Controllers) and unicast (one command sent to a single Luminaire Controller).	Essential		
11	Integrated in a Smart City environment: The Luminaire Controllers must integrated seamlessly in a Smart City wireless meshed network (a dedicated city-wide network to manage urban connected devices such as meters, waste bins, parking sensors, traffic lights, pollution sensors).	Vital		
12	Communication specifications: 128bit AES encryption Transmission power < 27dBm Full duplex communication. Radio modulation: GFSK / GMSK/ 2FSK/ MSK/ OOK/ ASK. Fully meshed wireless, self-configuration and self-healing network.	Desirable		
13	Remote management: The Luminaire Controllers must be controlled and managed remotely.	Essential		
14	Seamless installation and commissioning: The Luminaire Controllers must integratedseamlessly and automatically to an existing	Essential		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	Luminaire Controllers network. The Luminaire Controllers must communicate seamlessly and automatically with an existing gateway. The Luminaire Controllers must be able to roam between gateways for redundancy and seamless installation purposes.			
15	Communication performance: The fully meshed wireless network should support a bandwidth of up to 200Kbps.	Desirable		
16	Detect and report failures: The Luminaire Controllers must be able to detect and report alarms such as: lamp failures, ballast failure, low/high voltage, low/high current, low capacitor, flickering lamps, etc.	Desirable		
17	Measuring electrical values: The Luminaire Controllers must be able to measure mains voltage (RMS), current (RMS), frequency, power factor, active and reactive power, active and reactive energy; in real-time or not, with an accuracy equal or better than 2%.Integrated temperature meter. The load's electrical consumption measurement is up to 1,5kVA	Desirable		
18	Measure cumulated energy consumption: The Luminaire Controller must measure and store the cumulated energy consumption.	Desirable		
19	Measure number of burning hours: The Luminaire Controllers must measure and store the number of lamp burning hours	Desirable		
20	Additional I/O port for future use: The Luminaire Controllers must have at	Desirable		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
	least 2 local I/O programmable ports for future use			
Gateway				
1	<p>Certification CE</p> <ul style="list-style-type: none"> • Metering: EN 61326-1, • Health: EN 50385 • Safety: EN 60950-1 • Lighting: EN 61000 • EMC EN 301 489-1, ETSI EN 301 489-3, ETSI EN 301 489-17 • Radio & RF Spectrum Efficiency: ETSI EN 300 220-2 v2.3.1, ETSI EN 300 328, ETSI EN 301 893 • RoHS • R&TTE 1999/5/EC • Applicable FCC Title 47 part 15 classes <p>The narrowband wireless transmission system needs to comply with the European maximum transmission power of 10mW (+10dBm) or 500mW (+27dBm) and a receive sensibility of -98dBm (for the 6LoWPAN 802.15.4 communication standard), as well as 500mW (+27dBm) and a receive sensibility of -119/-115/-107 dBm (for the EN 13757-4 – Wireless M-Bus). The broadband Wi-Fi transmission system needs to comply with the Wi-Fi power transmissions standards: 200mW (+23dBm) – 802.11 a/n/s and 100mW (+20dBm) – 802.11 b/g</p> <p>The system needs to be based on the IETF open standard.</p> <p>IP 40 (integrated gateway) or IP67 (for external enclosure) and RoHS approved.</p>	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
2	Power: 85-256 VAC 50/60Hz.12/24 DC. POE – IEEE 802.3at – 48VDC. Power consumption: 5W max.	Desirable		
3	Number of LED Lights to be considered: 60% of light are 250W and 40% of lights are 150W. Total number of poles for housing LED lights are 20,000.			
4	Environmental Dimension: 269 x 239 x 82 mm (rugged metal case) or 330 x 204 x 55 mm (anodized metal case) Operating temperature: -30°C et +60°C. Case: 1) External mounting: IP 67, rugged metal, resistant to oils/greases/fuels, diesel, paraffin/ozone and RoHS approved. 2) Internal mounting: IP40 anodized metal.	Desirable		
5	Wireless fully meshed communication protocol The gateway should be able to communicate in broadband and narrow band networks: 1) Narrowband networks (IPv6): The open standard 6LoWPAN (802.15.4) IPv6 should be supported on the ISM frequency band (433MHz, 868 MHz and 915MHz). 2) Broadband network (IPv4): The following standards should be supported: a) Wi-Fi 802.11 a/b/g/n/s standard on the 2.4GHz, 5.4GHz or	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	<p>5.8GHz frequency bands</p> <p>b) GSM/GPRS/EDGE/UMTS/3G on the 850/900/1800/1900 MHz frequency bands</p> <p>c) RJ-45 10/100Mb base-TX Ethernet port</p> <p>The gateway needs to communicate and route traffic between the different networks automatically and in real-time.</p>			
6	<p>Communication performance</p> <p>1) Narrowband network: The fully meshed wireless network should support a bandwidth of up to 200Kbps</p> <p>2) Broadband network: The fully meshed wireless network should support a bandwidth of up to 300Mbps.</p>	Essential		
7	<p>Broadcast communication: The wireless mesh protocol shall support broadcast (one command to target a group of Controllers/Nodes) and unicast (one command sent to a single Controller/Nodes).</p>	Essential		
8	<p>Integrated in a Smart City environment: The gateway must integrated seamlessly in a Smart City wireless meshed network (a dedicated city-wide network to manage urban connected devices such as meters, waste bins, parking sensors, traffic lights, pollution sensors).</p>	Vital		
9	<p>Remote management: The gateway must be controlled and managed remotely</p>	Essential		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
10	<p>Seamless installation and commissioning: The gateway must integrated seamlessly and automatically to an existing network. The gateway must communicate seamlessly and automatically with an existing gateway. The gateway should support the controllers/nodes roaming feature for redundancy and seamless installation purposes.</p>	Essential		
11	<p>Maximum number of nodes supported by the gateway: The gateway should be able to at least manage 200 nodes/controllers.</p>	Essential		
12	<p>Communication specifications:</p> <ul style="list-style-type: none"> • 256bit AES encryption for the broadband communication • 128bit AES encryption for the narrowband communication • Radio modulation: BPSK, DBPSK, QPSK, DQPSK, 16-QAM, 64-QAM, GFSK, FHSS • Full duplex communication. <p>Fully meshed wireless, self-configuration and self-healing features on the narrowband and the broadband networks</p>	Essential		
Central Management Software				
1	<p>Multi-User Web Application Server The CMS shall be based on an open Web Application Server. Its user interface shall be 100% Web-based and accessible from any computer on the network through a Microsoft</p>	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	Internet Explorer, SAFARI or Chrome web browser			
2	Enterprise server The CMS shall be installed on a server that belongs to the organization/customer or to one of our local service or IT sub-contractor. Cloud-based, SaaS model or any server that is web-hosted by a Bidder of a part of the solution is not accepted.	Vital		
3	100% Web Interface Web user interfaces shall run and be supported on Microsoft Internet Explorer, SAFARI and Chrome on WINDOWS-based PC and MAC OS.	Desirable		
4	Based on open technologies The CMS must be developed with open and standardized languages including Java, XML configuration files and SQL database. It shall enable the development of additional features without the need to acquire any development software license.	Vital		
5	Open database engine The CMS shall record all the data in a centralized SQL database and shall be compatible with MYSQL to avoid being obliged to purchase additional software license for database engine.	Vital		
6	User authentication system The CMS shall enable administrator to create, modify and delete users, passwords, groups and access controls. The CMS shall automatically close connections after X mns (configurable) of inactivity. Tiered level access and management.	Desirable		
7	Integrated CMS The CMS shall be an integrated and ready-to-use	Essential		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	<p>application that does not require any specific development before being deployed.</p> <p>The CMS should be a flexible and modular application, supporting the management of any type of Smart City services: a dedicated city-wide central management system to manage all types of urban connected devices such as meters, waste bins, parking sensors, traffic lights, pollution sensors.</p>			
8	<p>Support multiple types of Control Systems, i.e. Gateways The CMS shall manage and communicate with different types of network devices as listed in the previous sections (gateways, nodes)</p> <p>It should also support different heterogeneous Control Systems, including power line systems and wireless systems.</p>	Desirable		
9	<p>Network management The CMS should support and enable:</p> <ul style="list-style-type: none"> • The management of the narrowband networks • The management of the broadband networks • The management of the applications • The management of the networks configurations • The management of the data generated by the nodes and gateways (network data and user data) • The Monitoring and configuration of network objects • The management of the network links and provide link status, link 	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	<p>quality and link reporting</p> <ul style="list-style-type: none"> Detailed broadband network reporting: wireless transmission power, TCP/IP usage, link utilization, The management of the network as a whole, with network status and network quality <p>The CMS should provide automatically or on request, the status and the related critical events of each managed objects. Those critical events could be: wireless link quality, usage of the objects, outages, battery life-time,</p>			
10	<p>CMS shall provide a user and object management system The CMS shall provide ways to create user profiles, users and access rights to web applications as well as to groups of objects.</p> <p>The CMS shall manage the objects individually or by groups of objects.</p>	Essential		
11	<p>CMS shall log all actions The CMS shall log all the actions from all the users.</p> <p>Recording Node and device history (linking network Nodes, lamps/meters, customer accounts) and keeping track of adds, moves or changes</p>	Desirable		
12	<p>CMS shall provide map-based inventory features The CMS shall enable users to group objects per geographical zone, to move objects, to delete objects and to duplicate objects on the maps.</p> <p>The CMS should display the network topology (objects, links, status) on a map, in a tree format, and other</p>	Essential		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	graphical views to ease the management of the network			
13	<p>CMS shall support multiple types of objects, enable new attributes to be created and provide inventory import/export features. The CMS shall support Light Points, Segment Controllers, Sensors, Electrical Vehicle Charging Stations, Weather Stations, Energy Meters and other types of objects.</p> <p>It shall enable the import/export of the inventory in a the following formats:</p> <ul style="list-style-type: none"> • standardized CSV formatted file • ODBC and text export • Via the XML server • Via SQL queries into the database. 	Vital		
14	<p>Configuration of all the parameters of the Gateway and the nodes The CMS shall enable end-users to configure all the parameters of the Gateway and the nodes, including the IP communication parameters, astronomical clock, real time clock, schedulers, Gateway’s inputs/outputs and associated scenario, etc. Auto-discovery of the networks’ objects.</p>	Vital		
15	<p>Management and configuration of the services The CMS shall enable the management and configuration of the Smart City services, such as the street lighting, parking spaces, meters</p>	Essential		
16	<p>Automatic installation process The CMS shall provide end-users with processes and tools to automatically process the installation and configuration of the Nodes.</p>	Essential		
17	Gateways shall “PUSH” data to CMS	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	<p>The data logs (all data read by the Gateway on the Nodes) generated on the Gateway shall be pushed by Gateways to the CMS rather than pulled by the CMS to provide a higher scalability. The data collect process shall not require any manual operation.</p> <p>The data presented by the CMS (related to the network or the services) should be updated dynamically.</p>			
18	<p>Ready-to-use Web Reports The CMS shall provide ready-to-use web reports to analyze failures, energy consumption and lamp age. It shall provide a way to display historical values for any measured attribute of any device in the database.</p>	Desirable		
19	<p>Customized desktop of Web Reports and Applications The CMS shall manage access control depending on the user profile and provide the according list of web reports and applications on a web desktop. Each application shall display only the geographical zone, devices and data that the user is authorized to access.</p>	Essential		
20	<p>Alarm management The CMS shall enable the administrator to create complex alarm scenario based on the data collected from the Nodes through the Gateways. Such alarms aim at sending only effective alarms to the right end-user.</p> <p>The CMS shall perform and support the following alarm features:</p> <ul style="list-style-type: none"> • Receiving/capturing successful/unsuccessful readings from any node- 	Essential		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance	Remarks
	<p>connected devices, at scheduled timings/intervals or on demand;</p> <ul style="list-style-type: none"> • Reporting about alarms and status indicators, tamper/thefts, consumption / usage trends from node-connected devices • Identifying and reporting critical events from Nodes and devices (failures, memory capacity issues, communication link or network failures, power failures,) • Notify of events via <ul style="list-style-type: none"> ○ Email and distribution lists ○ SMS ○ The execution of a process <p>An alarm warning on the CMS</p>			
21	<p>Real-time control on maps The CMS shall enable authorized users to control, command and monitor each objects in real-time. It shall provide instantaneous (less than 20 seconds in average) communication (sending commands and/or receiving data) between the nodes/controllers, the gateways and the CMS.</p> <p>Multi-level network topology hierarchy and map visualization to ease the management of the network and the services,</p>	Vital		

#.	Clause	Criticality	Compliance (Non-Compliance/ Compliant on Customization / Fully Compliance)	Remarks
22	Provide web service interface for 3rd party software to leverage the CMS features The CMS shall provide with XML, API and SQL access as well as a set of web service interface to enable third party authorized software to use the CMS features.	Vital		
23	Maximum number of managed objects The CMS should be able to support and manage an unlimited number of objects.	Essential		
24	Backup server and server farms The CMS should have a backup function with a live standby server and automated failover The CMS application and the SQL database should be able to run on different servers, if needed, to manage growth. The CMS application and the SQL database should be able to run on their respective server farms, if needed, to manage growth.	Essential		

OFFICE OF THE MUNICIPAL CORPORATION, BHOPAL
ELECTRIC SECTION

SPECIAL CONDITIONS

1. The entire work shall be carried out confirming to relevant Indian standard code of practice and as directed by Engineer-in-Charge.
2. All material fitting's appliances etc. used in the installation shall confirm to relevant Indian standard specification wherever they exists. in cases where there is not Indian standard available the item shall confirmed to specification approved by Engineer-In- Charge.
3. All Electrical installation shall comply with required Indian electricity Act 1910 as amended and Indian electricity rules 1956 as amended upto date and as per rules and regulation of MP state electricity board and to the requirement of local bodies and electrical inspectorates/ Central electricity Authority.
4. The contractor executing the work will be fully responsible for arranging inspection of the above local authorities as and when required, preparation and submission of

- drawing as required, getting approval of the work and drawing etc. testing of the installation preparation and submission of test reports with signature of authorised license hold persons, on behalf of BMC No payment of charges will be reimbursed to the contractor for this work. Necessary fees to MP electrical licensing board for getting charging permission shall be paid by contractor for. inspection/ Testing charges/ Supervision Charges/ System strengthening charges shall only be paid by BMC to MP state electricity board.
5. The contractor shall make his own arrangement of water supply and electricity at site for execution of work.
 6. The contractor shall make his own arrangement of site office and store at site for execution of work.
 7. The contractor shall finalize the tenderer of work physically at site as per approved drawing and get approved by MP electricity board taking actual measurement for quantities of items before BMC.
 8. The contractor should submit the excise gate pass for the equipment / materials supplies at site.
 9. All the correspondence with other department like MP electricity board/ central electricity authority/ Mp licensing board etc. will be done by contractor only, though BMC.
 10. Payment of the running bill will be made only after rectification of defects if pointed out by any inspecting authority.
 11. The contractor will be responsible to hand over the substation/ Lines to MPMKVCL and submission of charge certificate to BMC.
 12. The date of charging of complete installation by MPMKVCL and handing over of all installation to MPMKVCL will be treated as date of completion of work.
 13. The contractor will be responsible for taking shut down etc. if required, by their own Efforts.
 14. The contractor should be responsible for any loss/ theft, if required by their own cost.
 15. All the equipments/ accessories/ materials and complete installation shall be guaranteed for the period of two year's from date of charging by MP state electricity board.
 16. The contractor shall have to furnish declaration on stamp paper worth Rs. 500/- as per Annexure for related work's.
 17. 5% cost of transformer and 2% total value of work will be kept in miscellaneous deposit till the line is taken over by MPMKVCL.
 18. Transformers/ VCBs/ CTs/ PTs and associated item will be inspected/ tested as per IS at works by BMC before dispatch. The above item will be accepted subject to the above specifying.
 19. **Guarantee against manufacturing defects for 24 months will be given in the name of MPMKVCL directly by the manufacturer Arranged by the Tenderer.(not in case of fitting)**
 20. **Guarantee/ warrantee offered by the manufacturer shall be given in the name MPMKVCL be Arranged by the Tenderer.**
 21. If it found that the contractor has quoted abnormally high rates of the item/ items as compared to the rates as estimated by the BMC, then payment of such items in running bill shall be limited to the rates as estimated by BMC and shall be released

at the time of settlement of final bill and also after the execution of necessary item for which contractor has quoted abnormally low rates as compared to the rated as estimated by BMC.

Action and compensation payable in case of Bad work

- 22.** If at any time before the security deposit is refunded to the contractor, it shall appear to the engineer-in-charge or his subordinate in charge of the work that any work has been executed with unsound, imperfect or unskillful workmanship or with material of inferior quality 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 are otherwise not in accordance with the contract, it shall be lawful for the engineer-in-charge to intimate this fact in writing to the contractor and then notwithstanding the fact that the work, materials or articles complained of may have been inadvertently passed, certified and paid for the contractor shall be bound forthwith to rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or if so required shall 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 written intimation as aforesaid, the contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for every day not exceeding ten days, during which the failure so continues and in the case of any such failure the engineer-in-charge may rectify or removed and re-execute the work or removed and replace the materials as described above may be accepted or maybe made use of at reduced rate then in such cases the engineer-in-charge shall submit detailed proposal for appropriate reduction (preferably supported by an analysis wherever possible) to and obtain this approval expeditiously and accept the same at such reduced rates as approved by the City Engineer.
- 23** Any sort of accident/fatal/Non fatal to workers or to any person. the entire full liability is on the part of contractor, BMC has not the pay any compensation in this regard.
- 24** The Contractor should submit completion drawing on tracing cloth and five additional copies of the same showing the position of Metering DP Transformer, panel, earthing stations, cable routes etc. at the time of final bill otherwise deduction of 1/2 percent of total amount of completed contract work will be made from the bill. This condition corresponds to the completion plan of actual work done and the same shall have to be submitted by the contractor after completion of work and before submission of final bill.
- 25** Rights to increase or decrease work- The competent authority reserves the right to increase or decrease work.
- 26** The competent authority reserves the right to increase or decrease any item of the work during the currency of the contract and the contractor will be bound to comply with the order of the competent authority without any claim for compensation.
- 27** Execution of agreement- The Tenderer whose tender has been accepted hereunder referred to as the contractor shall produce an appropriate solvency certificate, if so required by the executive engineer and will execute the agreement in the prescribed form within a fortnight of the date of communication of the

acceptance of his tender by competent authority failure to do so will result in the earnest money being forfeited to BMC and tender being cancelled.

28 Conditions applicable for contract- All the condition of the tender notice will be binding on the contractors in addition to the conditions of the contract in the prescribed form-

Following documents annexed with this NIT shall form a part of the contract, Document on (i) Stamp paper (ii) List of deleted clause

- 1 Action when the contractors becomes liable for levy Penalty.
- a) To rescind the contract and in which case the security deposit of the contractor shall stand forfeited and be absolutely at the disposal of BMC.
- b) To empolly labour paid in the PWD/Irrigation/PHE department or by employing departmental machinery and to supply materials to carry out work or any part of work debiting the contractor with the cost of the labour or hire charge of departmental machinery and the price of the materials and crediting him with the value of the work done in all respects in the same manner and the same rate as if had been carried out by the contractor undr the terms of this contract or the cost of the labour certificate of the divisional officer as to the value of the work done shall be final and conclusive against the contractor. this does not qualify the contractor to any refund if the work is carried out at lower rates than the rates quoted by the contractor saving if any will go to the BMC Bhopal.
- c) To measure up the work the contractor and to take such part there of as shall be unexecuted out of his hand and to give it to another contractor to complete in such case any expenses which may by incurred in excess of the sum such would have been paid to the original contractor if the whole work had been executed by him shall be borne and paid by the original or any other contract with BMC or otherwise or from his security deposit or the proceeds of sale thereof or a sufficient part thereof if the work is carried out at lowe rated the contractor shall not be entitled for any refund on the account saving, if any which shall go to the BMC

Alterations in specification and Designs

- 1 The engineer-in-charge shall have power to make any alterations in omissions from additions to substitution for the original specification drawings designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contracted shall be bound to carry out work in accordance with any instructions which may be given to him in writing signed by the engineer-in-charge and such alternations omissions additions or substitutions shall not invalidate the contract and any above specified as part of the work shall be carried out by the contractor on the same condition in all respects on such he afreed to do the main work and at the same rates as are specified in the tender for the main work.
- 2 Extension of time in consequence of alterations- The time for the completion of the work shall be extended in the proportion that the altered additional or subsitiuted work bears to the original contract work and the certificate of the engineer-in-charge shall be conclusive as to such proportion.
- 3 Quantities shown in the tender are approximate and no claim shall be enertained for quantities or work executed being either more or less than those entered in the tender or estimate.

- 29** No compensation shall be allowed for any delay caused in the starting of the work on account of acquisition of land or in the case of clearance work on account of any delay in according sanction to estimates.
- 30** The submission of tender by tenders shall imply that he has read the Tender Notice, each and every word of this tender document, has understood its contents and scope of work within the meaning of technical and legal aspects has seen the site and has made self aware of the standard and procedure to be followed in this work.
- 31** The tender notice shall mean only an invitation extended to the contractor for making offer. it does not amount to an offer or proposal.
- 32** Issue of tender documents by Bhopal Municipal Corporation, to any tenders and subsequent participation of the latter by submitting his offer on due date shall not be an entitlement for this (Tender's) right of claim for approval by the BMC even in the event of his being the lowest offers.
- 33** On contrary to the contents of the Para 2.086 instruction 4 in the M.P. works Department manual for negotiations on the basis of offers received in First call. An intimation for negotiations shall certainly mean for withdrawal of all conditions given by tenderers and reductions of their offered rates. In the event of increase of rates or addition of any condition by any tenderer in negotiations, his original offer, without conditions, shall remain valid and open for considerations by BMC for approval, in the event of such approved of original of original offer the tenders shall have no right to deny the acceptance of his original offer by BMC. the tenderer withdrawing his offer shall forfeit his earnest money to BMC.
- 34** All works shall be carried out in strict accordance to the norms, procedure and specifications issued and enforced by BIS in relevant Indian standard specifications and code of practices with up to date amendments and revisions. latest editions of National Building code and National Electric code, In additions the installation shall comply in all respects with the equipments of Indian. Electricity Act 1910 and Indian Electricity rule 1956 with up to date amendments and revisions and special requirement if any of the M.P. Madhya Kshetra Vidyut Company or chief electrical advisor to Government of Madhya Pradesh cum Chief Electrical Inspector and his subordinate office.
- 35** For certain items RATES ONLY have called for, in schedule of item, without mentioning their quantities. These items may, or not required for execution, In case, any or all these items are required to be executed under this contract, the same shall have to be executed for the quantities and on the rates to be decided as below:
- (a) Rates for any item falling under this category shall be the average, of rates tendered by all tenders for respective individual item. In case, the derived average rate is more than the tendered rate of approved tenders the lesser/lower rate shall be approved and make applicable for payment under this contract.
 - (b) Quantities of all items falling under this category shall be as per requirement and up to any extent.
- 36.** The successful tenders shall make his own arrangements for supply of water and electricity at his own expense, required for execution of work. The BMC shall neither make any such arrangements nor shall make any payments in this regard.

37. The successful tenders has to construct at his own cost his site office and store at site on a suitable place and locations as permitted by BMC shall not provide any place or room in the building under constructions for storage of equipments required for work. No amount shall be paid to the contractor in this regard.
38. Proper upkeep, maintenance, security and safety of stores and stocks of materials brought at site installed/laid at site shall be the responsibility of the contractor. The materials got damaged due to negligence for its up keeping at site or due to mishandling at the time of installation/laying. shall have to be replaced by the contractor at his own cost. On discovery of such damages the BMC shall recover the amount paid through the running bills to the contractor which shall only be reimbursed after the replacement of the same. The BMC shall also not be responsible for theft of materials from site and the contractor has to replace all such materials at his own cost, No compensations whatsoever shall be payable to the contractor on above grounds.
39. The successful tenderer shall note that during the execution of works there is likelihood of additions of such items or works which are not included in the schedule of items annexed with this tender document for which the tenderers has not tendered his rates, for such items analysis and proposed rates shall be prepared and submitted by contractor with all supporting documents which shall be scrutinized and decided by the tender accepting authority and shall be final and binding on the contractor. The quantum of such work will not more than 25% of contract amount shall depend upon the mutual agreement by the contractor and the BMC.
40. The successful tenderer shall note that during the execution of works there is likelihood in change of latenderert, specifications and change in quantities of items entered in the schedule of item for which the successful tenderer has tendered his rates. The value of increase or decrease in the quantities of such items may be up to 30 percent of the rates sanctioned to him in his original offer. The contractor shall, on the grounds of execution of such quantity, not entitled to procurement of additional quantities of such items due to such changes. the successful tenderer has to procure the said additional quantity on the same rates as already entered by him in the tender without claiming any loss for compensation.
41. Time being the essence of the contract, the successful tenderer shall before commencement of the work prepare a detail work program for successful completion of contract with in the allowed time, which shall be approved by the City Engineer charge of the work.
42. Time schedule may under unavoidable circumstances be revised by the BMC form time to time for any reasons whatsoever. it may be necessary to stop the work at certain places due to some unavoidable reasons and restart the work at a later date. Such contingencies shall not vitiate the contract and shall not be considered a ground for extra claim.
43. The successful tenderer shall not be entitled to any compensation for any loss suffered by him on account of delay in commencement of execution of work whatever the cause of delay may be including delay arising out of other materials or delay in supplying the materials to be supplied by BMC or any other reasons whatever and the BMC shall not be for liable any claim in this respected thereof.

- 44 The successful tenderer shall not, without the prior approval of the competent authority in writing sublet or assign to any other party, or parties, the whole or any portion of the work under contract. Even if such approval is granted the contractor shall not be relieved of any obligation of duty or responsibility which he undertakes under this contract.
- 45 All dues regarding taxed, including sales tax, service tax, octroi duties etc, levied by Government or Local Bodies or private individuals on the contractor, in connection with the after said work executed by the BMC will be payable by the contractor, the BMC will grant a certificate for the quantities actually used on the work, but will not entertain any claim on this account.
- 46 The successful tenderer shall finalize the latenderert of work, physically at site, and get it approved by MPMKVVC before placing orders for material. approval of above latenderert by MPMKVVC shall be general and shall not absolve the contractor with responsibility of its correctness.
- 47 The successful tenderer shall within 15 (fifteen) days from the date of issue of work order shall prepare and submit all relevant drawing and details for the work to be forwarded to the concerned office of MPMKVVC and to the office of Chief Electrical advisor to Government of Madhya Pradesh cum electrical inspector or its concerned subordinate office or any other competent office for approval. All required sanctions and approvals from the offices shall have to be obtained by the successful tenderer at his own cost and effort within the above stipulated period. the successful tenderer may however procure material at site within the context of clause 17 of these special conditions during this period.
- 48 Time allowed to carry out the work as entered in the tender notice shall be strictly observed by the contractor and shall rekoned form date issue of work order to commence the work.
- 49 Rates quoted in the schedule of items shall be firm not be subjected to any variation duo to increase in labour wages, cost of materials, etc. any other price variation whatsoever either due to cost escalation during the stipulated period of executions or during extended period of completion if any.
- 50 The decision of City Engineer for specific make of item to be supplied and installed at site from the list of approved make of materials shall be final and binding on the contractor. Before placing the orders for materials the successful tenderer shall get approval of the specific makes of every item by the City Engineer BMC.
- 51 Rate quoted shall be applicable for works at all height unless otherwise specified in the schedule of quantities.
- 52 The successful tenderer shall afford all reasonable facilities and cooperation to the various other agencies and contractors working at the site simultaneously, so that the entire work can be preceded smoothly to the successful completion.
- 53 The successful tenderer shall submit the drawings to BMC for this work duly approved by the office of the chief electrical advisor to the Government of Madhya Pradesh and its concerned subordinate office or concerned offices of MPMKVVC with in 15 days form the date of work order. The approval of theses drawing will be general and will not absolve the contractor of the responsibility of the correctness of these drawings. At least 5 sets/copies of the approved drawing shall be supplied to the City engineer BMC for its distribution to various agencies at site. at no cost.

- 54 The successful tenderer shall submit manufacturer's test report and drawings of the equipments to be supplied, for approval of the City engineer before supplying the equipment. The successful tenderer shall also submit the purchase bills of major items as required and directed at no cost.
- 55 (A) The Successful tenderer shall have to arrange all free of cost facilities for the inspection, such as employ of material labour etc. and any fees payable to Government or any competent Authority at his own cost, the successful tenderer shall arrange to obtain all sanctions from the concerned office of MPMKVVC and from the office of the Chief Electrical advisor to Govt. fo M.P. or his concerned subordinate office at his own cost Any fee in respect of above work paid by the successful tenderer shall not be reimbursed or refunded by the BMC and no claim for compensation shall be entertained in this regard.
- (B) If required by the Engineer-in-Charge or concerned office of MPMKVVC of Chief electrical advisor to Government of M.P. cum Chief Electrical inspector. the contractor has to get any equipment or complete installation checked and tested by any Government/Semi Government/Private Authority such as CPRI, BHEL, Testing department of MPMKVVC etc. at his own cost He shall also provide free of cost all labour material transport equipments etc. for the purpose of above testing. The contractor shall not be entitled for any compensation on this on this ground.
- 56 The authority competent to accept the tenders reserves to itself the right to accept any or reject all the tenders without assigning any reason.
- 57 The authority competent to accept the tender reserves the right to itself to accept the tender for whole works. or for part of work. or to distribute the work between one or more contractors without assigning any reason thereof.
- 58 The contractor shall submit analysis of rates of any or all items for which he has tendered his rates in the schedule of item. if so desired by the Engineer-in-Charge at no cost.
- 59 The tender must be accompanied by a list of similar contracts executed by the tenderer since last 3 years.
- 60 Conditional Tenders are liable to be rejected.
- 61 Tenders not properly sealed shall be rejected.
- 62 The tender will be received only from the contractor/firms of repute. possessing proper valid electric license from the office of Chief Electrical advisor to Government of MP for executions of such work.
- 63 The successful tenderer shall make his own arrangement for transport of all materials. The BMC is not bound to arrange for priority for getting wagon for transportation of any material.
- 64 Each of the tender documents is required to be signed by the person or persons submitting the tenders.
- 65 The contractor shall be responsible for removal of all defects and shall make rectification in the work at his own cost. if any, at the time of handing over the installation of MPMKVVC without any claim for compensation.
- 66 The successful tenderer shall submit the name, qualification, experience of his site staff with copies of their certificates to Engineer-in-Charge before start of work.
- 67 **It shall be the duty of the contractor.**
- a. To arrange all clearances form Chief electrical advisor to Govt. of Mp. cum chief electrical inspector or from his subordinate office.

- b. To coordinate and peruse the offices of MPMKVVC and office of the chief Electrical Advisor to Govt. of M.P. cum chief electrical inspector/Vidyut Anugyapan Mandal for periodical inspections during the currency of contract.
- c. and to arrange final inspection of the work and get the complete installation handover to MPMKVVC and get it electrically charged in presence of MPMKVVCL representative.
- d. **All the dismantled material (including poles conductor,cables DP structure transformers etc.) to be deposited in MPMKVVCL store as per MPMKVVCL return schedule and Receipt is to be produced before final payments.**

No Extra payment shall be made to the contractor in above account.

- 68 The successful tenderer at his own cost and efforts shall arrange periodical inspection of work by various officers of MPMKVVCL (Superintending engineer, Divisional engineer, Rank Office) during course of execution of work and any instructions issued by the officers of MPMKVVC shall be executed by the bidder and communicated to BMC in writing and prior permission shall be taken form BMC before its compliance.
- 69 Blasting of any type shall in any case not be permitted for excavation work. the tenderer may therefore visit the site before filling up the tender. Only chiseling in hard rock shall be allowed.
- 70 The successful tenderer, during course of execution, desires to make drill holes of required dia. and depth through drill/rig machine for erection of poles shall be permitted to do so but no payment for excavation of such drilled hole shall be made. However in lieu of above amount not being paid for drill hole he shall be exempted to provide base plate at the bottom of pole as it is not required in said case.
- 71 Before entering the rates for individual items in the annexed **schedule of items** the tenderer must make himself fully sure of its correctness. the rates. Once entered in the schedule of items, shall be deemed to be final and any condition for deviation in above rates written separately at any place in the tender document shall not be offer valid and liable to be rejected by BMC.
- 72 The complete installation shall be guaranteed for TWENTY-FOUR calendar months. The guarantee period shall be reckoned from the date of handing over the installation to MPMKVVCL The all transformers and cables shall be guaranteed for 24 calendar months from the date of handing over the installation to MPMKVVCL the contractor has to replace/repair the faulty of damaged material to the full satisfaction of MPMKVVCL authorities in the event of failure/damage of any item during the said guarantee period.
- 73 The tenderer has to ensure before filling up the rates regarding their availability and period of delivery, in the event of the materials of equipment of makes called for are available alternative make be approved under the conditions mentioned in Annexure. But it will not be a ground for claim of time extension or any other compensation whatsoever.
- 74 All the condition of the tender notice. Instructions in regard to submission of tender, schedule of items and rates accepted, these special conditions, general specifications and all other documents attached will be binding on the contractor and shall form part of the agreement to be executed by the contractor in addition to

the conditions of the contract in the prescribed printed forms. In the event of any of these special conditions being contradictory to the condition of similar effect in printed form, condition mentioned in these special condition shall be deemed to be applicable for the contract agreement for all legal and technical matters. In the event of any of these special conditions is of the similar effect to that of any condition of printed form the former shall be read in conjunction with the latter for all legal and technical aspects within the scope of this contract.



I. PRINCIPLES DECIDING FACTORS FOR SELECTION/ PROCUREMENT OF LED LIGHTS

- Minimum working hours (50000 hrs) of LEDs
- Minimum warranty shall not be less than 5 years for LED & Driver
- LED make as specified in document, and complete street light fitting can be of any manufacturer
- Additional cost towards high price of the LED light to be compensated by energy saving and zero maintenance.

III. TYPE OF LUMINAIRE

The following types of LED luminaires as replacements for conventional fittings are proposed for ULBs:

*** At nominal input voltage of 220V AC**

IV. ELECTRONIC COMPONENTS

The electronic components used shall be as follows:

- a. IC (Integrated Circuit) shall be of industrial grade.
- b. The resistors shall be preferably made of metal film of adequate rating.
- c. The conformal coating used on PCBs should be cleared and transparent and should not affect colour code of electronic components or the product code of the company.
- d. The heavy components shall be properly fixed. The solder connection should be with good finish.
- e. The infrastructure for Quality Assurance facilities as called for in the Specification shall be available for the manufacturing of this product. The compliance shall be indicated clearly in the tender itself.

V. CONSTRUCTION

- i. Extruded aluminium and pressure die cast aluminium (sand/gravity casting not to be considered). Aluminium grade LM 6063 or LM 6 as applicable or above high conductivity heat sink material. Heat sink must be made of extruded Al or pressure die cast Al only. Efforts shall be made to keep the overall outer dimensions and weight as minimum as possible.
- m. All light fittings shall be provided with toughened glass of sufficient strength under the LED chamber to protect the LED and luminaires.
- n. Suitable number of LED Lamps shall be used in the luminaires.
- o. Suitable reflector/lenses shall be provided to modify the illumination angle.
- p. The connecting wires used inside the luminaires, shall be low smoke halogen free, fire retardant e-beam/PTFE cable and fuse protection shall be provided in input side.
- q. The control gear shall be designed in such a way that the junction temperature of LED should not be more than 25 °C with respect to ambient temperature.
- r. The luminaires shall be such that the glare from individual LED is restricted and shall not cause inconvenience to the public.
- s. All the material used in the (luminaires) shall be halogen free and fire retardant conforming to UL 94.

- t. The fixture should be impact resistant with suitable protection by cover for driver and LED's.
- u. The fixture should have designed for IP65 ingress protection or above.

VI. HIGH POWER AND HIGH LUMEN EFFICIENT LEDS SUITABLE FOR FOLLOWING FEATURES SHALL BE USED:

- i. LED Chips of Cree/ Osram/ Philips/ Nichia make shall be used for the purpose. No other make shall be accepted. The manufacturer shall submit the proof of procurement of LEDs from above OMMs at the time of supply.
- j. The efficiency of the LED lamps at 110°C junction temperature shall be more than 80%
- k. LED junction temperature should not cross more than 90 °C for longevity of luminaries
- l. Solder point temp should not cross 75°C
- m. The working life of the lamp at junction temperature of 90°C for 350mA current shall be more than 50,000 hours of accumulative operation and shall be suitable for continuous operation of 24 hours per day these shall be supported with the suitable section of the LM80 report from the manufacturer of LED.
- n. Colour temperature of the proposed white colour LED shall be 5000K-6500K.
- o. The output of LED shall be more than 110 lumen (+-5%) per watt at 350mA operating current
- p. The colour rendering index (CRI) shall be of nominal 65 with cool white light output.

VII. ILLUMINATION LEVEL (Lux Measurement):

Lux measurement with the help of lux meter shall be done at distance as shown in table below. Value obtained shall not be less than the lux specified in the table there in considering 10% lumen is absorbed by the reflector.

The fitting shall be so designed that the illumination level shall be evenly distributed and shall be free from glare. Illumination level of different types of luminaires shall be as below:

1. Variation in illumination level shall be ± 2% is allowed in input voltage range from 180VAC to 250VAC.
2. The illumination shall not have infra-red and ultra-violet emission. The test certificate from the NABL approved laboratory shall be submitted.
3. Electronic efficiency shall be more than 85%.
4. **If required third party inspection on the contractor's expense by any NABL approved or government lab finalized by BMC is to be provided as per instructions of Engineer –in-charge.**

VIII. ELECTRICAL/TECHNICAL SPECIFICATIONS

Supply of LED streetlight luminaire complete with pressure die cast/extruded aluminum housing and adhering to the following specifications and lighting design requirements will be as per the actual application:

- viii. The driver card shall cut off at 270V and shall resume normal working when nominal voltage is applied again. This is to ensure protection of luminaires from neutral faults and error in connection at sites.

- ix. Efficiency of driver electronics shall be more than 85%.
- x. The LEDs should be driven at the suitable current and within the permissible limits specified by the LED chip/lamp manufacturer.
- xi. The fixture shall be designed so as to have lumen maintenance of at least 70% at the end of 50,000 hours.
- xii. The luminaire should be operable with auto adjustable 100-270V supply Voltage using the same driver.
- xiii. Power Factor of the electronic driver should be at least > 0.95 with THD < 10%.
- xiv. The luminaire should throw the perfect amount of uniform light with exactly the desired intensity, and offer best pole spacing, along with better light control. For this purpose, spacing to height ratio calculations must be attached for all installations where the poles are to be newly installed. The Luminaire shall employ individual optical lens for each of the LED to ensure better uniformity of light distribution.

IX. ABSTRACT OF KEY SPECIFICATIONS

	Electrical specifications	18W/25W/35W/45 W	60W/75 W	120W/150W/200 W
i)	Voltage range or rating: [130 volt – 270volt AC] on single phase	100-270V	100-270V	100-270V
ii)	LED Output (lumen per watt)	>115 (+5%)	>115 (+5%)	>115 (+5%)
iii)	Frequency range (+/-5)	50Hz	50Hz	50Hz
iv)	Power factor:	>/=0.95	>/= 0.95	>/= 0.95
vi)	Colour temperature	5000K-6500K	5000K-6500K	5000K-6500K
vii)	CRI (Colour Rendering Index)	>=65	>=65	>=65
viii)	LED Life Expectancy	50,000 hrs with 70% Lumens	50,000 hrs with 70% Lumens	50,000 hrs with 70% Lumens
x)	Protection level	IP65 minimum	IP65 min	IP65 minimum
Xi)	Total Harmonic Distortion (THD)	<10%	< 10%	< 10%

X. CONFORMANCE STANDARDS:

Product Certification should be obtained from UL or any other NABL certified lab. The following test reports should be provided (if asked) :

LM-79	Luminaire efficacy (Photometry data)
LM-80	LED chip data
IP 65	Luminaire Ingress Protection
Luminaire Endurance Test	Practical testing of luminaire through 20,000 cycles
EN 60929	Performance
IEC 60598-1	General requirement and tests
IEC 61000-3-2	Limits for Harmonic current emission - THD < 10%

1. The payment condition for LED fittings only :-

(For supply, installation, commissioning and CMC for Four years) with one year guarantee period (1+4) year's.

80% of the value of the LED fittings with the value of taxes and duties after satisfactory installation commissioning of the fixtures at site on street light poles will be released at the time of final payment

05 % after completion of one year of guaranty period from the date of final satisfactory commissioning installation of the fixtures fittings at site.05% after 36 months from the date of installation , next 05% after 48 months of successful installation and rest will be released after completion of CMC condition.

**City Engineer
BSCDCL**

Signature of Contractor

BID FORM (WITH PRICE)
(To be Quoted Online)
e - TenderNo.BSCDCL/Traffic & Transport/16-17

Bidders are required to fill up all blank spaces in this Bid Form

The City Engineer
Bhopal Smart City Development Corporation Limited
Zone -14, Bhopal Municipal Corporation, BHEL
Govindpura, Bhopal – 462023

SUB : Development of Polytechnic Junction to Bharatmata Square Four Lane Smart Road with External Electrification and Cycle Track Corridor at Bhopal City

Dear Sir,

Having visited the site and examined the Bid Documents, Drawings, Conditions of Contract, Specifications, Schedules, Annexures, Preamble to Price Schedules, Price Schedules etc. including Addenda/Amendments to the above, for the execution of the above Contract, we the undersigned offer to carry out as given in Conditions of Contract and in conformity with the Drawings, Conditions of Contract, Specifications, Preamble to Price Schedules, Price Schedules, Annexures, Bidding Documents, including Addenda Nos. _____(insert numbers) for _____%age (in figure) _____ (in words) below / above than the rates given in Price Schedule.

2. I / We agree that
 - a. if we fail to provide required facilities to the Employer's representative or any other person/agency by the employer to perform on his behalf for carrying out the inspection and testing of materials and workmanship or
 - b. if we incorporate into the Works, materials before they are tested and approved by the Engineer's representative or
3. We undertake, if our Bid is accepted, to complete and deliver the Works in accordance with the Contract within **15 Months including Rainy Season**, from the date of Work order issued to us by you.
4. We agree to abide by this Bid for a period of **120 days** from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiry of that period.
5. In the event of our Bid being accepted, we agree to enter into a formal Contract Agreement with you incorporating the conditions of Contract thereto annexed but until such agreement is prepared this Bid together with your written acceptance thereof shall constitute a binding Contract between us.

6. We agree, if our Bid is accepted, to furnish Performance Bond/Security in the forms and of value specified in the Conditions of Contract of a sum equivalent to 5% of the Contract price for due performance of the Contract.

7. We have independently considered the amounts of liquidated damages shown in Appendix to Bid and agree that they represent a fair estimate of the damages likely to be suffered by you in the event of the Work not being completed by us in time.

8. We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this _____ day of _____ 2016.

(Signature)

(Name of the person)

(In the capacity of)

Company Seal

(Name of firm)
Duly authorised to sign Bid for and on behalf of
(Fill in block capitals)

— _____
— _____
— _____

Witness

Signature _____
Name _____
Address _____

Note on Schedule

Name of Work: Development of Polytechnic Junction to Bharatmata Square Four Lane Smart Road with External Electrification and Cycle Track Corridor at Bhopal City

The bid is on Percentage Rate for Development of Polytechnic Junction to Bharatmata Square Four Lane Smart Road with External Electrification and Cycle Track Corridor at Bhopal City. This work largely includes Road work, External electrification, Drain cum Duct under Footpath, Culvert, Cycle Track, road marking, road painting, traffic signages and other essential special features.

The rates and prices shall be submitted online in the formats given in the enclosed Price Schedules. Rates and prices received in any other formats will be rejected and the Bids will be disqualified.

1. The bid is percentage rate bid for Development of Polytechnic Junction to Bharatmata Square Four Lane Smart Road with External Electrification and Cycle Track Corridor.
2. The rates and prices shall be submitted in the formats given in the online Price Schedules. Rates and prices received in any other formats will be rejected and the Bids will be disqualified.
3. It will be entirely at the discretion of the Employer to accept or reject the bidder's proposal, without giving any reasons whatsoever.

4. In Price Schedule, bidder shall quote his percentage equal/above/below for items listed in the schedule. Prices quoted in online Schedule only will be considered for price evaluation & shall form a part of the Contract Agreement.
5. Only Price Schedule will be considered for financial evaluation of the bid with the successful bidder.
6. The bidder shall be deemed to have allowed in his price for provision, maintenance and final removal of all temporary works of whatsoever nature required for construction including temporary bunds, diverting water, pumping, dewatering etc. for the proper execution of works. The rates shall also be deemed to include any works and setting out that may be required to be carried out for laying out of all the works involved.
7. Where there is a discrepancy between the unit rates and the amount entered, the amount entered shall govern.
8. The Price Schedules are to be read in conjunction with the Conditions of Contract, the Specifications and other sections of these bid documents and these documents are to be taken as mutually explanatory of one another.
9. Prices quoted by the bidder shall be firm for the entire period of Contract without any escalation.
10. The bidder shall interpret the data furnished and carry out any additional survey work, or investigation work required at his own cost.
11. The prices quoted shall also include the cost of materials utilized for testing.
12. The bidder should acquaint himself with the site conditions including the access to Worksite. The successful bidder shall have to make suitable access to worksites at his own cost. These accesses will be used by the other contractors working for BSCDCL.
13. This work includes all type of structural analysis and design, for which, charges will be borne by the agency.
14. The material/Items as supplied by the contractor and as found necessary by Engineer-in-charge will be inspected by third party inspection agency approved by BSCDCL and the charges of third party inspection will be deducted from the bill of the agency, which will be paid by BSCDCL to the TPI Agency. The Contractor shall replace the defective material.

Signature of Contractor

City Engineer
Bhopal Smart City Development Corporation Limited

FORMS

FORM OF CONTRACT AGREEMENT
AGREEMENT

THIS AGREEMENT made the _____ day of _____ 2016 _____
between

of _____ (h
ereinafter called "the Employer") of the one part and _____ of

(here in after called "the Contractor" of the other part.

WHEREAS the Employer is desirous that certain Works should be executed by the Contractor, _____ viz.,

and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein at a cost of Rs. _____

and _____.

NOW THIS AGREEMENT WITNESSETH as follows:

In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:

- a) The Contract Agreement;
- b) The Letter of Acceptance;
- c) The Employer's Requirements;
- d) The Bid;
- e) The Conditions of Contract - Part II;
- f) The Conditions of Contract - Part I;
- g) The Specifications;
- h) The Bid Drawings;
- i) The Schedules; and
- j) The Contractor's Proposal

In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Work and the remedying of defects therein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____ was

hereunto affixed in the presence of:

_____ or _____

Signed, sealed, and delivered by the said _____

in the presence of: _____

Binding Signature of Employer _____

Binding Signature of Contractor _____